Examining the Factors Affecting the Waiting Times for Patients Coming for General Abdominal Ultrasound in a Diagnostic Centre in Danyame: A Cross-sectional Study

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Abstract

Background: Lengthy waiting time in ultrasound units can significantly affects patient satisfaction and are crucial indicators of service quality in healthcare settings. The study investigates the factors influencing waiting times for general abdominal ultrasound at a diagnostic centre.

Method: A cross-sectional study of 100 participants was conducted at Totalite Diagnostic Centre. Data were presented using descriptive statistics, followed by analysis using the chi square and logistic regression test to identify the factors associated with waiting times and the significant predictors of turnaround time respectively.

Results: Of the participants, 62% were female and 38% were male. The primary causes of long waiting times were identified as few working staff, poor communication and staff impunctuality. These factors were significantly associated with prolong waiting times (p-value < 0.05). Additionally, waiting area time was found to play a significant role in predicting the likelihood of extended wait times across all categories.

Conclusion: Key factors contributing to long waiting times in the ultrasound unit include few working staff, impunctuality, poor communication and waiting area time. Addressing these factors is crucial for improving patients experience and reducing waiting times in a diagnostic centre.

Keywords: Waiting time, Ultrasound, Diagnostic center, Abdomen, Patient, Radiologist

1.0 Background

Lengthy waiting time is one of the major causes of patient dissatisfaction at various ultrasound units in most hospitals and remain a critical indicator of service quality (Mensur et al., 2022). Waiting time refers to the time a patient waits in the clinic before being attended to by medical staff (Enabulele et al., 2018). In the ultrasound unit, waiting time covers the time the patients report to the ultrasound department reception area to the time the report is taken to the medical records for dispatch (Wanganui, 2019). This duration includes the time spent during registration, the actual examination time and the subsequent report collection time. Each ultrasound examination such as the abdominal, gynecological, vascular, and small parts has a specific duration which should be communicated to patients to manage their expectations effectively.

Doctors looking to make fewer mistakes in their diagnosis, request that patients undergo various kinds of examinations to enable them to give proper diagnoses and provide them with good and high-quality healthcare. One disadvantage of the frequent request for this examination is that it increases the waiting list for patients at the unit since the ultrasound equipment to patient ratio at most units does not match, leading to patients being highly unsatisfied owing to the long waiting time (Akintomide et al., 2019). At Kenyatta National Hospital in Kenya, most ultrasound cases are booked, with the exception of emergency cases (Wanganui, 2019). For those who do not book, examinations are performed depending on the degree of urgency and need for preparation (Wanganui, 2019). With respect to preparation, certain abdominal examinations, which include the pelvic region, require a full bladder to create a clearer view of structures such as the uterus, prostate, ovaries, and other organs in the pelvic region but those that involve only the abdomen do not require a full bladder; hence, the unit must explain to patients why certain patients with a full bladder will be attended to before others, regardless of the time they visit, to avoid any unnecessary argument among patients to prevent patient dissatisfaction (Zalak et al., 2023)Recent studies on patient waiting times have revealed a strong inverse relationship between waiting time and patient satisfaction (Enabulele et al., 2018). A completely satisfied patient believes that the organization has the potential to understand patient needs and demands related to health care (Ferreiraet al., 2023). The patient's experience of waiting can influence his/her perception of the quality of service. According to Ouko (2012), some of the factors contributing

to delay could include lack of enough staff, billing system breakdown, the need for further discussion or consultation, patients' preparation for the examination, a countercheck of the request form for justification of examination and a lack of proper direction to the examination rooms.

In Ghana, healthcare resources are often limited, and demand for diagnostic services often exceeds supply, leading to extended waiting times in radiology unit. Despite the critical importance of this issue, there is a notable lack of research specifically addressing waiting time in outpatient radiology services within the Ghanaian context. This gap in the literature is significant because most of the problems that healthcare providers and patients face in Ghana like not having enough medical equipment, staff shortages and other issues are not well studied and documented.

This study seeks to fill this gap by identifying the factors influencing waiting times for general abdominal ultrasound at a diagnostic center, in Danyame, Ghana.

2.0 Methodology

This is a cross-sectional study in a private healthcare facility in Danyame, Ashanti region, Ghana. The healthcare facility has a radiology department run by a radiologist and other specialized department. The study involves 100 participants referred mainly by neighboring community hospital. A convenience sampling method was used to select the participants from all individuals who visited the healthcare facility for an abdominal ultrasound during the study period. This approach was chosen due to practical constraints, allowing for efficient and feasible data collection. The participants were scanned in the ultrasound unit of the radiology department during regular working hours on Monday to Saturday each week, for a 5weeks study period.

The study obtained informed consent from participants and permission from Totalite Diagnostic Center's Board. Due to absence of an Institutional Review Board (IRB), formal ethical review was not sought. Different codes were generated for participants for identification purposes. Participant names and personal details were kept anonymous. Data collected for this research will be kept for at least four (4) years.

In this study, the data were collected mainly through the use of a set of comprehensive questionnaires. The questionnaires sought information such as sociodemographic characteristics such as age, sex, health status and time of arrival. Other information that was elicited from the participants included time spent at various departments at the ultrasound unit and their overall turnaround time. Additionally, the questionnaire included multiple response questions on factors contributing to waiting times. To enhance the accuracy of the data collected, a stop watch was used to confirm the time range selected by the participants on the questionnaire. This method ensured that the participants' reported times were cross-validated with objective measurement, increasing the reliability of the data collected. The data collected were analyzed using Microsoft Excel and the statistical package SPSS version 20. The data were entered into Microsoft Excel and all the statistical analyses were performed using the SPSS version 20. Frequency distribution

and cross tabulation analyses were performed. A chi-square test was used to assess the associations between categorical variables in order to establish their statistical significance with p-value < 0.05. Also, logical regression was used to identify significant predictors of turnaround time. The model included time taken at various service point of the ultrasound unit (registration point, payment point, waiting area, examination room and report typing after procedure) The results are presented in tables and figure.

3.0 Results and Statistical Analysis
3.1 Overview
This section presents the results of the data collection and analysis. The data available for statistical analysis were from 100 participants from Totalite Health Diagnostics. The results are explained and presented in the form of text and tables.

3.2.0 Sociodemographic and clinical characteristics of the study participants

Table 1: Sociodemographic and Clinical Characteristics of Study Participants

Variable	Category	Frequency (%)
Gender	Female	62 (62%)
	Male	38 (38%)
Age Group	Less than 18	5 (5%)
	18-25	24 (24%)
	26-39	42 (42%)
	40-64	24 (24%)
	65-75	3 (3%)
	Above 75	2 (2%)
Time of Arrival	Morning Shift (8am-2pm)	80 (80%)
	Afternoon Shift (2pm-8pm)	20 (20%)
Health Status	No difficulty in performing activities	71 (71%)
	Difficulty in performing activities	29 (29%)

Table 1 presents the sociodemographic and clinical characteristics of the study participants. A majority of respondents were female (62%) and belonged to the age group of 26-39 years (42%). Most participants (80%) visited the diagnostic center during the morning shift, and 71% of respondents reported no difficulty in performing life activities.

3.3.1 Time Taken at Various Service Points.

Table 2: Time Distribution at Various Service Points and Overall Turnaround Time at the Ultrasound Unit (n=100)

Time Period	Frequency (%)
Registration Point	
1-15 min	84 (84.0%)
16-30 min	12 (12.0%)
31-45 min	3 (3.0%)
46-60 min	-
Above 60 min	1 (1.0%)
Payment Point	
1-15 min	86 (86.0%)
16-30 min	11 (11.0%)
31-45 min	2 (2.0%)
46-60 min	-
Above 60 min	1 (1%)
Waiting Area	
1-15 min	8 (8.0%)
16-30 min	26 (26.0%)
31-45 min	8 (8.0%)
46-60 min	13 (13.0%)
Above 60 min	45 (45%)
Examination Room	
1-15 min	61 (61.0%)
16-30 min	32 (32.0%)
31-45 min	6 (6.0%)
46-60 min	1 (1.0%)
Above 60 min	-
Reporting after procedure	
1-15 min	43 (43.0%)
16-30 min	43 (43.0%)
31-45 min	8 (8.0%)
46-60 min	3 (3.0%)
Above 60 min	3 (3.0%)
Total Turnaround time	
Less than 1hr	11 (11.0%)
1-2 hrs	34 (34.0%)
2-3 hrs	33 (33.0%)
3-4 hrs	14 (14.0%)
Over 4 hrs	8 (8.0%)

Table 2 presents the time taken at various service points in the ultrasound department. Most patients spent 1-15 minutes at the registration (84%) and cashier points (86%), while a notable portion spent over 60 minutes in the waiting area (45%). The overall turnaround time showed that most patients (67%) took between 1 to 3 hours to complete their ultrasound services.

3.2.2 Causes of delay at the ultrasound unit

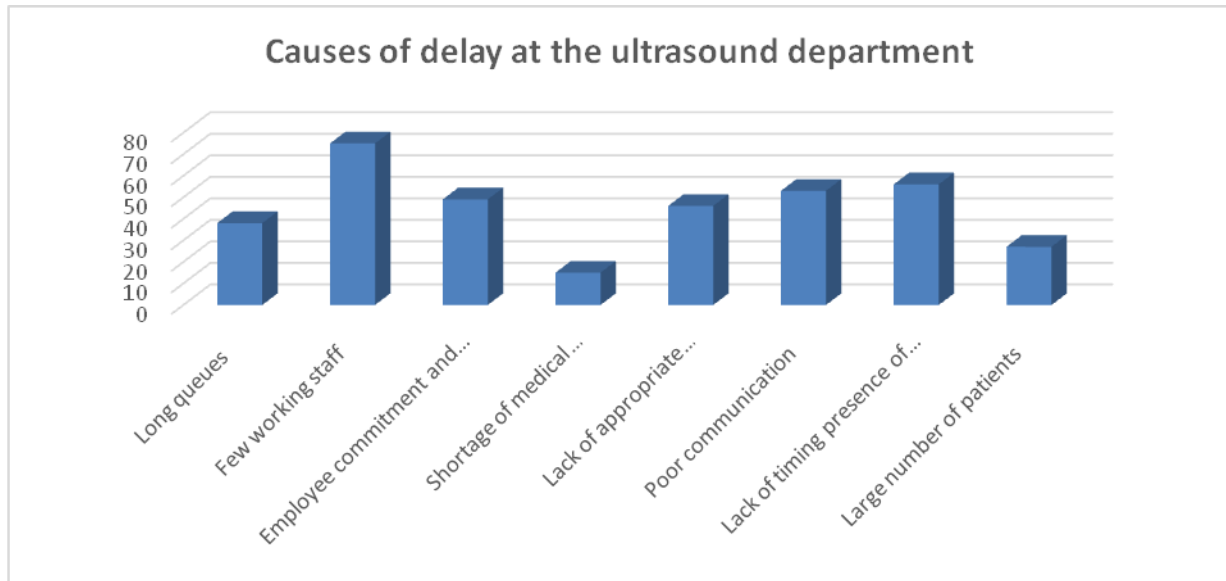Figure 1: Causes of delay at the ultrasound department

Figure 1 above illustrates the cause of the delay at the ultrasound unit. Out of the 100 respondents, more than 50% of the respondent believed that few working staff, poor communication, and lack of timing of staff were the major cause of delay at the ultrasound department.

3.3. Factors associated with patients' waiting time.
3.3.1 Sociodemographic and Clinical Characteristics Associated with Patient Turnaround Time

Table 3: Sociodemographic and Clinical Characteristics Associated with Patient Turnaround Time

Variable	Turnaround time at the ultrasound department					Chi-Square	P-value
	Less than 1 hour	1-2 hours	2-3 hours	3-4 hours	Above 4 hours		
Gender						**3.244**	**0.518**
Male	5 (13.2%)	13 (34.2%)	15 (39.5%)	3 (7.9%)	2 (5.3%)		
Female	6 (9.7%)	21 (33.9%)	18 (29%)	11 (17.7%)	6 (9.7%)		
Health status						**1.663**	**0.797**
Difficulty performing life activities	2 (6.9%)	9 (31%)	12 (41.4%)	4 (13.8%)	2 (6.9%)		
No difficulty performing life activities	9 (12.7%)	25 (35.2%)	21 (29.6%)	10 (14.1%)	6 (8.5%)		
Time of arrival						**24.538**	**<0.001****
Morning shift (8am-2pm)	4 (5.0%)	24 (30.0%)	32 (40.0%)	14 (17.5%)	6 (7.5%)		
Afternoon shift (20m-8pm)	7 (35.0%)	10 (50.0%)	1 (5.0%)	0 (0.0%)	2 (10.0%)		
Age						**18.814**	**0.530**
Less than 18years	0 (0.0%)	3 (60.0%)	1 (20.0%)	0 (0.0%)	1 (20.0%)		
18 to 25years	4 (16.7%)	8 (33.3%)	7 (29.2%)	2 (8.3%)	3 (12.5%)		
26 to 39years	4 (9.5%)	12 (28.6%)	13 (31.0%)	11 (26.2%)	2 (4.8%)		
40 to 64years	3 (12.5%)	9 (37.5%)	9 (37.5%)	1 (4.2%)	2 (8.3%)		
64 to 75 years	0 (0.0%)	2 (66.7%)	1 (33.3%)	0 (0.0%)	0 (0.0%)		
Above 75years	0 (0.0%)	0 (0.0%)	2 (100.0%)	0 (0.0%)	0 (0.0%)		

Table 3 above illustrates the associations between sociodemographic characteristics and turnaround time. The results indicate a significant association between the time of arrival and turnaround time (p<0.001). However, gender showed no association with turnaround time (p= 0.518). Additionally, the health status of the participants showed no significant association with turnaround time (p = 0.797). Similarly, their age showed no significant association with turnaround time; Chi-square analysis gave p-values of (p = 0.530).

3.3.2 Causes of Delays Associated with Turnaround Time

Table 4: Causes of Delays Associated with Turnaround Time

Variable	Turnaround time at the ultrasound department					Chi-Square	P-Value
	Less than 1 hour	1-2 hours	2-3 hours	3-4 hours	Over 4 hours		
Long queues						**7.143**	**0.123**
Yes	3(7.9%)	10(26.3%)	12(31.6%)	7(18.4%)	6(15.8%)		
No	8(12.9%)	24(38.7%)	21(33.9%)	7(11.3%)	2(3.2%)		
Few working staff						**16.300**	**0.003****
Yes	3(4.0%)	29(38.7%)	26(34.7%)	10(13.3%)	7(9.3%)		
No	8(32.0%)	5(20.0%)	7(28.0%)	4(16.0%)	1(4.0%)		
Employee commitment and attitude						**11.346**	**0.002****
Yes	1(2.0%)	18(36.7%)	19(38.8%)	5(10.2%)	6(12.2%)		
No	10(19.6%)	16(31.4%)	14(27.5%)	9(17.6%)	2(3.9%)		
Lack of appropriate timing and planning						**10.895**	**0.028****
Yes	1(2.2%)	14(30.4%)	19(41.3%)	6(13.0%)	6(13.0%)		
No	10(18.5%)	20(37%)	14(25.9%)	8(14.8%)	2(3.7%)		
Poor communication						**11.468**	**0.022****
Yes	3(5.7%)	15(28.3%)	25(47.2%)	6(11.3%)	4(7.5%)		
No	8(32.0%)	19(40.4%)	8(17.0%)	8(17.0%)	4(8.5%)		
Lack of timing presence of staff						**10.574**	**0.032****
Yes	2(3.6%)	17(30.4%)	23(41.1%)	8(14.3%)	6(10.7%)		
No	9(20.5%)	17(38.6%)	10(22.7%)	6(13.6%)	2(4.5%)		

Table 4 above illustrates the association between cause of the delay and the turnaround time. There was a significant association between the few working staff (radiologists) and turnaround time (p = 0.003). Employee commitment and attitude also showed a significant association with turnaround time (p = 0.002). Also, lack of appropriate timing and planning showed a significant association with turnaround time (p = 0.028). Similarly, poor communication showed an association with turnaround time (p = 0.022), and, lack of timing presence of staff also showed a significant association with turnaround time (0.032). Long queues, on the other hand, showed no significant association with turnaround time; Chi-square analysis gave p-values of (p = 0.123).

3.3.3 Logistic Regression Analysis of Turnaround Time Predictors in the Ultrasound Department

Table 5: Logistic Regression Analysis of Turnaround Time Predictors in the Ultrasound Department

Time Category	Predictor	B	P-Value	Odds Ratio	95% CI
1-2 hours	Intercept	2.206	.214		
	Registration point time	0.151	.921	1.163	0.059 - 23.063
	Cashier point time	0.344	.834	0.709	0.028 - 17.780
	Waiting area time	0.742	.027	2.100	1.088 - 4.054
	Examination time	1.411	.090	4.100	0.804 - 20.920
	Reporting time	0.261	.526	0.770	0.344 - 1.727
2-3 hours	Intercept	2.586	.129		
	Registration point time	0.000	1.000	1.000	0.052 - 19.198
	Cashier point time	0.700	.650	2.013	0.098 - 41.392
	Waiting area time	0.971	.004	2.639	1.357 - 5.134
	Examination time	0.769	.367	2.157	0.405 - 11.482
	Reporting time	0.541	.223	0.582	0.244 - 1.389
3-4 hours	Intercept	5.384	.014		
	Registration point time	0.804	.628	0.447	0.017 - 11.584
	Cashier point time	1.837	.270	6.275	0.240 - 163.766
	Waiting area time	1.246	.002	3.477	1.589 - 7.610
	Examination time	0.158	.874	1.171	0.167 - 8.212
	Reporting time	0.113	.802	1.120	0.463 - 2.706
Over 4 hours	Intercept	7.207	.015		
	Registration point time	1.466	.412	4.332	0.130 - 143.829
	Cashier point time	0.083	.964	0.921	0.025 - 34.306
	Waiting area time	1.556	.003	4.738	1.679 - 13.371
	Examination time	0.344	.773	0.709	0.068 - 7.361

Time Category	Predictor	B	P-Value	Odds Ratio	95% CI
	Reporting time	0.116	.826	1.123	0.398 - 3.168

Table 5 predicts the likelihood of different waiting times at the ultrasound department based on the time spent at various points in the hospital. The analysis of the turnaround time at the ultrasound department reveals that the variable waiting area time plays a significant role in predicting the likelihood of extended wait times across all categories. For the 1–2-hour category, a one-unit increase in waiting area time is associated with a 2.1 times higher likelihood of waiting 1-2 hours compared to less than 1 hour, and this result is statistically significant (p = 0.027). Although Examination room time shows a potential 4.1 times higher odds of waiting 1-2 hours, this result is not statistically significant (p = 0.090), indicating some uncertainty. In the 2–3-hour category, waiting area time has a highly significant effect (p = 0.004), increasing the odds of waiting 2-3 hours by 2.639 times, while other variables (Registration point time, Cashier point time, Examination time, and Reporting time) show no significant effect. For the 3–4-hour category, a one-unit increase in waiting area time significantly raises the odds by 3.477 times (p = 0.002). Cashier point time, although not significant (p = 0.270), suggests an increase in odds with high uncertainty. In the over 4 hours category, the waiting area time has a significant effect, increasing the odds by 4.738 times (p = 0.003). Other variables in this category (Registration point time, Cashier point time, Examination time, and Reporting time) show no significant association. Overall, waiting area time consistently demonstrates a significant positive relationship with longer turnaround times, while other variables tend to have weaker or non-significant effects on turnaround times.

4. Discussion
4.1 Overview
This chapter discusses the research findings on the basis of the study's results. A conclusion and recommendations are also drawn on the basis of the findings of the study. The recommendation encompasses findings on the basis of the study objectives.

4.2 Sociodemographic and Clinical Characteristics
A total of 100 questionnaires were distributed, and the corresponding data were entered and analyzed. Most of the participants were females (62%), predominantly aged 26 to 39years which aligns with the study of Akintomide et al. (2019) in which 87.7% of those surveyed were females, with most of them being between the age group of 21 to 30 years. However, while the findings are consistent some aspects of previous research, other studies, such as Hamed & Salem (2014), reported that a greater proportion of their participants had difficulty performing various life activities, contrasting with the 71% of participants who reported no difficulties.
The significant association between time of arrival and turnaround time underscores the operational challenges faced by the diagnostic centre. Whiles most of the participants arrived during morning hours, only one radiologist was available, and their late arrival contributed significantly to long waiting times. This is in contrast to the findings of Dadeh &

Phunyanantakorn (2020), where rime of arrival did not affect patient turnaround times, highlighting the need for context specific interventions in healthcare delivery.

4.3. Determination of the Turnaround Time for Abdominal Ultrasound in A Diagnostic Center

According to the analyzed data, 45% of the participants spent more than 60 minutes at the waiting area. This contrast with Issue, who reported a maximum waiting time of less than 20minutes, but aligns with Shahzadi & Annayat (2017), who observed waiting time exceeding 60minutes. The lengthy time spent at the waiting area may be attributed to operational challenges in the study settings, such as the late arrival of radiologist and the fact that only one radiologist was available to attend to all patients. Furthermore, most participants arrived in the morning hours, leading to backlog that increased waiting times. More than 50% of the participants spent between 1 to 15 minutes at each service point- registration point, the payment point, and the examination room- consistent with Catherine (2019)who noted that patients spent between 1-15 minutes. The mean turnaround time was 2hrs/6min, which contradicts the findings of Catherine (2019), who reported that the turnaround time of patient visiting the radiology department was more 4 hours. This difference may be due to differences in patients' management practice, case complexity, time of arrival of staff and staff workload.,

To further understand the impact each service point had on the turnaround time, a logistics analysis was conducted. The results indicated that waiting area time was the most significant predictor of extended turnaround times. Specifically, for a 1-2hour turnaround time, a one-unit increase in waiting area time raised the odds by 2.1 times ($p = 0.027$). For 2-3hours, the odds increased by 2.6 times ($p = 0.004$) and for 3-4hours the odds were 3.5 times higher ($p = 0.002$). For over four hours one-unit increase in waiting area was associated with a 4.7-fold increase in the ($p = 0.003$).

This finding suggests that waiting area time significantly contributes to prolonged turnaround time in diagnostic centres. Other variables, such as registration point time, cashier point time, examination time, and reporting time, did not show significant associations with prolonged turnaround times, indicating that efforts to improve efficiency should particularly focus on reducing waiting times in the waiting area.

4.4. Determination of the Factors That Contribute to the Waiting Time of Patients Visiting the Diagnostic Center for an Abdominal Ultrasound

The study identified three primary factors contributing to prolonged waiting time: few working staff (radiologist), impunctuality of staff and poor communication. These findings partially align with some existing studies. For instance, Chimuanya (2017) reported that lack of staff is a significant factor contributing to long waiting times in radiology units, consistent with our findings that that few working staff affect patients turnaround time. In our study, the majority of the participants visited during the morning hours, and since there was only one radiologist attending to all of them, the radiologist was overwhelmed with the workload, which contributed to the long waiting times. However, the study also highlights poor communication and impunctuality of staff as major factors which have not been explicitly addressed in prior literature. Patients reported that the radiologist often arrived later than the communicated time of

8:00 AM, and that they were not informed about the reasons for the delay. Many participants felt misinformed about when services would begin, causing frustration and extended waiting time. In addition to the above mentioned, the participants' process related factors were also assessed using the Likert scale format, and from the mean of their responses, majority of the participants agreed with the following statement: that the radiologist arrived late, the radiologist started working late, and few radiologists were available to attend to patients which increased the workload on them. This statement is in line with the findings of Chimuanya (2017), who reported that patients arriving before staff was a contributing factor to prolonged waiting time.

4.5. Association between Turnaround Time and Factors Affecting Patient Waiting Time

The study findings revealed a statistically significant association between few working staff (radiologist) and turnaround time ($p = 0.003$). Most of the participants who believed that having few working staff was a factor affecting waiting time, spent between 1 to 2 hours at the diagnostic centre. They attributed this to the high workload on the few working staff, which they felt led to longer waiting times. Participants suggested that increasing the number of working staff (radiologists) could reduce waiting time at the diagnostic centre.

Additionally, the study found a significant association between poor communication and turnaround time ($p = 0.022$). Majority of the participants who identified poor communication as a contributing factor to long waiting time, reported spending between 2 to 3hours at the ultrasound unit. They explained that they were informed the diagnostic centre opened at 8am; however, they often arrived earlier than this, only to realize the radiologist would arrive 30 to 60 minutes late, which affected their turnaround time.

The study also showed a significant association between turnaround time and several factors, such as lack of checks on staff punctuality, employment commitment and lack of appropriate timing and planning ($p < 0.05$). Most participants mentioned that the more frequently sonographers arrived late, the longer the turnaround time. The results showed that majority of the patients who stated that the lack of checks on the punctuality of staff and poor attitudes and commitments toward work were contributing factors to the long waiting time spent between 2 to 3 hours at the ultrasound unit. This delay was as a result of staff not arriving on time and hence not starting work on time. However, there was no significant association between long queues and turnaround time with a p-value of 0.123. This suggest that contrary to previous studies by (Catherine, 2019) and (Issue et al., 2015) long queues in the radiology unit do not necessarily contribute to long waiting times.

4.6. Limitations of the study

1. The study involved 100 participants, which may limit the generalizability of the findings to a larger population. Future studies with larger sample sizes are recommended to enhance the robustness of the results.
2. The research was conducted at a single diagnostic centre, which may limit the applicability of the findings to other settings with different operational practices.

3. The use of convenience sampling may introduce selection bias, as participants were recruited based on availability rather than random selection. This may affect the representativeness of the sample and the generalizability of the findings.

4.7. Recommendation for future researchers

1. Future studies should aim to include a larger sample size to improve the generalizability of the findings. A more extensive sample would provide a more accurate representation of the population and strengthen the reliability of the results.
2. To enhance the applicability of the findings, conducting similar studies across multiple diagnostic centres or hospitals with varying operational practices is recommended. This would allow for comparisons between different settings and identify potential universal or context-specific factors affecting waiting times.
3. To minimize selection bias and improve the representativeness of the sample, future research should consider employing random sampling techniques. This would increase the validity of the findings and make them more generalizable to a broader population.

4.8. Recommendation for policy makers

1. Improving staff punctuality and communication at diagnostic centres could significantly reduce waiting times, thereby enhancing patient satisfaction
2. Recruiting and training more sonographers in diagnostic centres will help reduce the patient to staff ratio, leading to quicker service delivery.
3. Regular performance evaluations of diagnostic centres can help identify bottlenecks and improve service efficiency.
4. Establishing clear guidelines on patient preparation and scheduling could prevent unnecessary delays and streamline ultrasound process
5. Investing in technological advancement, such as automated scheduling system, could minimize human errors and enhance workflow.

5.0 Conclusion

Findings from the study indicate that having few working staff, staff impunctuality and poor communication were the major factors contributing to prolonged waiting time at the diagnostic unit. Additionally, the time of arrival of participants had a significant association with patient's turnaround time, underscoring the impact time of arrival of participants contributed to their turnaround time. The study also revealed that time spent in the waiting area significantly contributes to the overall waiting time. Logistic regression analysis confirmed the significant impact of waiting area time on the turnaround time. It can be concluded that findings of this study have met the objectives of the research by identifying the key factors influencing waiting times in the ultrasound unit.

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