Effectiveness of Socio-Economic-Demographic Factors on Utilization of Routine Health Information Among Hospital Management Teams in Tier-Three Hospitals in Kiambu County, Kenya

Bernard Maracha Wambu[1], Dr Kenneth Rucha Kibaara[2], Dr Peter Kithuka[3]
[1]*Health Information Management, School of Health Sciences, Kenyatta University, Kenya*
[2]*Lecturer, Department of Health Management and Informatics, Kenyatta University, Kenya*
[3]*Lecturer, Department of Health Management and Informatics, Kenyatta University, Kenya*

Abstract

This study investigated the effectiveness of socio-economic-demographic factors on utilization of routine health information among HMTs in tier-three hospitals in Kiambu County. The study design was interventional, employing a quasi-experimental research design that guided the study in the 12 tier-three hospitals. There was an intervention cluster and a control cluster, each with six hospitals. The study adopted a census technique, and all 240 HMT members were included. The study used both qualitative and qualitative data collection techniques. Data was analysed using Fisher's exact test for the bi-variate analysis, logistics regression to ascertain the statistical relationships, Mann-Whitney U-test to test the difference in means at baseline and end-line, Difference in Difference technique was used to establish the average treatment effect of the intervention. The study used thematic content analysis to analyse qualitative data. The County Health Management Teams and the Sub County Health Management Teams participated in the Key Informant interviews. The results indicate that there was no statistically significant difference regarding the socio-economic-demographic factors before and after the intervention, (Mann-Whitney U-test results, U = 28333, p = 0.7851). The study concludes that, designing HIS should be based on the users' desired needs and that the intervention was highly effective in promoting the use of the RHI among HMTs. The study recommends that Kiambu County Department of Health should provide strategies for sustaining effective utilization RHI and should provide guidelines to ensure all HMTs are trained to enable them manage hospitals better. The study recommends that; further research be conducted in the lower-level health facilities to generate recommendations appropriate for the different levels of health care systems, similar studies should be replicated in other countries to compare results and enable the drawing of triangulated policy recommendations and a follow-up study be done to determine whether the increase in utilization translates into improved health outcomes or efficiencies within the health system.

Key Words: *Socio-Economic-Demographic Factors, Routine Health Information, Hospital Management Teams*

DOI 10.35942/jahss.v4i1.26

Cite this Article:

Maracha, B., Kibaara, K., & Kithuka, P. (2025). Effectiveness of socio-economic-demographic factors on utilization of routine health information among hospital management teams in tier-three hospitals in in Kiambu County, Kenya. *Journal of Applied Humanities and Social Sciences- ISSN 2791-1594*, 4(1), 1–12. https://doi.org/10.35942/jahss.v4i1.26

1.0 Introduction

1.1 Background

Globally, strengthening health systems has been recognized as critical for improving health services. Challenges in health system governance, leadership, and management; health financing; critical shortages and inadequate performance of human resources for health; inadequacies and inappropriate usage of health information for decision making; limited access to medicines and technology as well as poor service delivery need to be adequately addressed as a matter of priority. Most countries worldwide, including those in Africa, have weak health systems. A health information system (HIS), an element of a health system, communicates with the other five components. An efficient HIS generates trustworthy, up-to-date evidence regarding a population's health status, health determinants, and health system outcomes. It offers data that helps guide operations in complementary areas of a medical system, including the medical personnel, delivery of service, accessibility to necessary medications, funding, and management and administration of a medical system. The regular medical information system could be the point of reference for academic purposes in addition to helping manage the health system (Hoyle, 2019). The Sustainable Development Goals include health-related targets that must be met, and effective information use is seen as the key to achieving these goals (SDG)

In Europe, the health information system is guided by the WHO European regional tool developed to direct the evaluation of medical information and create a formidable national health information plan. The European Countries must periodically integrate the health information gathered at the national level to enable better health decision-making, benchmarking, and European Union (EU) wide public health monitoring (WHO, 2021). Nonetheless, some EU member countries still face challenges in implementing the health Information system due to a lack of resources, legal restrictions, technical restrictions, and organizational factors (Saigí-Rubió et al., 2021). In China, health service providers primarily utilize their informational system founded on the analysis of information integration of data into hospitals to support health managers running the hospital, predict healthcare requirements, use healthcare resources, and provide timely decisions to manage the dispensation of health services (Yin, Zhang & Hu, 2022). In Africa, there are still issues with routine health data collecting and usage for decision-making. Utilization of routine healthcare data is still low, at 42% in Tanzania, 59% in Uganda, and 58% in Liberia (Dagnew et al., 2018). Still, Dagnew et al. (2018) determined that whereas 71.6% of Ethiopians used routine health information (RHI) for decision-making, 78.5% of health care professionals used RHI in North Gondar, Northwest Ethiopia (Tulu, et.al. 2021). Countries in sub-Saharan Africa have acknowledged and further recognized a Health Management Information System to be a reliable reference of medical information, although health plans typically fail to use this data to guide decisions effectively (Kayo, Murmur & Njuguna, 2018). Additional research from this location revealed that although health professionals typically spend 40%, sometimes even higher, of their time entering health information, they rarely utilize this information.

The Health Management and Information System architecture in Kenya has continued to enhance the accuracy of the information. However, according to the KHSSP (20142018) report, routine health management information is still not widely used. USAID/Kenya (2017) also notes that data utilization and dissemination appear to be the weakest areas, particularly for routine data acquired by HMIS. Health policy decisions have consistently been made without considering the wealth of data available. One of the parts of our economy that uses the most information is the healthcare sector. A vital component of the larger group of health management information systems, whose components all serve to inform and direct decision-making, is the health information system. Tracking progress towards Kenya's health goals,

including the Sustainable Development Goals (SDGs), Kenya National Vision 2030, and the Kenya Health Policy 2014–2030 aspirations, ultimately requires a strong health information system and health information management (Health Sector Health Information Policy, 2010-2030). The use of routine medical information is improved by further training, encouraging supervision, perceived medical data tradition, creating a stable pool of indicators, and competency in managing medical information roles (Wude et al., 2020). The utilization of district medical information systems was linked to having enough skills training, being highly motivated, receiving feedback, and receiving regular supervision (Kanfe et al., 2021). With this proposition, this study investigated the effectiveness of training HMT members on using routine health information in tier-three hospitals in Kiambu County for improved decision-making and better health outcomes.

Aila (2021) reports that Mandera County's total usage of routine health information for decision-making is below average at 47.1%. On the other side, Nzomo (2017) discovered that in Mombasa County, 69.6% of people use regular health information in making determinations. RHI is crucial for providing high-quality healthcare services in Kiambu County, although its use for decision-making is not demonstrated by empirical research (Ikenye, 2021). The best possible standard of health must be attained while considering the demands of the Kenyan populace; this is based on the Kenyan Health Policy 2014–2030. Towards the development of robust medical investments, medical strategies, ideas on policy, and inductions have been established. The Kenya Health Policy 2014–2030 states that Kenya's healthcare system is hierarchically organized, starting with primary healthcare, with the community serving as the lowest level of treatment and progressing to higher levels of care for complex cases. Following are the four levels of care and their respective tiers that make up the current system.

1.2 Statement of the Problem

In most poorly and developing countries, the application of data in knowledge-based choice determination continues to be minimal, particularly for data generated by healthcare facilities (Kagaruki, Kimaro & Mboera, 2013). Health professionals in Sub-Saharan African nations typically spend 40%, sometimes even more, entering medical details, although there is a rarity in utilizing this entered information (Kayo et al., 2018). The culture of information generation and use remains under-developed or is limited, inadequate capacities (HIS policy,2010-2030)**.** Only 28% of facilities have evidence for using HMIS reports, according to the Kenya Harmonized Health Facility Assessment (KHFA) 2018/2019 Report, indicating that the country's utilization of service information and data to make decisions is weak. The District Health Information Software (DHIS2) is a digital platform created by the Ministry of Health in 2021 to facilitate the creation, analysis, and dissemination of reliable medical information towards sound choice determination (MOH,2010)

Recent data indicates that the intended users in Kenya have relatively reduced information demand, accessibility, and use despite the implementation of DHIS2 (Ekirapa et al., 2013). The departmental heads were not trained to use HIS (Kihuba et al., 2014). In Kenya, just 55.6% of managers use routine health information when making decisions (Kimani & Kenyatta, 2015). Aila (2021) reports that Mandera County's total usage of health information to make determinations is under 47%. On the other hand, Nzomo (2017) discovered that in Mombasa County, 69% of the population applies health information when making determinations.

According to a study by Kawila & Odhiambo (2019) that was done in Kiambu, Kitui, and Mombasa counties, there was an inability by medical personnel to access patient information at a go, 90% of health workers not aware of HIS policies/ guidelines and standard operating procedures on information use. At the same time, the HMIS did not have easy access to data on healthcare costs. HIS essential principles encourage using current data and demand that

medical details and statistical information be available freely, faster, and with positive intentions (MOH, 2009). Kiambu County has a low rate of decision-making based on routine health information. As a result of disease recurrence, inconsistent management of patients, increased workload on healthcare professionals, and reduced capacity to obtain a comprehensive view of the general public's health status, this has resulted in increased operating costs for healthcare facilities, which has slowed the achievement of health goals (Mogere, 2010). There is not enough literature to refer to because there has not been enough empirical research in Kiambu County. In light of this, the study investigated the effectiveness of training HMT members on using routine health information in tier-three hospitals in Kiambu County for improved decision-making and better health outcomes.

1.3 Objective of the Study

To determine the effects of socio-economic-demographic factors on utilization of routine health information among HMTs in tier-three hospitals in Kiambu County.

1.4 Theoretical Framework

The Evidence-Based Health Information System idea proposed by Carbone will serve as the study's guiding principle (2009). It says that to perform their managing obligations, managers need proof; this means that choices must be founded on facts from reliable data. The need to possess health information systems principles to facilitate the application of improved technology in the field of medicine is emphasized by Carbone (2009). Although the application of information within the medical sector is typically restricted to medical purposes, evidence-based choice determination is not new; this makes it difficult to use information in other aspects of decision-making. In areas where HIS operations can be easily implemented and sustained, proof is crucial, according to this theory and other authoritative literature in the field. Health professionals administer medical facilities as leading markers (Carbone, 2009). This supports the requirement that all healthcare professionals receive HIS training.

As per Carbone (2009), clinicians receive scientific training and supervision in logical thought. A healthcare worker's clinical practice conduct may change due to this empirically rational thinking style. The idea claims that evidence influences behaviour change favourably and that maintaining the change also depends on the evidence presented. With healthcare providers' concerns and patient outcomes in mind, the major objective of patient care should be represented in the evidence. Clinical tasks that must be carried out or enhanced by adopting HIS should include using evidence-based systems. This idea describes the "catalyst" who is in charge of ensuring the overall clinical care duty is carried out. In enabling the role of a clinician to meet the general health goal, the catalyst must ensure that there is an examination of different elements, ranging from service providers to medical goals. It is the role of the catalyst to fulfil different roles to ensure the success of any evidence-based mechanism. For instance, the medical personnel is enabled to share information; avails risk management structures towards the care of a patient, avails a comprehensive financial platform sufficient for task performance, and ensures the measurement of the success of service (better health results) (Aqil et al., 2009).

2.0 Literature Review

Health economists prioritize a healthcare system that provides equal access to everyone who needs it. Access to and use health services appears more unequal (Oladigbolu et al. 2017). Healthcare services improve when health information systems are used effectively in a particular environment. Because socio-economic considerations may affect access to and consumption of healthcare services, the mere existence of healthcare facilities does not ensure the quality of healthcare services. Low use of medical facilities may result from the attitude

and performance of the medical staff. Insufficient healthcare professionals may cause the poor delivery of healthcare services, long wait times to be seen, wealthy patrons and staff attitudes ascribed to negligence or lack of empathy. Morgan et al. (2013) explored socioeconomic impacts on health information searching in the USA: a diabetes case using a mixed methods research design. The study concluded that people who use different types of health services have a variety of motivations for doing so. Accessibility to healthcare services, facilities, or resources and the effectiveness of searches are critical motivators for consumers.

It was established that more training, collaborative monitoring, a tradition of medical data, performance markers setting, and competency in consistent informational roles tasks were better for improving health services. Employing the logit model, Saeed et al. (2016) studied the impact of socioeconomic components on healthcare services among older people in Ghana. Due to socio-economic inequities, differences have resulted in non-optimal health information system usage. Inadequate financing and low-income levels remain significant impediments to fully utilizing the health information system. Konca et al. (2022) argued that the digital space has changed information access and sharing. Access to health information is more accessible in areas with internet connectivity. Age is critical in health information search; people who are middle-aged and older are actively searching for health information from the health information platform. Level of income is vital in accessing information and buying information devices such as computers and internet connectivity (Li et al., 2016). Kefeli and Zaidi (2013) assessed the demographic and medical care-seeking conduct within the immigrant workforce in Malaysia. The determination was that socio-economic elements like sex, job profile, age, schooling level, revenue, marital status, language, and background affected the group's use of health care services. Socioeconomic factors vary from one country to another. Using logistic regression analyses, Zyaambo et al. (2012) studied medical conditions and socio-economic elements linked to using health facilities in Zambia's rural and urban areas. The investigation determined that medical care demands were primarily connected with seeking medical care. It has been proven that further training, encouraging monitoring, the perception of a health information culture, the establishment of performance metrics, and the aptitude for routine information tasks are all conducive to improving health services. Using the logit model, Saeed et al. (2016) investigated how socio-economic factors affected how elderly men and women in Ghana used healthcare services. The non-optimal use of the health information system results from socio-economic inequality. Low income and insufficient funding remain the critical obstacles to properly utilizing the medical information platform.

As per Konca et al. (2022), the internet has fundamentally changed how people share and access information. Access to health information is simpler where there is internet connectivity. People in their middle and older years actively seek health information from the health information system, which is why age is essential when looking for health information. The ability to acquire information and purchase informational technology like computers and internet connectivity depends on one's financial level (Li et al., 2016). The demographics and healthcare-seeking behaviour of foreign workers in Malaysia were evaluated by Kefeli and Zaidi in 2013. It was determined that socio-economic features, like sex, schooling level, marital status, job profile, age, salary, and background, impact how frequently foreign employees use health care services like health information systems. Socioeconomic elements differ from one nation to the next.

Using logistic regression analysis, Zyaambo et al. (2012) investigated the socio-economic characteristics and health status related to using health facilities in rural and urban areas of Zambia. The study found that the characteristics most significantly related to seeking medical care were health care requirements. After adjusting for differences in needs, healthcare seeking

varied only slightly between urban and rural areas, tended to favour women more, and rose significantly with socioeconomic status.

3.0 Methods

The study design was interventional, employing a quasi-experimental research design that guided this study. There was an intervention cluster of hospitals and a control cluster. The quasi-experimental methodology was considered suitable for addressing the study objectives and satisfactory enabled achievements of the objectives. Lauren (2020) states that any quasi-experimental approach intends to create a cyclical association among independent and dependent variables. Six tier 3 hospitals were selected for in-depth intervention studies in the interventional arm, and six tier 3 hospitals were selected for the control arm for this study, which trained the HMTs to stimulate effective utilization of routine health information to improve hospital decision-making. The selection of hospitals was random. The study was conducted in all tier 3 hospitals in Kiambu County. Kiambu. Kiambu County is located in the central region. Its coverage is 2,543.4km. It borders Nairobi County, Machakos County, Murang'a County, Nyandarua County, Kajiado County and Nakuru County. As per the 2019 Kenya Population and Housing Census, Kiambu County's population stood at 2.4 million, the second most populous county after Nairobi. The county has 113 public health facilities, which are broken down as follows as per the Kenya Essential Package of Health (KEPH) levels: Tier 2 (75 dispensaries & 26 health centers), tier 3 (10 primary referral facilities & 2 secondary referral facilities)

The study population included all 12-tier three hospitals (levels 4 & 5) in the county. The total respondents were 240 all the Hospital Management Teams (12 hospitals x 20 HMTs). The qualitative study involved 25 county and sub-county health management teams. The study focused on the 12 referral facilities (tier 3) that admit patients. Since each hospital has 20 HMTs, this gives 240 respondents. Two groups from the 12 hospitals were selected randomly to form 6 intervention study sites and six control sites. The sample size was 120 for each group; hence, 240 HMT participants were involved in the investigation. The investigation adopted a census technique, making all 240 HMT members eligible. The study involved all the HMTs in the 12 tier three hospitals (levels 4 and 5), including the medical superintendent, MO/consultant, Nursing Service manager, Hospital administrator, Clinician in charge, Health Records & Information officer, Nutritionist, Laboratory technologist, Radiographer, Pharmacists, Physiotherapist, Occupational Therapist, Public Health officer, Social Health worker, Procurement officer, Medical engineering in charge, Orthopaedic technologist, Dental officer in charge, Casualty in charge, and Accountant. The Key Informant interviews involved two randomly selected Sub County Health Management Team members from the ten sub-counties, and five purposively included County Health management members.

The study locality, Kiambu County, was purposively determined. This technique arbitrarily selects samples based on their features and is considered significant in the study (Paly & Achison, 2008; Grellety, 2016). All 12 tier-three hospitals and all the 240 HMT members were included. A census technique. The Key Informant interviews involve purposively selected Sub County Health Management Team (SCHMTs) members and County Health Management Team (CHMTs) members. The study was undertaken in Kiambu County in the all-12 tier 3 hospitals. Six hospitals were in the intervention, and the other six were in the control arm. The HMT members from each health facility were studied. HMT members in the experimental arm benefited from the intervention. In contrast, the other HMT members in hospitals in the control arm acted as markers to compare the impact of the intervention on the utilization of routine health information. The selection was done to ensure limited contamination between the

intervention hospitals and the control group. HMT members from the selected health centers, either in the intervention or control arm, consented.

Tools were pre-tested in the neighbouring Muranga County. The pre-test sample size was predetermined using 10% of the sample size. Therefore, 34 respondents who assumed similar positions as the ones held by the primary respondents were purposively selected and participated in conducting the pre-testing of the tools. This was to ensure the findings obtained from the pilot test sample were a true reflection of the targeted sample. 2 hospitals were purposively selected to be able to pre-test the tools, and these were Muranga County Referral Hospital and Muriranjas Sub-County Hospital. The objective of pre-testing was to ensure that the questionnaire could bring out the exact information required by the researcher. The data was collected as needed during the study period by RAs and principal researchers. The research team checked the data carefully to ensure all the field tools were available and neatly arranged for filing. After each day of data collection, filled questionnaires were checked for completeness by the principal researcher. The responses were coded with numbers to ease quantification and analysis. The coded data was entered into the computer using the SPSS 25 software for storage and analysis later. The file of the filled data tools was kept in a locked cabinet for safety. Quantitative data was analysed according to research objectives and emerging themes using the SPSS 25 computer package. After recording the responses to the questionnaires, interviews, and observations, the researcher categorized and coded the responses.

4.0 Results

4.1: Association between socio-demographic characteristics on the extent of Routine Health information system utilization.

Table 1 indicates the analysis of routine health information utilization in the intervention arm when tabulated with social demographic variables after training the HMTs showed no significant relationship between utilization of routine health information and age, working experience, education, and cadre. Fisher's exact test reveals that age (*p=0.979)*, this p-value indicates no significant association between age and the outcome. The respondent's working experience (p=0.626) indicated no significant association. There is no significant relationship between the level of education and the outcome and cadre of staff (*p=0.766*), and the cadre does not significantly impact the outcome of interest. The analysis suggests that age, working experience, education level, and cadre of staff do not significantly influence the extent of RHIS utilization post-intervention. In all cases, most respondents reported good utilization, with only a small proportion indicating poor utilization.

Table 1: Association between socio-demographic characteristics and the extent of Routine Health Information Utilization.

Variable	Utilization of routine health information by HMT post-intervention					*Fisher's exact test*
Age						
Extent of Utilization	< 30 yrs	30-34 yrs.	35-39 yrs	40-44 yrs	45>yrs	
Good	23(100%)	62(96.9%)	45(95.7%)	47(97.9)	55(96.5%)	*Fisher's exact p=0.979*
Poor	0(0%)	2(3.1%)	2(4.3%)	1(2.1)	2(3.5%)	

Working Experience	<5yrs	6-10 yrs	11-15 yrs	16-20 yrs	>21 yrs	*Fisher's exact p=0.626*
Good	42(100%)	67(95.7%)	53(96.4%)	29(100%)	38(95%)	
Poor	0(0.0%)	3(4.3%)	2(3.6)	0(0%)	2(5%)	
Education	Certificate	Diploma	Bachelor's	Masters	Doctoral	*Fisher's exact p=0.668*
Good	6(100%)	116(97.7%)	27(96.4%)	75(98.7%)	1(100%)	
Poor	0(0%)	4(3.3%)	1(3.6%)	0(%)	1(1.3%)	
Cadre of Staff						
Extent of Utilization of RHIS	Administrative Staff	Clinical	Allied Health care workers			
Good	21(100%)	135(96.4%)	34(100%)	*Fisher's exact p=0.766*		
Poor	0	5(3.6%)	0(0.0%)			

4.2: Influence of Socio-Economic factors on utilization of health information system

Table 2 present respondents' opinion on influence of socio-economic factors on utilization of health information. A majority of respondents (37.2%) strongly agree that education level influences the utilization of routine health information, followed by 21.5% who disagree. Education level appears to have a notable impact on the utilization of health information. The majority of respondents (37.58%) strongly agree that lack of knowledge about the usefulness of routine HIS data is a factor in low utilization. A large portion (34.86%) disagree with the statement that age is a critical factor in health information management and utilization, therefore age does not appear to be widely considered a critical factor in health information management by most respondents. On gender, 32.6% strongly disagreeing, with the idea that gender affects health information utilization. A significant number of respondents (37.79%) strongly agree that low morale and motivation are major impediments to data demand and utilization

Table 2: Socio-Economic factors on utilization of health information

Education level influences utilization of routine health information	**Freq.**	**Percent**
Strongly Agree	178	37.2
Disagree	103	21.5
Strongly Disagree	98	20.5
Agree	85	17.8
Neither agree nor disagree	15	3.1
Total	479	100

Lack of knowledge on usefulness of routine HIS data is attributed to low utilization	**Freq.**	**Percent**
Strongly Agree	180	37.58
Disagree	112	23.38
Strongly Disagree	105	21.92
Agree	64	13.36
Neither agree nor disagree	18	3.76
Total	479	100
Age is a critical factor in health information management and utilization	**Freq.**	**Percent**
Disagree	167	34.86
Strongly Agree	100	20.88
Strongly Disagree	80	16.7
Agree	78	16.28
Neither agree nor disagree	54	11.27
Total	479	100
Gender affects the utilization of related health information data	**Freq.**	**Percent**
Strongly Disagree	156	32.6
Strongly Agree	107	22.3
Disagree	106	22.1
Agree	82	17.1
Neither agree nor disagree	28	5.9
Total	479	100
Low morale and motivation remain a major impediment towards data demand and utilization	**Freq.**	**Percent**
Strongly Disagree	111	23.17
Disagree	85	17.75
Neither agree nor disagree	36	7.52
Agree	66	13.78
Strongly Agree	181	37.79
Total	479	100

4.2.1: Mean differences in Socio-Economic Factors before and after the intervention

Composite means of socio-economic factors were computed at baseline and endline and compared for statistical differences and significance. The analysis indicates no significant mean difference in the effect of socio-economic factors on RHI utilization before and after the intervention, as evidenced by the Mann-Whitney U-test results (U = 0.273, p = 0.7851). The p-value (0.7851) is much greater than the common alpha level of 0.05.

This suggests that the socio-economic factors did not significantly influence RHI's utilization, as illustrated in Table 3.

Table 3: Mean difference in the effect of socio-economic factors before and after the intervention

time	Obs.	rank sum	expected	U	*p-value*
baseline	240	57193	57600		
end line	239	57761	57360	28333	*p=0.7851*
combined	479	114960	114960		

5.0 Discussion, Conclusion, and Recommendation

5.1 Conclusions

The study concludes that socio-economic-demographic factors did not significantly influence how HMT members utilized RHI in tier 3 facilities in Kiambu County but low morale and motivation among HMTs are recognized as major obstacles, suggesting the need for efforts to improve these factors in order to enhance routine data utilization.

5.2 Recommendations

It is hereby recommended that the Kiambu county government to address and improve factors relating to low morale and motivation among HMTs in order to enhance routine data utilization. This study applied data from tier hospitals but did not capture data from the lower-level health facilities. Therefore, the study recommends that further research be conducted in the lower-level health facilities to generate recommendations appropriate for the different levels of health care systems. This study was done in Kiambu County with its own specific environment. It is recommended that similar studies be replicated in other countries for comparison of results and to enable the drawing of triangulated policy recommendations. It's recommended that a follow-up study be done to determine whether the increase in utilization translates into improved health outcomes or efficiencies within the health system.

References

Aqil, A., Lippeveld, T., & Hozumi, D. (2009). PRISM framework: a paradigm shift for designing, strengthening and evaluating routine health information systems. *Health policy and planning*, *24*(3), 217-228.

Carbone, D. (2009). *An Evidence-Based Health Information Theory. Melbourne*, Australia: University of Melbourne, Australia.

Creswell, J.W. and Creswell, J.D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Sage, Los Angeles.

Dagnew, E., Woreta, S. A., & Shiferaw, A. M. (2018). Routine health information utilization and associated factors among health care professionals working at public health institution in North Gondar, Northwest Ethiopia. *BMC health services research*, *18*(1), 1-8.

Grellety E, Golden MH, (2016). The Effect of Random Error on Diagnostic Accuracy Illustrated with the Anthropometric Diagnosis of Malnutrition. *PLoS ONE 11*(12):https://doi.org/10.1371/journal.pone.0168585

Hoyle, D. (2019). *Knowledge-based decision-making: moving beyond intuition through data-laced wisdom leading to informed actions*. School Administrator.

Ijaz, F., & Chaudhry, N. I. (2021). Impact of health information technology adoption and its drivers on quality of care & patient safety in the health care sector of Pakistan. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, *15*(1), 196-212.

Ikenye, M. W. (2021). *Effect of Organization Factors on Healthcare Service Delivery in Public Hospitals within Kiambu County* (Doctoral dissertation, United States International University-Africa).

Kagaruki, G., Kimaro, H. C., & Mboera, L. (2013). Factors Affecting Utilization of Evidence Based Health Information System for Effective Supply Chain of Essential Medicine in Tanzania: A Case Study from Mbeya Region. *Journal of Health Informatics in Developing Countries*, *7*(1). Retrieved from https://www.jhidc.org/index.php/jhidc/article/view/99

Kanfe, S. G., Debele, G. R., Berhanu, R. D., Ngusie, H. S., & Ahmed, M. H. (2021). Utilisation of district health information system and its associated factors among health professionals working at public health facilities of the southwest of Ethiopia: cross-sectional survey. *BMJ open*, *11*(8), e046578.

Kawila, C. K., & Odhiambo-Otieno, G.W. (2019). Transforming the Health Sector in Kenya by adopting Integrated Health Information System. *International Journal of professional Practice (IJPP) 7*(1), 2019

Kayo, R. O., Murmur, L., & Njuguna, S. (2018). Organizational factors influencing the adoption of the district health information system 2 in Uasin Gishu County, Kenya.

Kefeli, Z., & Zaidi, M. A. S. (2013). Health care utilisation among the elderly in Malaysia: Does socioeconomic status matters. *Persidangan Kebangsaan Ekonomi Malaysia ke-VIII (PERKEM VIII)*, 1141-1152.

Kihuba E, Gathara D, Mwinga S, Mulaku M, Kosgei R, Mogoa W, et al. (2014).Assessing the ability of health information systems in hospitals to support evidence-informed decisions Kenya. *Global Health Act.*;7:24859. doi: 10.3402/gha.v7.24859.

Kimani, J., & Kenyatta, J. (2015). Factors affecting the utilization of health information technology projects in Nairobi County. *Strat J Bus Chang Manag*, *2*(57), 286-315.

King, N. (2004). Using templates in the thematic analysis of text. In C. Cassell & G. Symon (Eds.), *Essential guide to qualitative methods in organizational research* (pp. 257–270). London, UK:Sage.

Konca, M., Demirci, Ş., Çakmak, C., & Uğurluoğlu, Ö. (2022). Exploring the socio-economic determinants of health information-seeking behaviour on the Internet in Turkey.

Li, J., Theng, Y. L., & Foo, S. (2016). Predictors of online health information seeking behavior: changes between 2002 and 2012. *Health Informatics Journal*, *22*(4), 804-814. https://doi.org/10.1177/1460458215595851.

Lippeveld, T. (2001). *Routine Health Information Systems: The Glue of a Unified Health System. Keynote Address at the Workshop on Issues and Innovation in Routine Health Information* in Developing Countries, Potomac.

MEASURE Evaluation. (2007). *Routine Data Quality Assessment Tool: Guidelines for Implemenation.* Chapel Hill, NC: MEASURE Evaluation.

MEASURE Evaluation. (2011). *Tools for Data Demand and Use in the Health Sector Performance of Routine Information Systems (PRISM) Tools.* Nairobi: MEASURE Evaluation.

MoH (2014b). Kenya Health Information System Annual Statistical Report 2013. Nairobi, Kenya

MOH, (2010). *Master Health Facilities Inventory, July 2012 Health Infrastructure Division. MOH.* Kampala. Uganda

MoH, (2018). *Annual Health Sector Performance Report: . Performance , Kampala.* : MoH. Kampala. Uganda.

Saeed, B. I. I., Yawson, A. E., Nguah, S., Agyei-Baffour, P., Emmanuel, N., & Ayesu, E. (2016). Effect of socio-economic factors in utilization of different healthcare services among older adult men and women in Ghana. *BMC Health Services Research*, *16*(1), 1-9.

T, A. C. (2005). Health information Systems: the foundation of Public health. *Buletin of the World Health organization*, 78-583.

Yin, T., Zhang, X., & Hu, H. (2022). Utilization of Data Analysis and Decision Support System in the Chinese General Hospitals. *African and Asian Studies*, *21*(1-2), 135-142.

Zyaambo, C., Siziya, S., & Fylkesnes, K. (2012). Health status and socio-economic factors associated with health facility utilization in rural and urban areas in Zambia. *BMC health services research*, *12*(1), 1-8.