

Monitoring and evaluation system and health service delivery in public health institutions in Juba, South Sudan

Abstract

Introduction: The recent policy changes across the world are important steps towards health system strengthening. Several countries are now embracing M&E to improve services, although it has received less attention in developing nations. The aim of the study was to analyse the effect of M&E system on health service delivery in public health institutions in Juba, South Sudan, with the objectives to examine the influence of organizational structure, M&E human capacity and data use on health service delivery.

Methodology: Descriptive cross-sectional surveys with both quantitative and qualitative approaches were applied. A total of 315 participants were sampled, 124 patients using systematic methods as they exited the facility after discharge and 191 healthcare workers using simple random sampling and purposive sampling for key informants. Data was analysed using descriptive statistics, spearman correlation and multinomial logistic regression.

Results. Emergency health services were available in facilities and the available health workers responded faster when needed. However, absence of health care workers, supplies stockout, longer waiting time and dysfunctional equipment led to inaccessibility of health services and compromised the quality. The organizational structure improves health service delivery

0.158 times less than that of the data use (p-value 0.019, OR= 0.854) and has a weak and negative association with health service delivery (Spearman $r=-0.042$, p-value = 0.003). M&E human capacity improves health service delivery 0.997 times less than that of the data use (p-value = 0.010, OR= 0.369) with strong and positive association with health service delivery ($r =0.802$, p-value 0.000). The data use had a composite mean score of 4.702 and Sdev. of 1.2554, a significant influence on health services and $r =-0.770$, p-value =0.007).

Conclusions. The organizational structure has a weak relationship with health service delivery but less than that of data use. M&E human capacity has a strong positive relationship with health service delivery. Data use has a strong negative correlation with health service delivery.

Recommendations. The organizational structure with a functional M&E unit should be set with full financial support for M & E unit. M&E should be integrated in the overall health system and appropriate M&E professionals employed. Advocate for data use to ensure demand creation for decision-making and accountability in health sector

Key words: M&E, Organizational Structure, Human Capacity for M&E, Data use, Health service delivery, Public Health Institutions, Juba, South Sudan.

Introduction

The recent policy changes across the world are important steps toward health system strengthening and reform to ensure quality of health services. This is in line with the Alma Ata declaration of 1978 for primary healthcare, the Ottawa Charter of 1986 for 'Health for All' by the year 2000 (Thompson et al., 2017), the Millennium Declaration in 2000, which also had health indicators, were declared in response to failure to achieve most indicators in 'Health for All' commitments and the Sustainable Development Goals (SDGs) with some targets to improve health service delivery to each country by 2030 (Richard et al., 2018; Allen et al., 2018, p. 421-438). Despite the above efforts, health service integration and health equity problem remain a challenge within the sector and hinders successful implementation of development programs (Sorato et al., 2020). In fact, many people could still resort to traditional medical practitioners for treatment (Malakoane et al., 2020).

Healthcare services in African Tradition

The search for healthy living has been central to the African population (Regional Committee for Africa 63, 2013). In African tradition, health means someone does not have a disease, evidenced by his/her active participation in all community activities

without any limitation. Ajima and Ubana (2018) said that the health service provision in Africa takes different dimensions compared with modern medicine. While modern medicine interprets sickness using 'germ theory', African quest for healthy lives takes spiritual and herbal dimensions (Farah et al., 2019). Spiritually, Africans believe that sickness is a result of a supernatural realm that could affect human health and the malevolent spirits are believed to cause extreme sufferings. To avoid such suffering, Africans live to appease gods, ancestors, and witches. The spiritual healing practices were through divination to diagnose diseases and evoking natural and supernatural fortunes to prevent the sickness before the use of herbal medication (Onongha, 2015). Herbal dimension is usually dealing with curative and preventive aspects of disease management to Africans (Adenowo & Kazeem, 2020). The herbal medication is to treat and prevent some cases of illnesses like measles and cholera outbreaks and such practices were based on experiences, system of taboos, customs and deep-rooted traditions (Sati et al., 2016). To date, traditional African healthcare services are delivered by different herbalists using different herbal medications while others

specialize in different fields of disease treatment such as Magical treatment including Witchcraft and sorcery (Ajima & Ubana, 2018), Traditional birth attendants (TBA) and Bone setters. All these were practiced in the Sudan and South Sudan as well (Aziato & Omenyo, 2018).

South Sudan health service delivery after the Independence 2011

The 2011 independence of South Sudan allowed the country to contextualize the health system of the Sudan and began to deliver health services to her population through three layers; hospital, Primary HealthCare Center (PHCC) and Primary Healthcare unit (PHCU), with different health services delivered at these levels (Achut et al., 2022). However, 2013 and 2016 civil wars have left over 4 million people with no accessibility to indispensable health services (Kane et al., 2018). The country has the highest maternal, neonatal and child mortalities in the region (WHO, 2017). Coupled with the displaced people and only less than 2% of her national budget is allocated to the health sector, short of the 15% Abuja declaration, with its consequences on health service delivery. The study focused on the effect of the M & E system on health services delivery. But in this research, the concept of M&E system is

approached from three-dimensions; the organizational structure, the M&E human capacity and the data use.

Problem statement

Strong health system is needed for the achievement of universal health coverage (UHC) by 2030 (Kasilo, et al., 2019). Although the developing nations are eager to achieve UHC, health service availability, accessibility, affordability and quality still sum up the African development problem, rendering population non-productive (Edlyne, 2020). Therefore, the financial protection against health costs and development of a sustainable health system is a government mandate (WHO, 2019). South Sudan devotes only less than 2% of her annual national budget to health, short of 15% Abuja declaration, although maternal, neonatal and under-five mortalities are 1225 per 100,000, 39.2 and 99.7 per 1000 live birth respectively, ranking 6th of the lowest 10 African countries with low performance against WHO health outcome indicators (Business Insider Africa 2022, world bank, 2017; Adeloje et al., 2017). If this practice continues, the country will experience more disease outbreaks, evidenced by recurrent Polio, Measles and Cholera outbreaks, with increase in mortality and morbidity and the down slope of economic recovery. More so,

clear accountability and transparency using M&E tools is needed to convince fatigued donors to continue supporting the sector. Much as health partners do support emergency health program/project, developmental government's satisfactory health service delivery remains wanting and as such, this research analysed M&E system influences on service delivery and reveals that M&E system helps to ensure accountability and transparency and hence improve health service delivery.

Objectives and Hypotheses

The purpose of the study was to analyse the effect of the M & E system on service delivery in public health institutions in Juba, South Sudan and was guided by the following objectives. I) To assess the influence of organizational structure on health service delivery in public health institutions in Juba, South Sudan. II) To establish the influence of M&E human capacity on health service delivery in public health institutions in Juba, South Sudan. III) to examine how data use influences health service delivery in public health institutions in Juba, South Sudan.

Research questions

- I. What is the influence of organizational structure on health service delivery in public health institutions in Juba, South Sudan?
- II. What is the influence of human capacity for M&E on health service delivery in public health institutions in Juba, South Sudan?
- III. How does data use influence health service delivery in public health institutions in Juba, South Sudan?

Hypotheses

H01: Organizational structure does not significantly influence health service delivery in public health institutions in Juba, South Sudan.

H02: M&E Human capacity does not significantly influence health service delivery in public health institutions in Juba, South Sudan.

H03: Data use does not significantly influence health service delivery in public health institutions in Juba, South Sudan.

Study significance

The research was anticipated to influence the strategic policy making process by offering evidence-based information to scale up the M&E system in MOH and health facilities in the country. This was also to ensure an increase in demand for budget

allocation to M&E. The study was to illustrate the use of M&E as an important managing instrument to advance the way health services are distributed. The study was expected to generate additional information in the perspective of how to use M&E components to improve health service delivery and to promote institutionalization of M&E at different health service delivery levels. The study was expected to generate evidence-based information which is later used for improvement of service to the public through empowering health workers and to improve quality of healthcare provision. The study is also expected to promote advocacy for transparency and accountability in handling health issues.

Justification

The increasing disease outbreaks in the country is an indication that MOH South Sudan needs to strengthen public health across the country. Being a donor driven sector, accountability and transparency would mean the M & E system should be strengthened. There is a need to strengthen accountability mechanisms for the health system, and build technical and institutional capacity to implement a laudable country's health policy 2016-2025. The M & E system is considered to help back the accountability mechanism with emphasis on organization

structure, M&E human capacity, and data use for best practice adaptation. To abate the ongoing and recurrent outbreaks in the country, there was need to understand the association of M&E system and health services delivery in public health institutions in Juba, South Sudan. This was to help the government to improve health services and reduce high mortality currently experienced in the country from different causes.

LITERATURE REVIEW

Theoretical review

System theory by Karl Ludwig von Bertalanffy of the 1940 and advanced by W. Ross Ashby (1964) will guide the research (Brett, & Anderson, 2016). The theory states that the system consists of components interacting symbiotically to produce results. According to this theory, service delivery is a result of interactions of components within the system (Charissa, 2013). Charissa further said that a system comprises inputs, process, output and feedback. Interactions among these components shape the quality-of-services delivered. Similarly, the health system comprises six functional units, such as healthcare delivery, medical personnel, information, medical products funding, leadership and authority and links them to the health system goals (WHO Framework for Action 2007). Understanding the

relationship between components helps to predict outcomes of an activity. When the M & E system is integrated into this health system and strengthened, feedback will be generated to improve service delivery (Sifa et al., 2022). To achieve universal health coverage, the WHO encourages all nations to embrace a monitoring and evaluation system with objectives to provide evidence-based health care services to people in a satisfactory manner. Odiambo (2020) acknowledged that organizational structure, skilled M&E human capacity and data dissemination for use can improve quality of health services to patients. The organizational structure and health systems management greater impact on outcomes. The skilled M&E human capacity is essential to handle health programs to deliver a credible result that contributes to effective service delivery despite numerous challenges in using M&E. One of the components of the health system is information which is generated from data collected, analysed and disseminated and utilized for improvement of health service delivery. The information will help the management to comprehend the state at which the health system is and will use the result of the research to ensure effective health service delivery in public health

institutions by giving feedback (Odiambo, 2020).

M&E system

Ssekamate (2018) stated that monitor is to continuously and systematically collect data on preset indicators to provide shareholders with a development intervention at hands, progress made and how funds are used. Evaluation is an intermittent assessment of a program or policy to control any significant and effective progress to achieve specific goals. This theory emphasizes that effective use of the M & E system influences effectiveness of health services delivered.

Effects of organizational structure on health service delivery

Organization structure, as defined by Gaitho et al. (2019) embraces the arrangement of duties to be performed by individuals and the structure includes the framework of leadership and shows functional relationships within an organization. Neis et al. (2017) stated that organization structure is a way of how tasks are aligned in diverse positions as well as the roles of handling a given challenges in the organization process. Mahmoudsalehi et al. (2012) defined organization structure as an official distribution of responsibilities and managerial mechanisms to govern and

assimilate actions. M&E is a new concept in most African countries including South Sudan and her health sector. Although the authors of system theories touched on leadership to improve eminence of healthcare services, they have not directly related M&E systems to health sector service delivery.

Onono (2018) carried out research on the outcome of structure of organization on work performed at General Electric Africa, with the purpose of investigating influence of structure of organization on performance. They believed that an organization's structure adapted by an organization affects the swiftness and precision of decision-making with subsequent influence on the learning. The responses from staff of General Electric Africa in Nairobi and Johannesburg to represent General Electric Africa employee population were gathered. The researcher used a descriptive statistic and targeted 290 staff in Nairobi, Lagos, Luanda and Johannesburg. They used structured questionnaires for collection and analysis used SPSS version 21. The association of organizational structure, and organizational learning with performance was analysed. The outcomes showed a strong, positive relationship of organization's structure with performance

$p < 0.000$. The regression analysis showed that 37% of the variation in performance was as a result of organization structure.

This study is related to the current one in that it examines the association between organization structure and performance. However, he employed only a quantitative method without the element of qualitative which would be suitable in his multi-country study. Since the health sector is data intensive, the main quantitative method was employed and the qualitative method adds more value in health service delivery in South Sudan.

Djamaluddin (2018) underscored the association between the organization structure, culture with teachers' performance in pesantren, Quantitative method with correlation model was used. The results showed positive association between the organizational structure and teacher performance with $r^2 = 0.683$, and organization culture and teachers' performance with $r^2 = 0.749$. Combining the two variables together showed an increase in teachers' performance $r^2 = 0.764$, contributing 58.4 % to teachers' performance. There was an important association between organization structure

and culture to teachers' performance in the Pesantren education system.

Nur and Aliza (2015) looked at organization structure and performance of accountable Malaysian Workers of healthcare services. The aim was to evaluate the organization structure and performances using the Balanced Scorecard of private health facilities in Malaysia, focused on perceptions of top managers. Structured questionnaires were used and 97 private hospitals were considered. In total, 39 replies were collected meaning the 40.2% response rate. The descriptive outcomes revealed most private health facilities that accept the Balanced Scorecard had higher chances for improving performance in the sector on key parts.

Nchorbuno et al. (2017) conducted a study on the impact of the organizational structure of Bolgatanga Polytechnic on the services rendered to students. The objectives were to assess the challenges of the organizational structure of the Polytechnic in meeting the needs of students, the satisfactory levels of students in relation to the services provided and to make recommendations to improve on services to students. The study was a descriptive survey including 114 students from Bolgatanga Polytechnic. Data was

collected using structured questionnaire, aided by face-to-face interaction with respondents. The findings showed that most of the students were dissatisfied with the organizational structure of the Polytechnic. Majority of the students strongly agreed that the organizational structure of the faculty affects the quality of services they get. There was an issue of bureaucratic procedures which hamper access to services, delays in getting results, difficulties in going through registration procedures among others. On basis of the findings, the study recommends that, authorities should take innovative steps to restructure the organization to enhance efficient delivery of services to their students and other clients. This study is similar to the current one in that they both assessed the effects of the organizational structure on service delivery, although the services were different from that of health system

Effects of M&E human capacity on delivery of health services

M&E staff in the health system are hardly enough to coordinate M&E activities for the improvement of service delivery in the country (Kabukwes et al., 2018). But only when appropriate human capacity is coordinated to manage M&E for improved health service delivery. The perception of

capacity is that investing in human resources can be measured by their contributions to the society, which requires capacities of the employee to improve performance (Basheka & Byamugisha, 2015). Human capacity can be enhanced by education, on job mentorship and training so that they increase their performance (Jose et al., 2017).

Kabukwes et al. (2018) studied factors for Effective M&E in public health institutes in Nairobi City County. They aimed to study the effect of capacity of M&E on delivery of health services. They sampled 113 health facilities using the Lot Quality Assurance Sampling method. Primary data was collected with planned questionnaires review of relevant literature for secondary data. The M&E human capacity was measured based on the experience, education level and field of the study. Both SPSS and content analysis were used and later triangulated. The results showed that human capacity for M&E explained 84.4% of change in delivery of health services (Okello et al., 2014). Both studies explain the association of M&E staff capacity with delivery of services. However, the previous study used Lot Quality Assurance Sampling that uses a small sample size at a time.

Ochieng (2018) studied the influence of M&E staff capacity on delivery of health services in Migori County public health facilities. The descriptive cross-sectional design was used, targeting sixty medical doctors, one hundred and two Nurses, forty-three M&E officers, nine social workers, sixteen public health workers and fifty-five patients. Questionnaire and an interview guide were used. Multiple regression was conducted using SPSS version 19. The results showed that technical support could improve knowledge on M&E systems, and concluded that capacity building on M&E could increase access to delivery of health services to some extent.

The current study is similar to that of Ochieng as both look at the association of M&E human capacity with delivery health services. On the other hand, the current study used multinomial regression and correlation analysis in SPSS contrary to that of Ochieng. Ochieng concentrated on human capacity, the current study in addition considered effects of organizational structure and data use.

Odhiambo (2020) studied the association of M&E systems, stakeholders' involvement, structure of organization with delivery of remedial and precautionary measures to

tuberculosis in public health institution in the County of Kisumu, Kenya, that examined the effects of M&E system, stakeholders' participation, organization structure, M&E staff capacity and delivery of remedial and prevention of tuberculosis in public health facility in County of Kisumu. The study was steered by a realism model with a description to allow for data collection and a correlation analysis was used for testing the hypothesis. He used stratified sampling and with sample size of 221 from 517 population of health personnel and patients. Both closed and open-ended structured questionnaires with 5 points Likert scale. Numerical data was analysed using univariate analysis and tabulated as frequency, means and standard deviation. Content analysis was used for qualitative data and presented in narrative form. Linear regression was used with a significant level of 0.05 and determined the relationships among variables. The Cronbach Alpha of 0.6 and above was considered reliable. The results showed that 60.3% was attributed to the combined M&E system including human capacity.

There is similarity in these studies as both addressed the effect of the M & E system and health service delivery. However, Cronbach Alpha 0.6 was considered a data

collection tool to be reliable. The current study considered 0.7 and above as reliable and stakeholder participation and delivery of tuberculosis treatment services was not included. The current study only considered organizational structure, human capacity and data use.

Oryem et al. (2021) studied the influence of human capacity for M&E on the performance of M&E systems of national non-governmental organization in Juba, South Sudan. The study was conducted on a sample of 60 respondents from NGOs in Juba, South Sudan. Both qualitative and quantitative data was collected and analysed. A regression analysis indicated insignificant relationship between human capacity for M&E and the performance of M&E system with coefficient of 0.030 and p value of 0.873 level of significance. The study concluded that organizations should constantly do capacity building to their project staff through trainings, seminars or workshops so as to have a clear understanding of different approaches and the tools used in monitoring and evaluation. This study is similar to the current one in that they both looked at effects of human capacity for M&E on performance

Murei et al. (2017) researched the impact of M&E staff capacity on performance of agriculture projects in NAKURU County, with the aim of establishing the degree of impact of M&E staff capacity. Results show that staff capacity had a substantial effect on performance of agriculture projects. Capable M&E professionals need to be recruited and build monitoring and evaluation capacity is significant.

The study is comparable to the present study in that both are focusing on the effects of staff capacity and service provision and tools used to analysed the data are similar. However, Murei and his colleagues analysed their data and calculated the mean in data collected using Likert scale. It was not clear how he interpreted the meaning of strongly disagree and strongly agree. The current study concentrated on health sector and tend to exclude mean in the Likert scale data analysis

Data use and health service delivery

Health outcome indicators are key for health service improvement especially when there is data dissemination and use and routine data collection on health indicators is therefore critical in the health sector (Kabukwes et al., 2018). According to WHO (2019), many nations globally have

established M&E systems to gain insight into the factors affecting people's health and the effective health interventions, with the intention of capturing evidence on health service delivery and helping in decision-making. The need for monitoring and evaluation is aggravated by the demand to be accountable in the health system and emphasis on report requirements as a result of the millennium and Sustainable Development Goals (Rendell et al., 2020).

Jose et al. (2017) studied the impact of accumulated patient-reported outcome data on healthcare enhancement. The study aimed at comprehending how commenting on reports from patients' data could improve patient care. The method used was the realist synthesis, by identifying program concepts that underpin patient-reported result procedures as a strategy to improve quality and expressed them as nine 'if then' suggestions. The global indication was identified to test these suggestions through examination of electronic databases as well as tracking citation. They later compared tools and the effect of patient reported result trials and other performance statistics on improved quality in diverse situations. The program models identified included; support of patients' choice, improvement to be accountable and allowing workers to narrate

their recital with others. The results showed patients and/or their representatives hardly used any available performance facts to select providers. The perception of impetus for public reports is a significant determining factor for response.

Similarity of this study to the current study is that both aim at achieving improvement in health service delivery through data use. But different in that it concentrated on the data collected from patients and used the program theories as the unit of analysis while the current study looked at how data dissemination and use can improve HSD and the unit of analysis was health service providers at different levels as well as monitoring and evaluation personnel in facilities and MOH.

Lazzerini et al. (2019) carried out research on application of a person's potential record in a hospital birth and how it improves health care quality in Sri Lanka. The aim was to pilot a potential record of deliveries in hospitals in Colombo, Sri Lanka, and explore the use to develop commendations to improve quality of healthcare. Observation was employed in Maternity Hospital, in Sri Lanka. The data were collected for a period of two years starting from July 2015 through June 2017. Data

analysis was done every 8 months. The record showed 7504 deliveries were without any challenges. Data completeness was better than the existing hospital recording systems. Therefore, the new information gathering system generated a huge amount of consistent data that helps to discuss health facility performance, finding loopholes and improve quality of healthcare delivery

This study is similar to the current one as both aim at improving health care services to the population but it concentrated on the prospective birth database only and it was a pilot to test the new system of data collection. However, the current study concentrated on influence of organizational structure, M&E staff capacity and dissemination and utilization of data on health service delivery

A study conducted by Nutley and Reynolds (2013) on refining health data use for health system strengthening showed that decent quality and appropriate facts from HMIS are the basis of the entire healthcare system. The need for the study was that oftentimes, data remain in reports, on tables or in databases without adequate utilization to develop policies and programs, their improvement, tactical planning and advocacy. The objectives of the study were; to define a path

on how exact actions and involvements can reinforce utilization of health data for making decisions. A logic concept was developed to deliver a real-world approach to develop, monitor and evaluate projects for solidifying data use to make decisions. The logic model and guidance are offered for facilitating general usage and to allow better-quality data for informed decision-making. The logic model offered precise and complete control to improve data request and use and at the end improved health services.

These studies are similar in that both suggest that data dissemination and use could improve health service delivery to the population. However, the study concentrated more on the use of data and indirectly emphasized on the enhancement of services which the current study focused on.

Nicole et al., (2020) studied influences of data use on improving provision of health service in underdeveloped nations. They systematically reviewed the factors influencing indicators of health service delivery use for improving services of primary healthcare in developing nations. The researchers used literature from diverse sources. It was found that only 12 studies

were considered, which was too small a sample size for drawing conclusions.

Their conclusion was that there was no sufficient indication to explain factors influencing the use of the indicators for improving primary health service delivery in developing countries. Although some highlighted findings showed other factors that could have an influence in improving data use.

Enticott et al. (2021) conducted a study on the effects of learning health system using data to drive healthcare improvement and impacts. The Learning Health System (LHS) is a new practice of using data translation from, data to new knowledge, knowledge to practice and hence, improves health service delivery. In their study, they use systematic review to demonstrate that LHS across multiple continents and settings can generate measurable healthcare improvement. A systematic search of both academic and grey literature, included publications that used qualitative, quantitative, mixed and case study methodologies, and cross-sectional, cohort, experimental and observational designs were considered in multiple continents. study designs and outcomes, narrative synthesis methods were used.

With the flood gates of health data now open, there are clear opportunities to turn practice into data, data into new knowledge and knowledge into improved practice. Key findings show that benchmarking and individual patient tracking longitudinally with outcomes readily available to patients, clinicians and health services at the point of care. Benefits included better patient self-management, improved clinician care, and optimized clinical service, organisation. This study is similar to the current one in that both seek to understand effects of data use to improve health service delivery, although the context was quite different.

Bryne and Ivar (2022) conducted a study on the routine use of District Health Information System two (DHIS2). The aim of the study was to review the documentation on how exactly DHIS2 data is routinely being used for decision-making and subsequent programming of action. The five-stage approach of Arksey and O'Malley progressed by Levac et al. and Peters was followed. Three databases (PubMed, Web of Science and Embase) were searched, along with relevant conference proceedings and postgraduate theses. In total, over 500 documents were reviewed and data from 19 documents were extracted and analyzed. Overall, DHIS2 data are being used but

there are few detailed descriptions of this usage in peer reviewed or grey literature. We find that, commonly, there exists a centralized versus decentralized pattern of use in terms of access to data and the reporting of data 'up' in the system. We also find that the different conceptualizations of data use and how data use is conceptualized are not made explicit. This could explain why decision-making does not favor health service delivery. The limitation of the review is that the study could not explore some of the data were not being used.

Health service delivery

This refers to continuous provision of medical, surgical and nursing treatments to the public to ensure physical and mental well-being of individuals (WHO, 2019). Globally, the provision of health service delivery, funded by the individual government, was championed by the World Health Organization (WHO, 2020). To achieve sustainable development Goals 3 and 6, strengthening service delivery is vital. It requires projects to address maternal, neonatal and child mortalities and the problem of HIV/AIDS, TB and Malaria. It is believed that increase in resources should result in improvement of service delivery and enhanced access to services. In this study, terms availability, accessibility and

quality will be considered (Geoffrey et al., 2017). Availability in this case denotes the services reaching people and meeting a minimum standard. Accessibility of the services refers to available services that are received by end users with no or minimal financial implication. Quality refers to minimal standards the services must meet to satisfy the users. For effective delivery of health services, result chains need to be well structured to allow quality data collection and use to inform policy, project and program implementation. This therefore, needs a monitoring and evaluation system so that the desired outputs in health services, resources required and data collection methods are well coordinated. Monitoring and evaluation are relevant to health service management and has been undertaken in many countries due to its usefulness in the health sector. Geoffrey et al., (2017), also stated that adequate resources for service delivery are paramount in making the services available, accessibility and quality of service

Literature review summary

As seen in the empirical literature reviewed, health service delivery is a continuous provision of medical, surgical and nursing treatments to the public to ensure physical and mental well-being of individuals. For

effective delivery of health services, result chains need to be well structured to allow quality data collection and use to inform policy, project and program implementation. When there are no clear objectives, accountability and transparency for any project, service delivery to beneficiaries tends to be inadequate. Adequate resources for service delivery are paramount in making quality services available and accessible. M&E has been undertaken in many countries due to its usefulness in the health sector. Organizational structure adopted in an organization determines accessibility and availability of services to beneficiaries. Majority of some projects in health sectors are successful due to organizational structure adopted. Even in sectors other than health, structure of organization has robust association with performance, meaning the type of structure adapted by an organization affects decision making with subsequent influence on service improvement. In the literature reviewed, the authors explained well the different types of organizational structures and their influences on service delivery. No attempt has been made to understand how the presence of M&E units, the types and amount of support given to it can influence

health service delivery and this is a gap we find imperative to dive deeper into.

M&E human capacity can variably influence service delivery to the population. The effects of human empowerment increase access to services. As M&E human capacity has a substantial effect on a project as explicitly explained in the literature, the experiences and the continuous training of the M&E staff and their subsequent influence on service delivery remains a gap and requires study.

To incorporate lessons learnt from an activity, data should be used by relevant stakeholders. In the health sector which is data intensive, dissemination of data alone without ensuring its use will have a negligible benefit to the population. This is because use of collected data from health facilities can enhance evidence-based decision-making, planning, advocacy, policy development for better service delivery. In the literature reviewed, the influence of data dissemination is well documented but less emphasis has been put on use of the data to improve health service delivery, for which this study will address.

METHODOLOGY

This was a descriptive cross-sectional survey and both quantitative and qualitative

approaches were used. It allows collection of study variables at a single point across the sampled population, allowed collection of both quantitative and qualitative data, assesses many variables with no need for follow up and most suitable for public health data collection and both outcome and exposure in the study participants is determined simultaneously. Qualitative approach was employed to explore and understand the problem and to gather participants' understandings, insights, and behaviour. It answers the 'how' and why instead of how many or how much (Moser A & Korstjens, 2017). Quantitative approach to collect and analysed numerical data. It was used to find out how the data was in terms of averages, make predictions, test contributory effects of the M & E system on health service delivery. The study conducted in selected public health institutions in Juba. Juba has 9 government health facilities; 3 hospitals and 6 PHCCs.

The unit of analysis comprised all staff who were on duty in M&E departments in both public health facilities and MOH, during data collection. Patients receiving services were also interacted with at the facilities to understand their opinions on accessibility, availability and quality of health service delivery.

Sampling health facilities and size determination

This was purposive for public hospitals since they were few in number and for The target population was 215 in addition to 136 patients who provided information about perceptions of delivery of health services in terms of availability, accessibility and quality. Therefore, the total target

Sample size determination

Group of population	Total Number	Sample size	Method of sampling
Doctors	21	19	Simple random
Clinical officer	46	40	Simple random
Midwife	44	40	Simple random
Nurse	65	56	Simple random
Data clerk	39	36	Purposive
Patient	136	124	Systematic random
Total	351	315	

The table 1 shows the sampling methods used

Data collection methods

The method applied during the data collection included interviews for collecting data from key informants, during which 7 key informants were purposely selected, two from each hospital and 1 from the ministry of health. The 7 key informants were considered sufficient for this study as increasing the number more than 7 for this size of study could not generate any more significant new information (Muellmann et

selection of key informants in MOH and health facilities. Systematic sampling for patients and simple random sampling for health personnel.

population was 351. Using the Krejcie and Morgan (1970), the sample size was approximated to be 315, distributed among different cadres and patients as seen in the table 1 below

at., 2021). They are coded as KIHW1 up to KIHW7. Document reviewing for using monitoring and evaluation checklist to confirm if the facilities conform to the items in the checklist and questionnaires were administered to participants especially for those who had little time to answer the questions in the questionnaires at the time when questionnaires were being distributed.

Tool for data collection

Self-administered questionnaires with closed-ended questions and semi-structure questions were given to staff working in the M & E unit and health care workers.

Interview guide for key informant interview in the ministry of health and health facilities. Open-ended questions were considered in this regard. It was selected to guide interviewers on questions to ask and remain focused (Crawford and Bryce, 2013).

Document review checklist

The checklists for M&E utilization in relation to health service delivery were used.

It contained a list of items that acted as evidence of M&E being used effectively in the health system.

The co-efficiencies of the Cronbach's Alpha for health service delivery in public health institutions, organizational structure, M&E human capacity and data use are ranging

Data Quality Control

from 0.67 to 0.86, meaning that all are considered reliable. Details on the 15 items for health service delivery in public health institutions are presented in the table below.

TABLE 2: RELIABILITY COEFFICIENT FOR ITEMS IN PATIENTS' QUESTIONNAIRES

N = 15	Cronbach's Alpha if Item Deleted
Doctors/clinicians/nurses are always present during their working hours	.920
It takes less than 1 hour to get services in health facility	.790
Prescribed drugs are always available in the facility pharmacy	.640
Most services are always readily available for emergency conditions in health facility	.711
The facility has functional equipment for most emergencies	.657
Staff in the health facility respond faster to patients when needed.	.508
The waiting time to see a clinician/doctor is always appropriate	.604
Patients always return home without seeing a doctor in this health facility	.740
The drugs are either free or subsidized price from health facilities	.914
Doctors deliver services at the time they promise	.855
Health workers allow patients to talk about the medical treatment.	.757
Clinicians/ doctors/Nurses usually give privacy when examining patients and keep patients' information confidential.	.663

I am always treated with respect and dignity by health personnel while in the health facility	.609
Clinicians do involve me in decision making on my sickness	.873
Dr/clinicians usually explain to me alternative drugs and their side effects	.723

The 15 items in the table are all reliable as their co-efficiencies fall within the expected range (05-1), although Staff in health facilities respond faster to patients when needed is in the lower limit. All were considered and then used.

Validity; The data collection tools were verified by the researcher and approved the measured concept being under study. Research assistants got trained to allow them to understand the contents of the tools, sampling and its administration.

Data analysis and presentation; The data was checked for completeness, coded and used SPSS to analyse. The univariate analysis was used to summarize the data in terms of frequencies, means, mode, median and standard deviation. The association of organizational structure, M&E staff capacity and data use and health service delivery was evaluated using spearman correlation and multinomial logistic regression. The analysis of the qualitative data was by content in which themes were generated and coding was done based on the themes and category. The data is presented in tables as absolute figures, percentages and narrative form.

Limitations of the study; The anticipated insecurity in some parts of the state was avoided by limiting the study area only within the four counties in Juba. The study is only generalizable within the four counties in Juba as the study was only conducted in the public health institutions within Juba.

Ethical consideration; Institutional consent was given by Research and Ethics Committee of Uganda management institute and the South Sudan national ministry of health permitted

the study to proceed. Also, access to participants was permitted by facility administrators. Names of participants were omitted by coding all questionnaires. Confidentiality was ensured by restricting access to the data by unauthorized person. All participants were voluntarily recruited and consented before participation

Results

The questionnaires return rate

This describes the total number of questionnaires compared with the questionnaires answered and returned to the researcher and is presented in table 3 below.

TABLE 3: QUESTIONNAIRE RETURN RATE

Data collection	Number of questionnaires issued out	Number of Questionnaires returned N (%)
Interview with key informants	7	7 (100)
Self-administered questionnaires for M&E staff and medical personnel	180	180 (100)
Self-administered questionnaires for patients	124	124 (100)
Document review checklist	4	4 (100)
Total	315	315 (100)

The data was collected in a period of one month. The total questionnaires issued were 315. The researcher ensured that all the 315 questionnaires answered were returned by replacing those who had not returned theirs. This made a return rate of 100%

Socio-demographic characteristics of the respondents.

The respondents here include health personnel, data clerks and M&E officers. Patient participants are considered in table as for their demographic characteristics.

TABLE. 4: THE RESPONDENTS (HEALTH CARE WORKERS AND M&E/DATA CLERKS)

Category	Frequency (N)	Percentage (%)
Age		
18-29	47	24.6
30-39	62	32.5
40-49	51	26.7

50-59	23	12.0
60+	8	4.2
Total	191	100.0
Gender		
Male	94	49.2
Female	97	50.8
Total	191	100.0
Cadre of participant		
Data clerk	31	16.2
M&E officer	5	2.6
Nurse	56	29.3
Clinical officer	40	20.9
Medical officer	19	9.9
Midwife	40	20.9
Total	191	100.0
Education level		
Primary	2	1.0
Secondary	39	20.4
Tertiary	150	78.5
Total	191	100.0
Experience in department		
Less than 1 year	31	16.2
1<3 years	57	29.8
3<5 years	33	17.3

5+ years	70	36.6
Total	191	100.0

In this table, patient participants were not put as their educational background, cadres as well as experiences were not applicable to them. Their information is found in table 9 below.

Age group; The table for the demographic characteristics indicates that the majority of the participants aged between 30-39 years accounting for over 32.50%, followed by 40-49 years (26.7%) and 18-29 (24.6%). The younger staff can develop their careers in the field of M&E through any M&E training opportunities to embrace M&E practice and they apply the knowledge to improve health service delivery in public health institutions in Juba South Sudan.

Cadres; Pertaining to cadres, more nurses 56 (29.3%) were interviewed followed by clinical officers 40 (20.9%) and midwives 40 (20.9%). The study was also able to identify 5 M&E officers among the participants who were based in the ministry of health. The M&E officers are those who studied M&E as a profession. Although they are fewer in number, they have the technical ability to integrate M & E into the health

service delivery for improvement of services and ensure accountability and transparency.

Education level; Majority of the participants attained tertiary level followed by secondary education. However, others were trained either as data clerks or M&E personnel while others got on the job mentorship. The level of education attained is somewhat one of the elements needed for performance

Experiences; Majority of the respondents (36%) had 5 years of work experience in the health sector. This was followed by those with experience less than 3 years (29%). The result indicates that the participants had technical expertise to integrate M&E into the health services, with the aim of improving the system. Although majority had experience in different units.

Socio-demographic characteristics of the respondents (Patients)

These are the patients who were interviewed to give their views on the status of the health services delivered in public health institutions in Juba South Sudan. The views were analyzed to understand the actual health service delivery in the facilities

TABLE 5: AGE OF PATIENT PARTICIPANTS

Age of patients	Frequency	Percent
18-29 Years	38	30.6
30-39 Years	32	25.8
40-49 Years	38	30.6
50-59 Years	10	8.1
60+ Years	6	4.8
Total	124	100.0

Table 5 shows age of the patients who were able to give information about the health service delivery in public health institutions in Juba South Sudan. As seen in the table, the majority were in the age group of 18-29 years (30.6%) and also 40-49 years (30.6%). The young participants had higher expectations on the availability, accessibility and quality of health service delivery in

Influence of monitoring and evaluation system on health service delivery

This describes the influences of the components considered in this study on health service delivery in public health institutions. These include organizational structure, human capacity for M & E data use.

Influence of organizational structure on health service delivery.

The study assessed

public health institutions in Juba, South Sudan. Therefore, they could under rate the services. Similarly, older people have had experiences in the kind of services they have been having and they tend to over rate the services. But their information can be used as a guiding document to pre-empt the status of health service delivery in public health institution

how the organizational structure could influence health service delivery in public health institutions. To achieve this, the respondents were given sets of statements to which they responded; Very strongly disagree to very strongly agree. Scale of 1-6 was used where 1 = very strongly disagree (VSD), 2 = strongly disagree (SD), 3 = Disagree (D), 4 = agree (A), 5 = strongly agree (SA), 6 = very strongly agree (VSA). The results are presented in the table below.

TABLE 6: HEALTH WORKERS' RESPONSES TO ORGANIZATIONAL STRUCTURE ON HEALTH SERVICE

Statement	Response						mean	Std deviation
	VSD N (%)	SD N (%)	D N (%)	A N (%)	SA N (%)	VSA N (%)		
Organizational structure and health service delivery								
Centralized system in an organization confined HDS to close residents	97 (50.8)	41 (21.5)	6 (3.1)	28 (14.7)	5 (2.6)	14 (7.3)	2.19	1.585
Flexibility of the institution allows hard work and improves health service delivery	3 (1.6)	2 (1.0)	1 (0.5)	55 (28.8)	48 (25.1)	82 (42.0)	5.04	1.043
Institution decentralized system leads to an effective decision making and work allocation to ensure improved health service delivery	15 (7.9)	19 (9.9)	10 (5.2)	29 (15.2)	38 (19.9)	80 (41.9)	4.55	1.656
M&E unit plays a key role to improve health service delivery	6 (3.1)	4 (2.1)	7 (3.7)	47 (24.6)	84 (44.0)	43 (22.5)	4.72	1.112
The budget allocation to M&E improves health service delivery activities.	29 (15.2)	12 (6.3)	24 (12.6)	27 (14.1)	58 (30.4)	41 (21.5)	2.99	1.714
Composite mean and standard deviation							3.898	1.422

Organizational structure

Organization structure embraces the arrangement of individual duties to perform and shows frameworks of leadership and functional relationship within an organization. This framework is considered to improve service delivery in an organization.

Out of 191 of the participants who responded to the question of whether the centralized system in an organization could confine health service delivery to close residents, 97 (50.8%) very strongly

disagreed, 41 (21.5%) strongly disagreed and 6 (3.1%) disagreed. The statement mean score is 2.19 and standard deviation of 1.585 which is less than that of the composite mean of 3.895 and standard deviation of 1.422. This indicates that a centralized system in an organization does not necessarily confine health service delivery to close residents.

Out of 191 of the participants who responded to the question of flexibility, 82 (42.0%) very strongly agreed, 48 (25.1%) strongly agreed and 55 (28.8%) agreed with

the statement that flexibility of the institution allows hard work and improves health service delivery. The statement's mean score is 5.05 and standard deviation of 1.043, which is greater than the composite mean score of 3.898 and standard deviation of 1.442. This means that flexibility of an institution influences an organization to improve health service delivery.

In response to the statement that institution decentralized system leads to an effective decision making and work allocation to ensure improved health service delivery, 118 (61.8%) generally agreed to the statement while 74 (38.2%) generally disagreed with statement's mean score of 4.55 and standard deviation of 1.656 which is greater than the composite mean of 3.898 and standard deviation of 1.442. This implies that the institutional decentralized system leads to an effective decision making and work allocation to ensure improved health service delivery influences health service delivery in public health institutions.

Therefore, management should embark on a decentralized system that allows devolution of power and health services delivery to the population.

On the statement that M&E units play a key role to improve health service delivery,

84(44%) strongly agreed and 47(24.6%) agreed while 43 (22.5%) very strongly agreed to the statement. The mean score for this statement is 4.72 and standard deviation of 1.112 which is greater than the composite mean score of 3.898 and standard deviation of 1.442. This indicates that it has an influence on health service delivery. Therefore, a stronger M&E system across the health sector improves health service delivery in public health institutions. This was echoed by other participants who had this to say.

When asked if the amount of budget allocated to M&E could improve health service delivery activities, the response skewed towards the agreement. Out of 191 participants who responded, 65 (34.0%) disagreed, while 126 (66.0%) generally agreed to the statement. The statement's mean score of 2.99 with standard deviation of 1.714 which is less than that of composite mean score of 3.898 and standard deviation of 1.442, implies that the percentage of budget allocated to M&E unit does not influence health service delivery because it has been so small and not released on a regular basis. Therefore, if budget allocation is increased and released on time, M&E units will plan for activities that can improve

health service delivery in public health institutions.

The organizational structure with a functional M&E unit can improve health service delivery to the consumers and this was echoed by one of the participants who stated that the organizational structure was under the directorate of planning headed by the director general. M&E had 3 staff and their main activities were to collect and analysed data, coordinate with other sections and mobilize resources.

When we interacted with the participants on the organizational structure, these are what they had to day;

...We have an M & E unit in the ministry of health but we are not feeling any effect of its work in the sector. They usually tell us to send the data but no feedback is officially discussed with us in the facility. In the facility here, we have only statisticians who usually send data to the ministry of health (KIHWS6).

M&E acts as a bridge in all sections of the hospital. It is headed by an M & E officer based in the MOH, who oversees collection and analysis of data to be used for making

informed decisions. We also have data clerk who also manage data here in the facility level (KIHWS1)

“There is no support given specifically to the M & E department to facilitate its activities. The staff only get their pay and sometimes they attend refresher training once in a while. There is no budget allocation to M&E.” (KIHWS3)

In the M&E document for budget allocation reviewed, the budget allocation was 0.5% and it was irregular. This means that presence of an organization structure indicated in the organogram, which included the M & E unit, is rendered non-functional and its in-effectiveness would not contribute to improvement of health service delivery to the population due to lack of financial support.

Test for the hypothesis I.

Friedman test was used to test this hypothesis

The null hypothesis H_0 . Organizational structure does not significantly influence health service delivery in public health institutions in Juba, South Sudan.

Table 7: Test Statistic^a

Chi-Square	176.109
Df	1
Asymp. Sig.	.000

a. Friedman test

The Friedman test was used to test this hypothesis. The result shows that $X^2(1) = 176.109$, p-value was .000 which is <0.05 level of significance. Therefore, the null hypothesis was rejected

Influence of M&E human capacity on health service delivery in public health institutions

The study assessed how human capacity for M&E could influence health service

delivery in public health institutions. To achieve this, the respondents were given sets of statements to which they responded; Very strongly disagree to very strongly agree. Scale of 1-6 was used where 1 = very strongly disagree (VSD), 2 = strongly disagree (SD), 3 = Disagree (D), 4 = agree (A), 5 = strongly agree (SA), 6 = very strongly agree (VSA). The results are presented in the table below.

TABLE8: HEALTH WORKERS' RESPONSE TO M&E HUMAN CAPACITY ON HEALTH SERVICE DELIVERY

Statement	Response						Mean	Std. Deviation
	VSD	SD	D	A	SA	VSA		
Human capacity for M&E and health service delivery (ME)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)		
There is adequate M&E staff to monitor and evaluate health service delivery in the department	20 (10.5)	7 (3.7)	21 (11.0)	33 (17.3)	49 (25.7)	61 (31.9)	4.40	1.609
M&E capacity building improves provision of Health care services	28 (14.7)	4 (2.1)	12 (6.3)	27 (14.1)	63 (33.0)	57 (29.8)	4.381	1.691
The institutional staff has technical ability to integrate M&E in to health service delivery	31 (16.2)	5 (2.6)	6 (3.1)	22 (11.5)	37 (19.4)	90 (47.1)	4.57	1.837
Trained M&E staff are able to contribute to improved health	35 (18.3)	35 (18.3)	19 (9.9)	28 (14.7)	28 (14.7)	46 (24.1)	3.61	1.860

service delivery.									
M&E staff have experience in data collection and analysis of health facility data to improve health service delivery	9 (4.7)	0 (0)	23 (12.0)	30 (15.7)	49 (25.7)	80 (41)	4.83	1.339	
Composite mean and standard deviation							4.3582	1.6672	

Influence of M&E human capacity on health service delivery

When looking at the influence of M&E on health service delivery, participants were asked multiple questions and the response seems to agree with the statement with few expressed negative responses.

Out of 191 participants who responded on whether there was adequate M&E staff for health service delivery in the department to monitor and evaluate health service delivery, 61(31.9%) very strongly agreed, 49 (25.5) strongly agreed, 33 (17.3%) agreed. The statement mean score is 4.40 and standard deviation of 1.609 which is greater than the composite mean score of 4.3582 and standard deviation of 1.6672. The finding shows there is adequate M&E staff for health service delivery in the department to monitor and evaluate health services, and this influences health service delivery. The government needs to continue employing staff to manage M&E units for the improvement of health service delivery in public health institutions.

Regarding the M&E capacity building to improve provision of Health care services, 63 (33.0%) of the participants strongly agreed ,57 (29.8%) very strongly agreed and 27 (14.1%) agreed. Also, 28 (14.7%), 4 (2.1%) and 12 (6.3%) very strong disagreed, strongly disagreed and disagreed respectively. The overall response is that 147 (77%) agreed while 44 (23%) disagreed, with a mean score of 4.371 and standard deviation of 1.691 which is greater than the composite mean score of 4.3582 and standard deviation of 1.6672. The finding implies that M&E capacity building improves provision of health care services and influences health service delivery in public health institutions. In fact, most of the respondents agreed that there is no regular training being conducted to M&E officers although capacity building ensures that M&E staff have updated knowledge on M&E management.

When asked whether the institutional staff has technical ability to integrate M&E in to health service delivery 90 (47.1%) very strongly agreed, 37 (19.4%) strongly agreed,

and 22 (11.5%) agreed, while 31 (16.2%), 5 (2.6%) and 6 (3.1%) very strongly disagreed, strongly disagreed and disagreed respectively with the statement. The mean score is 4.57 and standard deviation of 1.837 which is greater than the composite mean score of 4.3582 and standard deviation of 1.6672, implying that the institutional staff can integrate M & E into health service delivery and this will improve on health service delivery.

For the statement that trained M&E staff are able to contribute to improved health service delivery, 46 (24.1%) very strongly agreed, 28 (14.7%) each strongly agreed and agreed to the statement. While 35 (18.3%) each for very strongly disagreed and strongly agreed and 19(9.9%) disagreed. The statement mean score is 3.61 and standard deviation of 1.860 which is less than the composite mean score of 4.3582 and standard deviation of 1.6672. This implies that training alone does not influence on health service delivery

In response to whether 'M&E staff had experience in collection and analysis of health facility data to improve health service delivery, the majority 80(41%) very strongly agreed, 49 (25.7%) strongly agreed and 30 (15.7%) agreed. Generally, 159 (83.2%) and 32 (16.8%) agreed and disagreed

respectively. The statement mean score is 4.83 and standard deviation of 1.339, which is greater than the composite mean score of 4.3562 and standard deviation of 1.6672. This implies that the experience in data collection and analysis of health facility data will help in evidence-based decision making to improve health service delivery. This were supported by one of the participants who had this to say

M&E is very important in any organization. It tells the organization where it has come from and where it is going. The data it collects and analyses can be used to make appropriate and effective decisions to improve health service delivery. However, no regular training being offered to M&E staff. Sometimes the training is conducted by Centre for disease control and prevention (CDC) at the state and national levels (KIH2)

However, another participant had this to say about M&E staff and health service delivery. "The staff we have is not enough. They are three and poorly equipped to perform their duties effectively. Although the data they collect and analysed helps in making informed decisions which helps in improving health service delivery." KIH4

This shows that the contribution of M&E staff to the improvement of health services are recognized by all staff of the health facilities. However, lack of regular capacity building in terms of training has not attracted much attention of the management which is one of the action points to consider in future.

Human resources for health documents reviewed in the ministry and health facilities, very few had M&E qualification. And less than 50% got trained in M&E tools and their uses. Although they have

experience, the majority were trained on jobs and this affected them technically in integrating the M&E into the health system and hence substantially affected health service delivery in public health institutions.

Test the hypothesis II

Friedman test was used to test this hypothesis

Null hypothesis (Ho); M&E Human capacity does not significantly influence health service delivery in public health institutions in Juba, South Sudan.

Table 9: Test Statistic^a

N	315
Chi-Square	38.700
Df	1
Asymp. Sig.	.002

A. Friedman Test

The result shows that $X^2(1) = 38.700$, p-value was .002 which is <0.05 level of significance. Therefore, the null hypothesis was rejected.

Influence of data use on health service delivery in public health institutions

The study assessed how the data use could influence health service delivery in public health institutions. To achieve this, the

respondents were given sets of statements to which they responded; Very strongly disagree to very strongly agree. Scale of 1-6 was used where 1 = very strongly disagree (VSD), 2 = strongly disagree (SD), 3 = Disagree (D), 4 = agree (A), 5 = strongly agree (SA), 6 = very strongly agree (VSA). The results are presented in the table below

TABLE 10: INFLUENCE OF DATA USE ON HEALTH SERVICE DELIVERY IN PUBLIC HEALTH INSTITUTIONS

Statement	Response						Mean	Std deviation
	VSD N (%)	SD N (%)	D N (%)	A N (%)	SA N (%)	VSA N (%)		
The institution has developed a data collection system to improve health service delivery.	14 (7.3)	17 (8.9)	13 (6.8)	41 (21.6)	27 (14.1)	79 (41.4)	4.50	1.625
The institution is concerned that unreliable data collection tools lead to poor health service delivery.	1 (0.5)	2 (1.0)	15 (7.9)	37 (19.4)	95 (49.7)	41 (21.5)	4.81	0.932
Data accuracy for institution decision-making improves health service delivery.	6 (3.1)	1 (0.5)	10 (5.2)	26 (13.6)	68 (35.6)	80 (41.9)	5.04	1.149
Health facility data are usually disseminated for use to improve health service delivery.	5 (2.6)	2 (1.0)	15 (7.9)	54 (28.3)	64 (33.5)	51 (26.7)	4.69	1.135
Our data are always retrieved and utilized for planning and to inform decision making on provision of health services.	12 (6.3)	8 (4.2)	18 (9.4)	51 (26.7)	44 (23.0)	58 (30.4)	4.47	1.436
Composite mean and standard deviation							4.702	1.2554

4.3.8 Data dissemination and use

Health sector is a data intensive sector with outcome indicators which are key for health service improvement. Routine data collection on health indicators, dissemination and use is therefore critical in the health sector.

For the statement that the institution has developed a data collection system to improve health service delivery; the majority of the participants 79(41.4%) very strongly agreed, 27 (14.1%) strongly agreed and 41 (21.6%) agreed. Generally, 147

(77%) of the participants agreed to the statement while 44 (23%) disagreed, with mean score of 4.50 and standard deviation of 1.625 which is less than the composite mean score of 4.702 and standard deviation of 1.2553. This finding means developing a data collection system alone does not improve health service delivery in public health institutions.

In response to the institution's concerns about unreliable data collection tools that could lead to poor health service delivery, 41 (21.5%) very strongly agreed, 95(49.7%) strongly agreed and 37 (19.4 %) agreed to

the statement. While 18(9.4%) disagreed, with a statement mean score of 4.81 and standard deviation of 0.932 which is greater than the composite mean score of 4.702 and standard deviation of 1.2533. The result indicates unreliable data collection tools lead to poor health service delivery.

For data accuracy for institution decision-making to improve health service delivery, 80 (41.9%) very strongly agreed, 68 (35.6%) strongly agreed and 26 (13.6%) agreed. In general, 172 (90.1%) agreed to the statement with a mean score of 5.04 and standard deviation of 1.149 which is greater than the composite mean score of 4.702 and standard deviation of 1.2533. The result shows that data accuracy for institution decision-making improves health service delivery in public health institutions.

For health facility data dissemination for use to improve health service delivery, 51 (26.7%), 64 (33.5%) and 54 (28.3%) very strongly agreed, strongly agreed and agreed respectively with the statement. Overall, 169 (88.5%) agreed to the statement with a mean score of 4.69 and standard deviation of 1.135 which is less than the composite mean score of 4.702 and 1.2533. This again shows that the health facility data are not usually disseminated for use to improve health

service delivery and this will have no significant influence on health service delivery in public health institutions. Since the data in the public health institutions are seldom used for improving health service delivery, decision making is not always evidence-based.

Out of 191 of the participants who responded on data utilization for planning, 51 (26.7%) agreed, 44 (23.0%) strongly agreed and 58 (30.4%) very strongly agreed. Generally, a total of 153 (80.1%) agreed while 38 (19.9%) disagreed with the statement, with mean score of 4.47 and standard deviation of 1.436 which is less than the composite mean score of 4.702 and standard deviation of 1.2533. This implies that the data are not always retrieved and utilized for planning and to inform decision making on provision of health services. This was supported by two participants who had these to say.....

The data dissemination method includes Email, meetings but the data are not always used. They are only looked at when important donors are coming to visit the hospital just because we want them to see how we are performing. Just because there is no budget allocation to M&E work in the hospital. Since the data is not being utilized,

it negatively affects the organization's performance negatively. Making informed decisions becomes a problem because available data analysed are not taken into consideration when making decisions (KIH7).

...In most cases the data are not considered when making decisions due to fund shortages. When data is shared, it enables people to see their performances, know what needs to be done and how to improve delivery of healthcare services to the communities (KIH5).

Document review (M&E work plan and M&E unit performance reports)

TABLE 11: TEST STATISTIC^A

N	315
Chi-Square	40.727
Df	1
Asymp. Sig.	.004

A. Friedman Test

The Friedman test was used to test this hypothesis. The result shows that $X^2(1) = 40.727$, p-value was .004, which is <0.05 level of significance. Therefore, the null hypothesis was rejected

The Ministry had an M & E dissemination plan in place, mode of dissemination and data utilization plan. There was also very clear information in M&E reports especially on the under allocation of budget to M&E and the ministry of health at large but the shrinking of the budget allocation is an indication that data use needed to be put in practice.

Hypothesis testing III

The null hypothesis (Ho).

Data use does not significantly influence health service delivery in public health institutions in Juba, South Sudan.

Health service delivery in public health institutions in Juba, South Sudan

Basically, health service delivery is essential and is a step towards achieving universal health coverage. Although healthcare workers gave their views on the status of health service delivery in public health

institutions, it was important to assess the status of health services from the perspective of patients to verify the information given by the healthcare workers. The indicators assessed were health service availability, health service accessibility and quality. To achieve this, a 6 points Likert scale was used in order to eliminate the option of neutral response and allow the respondents to

consider the questions more carefully. The response ranged from Very strongly disagree to very strongly agree. 1 = very strongly disagree (VSD), 2 = strongly disagree (SD), 3 = Disagree (D), 4 = agree (A), 5 = strongly agree (SA), 6 very strongly agree (VSA). The results are presented in the table below

TABLE 12: RESPONSE OF PATIENT PARTICIPANTS ON HEALTH SERVICE DELIVERY

Statement	VSD N (%)	SD N (%)	D N (%)	A N (%)	SA N (%)	VSA N (%)	Mean	Std dev.
Availability of health service								
Health workers are always present during their working hours	25 (20.2)	23 (18.5)	27 (21.8)	18 (14.5)	25 (20.2)	6 (4.8)	3.10	1.55
It takes less than 1 hour to get services in health facility	27 (21.8)	44 (35.5)	37 (28.8)	8 (6.5)	6 (4.8)	2 (1.6)	2.42	1.14
Prescribed drugs are always available in the facility pharmacy	18 (14.5)	8 (6.5)	80 (64.5)	6 (4.8)	8 (6.5)	4 (3.2)	2.68	0.76
Most services are always readily available for emergency conditions in health facility	2 (1.6)	17 (13.7)	10 (8.1)	43 (34.7)	50 (40.3)	2 (1.6)	4.17	0.90
The facility's functional equipment improves health service delivery	25 (20.2)	30 (24.2)	28 (22.6)	30 (24.2)	24 (19.4)	15 (12.1)	3.15	0.75
Accessibility of service								
Staff in health facility respond faster to patients' conditions	2 (1.6)	2 (1.6)	54 (43.5)	30 (24.2)	11 (8.9)	25 (20.2)	3.69	.868
The waiting time to see a clinician/doctor is always appropriate	2 (1.6)	31 (25)	45 (36.3)	28 (22.6)	12 (9.7)	6 (4.8)	2.86	.667
Patients always return home without seeing a doctor in this health facility	16 (12.9)	10 (8.1)	20 (16.1)	33 (26.6)	20 (16.1)	2 (1.6)	2.90	.961

Patient has no financial barrier to access drugs	18 (14.5)	4 (4.8)	50 (40.3)	23 (18.5)	2 (1.6)	2 (1.6)	3.11	1.098
Doctors deliver services on time	2 (1.6)	56 (45.2)	31 (45)	10 (8.1)	25 (20.2)	2 (1.6)	3.48	.869
Quality of service								
Health workers discuss treatment options with patients.	10 (8.1)	23 (18.5)	25 (20.2)	62 (50)	2 (1.6)	2 (1.6)	3.50	.738
Patients are usually given privacy during examination.	2 (1.6)	8 (6.5)	13 (10.5)	72 (59.1)	25 (20.2)	4 (3.2)	4.05	.805
I am always treated with respect and dignity in health facility	21 (16.9)	26 (21)	38 (30.6)	21 (16.9)	12 (9.7)	6 (4.8)	3.85	.977
Clinicians do involve me in decision making on my sickness	2 (1.6)	35 (28.2)	38 (30.6)	39 (31.5)	6 (4.8)	4 (3.2)	3.48	.801
Clinicians explain to me alternative drugs and their side effects	21 (16.9)	19 (15.3)	31 (25)	35 (28.2)	12 (9.7)	6 (4.8)	3.45	1.039
Composite mean and standard deviation							3.326	0.928

Health service availability

For the service availability participants were asked if health workers were always present during their working hours. Out of 124 of the participants who responded, 25 (20.2%) of them very strongly disagreed, 23 (18.5%) strongly disagreed and 27 (21.8%) disagreed with the statement, while 18 (14.5%), 25 (20.2%) and 6 (4.8%) agreed, strongly agreed and very strongly agreed respectively. In general, about 65.5% of the participants did not agree to the statement. The statement scored mean of 3.10 with standard deviation of 1.55 which is less than

the composite mean score of 3.326 and standard deviation of 0.928 indicating that health workers are not always present during their working hours.

For the time taken to get services in the health facility, participants were asked if it would take less than one hour to get service in the health facility. Out of 124 participants, 27(21.8%), 44(35.5%), and 38 (28.8%) very strongly disagreed, strongly disagreed and disagreed respectively. This means that the majority of the participants disagreed with the statement. The statement

mean score of 2.42 and standard deviation of 1.14 is less than the composite mean score of 3.326 and standard deviation of 0.928, implying that it takes more than 1 hour to get services in the health facility. Patients will always get dissatisfied with the quality of services offered by health professionals if the waiting time is longer than expected

Out of 124 participants, the majority 80 (64%) of them disagreed with the statement that prescribed drugs are always available in the facility pharmacy in general. The statement standard deviation is 2.68 and standard deviation of 0.76 which is well below the composite mean of 3.236 and standard deviation of 0.928, implies that the prescribed drugs are not always available in the facility pharmacy. Patients are always asked to buy from outside health facilities

Out of 124 participants who responded to the question that most services are always readily available for emergency conditions in a health facility, 43 (34.7%) and 50 (40.3%) agreed and strongly agreed to the statement. The statement score mean is 4.17 with standard deviation of 0.90 which is greater than the composite mean score of 3.236 and standard deviation of 0.928. This implies that the availability of most services for emergency conditions in health facilities

influence health service delivery in public health institutions. Therefore, lack of availability of services in facilities may lead to lack of achievement of health care goals in the country and hence, universal health coverage.

On the statement that the facility's functional equipment improves health service delivery, majority of the participants did not agree with the statement. Out of 124 participants, 25 (20.2%) very strongly disagreed, 30(24.2) strongly disagreed, and 28 (22.2%) disagreed. While 30 (24.2%), 24 (19.4%) and 15 (12.1%) agreed, strongly agreed and very strongly agreed respectively. The statement mean score is 3.15 and standard deviation of 0.75 which is below the composite mean of 3.326 and standard deviation of 0.928. This implies that the functionality of equipment is one of the driving forces to improvement of health service delivery in public health institutions.

Health service accessibility

Pertaining to faster response to patients' conditions by the Staff in the health facility, 66(53.3%) of the participants generally agreed to the statement while 58 (36.7%) generally disagreed. The statement mean score is 3.69 and standard deviation of 0.868

which is above composite mean of 3.326 and standard deviation of 0.928 and this means that when Staff in a health facility respond faster to patients' conditions, significantly influences health service delivery in public health institutions will improve. Therefore, having a health system which is responsive will improve the lives of beneficiaries.

Regarding the waiting time to see a clinician/doctor, majority of the participants 45 (36.3%) disagreed, 31(25%) strongly disagreed. In general, more than 76(61%) did not agree with the statement. As the waiting time was somewhat longer than expected and some participants may end up not getting the services. The statement mean is 2.86 with standard deviation of 0.667, which is below the composite mean of 3.326 and standard deviation of 0.928. This shows that the statement claiming that the patients waiting time to see a clinician/doctor is always appropriate is not true. Instead, patients do wait for a longer period of time before accessing clinician.

Regarding the statement that patients are always returning home without seeing a doctor in this health facility, the majority 66 (53.3%) did not agree with the statement while 58 (46.7%) generally agreed with the

statement. The statement mean score is 2.90 with standard deviation of 0.961 and is well below the composite mean of 3.326 and standard deviation of 0.928. This finding implies that patients always have access to see clinician/doctors before returning home, although few might not get the chance to see a doctor.

On financial barriers to access drugs, 50 (43.3%) disagreed that patients did not have barriers, 18 (14.5%) very strongly disagreed and 4 (3.2%) strongly disagreed. This result shows that over 72 (61.0%) generally disagreed with the statement. The statement mean score is 3.11 and standard deviation of 1.098 which is less than the composite mean score of 3.326 and standard deviation of 0.928, implying that the patients do have financial barrier to access drugs Therefore, reduction or removal of healthcare cost will improve accessibility of health services and hence, improves health service delivery in public health institutions.

When asked whether doctors deliver services on time, 87(70.2%) in total disagreed with the statement that doctors deliver services on time while 37 (29.8%) generally agreed with the statement. This means that doctors did not deliver services on time and this will affect health service

delivery. The statement mean score is 3.48 and standard deviation of 0.869 which implies that timely delivery of services influences health service delivery in terms of accessibility.

Quality of health services

In the statement that health workers discuss treatment options with patients, 66 (53.2%) generally agreed to the statement while 58(46.8%) disagreed, with mean score of 3.5 and standard deviation of 0.738. which is well above the composite mean score of 3.326 and standard deviation of 0.928 and it implies that discussing treatment options with patients has influence on health service quality. It is therefore important that treatment of patients should involve holistic discussion with the patient and caretaker. This will help in building trust in the services being offered.

In general, out of 124 participants who responded to the statement that patients are usually given privacy during examination, 101 (81.5%) of them agreed with the statement while 23 (18.5%) disagreed. The statement mean score is 4.05 and standard deviation of 0.805 which is greater than the composite mean score of 3.326 and standard deviation of 0.928. This implies that the statement giving privacy during

examinations influences quality of health services and improves health service delivery in public health institutions.

In the statement that patients are always treated with respect and dignity in health facilities, 85 (68.5%) disagreed while 39 (31.5%) agreed. This means that the majority of the patients admitted that they were not being treated with respect and dignity when they visited health facilities. The statement mean score is 3.85 with standard deviation of 0.977, which is greater than the composite mean score of 3.326 and standard deviation of 0.928. This implies that treating patients with respect and dignity has influence on quality of health service and hence, improves health service delivery in public health institutions.

In response to the statement that Clinicians do involve patients in decision making of their sickness, 75(60.5%) generally disagreed while 35 (38.5%) generally agreed with the statement. The statement's score mean is 3.48 and standard deviation of 0.801 which is greater than the composite mean score of 3.326 and standard deviation of 0.928. This indicates that involving patients in decision making on patient management significantly improves quality and hence,

health service delivery in public health institutions.

When asked if Clinicians were able to explain other alternative drugs and their side effects to patients, 71 (57.3%) disagreed while 53 (42.7%) agreed to the statement, with mean score of 3.45 and standard deviation of 1.039, which is greater than the composite score mean of 3.326 and standard deviation of 0.928. This means that explaining alternative drugs and their side effects to patients builds trust in the services. Health care workers need to embrace a

holistic approach when offering services in public health institutions and we need to encourage the principle of empathy in the management.

Inferential Statistics (Non-parametric method)

The data was subjected to a normality test to see if the data was normally distributed or not and this was to guide on the selection of the approach for analysis, either parametric or non-parametric. The data was entered into SPSS and run to generate the normality test result as seen in the tables below.

TABLE 13: TESTS OF NORMALITY

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Name of the health facility	.207	215	.000	.888	215	.000
OS	.123	215	.000	.945	215	.000
ME	.127	215	.000	.970	215	.000
DU	.079	215	.002	.975	215	.001
HSD	.171	215	.000	.935	215	.000

a. Lilliefors Significance Correction

TABLE 14: TESTS OF NORMALITY

Kolmogorov-Smirnov ^a	Shapiro-Wilk
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	Statistic	Df	Sig.	Statistic	Df	Sig.
Log_OS	.177	215	.000	.829	215	.000
Log_ME	.187	215	.000	.863	215	.000
Log_DU	.133	215	.000	.911	215	.000
Log_HSD	.173	215	.000	.933	215	.000

a. Lilliefors Significance Correction.

Using the Kolmogorov-Smirnov in both tables above, the findings revealed significant tests p-value 0.000, meaning that the data are not normally distributed. Since the data is not normally distributed in the normality test in the above tables even after logging, it is therefore pertinent to use a

non-parametric approach of analysis (multinomial logistic regression). Multinomial logistic regression was used since a test of parallel lines indicated that the rule of proportional odds was violated (p-value = 0.05).

TABLE 15: CORRELATION ANALYSIS BETWEEN THE INDEPENDENT AND DEPENDENT VARIABLES

Correlations			OS	ME	DU	HSD
Spearman's rho	OS	Correlation Coefficient	1.000	.071	.165*	-.042
		Sig. (2-tailed)	.	.331	.023	.003
		N	191	191	191	191
	ME	Correlation Coefficient	.071	1.000	.553**	.802
		Sig. (2-tailed)	.331	.	.000	.000
		N	191	191	191	191
	DU	Correlation Coefficient	.165*	.553**	1.000	-.770
		Sig. (2-tailed)	.023	.000	.	.007
		N	191	191	191	191
	HSD	Correlation Coefficient	-.042	-.802	-.770	1.000
		Sig. (2-tailed)	.003	.000	.007	.
		N	191	191	191	191

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

As seen in the table 19, for the influence of organizational structure on health services

delivery, the finding shows that there is a weak and negative correlation between

organizational structure and health service delivery which was statistically significant ($r = -0.042$, p -value 0.003). Similar trend is observed in association between data use and health service delivery, which was

statistically significant ($r = -0.770$, p -value 0.007). However, human capacity for M&E shows a strong and statistically significant positive association with health service delivery ($r = 0.802$, p -value 0.000).

TABLE 16: MODEL FITTING INFORMATION

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	Df	Sig.
Null	661.367			
Final	586.127	75.240	24	.000

The Model fitting information table shows that the model fits the data well, with the p -value 0.000 and Chi-square is 75.240. This

means that the model with the variables (Final) is a better predictor than the model without the variables (Null).

TABLE 17: THE GOODNESS OF FIT

Goodness-of-Fit			
	Chi-Square	Df	Sig.
Pearson	703.458	728	.737
Deviance	473.288	728	1.000

The goodness of fit table shows both Pearson and deviance not statistically significant with both p -values greater than

0.05. Thus, indicate that the model has a good fit for the data.

TABLE 18: PSEUDO R-SQUARED

Pseudo R-Square	
Cox and Snell	.326

Nagelkerke	.330
McFadden	.090

The pseudo-R-square result generated above with Nagelkerke value is 0.330 and it indicates that 33.0% of the change in dependent variable is accounted for by the independent variables. In other words, 33.0% of the change in health services is attributed to the independent variables in

question. The Nagelkerke value is less than 50%, meaning that the independent variables selected organizational structure, human capacity for M&E and data use, are not adequately impacting on the health service delivery. Therefore, more independent variable needs to be added

TABLE19: THE LIKELIHOOD RATIO TEST

Likelihood Ratio Tests		Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig.
OS	592.753	6.626	8	.050
ME	603.278	17.151	8	.029
DU	601.734	15.607	8	.048

The result shows that monitoring and evaluation of human capacity, organizational structure and data use are statistically significant (OS p-value = 0.050,

ME p-value= 0.029, DU p-value=0.048,) are having significant impact on health service delivery in public health institutions.

TABLE20: PARAMETER ESTIMATES

HSD ^a	B	Std. Error	Wald	Df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)		
							Lower Bound	Upper Bound	
3.13333333333333	OS	-.158	.692	.052	1	.019	.854	.220	3.313
	ME	-.997	.794	1.574	1	.010	.369	.078	1.751

	DU	.988	.823	1.441	1	.023	2.687	.535	13.488
3.266666666666667	OS	-.038	.529	.005	1	.142	.962	.341	2.713
	ME	-.657	.590	1.238	1	.000	.518	.163	1.649
	DU	.879	.603	2.129	1	.045	2.409	.739	7.850
3.333333333333333	OS	-.021	.632	.001	1	.974	.979	.284	3.380
	ME	.358	.653	.300	1	.004	1.430	.398	5.140
	DU	-.295	.660	.199	1	.006	.745	.204	2.718
3.4	OS	.462	.500	.855	1	.055	1.588	.596	4.231
	ME	-.439	.559	.616	1	.002	.645	.216	1.928
	DU	.318	.572	.308	1	.009	1.374	.447	4.218
3.466666666666667	OS	.028	.583	.002	1	.061	1.029	.328	3.224
	ME	-.280	.644	.189	1	.001	.756	.214	2.671
	DU	.335	.656	.261	1	.000	1.398	.387	5.056
3.533333333333333	OS	-.037	.580	.004	1	.949	.963	.309	3.006
	ME	-1.951	.690	8.002	1	.005	.142	.037	.549
	DU	1.854	.722	6.599	1	.010	6.388	1.552	26.294
3.6	OS	-.187	.530	.125	1	.024	.829	.294	2.342
	ME	-.602	.585	1.061	1	.003	.548	.174	1.723
	DU	.976	.594	2.694	1	.001	2.653	.828	8.505
3.666666666666667	OS	.395	.518	.582	1	.045	1.485	.538	4.102
	ME	-.867	.593	2.136	1	.044	.420	.131	1.344
	DU	.683	.612	1.245	1	.005	1.979	.596	6.567

a. The reference category is 3.7.

Influence of organizational structure on health service delivery in public health institutions

In the table above, the data use (DU) was considered as a reference category. The result shows that organizational structure improves health service delivery 0.158 times less than that of data use and this was statistically significant (p-value 0.019). The odd ratio shows that the odds of being in a

higher level on health service delivery changes by a factor of 0.854 for every one unit increase in organizational structure and the change decreases as the unit of organizational structure increases.

Influence of human capacity for M&E on health service delivery in public health institutions

For human capacity for M&E, the result shows that monitoring and evaluation of human capacity improves health service delivery 0.997 times less than that of data use and was statistically significant with p-value of 0.010. Odd ratio shows that the

odds of being in a higher level on health service delivery increases by a factor of 0.369 for every one unit increase in human capacity for M&E and the change decreases as unit of monitoring and evaluation increases.

TABLE 21: THE RATE OF PREDICTION OF HEALTH SERVICE DELIVERY IN THE MODEL

Observed	Predicted									Percent Correct
	3.13	3.27	3.33	3.4	3.47	3.53	3.6	3.67	3.73	
3.13	0	0	0	4	0	0	3	0	0	.0%
3.27	0	0	0	14	0	3	13	0	0	.0%
3.33	0	0	1	7	0	0	5	0	0	7.7%
3.4	0	0	0	28	0	0	10	0	0	73.7%
3.47	0	0	0	8	0	1	7	0	0	.0%
3.5	0	0	0	5	0	4	6	0	0	26.7%
3.6	0	0	1	15	0	1	18	0	0	51.4%
3.67	0	0	0	14	0	0	12	0	0	.0%
3.73	0	0	1	5	0	0	5	0	0	.0%
Overall Percentage	.0%	.0%	1.6%	52.4%	.0%	4.7%	41.4%	.0%	.0%	26.7%

Table 21 shows the rate of prediction in the model of health service delivery. The organization structure correctly predicted health service delivery at the rate of 73.7 %, M&E human capacity predicted correctly health service delivery at the rate of 0% and data use was predicted at the rate of 51.4%. The overall prediction rate was only 26.7%. This implies that the predictive variables were not good as it is less than 50%.

Summary

This describes a brief outline of the study focusing on the significant findings to give an overview of the study content. The study focused on examining the influence of M & E system on health service delivery in public health institutions in Juba, South Sudan.

The fact that M & E system was not fully embraced by the sector, the study reveals that as one of the components of M & E system, the organizational structure had influences on health service delivery in

public health institutions. The indicators considered included institutional flexibility, support with M&E unit and its roles and decentralized system. For M&E human capacity, the indicators studied included adequacy of M&E staff to monitor and evaluate health service delivery, capacity building and training of M&E staff, technical ability to integrate monitoring and evaluation into health service delivery and experiences of the staff and all these contributed significantly to improved health service delivery in public health institutions in South Sudan. Since the health sector is data intensive, the study of the effects of data use on the health service delivery was significant. The indicators considered included a data collection system for health service delivery, reliable data collection tools, and data accuracy. All these had effects on health service delivery positively. This is in line with the study conducted by Odhiambo (2020) in which he found that 60.3% was attributed to the combined M&E system. However, the health sector still needs to do a lot to improve the status of health service delivery in public health institutions in Juba, South Sudan. From the perspective of patients, health services were available to some extent although health workers are not always readily available for

consultation when needed. and the financial, as well as geographical barriers affected access to health services. The results of the study indicates that fewer clinicians on the ground increased the waiting time to see doctors or services. Patient's-clinician ratios were quite high and the logistics and supply chain to prevent stockouts was not sustainable and embracing the principle of respectful care at all times when in the health facilities was paramount. The finding also reveals that services provided were somewhat good with the help of quality improvement structure in the health facility to ensure that quality monitoring and evaluation are conducted regularly.

Effects of oorganizational structure on health service delivery in public health institutions in Juba South Sudan

The study's assumption was that monitoring and evaluation system components such as organizational structure plays a significant role in the improvement of health service in public health institutions. For instance, the flexibility of an institution allows staff to work hard and in turn improves health service delivery. The organizational structure had a component mean score of 3.898 and standard deviation of 1.422

indicating that organizational structure has influence on monitoring and evaluation system and thus, contributes to improved health service delivery in public health institutions in Juba, South Sudan.

Influence of M&E human capacity and health service delivery in public health institutions in Juba South Sudan

The study on human capacity for M&E had a composite mean score of 4.3582 and standard deviation of 1.6672, which implies that monitoring and evaluation of human capacity had a significant influence on health service delivery in public health institutions. The result shows p-value 0.010, less than 0.05 level of significance. And the odd ratio reveals that the odds of being in a higher level on health service delivery increases by a factor of 0.669 for every one unit increase in human capacity for M&E and the change decreases as unit of monitoring and evaluation increases. The indicators studied under this monitoring and evaluation human capacity included adequacy of M&E staff to monitor and evaluate health service delivery, capacity building and training of M&E staff, technical ability to integrate monitoring and evaluation into health service delivery and experiences of the staff and all these were assumed to influence health service delivery

Effects of data use on health service delivery in public health institutions in Juba South Sudan

The effects of data use were assessed and found to have a composite mean score of 4.702 and standard deviation of 1.2554, which meant that data use had a significant influence on health service delivery in public health institutions. Also, the correlation analysis shows that the p-value =0.007 which is less than 0.05 level of significance shows that data use is associated with improved health service delivery in public health institutions. The indicators considered under this included data collection system for health service delivery, reliable data collection tools, data accuracy for the institution decision making, data dissemination to relevant authorities and data retrieval and use by the institution for planning and to inform decision making on provision of health services. The finding is similar to the study conducted by Bryne and Ivar (2022) on the routine use of District Health Information System two (DHIS2) in which he found that although the data were not being used routinely, it had significantly influenced service delivery.

Discussion of the study findings

Influence of monitoring and evaluation system on health service delivery

Influence of organizational structure on health service delivery in public health institutions in Juba South Sudan

The study indicates that organizational structure had a component mean score of 3.898 and standard deviation of 1.422 more than the composite mean. This means that organizational structure has influence on monitoring and evaluation systems and thus, contributes to improved health services. Other indicators included, decentralized system for effective decision making and the roles of monitoring and evaluation units in improving health service delivery in public health institutions. The correlation analysis shows that organizational structure has a statistically significant, weak and negative relationship with health service delivery (Spearman $r=-0.042$, $p\text{-value} = 0.003$). This finding is similar to that of Onono, (2018), who studied the outcome of structures of organization on work performed and found that organization structure with functional M&E unit improved health service delivery by a factor. Miharti et al., (2021) studied the influence of organization design and local context also found that efficiency of work

improved significantly following a proper organization design.

Influence of human capacity for M&E on health service delivery in public health institutions

The indicators studied under M&E human capacity included adequacy of M&E staff to monitor and evaluate health service delivery, capacity building and training of M&E staff, technical ability to integrate monitoring and evaluation into health service delivery and experiences of the staff and all these were assumed to influence health service delivery. Human capacity for M&E had a composite mean score of 4.3582 and standard deviation of 1.6672, which implies that monitoring and evaluation of human capacity had a significant influence on health service delivery in public health institutions. The result shows $p\text{-value} 0.010$, less than 0.05 level of significance. And the odd ratio reveals that the odds of being in a higher level on health service delivery increases by a factor of 0.669 for every one unit increase in human capacity for M&E and the change decreases as unit of monitoring and evaluation increases. This was similar to findings by Olouch, (2020) who found that M&E staff capacity contributed to improvement in the treatment of TB patients. In general, most participants had

the view that trained and skilled M&E staff significantly contribute to improvement of health service delivery in public health institutions in Juba. This is in agreement with a study conducted by Okello et al., (2014), when they found out that Monitoring and evaluation human capacity explained over 84.4% of variation in health service provision.

Influence of data use on health service delivery in public health institutions

The influence of data use on health service delivery was determined. The indicators considered included data collection system for health service delivery, reliable data collection tools, data accuracy for the institution decision making, data dissemination to relevant authorities and data retrieval and use by the institution for planning and to inform decision making on provision of health services. The data use had a composite mean score of 4.702 and standard deviation of 1.2554, indicating that the majority of the participants acknowledged that data use has impact on health service delivery in public health institutions. Also, the correlation analysis shows that the p-value =0.007 which is less than 0.05 level of significance. This was in agreement to the study conducted by Nicole et al., (2020), who found out some factors

would impact data use for improvement of health service delivery in developing nations, although the sample size was too small to draw reliable conclusions. Lazzerini et al., (2019) carried out research on application of a person's potential record in a hospital birth and how it improves health care quality in Sri Lanka. The result revealed that 7504 deliveries were conducted without any challenge. This indicates that data use significantly improves health service delivery in public health institutions.

Conclusion

Health system organization is a complex one and its management requires strong leadership and directive to put health service delivery among the top priorities.

Organizational structure

Organizational structure has a significantly weak and negative relationship with health service delivery in public health institutions in Juba South Sudan. The nature of this health system requires leadership to manage, supervise and coordinate staff and all health programmes. Much as people reported that organizational structure improves health services, majority on the ground do not realize the impact in terms of tangible

outcome. This is due to lack of support reported by some participants.

Human capacity for M&E

The study shows that human capacity for monitoring and evaluation has a significant influence on health service delivery in public health institutions as it encourages accountability and transparency. The positive influence of M&E human capacity on health service delivery is fading as a result of lack of appropriate workforce in the unit to carry out monitoring and evaluation activities in public health institutions in Juba South Sudan, to improve health service delivery.

Data use

There was a strong and statistically negative association between data use and health service delivery in public health institutions. Additionally, data use allows informed decision-making especially to policy makers and that will help them to make healthy policies that benefit the entire population.

Despite the growing evidence provided by different scholars on the significance of data use in influencing health service delivery in public health intuitions, this has not been seen using the same Lense and has not been prioritized in South Sudan public health institutions. Data dissemination is a way of

ensuring that appropriate authorities get the information gathered for use and decision making. But the utilization of the data collected appeared to be options behind priorities

Recommendations

Based on the study finding, the following recommendations can derive to help improve the health services.

Organizational structure

For the health care institutions to perform and deliver health services requires coordination of specialized disciplines to achieve health care goals. The organizational structure with a functional M&E unit should be set with full support including budget allocation for the M & E unit from the leadership to manage, supervise and coordinate staff and all health programmes.

The decentralization system to give power to people to facilitate decision making is paramount to improve health service delivery in public health institutions in Juba South Sudan.

Monitoring and evaluating human capacity.

M&E units should have cohesiveness with the overall health system so that the effects

trickle down to the people on the ground. This can be done by identifying appropriate M&E professionals to run M&E activities across the sector and at all levels of health service delivery.

There should be a continuous refresher training and capacity building of other staff to be able to embrace innovations and incorporate lessons learnt to improve policies related to health service delivery in public health institutions in Juba, South Sudan.

Data use

Advocacy and emphasis on significance of data use to all concerned authorities to ensure demand creation for accountability in the sector and aids in evidence-based decision making to improve health services delivery in public health institutions in Juba, South Sudan. There should be a continuous data dissemination to the right authorities using the appropriate mode of dissemination so that it reaches decision makers

Areas of future research

- I. Effects of M&E system on specific health service delivery in health facilities for instance maternal health services.

- II. Effectiveness of the M & E system in the health sector in South Sudan.

Contributions of the study

The study contributes to the already existing knowledge and reveals that the organizational structure improves health service delivery significantly. Good leadership with a decentralized system and supported M&E unit does not only promote evidence-based decision making, but also guides the management on accountability and transparency and strengthens the system. When embraced, M&E can improve health service delivery and acts as a tool for evidence-based decision making to policy and decision makers. Hence, enriching an organizational structure encourages participatory approach to problem solving, improves staff performance and a sense of ownership. Similarly, an effective health service delivery can easily be realized if M&E staff, having the right qualifications, are able to integrate M&E into the health system.

The study provides evidence that data use contributes significantly to the improvement of health service. Data dissemination that targets appropriate authorities is essential in ensuring that information reaches the right persons to influence decision-making. Data

use is fundamentally important for planning in order to ensure provision of effective health service delivery to the population. Above all, the interactions between these components of the M & E system and the holistic integration into the health system across the sector will have profound positive effects on health service delivery in public health institutions in Juba South Sudan.

According to system theory, service delivery is a result of interactions of components within the system (Charissa, 2013) and a system comprises inputs, process, output and feedback. Interactions among these components shape the quality-of-services delivered. Similarly, the health system comprises six functional units that interact to produce results. Such components include healthcare delivery, medical personnel, information, medical products funding, leadership and authority and links them to the health system goals.

Declaration

The author declared that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for this article's research, authorship and/or publication.

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