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Health Information Systems Utilization: A Comparison of Extent and Magnitude in Public and Private Health Facilities in Dar Es Salaam, Tanzania

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ABSTRACT: Health information systems (HISs) are critical tools that have been widely adopted and implemented in healthcare settings around the world, intending to improve the quality of healthcare services (OHSs) delivered. However, it is the extent and magnitude of HISs utilization that seem to guarantee improvement in the quality of health care. The study explored the extent to which HISs have been utilized in selected public and private health facilities (PPHFs) in Dar es Salaam, Tanzania, and the determinants of its utilization. A descriptive cross-sectional design was employed to collect data using the Kobo Collect survey tool from 140 respondents and 12 key informants. Descriptive statistics (frequencies and percentages), Inferential statistics (Pearson chi-square tests), and Linear regression analyses were employed to analyse data. The analysis revealed that private ownership has a higher utilization rate of HIS (61.4%) compared to public ownership (38.6%). Moreover, perceived ease of use and perceived usefulness were significant predictors of actual use of the system, suggesting that users who found the system easy to use and useful were more likely to use it. In conclusion, the utilization of HIS in Tanzania seems to be influenced by various factors, including ownership type.

KEYWORDS: *Determinants of Health Information Systems utilization, Health Information Systems, Health Information Systems Utilization, Private Health Facilities, Public Health Facilities*

I.   INTRODUCTION

Health information systems (HISs) collect data from the health industry, including clinics, dispensaries, health centres, and hospitals.[1] The gathered data are then analysed and transformed into useful information that may be utilized to make informed health-related decisions.[1] The adoption and utilization of HISs in health facilities improve the quality of health services (QHSs) delivered.[2] The purpose of health information is to reduce errors in medication, and operational costs, and facilitate easy access to patients' information. Additionally, health information saves time in recording and retrieving patient information. It is through the same information that medical reports are shared, also data managed to overcome the limitations of the paper-based system, hence the improvement of patient care delivery which results in improvement of communication among workers in different departments.[3] HISs is being widely used to improve the quality of care in many healthcare settings.[4]

Globally, the extent to which HISs are being implemented, integrated, and adopted is quickly surging as a result of the benefits associated with their integration.[5] However, the adoption rate and utilization of these systems in developing countries are quite low because of many challenges in adopting and utilizing HISs.[6-10] The challenges include inadequate ICT infrastructure to support HISs such as computers and broadband, lack of ICT skills among health practitioners, lack of funding, poor management, and scarcity of health IT personnel. Other challenges are connected to system integration and usability, also lack of enacted policies that support health systems, the lack of training among health practitioners, and employees' fear of transitioning from manual to electronic systems, just to mention some.[8, 11-13, 14-17] Also, the adoption of these systems among users takes time due to their complexity and availability of many functions. [18] These challenges result in low acceptance and utilization levels of HISs. [4]

The larger adoption and use of these systems are highly determined by a multitude of factors. The perspective of users, perceived usefulness, user friendly, the system's usability, behavioural intention, knowledge, and finances for optimum maintenance are among the factors with the potential to influence the adoption and utilization level of these systems [4, 19-22]. It is reported by Khubone and colleagues [23] that factors including English language competence, computer literacy, and electronic medical/health record (EMR) literacy, as well as education level, can influence the level of HISs utilization. The Technology Acceptance Model (TAM) by Davis [24], explains that perceived ease of use, perceived usefulness, attitude towards using, and behavioural intention to use, are the factors that may influence one's actual use of the system. It is argued by Bhattacherjee and others [25], that greater adoption and utilization of technology in healthcare influence higher operational performance in a health facility.

The use of HIS improves the quality of services providedin health care facilities. This sets in a need to better understand the extent and magnitude of the adoption and utilization of HISs.Therefore, this paper examines the extent of HISs utilization in PPHFs in the Dar es salaam region, in the realization of the fact that the extent and magnitude of the utilization of HISs can guarantee improvement of the quality of health care in healthcare settings. Cognizant of this, this article specifically identifies the types of HISs used in PPHFs and the frequency of their use, examines the HISs utilization level in PPHFs and among healthcare practitioners, and determines what influences HISs utilization.

1.0 Theoretical Framework

The study was guided by the Technology Acceptance Model (TAM). The TAM model posits that "a person's intent to use and actual use of a technology is predicated by the person's perceptions of the benefit from using the technology and ease of use". [26] The model describes the user's willingness to adopt and use new technology depending on the effectiveness and user-friendliness of the system, [27] which are the means that lead to the adoption and use of information systems in organizations. TAM is a validated and good theoretical tool to understand users' acceptance and utilization of HISs. The study on which this article is based adopted the variables from this model, which explain the user's behavioural intentions, attitude towards using, perceived usefulness of the system, and perceived ease of the system, all of which influence one's actual usage of technology, either directly or indirectly (as indicated in Fig. 1). External factors, according to TAM, influence intention and actual use via mediated effects on perceived ease of use and perceived usefulness of the system. Socio-economic characteristics such as age, sex, educational level, occupation, and computer literacy level are external variables in the study. This model guided the study to contribute to a better understanding of the acceptance and utilization of HISs and to examine the utilization level of HIS among health practitioners in PPHFs.
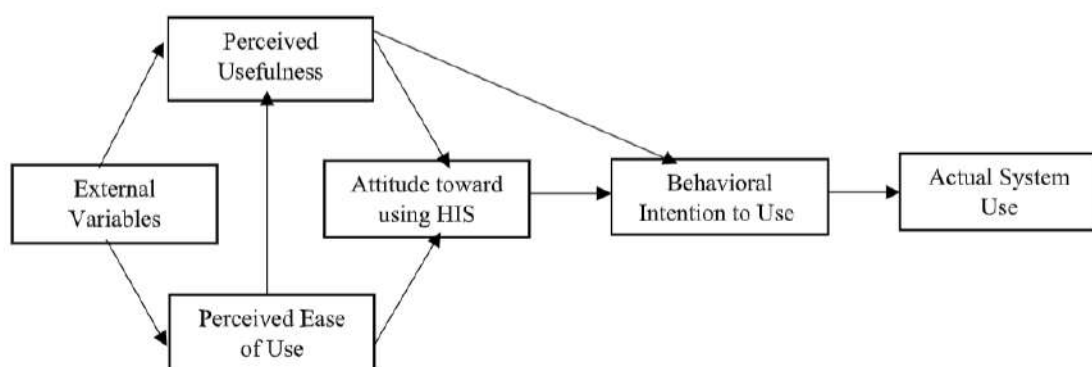

Fig 1: A technology acceptance model. **Adopted from Latipa and others.** [28]

II.   METHODS

A cross-sectional study was conducted with 140 health practitioners who used health information systems, including doctors, nurses, pharmacists, radiologists, laboratory personnel, IT personnel, and support staff (receptionists, billing, registration, and medical records). Also, the study involved 12 key informants, comprising doctors in charge and system administrators, in public and private health facilities in the Dar es Salaam region between July and August 2022. Data were collected using a Kobo Collect survey tool with a structured questionnaire, including a TAM theory questionnaire. TAM is a validated tool that includes variables (perceived ease of use, perceived usefulness, attitude towards using HIS, behavioural intention to use) that are used to evaluate the actual use of the system among system users. All constructs were measured on a 5-point

Likert scale ranging from "strongly disagree" (1 point) to "strongly agree" (5 points). In addition to the TAM questionnaire, respondents were asked about socioeconomic characteristics, types of health information systems, frequency of utilization, and current challenges with health information systems access and usage.

Qualitative data from the open-ended questions and key informant interviews were analysed using content analysis. IBM-SPSS version 26 was used to analyse quantitative data. We computed descriptive statistics such as frequencies and percentages. Inferential statistics were used to test hypotheses which involvedthe Pearson Chi-Square testanda Linear regression model. This model was used to guide how to measure the influence of perceived ease of use, perceived usefulness, attitude towards using, and behavioural intentions on actual use of the system (the dependent variable). The p-value of 0.05 was deemed significant. The following is the equation for the multiple linear regression model:

$$Y = b_0 + b_1x_i + b_2x_2 + \ldots + b_nx_n + \varepsilon i \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ equation (1)}$$

Where:
Y = the predicted or expected value of the dependent variable
b_0 = the value of Y when all of the independent variables (X_1 through X_n) are equal to zero
b_1 - b_n = estimated regression coefficients
x_1 - x_n = predictor variables entered in the linear regression model as shown in Table 1
ε_i = An error term

Table 1: TAM Variables entered in the model

Variable	Operational definition	Level of measurement
	Points scored on a Likert scale measuring…	
Y= Actual use	The frequency of using the health information system	Ratio
X_1 = Perceived ease of use	The degree to which a person believes that engaging in a health information system would be free of effort (that the technology is easy to use)	Ratio
X_2 = Perceived usefulness	The degree to which a health practitioner believes that the healthcare industry will be improved by using health information systems in delivering health services	Ratio
X_3 = Attitude	The attitude of health practitioners toward using health information systems	Ratio
X_4 = Behavioural intention to use	The user's likelihood to engage in health information systems	Ratio

To categorize the level of HIS utilization, the mean score was computed from the total points scored on the Actual Use variable from the TAM Likert scale.IBM-SPSS functions were used to compute the total score, and the scores were cut into 2 equal groups under percentile values to represent the HIS utilization level of high and low. The HIS utilization level was classified as high (scores above 5) and low (scores below 5).

III.   RESULTS AND DISCUSSIONS
3.1 Socio-demographic and economic characteristics of the respondents
Table 2 summarizes the comparison of the socio-demographic and economic characteristics of respondents based on their level of HIS utilization.In Table 2 the results show that 50.7% were male, and 49.3% were female. Almost three-quarters (73.6%) of them were between the ages of 18 and 35, and 42.9% of the study sample had a diploma followed by a bachelor's degree (28.6%). A quarter (25%) of the respondents were support staff (including personnel working in reception, billing, registration, and medical records), 59.3% had 2-5 years of experience in using HIS, while 37.1% had less than 1 year of experience.

The results of the study revealed that 52.6% of males had a higher HIS utilization level compared to females (47.4%). This result implies that a higher proportion of male health practitioners were found to have a higher utilization level of HIS compared to female health practitioners. This result is consistent with findings from similar studies on HIS utilization. For example, a study conducted in Iran found that male physicians had a higher level of HIS utilization compared to female physicians. [29] Another study conducted in Saudi Arabia also reported that male nurses had a higher HIS utilization level compared to female nurses. [30] This suggests that there may be gender-related factors that influence the utilization of HIS. Further research is needed to explore and understand these factors to design and implement effective strategies for improving HIS utilization

among both male and female populations. In addition, the disparity in the use of HIS between male and female health practitioners highlights the need for targeted interventions to improve HIS usage among female professionals.

Concerning age groups, results show that respondents aged 18–35 (youth) had a higher HIS utilization level (74.6%) compared to other age groups. It means that young health practitioners were more likely to use HIS than middle-aged and older people. The finding is consistent with Gadalla and Ahmed [31], who found that most system users were young adults (aged 35 and below). A study by Zaki and others[32] found that younger individuals were more likely to use EMR compared to older individuals, due to their greater familiarity with technology and higher levels of education. The low usage of HIS among middle-aged and older healthcare professionals suggests the need for training and support to improve HIS usage in these groups.

Table 2: Socio-demographic and economic characteristics of respondents (n=140)

Socio-demographic and economic characteristics		Frequency	The extent of HIS utilization	
			Lower HIS utilization	Higher HIS utilization
Sex	Male	71(50.7)	11(42.3)	60(52.6)
	Female	69(49.3)	15(57.7)	54(47.4)
Age groups	18-35 (Youth)	103(73.6)	18(69.2)	85(74.6)
	36-50 (Middle Age)	30(21.4)	8(30.8)	22(19.3)
	51 and above (Older)	7(5)	0(0.0)	7(6.1)
Education Level	Primary	1(0.7)	0(0.0)	1(0.9)
	Secondary	1(0.7)	0(0.0)	1(0.9)
	Certificate	23(16.4)	4(15.4)	19(16.7)
	Diploma	60(42.9)	10(38.5)	50(43.9)
	Advanced Diploma	12(8.6)	3(11.5)	9(7.9)
	Bachelor Degree	40(28.6)	8(30.8)	32(28.1)
	Master's Degree	3(2.1)	1(3.8)	2(1.8)
Occupation	Doctor	22(15.7)	7(26.9)	15(13.2)
	Nurse	24(17.1)	3(11.5)	21(18.4)
	Pharmacist	24(17.1)	6(23.1)	18(15.8)
	Radiologist	6(4.3)	1(3.8)	5(4.4)
	Laboratory personnel	21(15.0)	4(15.4)	17(14.9)
	IT personnel	8(5.7)	1(3.8)	7(6.1)
	Support Staff	35(25.0)	4(15.4)	31(25.0)
Experience in using HIS	Less than 1 year	52(37.1)	11(42.3)	41(36.0)
	2-5 years	83(59.3)	14(53.8)	69(60.5)
	5-10 years	4(2.9)	1(3.0)	3(2.6)
	10 years and more	1(0.7)	0(0.0)	1(0.9)
Total		140(100)	26(100)	114(100)

NB: The number in brackets presents percentages

As for education level, the results showed that respondents with a diploma education level and those with a bachelor's degree had the highest use of HIS (43.9%) and (30.8%) respectively. This implies that there is a positive correlation between education level and the utilization of HIS.Suggesting that a higher level of education may be positively associated with the use of HIS.Studies have shown that education level is an important determinant of technology adoption, including the utilization of HISs. For example, a study in Kenya found that health workers with higher levels of education were more likely to use electronic medical records (EMR) systems in their clinical practice. [33] Another study in Nigeria found that health workers with tertiary education had higher levels of EMR adoption compared to those with lower levels of education. [34] These findings suggest that education level may play a role in determining the utilization of health information systems and that interventions to improve the education and training of health workers may lead to higher utilization of HIS.

In Table 2, the results reveal that support staff (personnel working in reception, billing, registration, and medical records) had a higher HIS utilization level (25.0%) compared to personnel working in other departments. The results imply that the support staff who work in departments such as reception, billing, registration, and medical records have a higher utilization level of HIS, at 25.0%, compared to personnel in other departments. The second highest utilization level was reported among nurses at 18.4%. Studies have shown that support staff, such as those working in reception, billing, registration, and medical records, play a crucial role in the effective

implementation and use of HIS in-healthcare facilities. A study by Ndabarusha and colleagues [35] found that support staff were more likely to use HIS compared to other healthcare workers, such as physicians and nurses. Another study by Gari and colleagues [36] evaluated the extent of HIS utilization in public and private healthcare facilities in Tanzania and found similar results to the content mentioned. In their study, support staff were found to have a higher utilization level of HIS compared to other healthcare workers. Overall, these results suggest that support staff play a crucial role in the effective implementation and utilization of HIS in-healthcare facilities, and their level of utilization can have an impact on the overall success of HIS implementation in these settings.

The results in Table 2 show that respondents who qualified to use HIS between 2 and 5 years had a higher HIS utilization level (60.5%). This implies that respondents who had 2–5 years of experience using HIS were found to have a higher utilization rate of HIS compared to those with less experience (less than 1 year) or more experience (5–10 years or 10 years and more). The result suggests that respondents who had intermediate levels of experience in using HIS were more likely to make effective use of the technology compared to those with limited or excessive experience. This result is similar to a study by Alemu. [37] This study found that healthcare workers with intermediate levels of HIS training and experience had better HIS utilization compared to those with limited or excessive experience.

3.2 The extent of HIS utilization in public and private health facilities

Table 4 presents the results on the HIS utilization level between PPHFs. The aim was to evaluate if the HIS utilization level differs between PPHFs. The results of the study indicate that there is a significant difference in HIS utilization level based on ownership type. The ownership types are classified as either private (for-profit/FBO/company/NGOs) or public (LGA public). In the private ownership group, 8 out of 26 participants (30.8%) had lower HIS utilization while 70 out of 114 participants (61.4%) in the private ownership group had higher HIS utilization. On the other hand, in the public ownership group, 18 out of 26 participants (69.2%) had lower HIS utilization, while 44 out of 114 participants (38.6%) had higher HIS utilization.This implies that private health facilities were utilizing HIS more than public health facilities. This could be because, in private health facilities, infrastructures to support the HIS (such as computers, the internet or intranet, technical support, software, and hardware maintenance, system updates, a sufficient budget, skilled staff on IT, and training on the HIS) are adequate. In the presence of these, the utilization of HIS is guaranteed to be high, and vice versa. This observation was also supported by a key informant, who said:

> "In our facility, we have everything in place to support the HIS. We have permanent IT personnel, skilled medical staff on IT, functional computers in every department, enough broadband, on-the-job training on HIS, and technical support from the system's provider is adequate." (Key informant, Bochi Hospital, July 2022).

Table 4: HIS Utilization Level

HIS utilization level	Ownership		Total	Pearson Chi-Square	Asymp. Sig. (2-sided)
	Private (For Profit/FBO/Company/NGOs)	**Public (LGA Public)**			
Lower HIS utilization	8(30.8)	18(69.2)	26(100)	8.053	.005
Higher HIS utilization	70(61.4)	44(38.6)	114(100)		

The Pearson Chi-Square test was conducted, and the results showed that the difference in HIS utilization level between the two ownership groups was significant (p = .005). This indicates that the type of ownership has a significant impact on the HIS utilization level. Additionally, based on the results in Table 4, the null hypothesis that the HIS utilization level does not differ between PPHFs is rejected because the p-value (0.005) is less than 0.05. Therefore, the alternative hypothesis that the HIS utilization level differs between PPHFs is confirmed at the 0.1% level because the p-value (0.005) is less than 0.05. This implies that the HIS utilization level differs between PPHFs, as presented in Table 4.

A related study that has been conducted in the past is "The impact of ownership type on health information system utilization in low- and middle-income countries: a comparative study" by Alhammadi and Alshammari. [38] The study aimed to evaluate the impact of ownership type on HIS utilization in low- and middle-income countries and was conducted in a similar context as the current study. The study found that the private

ownership group had a higher level of HIS utilization compared to the public ownership group. The authors suggested that the higher level of HIS utilization in private ownership facilities might be due to the presence of more resources, better training, and a higher level of commitment to using the HIS compared to public ownership facilities. This study supports the results of the current study and provides additional evidence for the impact of ownership type on HIS utilization level. The findings of both studies highlight the importance of considering ownership type when evaluating HIS utilization.

3.3 Types of HIS used in public and private health facilities
In Table, 3the results of the study indicate that there is a significant difference in the utilization of various HIS types based on ownership. The ownership types are classified as either private (for-profit/FBO/company/NGOs) or public (LGA public). In the private ownership group, 14.1% of respondents utilized GoT-HoMIS, 25.6% utilized Ultra Health, 37.2% utilized tHL HIMS, 10.3% utilized eHMS, 2.6% utilized the Business Control System, and 10.3% utilized Health Care.

Table 3: Types of HIS utilized in health facilities (n=140)

HIS Type	Ownership	
	Private (For Profit/FBO/Company/NGOs)	Public (LGA Public)
GoT-HoMIS	11(14.1)	62(100.0)
ULTRA HEALTH	20(25.6)	0(0.0)
tHL HIMS	29(37.2)	0(0.0)
eHMS	8(10.3)	0(0.0)
Business Control System	2(2.6)	0(0.0)
Health Care	8(10.3)	0(0.0)
Total	**78(100)**	**62(100)**

NB: The number in brackets presents percentages

In the public ownership group, all 62 participants (100%) utilized GoT-HoMIS, while none of the participants utilized Ultra Health, tHL HIMS, eHMS, Business Control System, or Health Care. This was agreed upon during a key informant interview: *"LGA's policy and guidelines led to the selection and use of GoT-HoMIS in all public health facilities." (*Key informant, Magomeni HC, August 2022).

These results suggest that the utilization of different HIS types is influenced by ownership type. The private ownership group utilizes a wider range of HIS compared to the public ownership group. This could indicate that the private ownership group has access to more resources and is more willing to adopt and implement different HIS types based on their requirements. This was supported by a key informant, as shown in the quote below.

> *"We selected this kind of health information system based on the facilities' requirements; we wanted a system that performs well with good quality dimensions such as system quality, information quality, and service quality to improve the quality of health services delivered."* (Key informant, St. Monica Modern H/C, August 2022).

The finding of this present study is similar to a study by Alhammadi and Alshammari. [38]A related study is "A systematic review of health information systems used in low- and middle-income countries." This study aimed to identify and review the HIS types used in low- and middle-income countries and to assess the strengths and limitations of each type. The study found that GoT-HoMIS, Ultra Health, tHL HIMS, eHMS, Business Control System, and Health Care were some of the HIS types used in low- and middle-income countries. The study also noted that the utilization of different HIS types varied based on the country and the type of healthcare facility. This study supports the results of the current study and provides additional evidence for the utilization of different HIS types in low- and middle-income countries, including Tanzania. The findings emphasize the importance of taking HIS type into account when evaluating HIS utilization, as well as the need for additional research in this area.

3.4 Determinants of HIS Utilization in Public and Private Health Facilities
Factors influencing the utilization of HISs among health practitioners in health facilities were identified by using Technology Acceptance Model (TAM). TAM has been widely used to study the determinants of information system utilization.TAM suggests that perceived ease of use, perceived usefulness of the system, attitude toward using it, and behavioural intention to use it all predict the actual use of the system. The multiple linear regression results are presented in Table 5.

Table 5: Multiple linear regression showing the determinants of HIS utilization

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	4.537	.603		7.522	.000		
Perceived ease of use	.112	.043	.213	2.611	.010	.852	1.174
Perceived usefulness	.149	.044	.275	3.420	.001	.874	1.144
Attitude toward using HIS	-.012	.050	-.018	-.237	.813	.962	1.039
Behavioural intention to use	.133	.051	.204	2.590	.011	.914	1.094

. The dependent variable was the actual use of the system
. R = 0.487, R Square = 0.237, Adjusted R square = 0.215

The results of this multiple linear regression analysis show the relationship between the independent variables (perceived ease of use, perceived usefulness, attitude towards using HIS, and behavioural intention to use) and the dependent variable (actual use of the system). The coefficient of determination, which is $R^2 = 0.237$, indicates that the predictors included in the model were able to explain 23.7% of the variation in the variance of the outcome variable.

The results indicate that perceived ease of use (Beta = 0.213, t = 2.611, p = 0.010). This means that the results showed that "perceived ease of use" was found to be a predictor of actual use of the system. The beta value of 0.213 indicates that for every one-unit increase in perceived ease of use, actual use of the system is expected to increase by 0.213 unit. The t-value of 2.611 and p-value of 0.010 indicates that this relationship is statistically significant since the p-value is less than 0.05. This result suggests that perceived ease of use is positively associated with the actual use of the system, meaning that people who find the system easier to use are more likely to use it. The finding was supported by a key informant, who argued that "the user-friendliness of the system highly influences its users to use it." (Key Informant, Consolata Dispensary, August 2022).

In Table 5 results show that perceived usefulness (Beta =0.275, t = 3.420, p = 0.001) was positive and a significant predictorof actual use of the system. The beta value of 0.275 indicates that for every unit increase in perceived usefulness, actual system use should increase by 0.275 unit. The t-value of 3.420 and p-value of 0.001 indicates that this relationship is statistically significant and that there is a very low probability (less than 0.001) of this relationship occurring by chance. This result suggests that perceived usefulness had a positive influence on the actual use of the system. This is consistent with a study by Alanazi [4] who argued that the use of HIS is highly influenced by a variety of factors that include the perceived usefulness of the system. Meaning that people who find the system useful are more likely to use it.

On the other hand, attitude towards using HIS (Beta = -0.018, t = -0.237, p = 0.813) was not a significant predictor of actual use of the system. The beta value of -0.018 indicates that for every unit increase in attitude toward using HIS, actual use is expected to decrease by 0.018 unit. However, the t-value of -0.237 and p-value of 0.813 indicates that this relationship is not statistically significant and has a high probability (greater than 0.813) of occurring by chance. This result suggests that attitude towards using HIS is not significantly associated with the actual use of the system, meaning that people's opinions about the system do not seem to influence their actual use of the system.

Behavioural intent to use (Beta = 0.204, t = 2.590, p = 0.011) was also discovered to be a positive and significant predictor of system use. The beta value of 0.204 indicates that for every unit increase in behavioural intent to use, actual system use was expected to rise by 0.204 unit. The t-value of 2.590 and p-value of 0.011 indicates that this relationship is statistically significant. It means that behavioural intention to use had a direct and significant effect on the actual use of the system. The findings are supported by a study by Wu and Wang [39]; the results showed that behavioural intention to use a system has a significant effect on actual use (b = 0.48, p = 0.01). This result suggests that people who have a strong intention to use the system are more likely to use it.

3.5 Challenges of HIS utilization

Health practitioners were asked to mention several challenges they face when using health information systems daily. The existing HISs challenges are summarized in Table 6. The results show that 31.5% of respondents said that system failure has been a major challenge, followed by 30.0% of respondents who said that poor network connection has been the second-most serious challenge to the use of health information systems. The findings are consistent with a study conducted by Kombe [40], who found that system failure and poor network connection are the two biggest challenges faced when using a Project Management Information System (PMIS) in organizations.This depicts that system capacity and strong network connectivity is required for the system to function well.

Table 6: Challenges of utilization

Challenge	Responses		Percent of Cases
	N	Percent	
System failure	41	31.5%	42.3%
Poor network connection	39	30.0%	40.2%
Frequent power outage	14	10.8%	14.4%
Lack of technical support	12	9.2%	12.4%
Many functionalities	9	6.9%	9.3%
Challenges with HIS integration and usability	8	6.2%	8.2%
Less training	7	5.4%	7.2%

In Table 6, the results show that 10.8% of respondents said that frequent power outage is a challenge hindering the effective use of HIS because the system depends on power to operate. This means that in the absence of sufficient power, effective use of HIS becomes difficult. Sometimes, during power outages, health practitioners had to continue providing care using manual systems. This results in double work, as the information captured in the manual form will then be entered into the system when the power is on. The finding is consistent with a study by Peltola [8], who found that manual systems are still necessary or used during a power outage.

From the above-mentioned challenges in Table 6, we learn that the challenges faced when using health information systems are the roadblocks to the effective use of HIS among health practitioners. These challenges are the reasons why they sometimes had to use paper-based systems. According to the study's findings, some respondents said they sometimes use paper-based because the system in use is unreliable; others said that system failure causes the system to fail and they can't stop providing care. Therefore, in case of system failure and power outages, some health facilities use a manual system while providing care to patients. However, a study conducted by Zaemba in Zimbabwe suggested that the use of manual systems in health facilities results in a weakened healthcare delivery system. [41]These results highlight the need for improvement in the HIS infrastructure and support systems to ensure effective utilization of these systems. Addressing these challenges can improve the overall utilization and effectiveness of HIS in Tanzania.

IV. CONCLUSION

In conclusion, the utilization of HIS in Tanzania seems to be influenced by various factors, including ownership type and HIS type. Overall, the results of this study highlight the importance of considering both technical and social aspects in the implementation and adoption of HIS in Tanzania. Further research is needed to gain a deeper understanding of the determinants of HIS utilization and to inform the development of effective strategies for improving HIS utilization in the country. The study recommends that stakeholders should address the challenges and barriers to the adoption and utilization of HIS in the public health sector to ensure improved quality of health services delivery. Additionally, efforts should be made to encourage the private health sector to continue investing in HISs to further improve the quality of healthcare service delivery.

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