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The Impact of Diagnostic Accuracy and Waiting Time on Diabetes Patients' Satisfaction: An Applied Study at Benghazi Specialized Diabetes Treatment Center – Libya

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أثر دقة التشخيص الطبي ووقت الانتظار على رضا مرضى السكري: دراسة تطبيقية في مركز بنغازي المتخصص لعلاج السكري – ليبيا

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Abstract:

Patient satisfaction serves as a fundamental benchmark for measuring the quality of healthcare delivery, particularly for individuals managing chronic conditions like diabetes mellitus. This study aimed to investigate the specific impact of two critical factors—medical diagnostic accuracy and waiting time—on the overall satisfaction levels of patients at the Benghazi Specialized Diabetes Treatment Center in Libya. Additionally, the research explored the relationship between patient satisfaction and the likelihood of recommending the center to others. To achieve these objectives, a descriptive-analytical research design was employed, and data were collected through a structured questionnaire. The survey was distributed to a sample of 115 patients, resulting in 100 valid responses after the exclusion of incomplete or invalid entries. All multi-item measures were assessed using a five-point Likert scale. Statistical analysis, performed using R software, included descriptive statistics, Pearson correlation, and multiple linear regression. The results revealed a strong positive correlation between perceived diagnostic accuracy and patient satisfaction ($r = 0.87$, $p < 0.001$). Conversely, a strong negative correlation was found between waiting time and satisfaction levels ($r = -0.74$, $p < 0.001$). Multiple regression analysis indicated that diagnostic accuracy ($\beta = 0.71$, $p < 0.001$) and waiting time ($\beta = -0.62$, $p < 0.001$) collectively explained 79% of the variance in patient satisfaction ($R^2 = 0.79$). Furthermore, higher satisfaction was significantly associated with a greater likelihood of recommending the facility. These findings highlight the critical importance of balancing clinical precision with operational efficiency. The study concludes that healthcare providers must prioritize

continuous medical training to enhance diagnostic accuracy while simultaneously optimizing administrative workflows to reduce patient wait times

Keywords: Patient satisfaction, diagnostic accuracy, waiting time, diabetes, Likert scale, *R* software.

الملخص

يُعد رضا المرضى معياراً أساسياً لقياس جودة تقديم الرعاية الصحية، لا سيما للأفراد الذين يعانون من أمراض مزمنة مثل داء السكري .هدفت هذه الدراسة إلى استقصاء التأثير المحدد لعاملين حاسمين هما: دقة التشخيص الطبي ووقت الانتظار، على مستويات الرضا العام للمرضى في مركز بنغازي المتخصص لعلاج السكري في ليبيا .بالإضافة إلى ذلك، بحثت الدراسة في العلاقة بين رضا المرضى واحتمالية توصيتهم بالمركز للآخرين .ولتحقيق هذه الأهداف، تم استخدام تصميم بحثي وصفي تحليلي، وجُمِعت البيانات من خلال استبيان منظم .وُزّع الاستبيان على عينة مكونة من 115 مريضاً، مما نتج عنه 100 استجابة صالحة بعد استبعاد الإدخالات غير المكتملة أو غير الصالحة .تم تقييم جميع المقاييس متعددة البنود باستخدام مقياس ليكرت الخماسي .شمل التحليل الإحصائي، الذي تم إجراؤه باستخدام برنامجR ، الإحصاء الوصفي، وارتباط بيرسون، والانحدار الخطي المتعدد .كشفت النتائج عن وجود ارتباط إيجابي قوي بين دقة التشخيص المدركة ورضا المرضى ($r = 0.87 ,p < 0.001$) .وعلى العكس من ذلك، وُجِد ارتباط سلبي قوي بين وقت الانتظار ومستويات الرضا ($r = -0.74,p < 0.001$) .وأشار تحليل الانحدار المتعدد إلى أن دقة التشخيص (β=0.71 ، $p < 0.001$) ووقت الانتظار β =-0.62 ، $p < 0.001$) يفسران معاً 79% من التباين في رضا المرضى .($R^2 = 0.79$) علاوة على ذلك، ارتبط الرضا العالي بشكل كبير بزيادة احتمالية التوصية بالمرفق الطبي .تسلط هذه النتائج الضوء على الأهمية البالغة للتوازن بين الدقة السريرية والكفاءة التشغيلية .وتخلص الدراسة إلى أنه يجب على مزودي الرعاية الصحية إعطاء الأولوية للتدريب الطبي المستمر لتعزيز دقة التشخيص مع تحسين سير العمل الإداري في الوقت ذاته لتقليل أوقات انتظار المرضى

الكلمات المفتاحية: رضا المرضى، دقة التشخيص، وقت الانتظار، مرض السكري، مقياس ليكرت، برنامج R.

1. Introduction

In the contemporary landscape of healthcare management, patient satisfaction has transcended its role as a mere secondary outcome to become a cornerstone metric for evaluating clinical quality and institutional efficacy (Reguimi & Bou Salem, 2022). Within modern healthcare paradigms, the transition toward patient-centered care models has positioned the patient's subjective experience as a primary determinant of service effectiveness. This is particularly salient in the management of chronic pathologies, such as diabetes mellitus, where the therapeutic alliance and long-term engagement are vital (Al-Juhani, 2024). Since diabetes management necessitates longitudinal monitoring, high-stakes clinical precision, and systematic follow-up, the patient's perception of care quality profoundly dictates their adherence to treatment protocols and their overall satisfaction (Al-Ghazali, 2014).

Among the multifaceted determinants of healthcare satisfaction, medical diagnostic accuracy represents a fundamental clinical dimension. Enhanced diagnostic precision does not merely optimize physiological treatment outcomes and mitigate the risk of medical errors; it serves as a psychological catalyst that fosters deep-seated trust between the patient and the healthcare provider (Reguimi & Bou Salem, 2022). When a diagnosis is perceived as accurate and timely, patients report higher levels of confidence in the healthcare system. Conversely, waiting time functions as a critical operational barometer that directly influences the patient experience. Prolonged waiting periods are often synonymous with administrative inefficiency, frequently inducing patient frustration and undermining the perceived value of the clinical encounter

(Rizany et al., 2021). Evidence suggests that even when clinical outcomes are favorable, operational delays can significantly erode satisfaction scores.

Despite the well-documented correlation between aggregate service quality and patient contentment, a distinct scholarly gap persists regarding the isolated and combined influence of diagnostic precision and operational efficiency within specialized chronic disease environments (Reguimi & Bou Salem, 2022). Furthermore, empirical evidence remains notably scarce within the Libyan healthcare context, particularly following recent efforts to modernize specialized centers. This study addresses this empirical void by investigating the impact of diagnostic accuracy and waiting time on patient satisfaction at the Benghazi Specialized Diabetes Treatment Center. By synthesizing clinical and operational variables, this research provides evidence-based insights to inform quality improvement strategies and healthcare policy in Libya (Alharbi et al., 2025; Almadani et al., 2026).

2. Literature Review

The nexus between healthcare service quality and patient satisfaction has been the subject of extensive empirical inquiry across diverse regional and cultural contexts. The consensus within the literature suggests that satisfaction is a multidimensional construct heavily influenced by both technical competence and functional delivery.

For instance, Reguimi and Bou Salem (2022) conducted an empirical evaluation at Hakim Okbi Hospital in Algeria, demonstrating a robust positive correlation between perceived quality and patient satisfaction. Their findings particularly highlighted "tangibility"—the physical evidence of the facility and equipment—as a dominant predictor of positive patient perceptions.

In the Libyan context, Al-Ghazali (2014) conducted a pivotal study in Benghazi's public hospitals, confirming that service quality exerts a statistically significant influence on patient experiences. This study bridged a critical gap by demonstrating that clinical delivery and recipient perception are inextricably linked in the local healthcare environment.

Research from the Gulf region provides further depth to this relationship. Bu-Alayyan et al. (2008) evaluated primary care in Kuwait, reporting a 60.7% satisfaction rate and identifying significant demographic variations, where age and gender played a role in how services were perceived. Parallel to these clinical findings, studies on operational efficiency, such as the research conducted by Rizany et al. (2021) in Indonesia, have identified a significant inverse relationship between outpatient waiting periods and satisfaction levels. Their data suggests that as delays increase, the patient's perception of the provider's competence decreases.

More recently, Al-Juhani (2024) explored satisfaction among diabetic patients in Saudi Arabia, noting that satisfaction is not static but fluctuates based on the specific type of service provided and the demographic profile of the patient. While these studies collectively underscore the importance of service quality, few have isolated "diagnostic accuracy" as a standalone clinical variable in tandem with "waiting time" within a specialized setting. The present study builds upon this existing body of literature by scrutinizing these specific determinants within the specialized environment of a Libyan diabetes center, thereby offering a more nuanced understanding of chronic care satisfaction.

3. Methodology

3.1 Study Design and Data Collection A descriptive-analytical research design was adopted for this study. Data were gathered using a structured questionnaire distributed to a convenience sample of 115 patients. After excluding 15 incomplete responses, the final analytical sample comprised 100 participants. The instrument encompassed five dimensions: demographics, diagnostic accuracy, waiting time, satisfaction, and recommendation likelihood. All items were evaluated using a 5-point Likert scale (ranging from 1 = "Very Low" to 5 = "Very High").

3.2 Sample Size and Statistical Power A power analysis confirmed that a sample of N=100 provides sufficient statistical power (1 - β = 0.80) to detect medium effect sizes (r = 0.5) at a significance level of α = 0.05, adhering to established psychometric standards (Cohen, 1992; Tabachnick & Fidell, 2013).

3.3 Validity and Reliability Content validity was established through expert review by healthcare professionals. Internal consistency was rigorously assessed using Cronbach's alpha, which yielded coefficients exceeding 0.75 for all scales, indicating high instrument reliability.

3.4 Statistical Analysis Data analysis was conducted using R software. The analytical framework included descriptive statistics (means and standard deviations), Pearson correlation coefficients to assess bivariate relationships, and multiple linear regression to determine the predictive power of the independent variables.

4. Results

4.1 Demographic Profile The demographic analysis (Table 1) revealed that the majority of participants were female (56%), while males accounted for 44% of the sample.

Table 1: Gender Distribution of the Study Sample

Gender	**Count**	**Percentage**
Male	44	44%
Female	56	56%
Total	100	100%

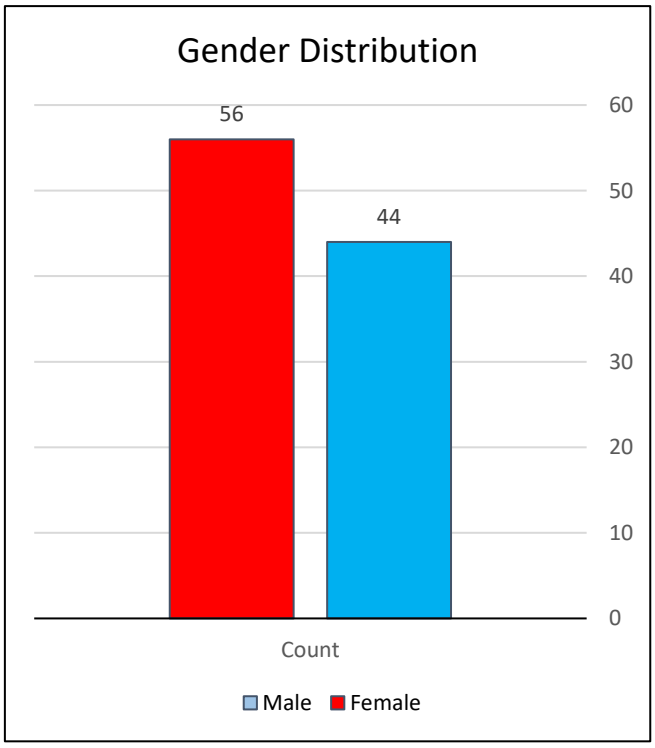

Figure 1: Gender Distribution.

4.2 Demographic and Socioeconomic Profile

The educational background of the participants was diverse, as detailed in Table 2. The descriptive analysis indicates that a substantial proportion of the sample held a Bachelor's

degree (46%), representing the largest educational cohort. This was followed by participants with secondary education (20%) and preparatory education (12%). Postgraduate qualifications were also present, with 15% holding a Master's degree and 7% possessing a Doctorate. These findings suggest that the study population is relatively well-educated, which may influence their expectations and perceptions of healthcare quality.

Table 2 Distribution of Participants by Education Level

Education	**Count**	**Percentage**
Preparatory	12	12%
Secondary	20	20%
Bachelor	46	46%
Master	15	15%
Doctorate	7	7%
Total	100	100%

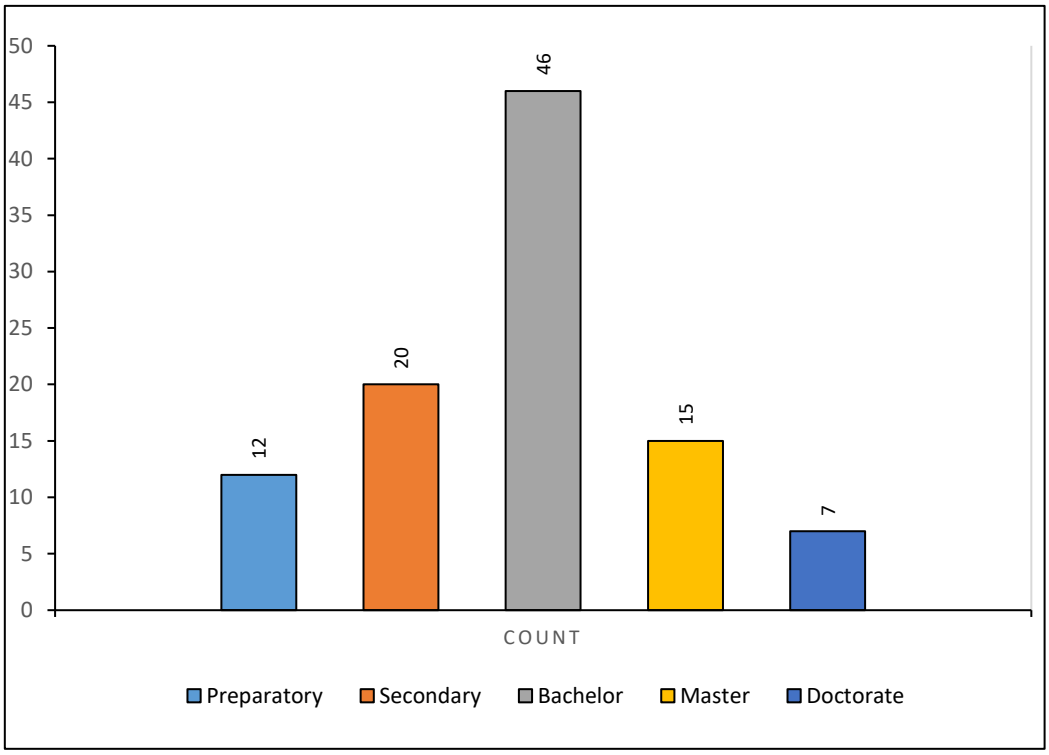

Figure 2: Education Level Distribution

4.3 Clinical Characteristics: Duration of Diabetes

The clinical profile of the respondents, specifically the duration of their condition, is presented in Table 3. A significant majority of the participants (57%) reported living with diabetes for more than 10 years, followed by those diagnosed for 6–10 years (22%). Only a small fraction (5%) had been diagnosed for less than a year. The cross-tabulation by gender shows a consistent pattern across both groups, indicating that the sample primarily consists of patients with long-term chronic illness who possess extensive experience with the center's services.

Table 3 Diabetes Duration Categorized by Gender

Duration	Female	Male	Total
<1 year	3	2	5
1–5 years	10	6	16
6–10 years	12	10	22
>10 years	31	26	57
Total	56	44	100

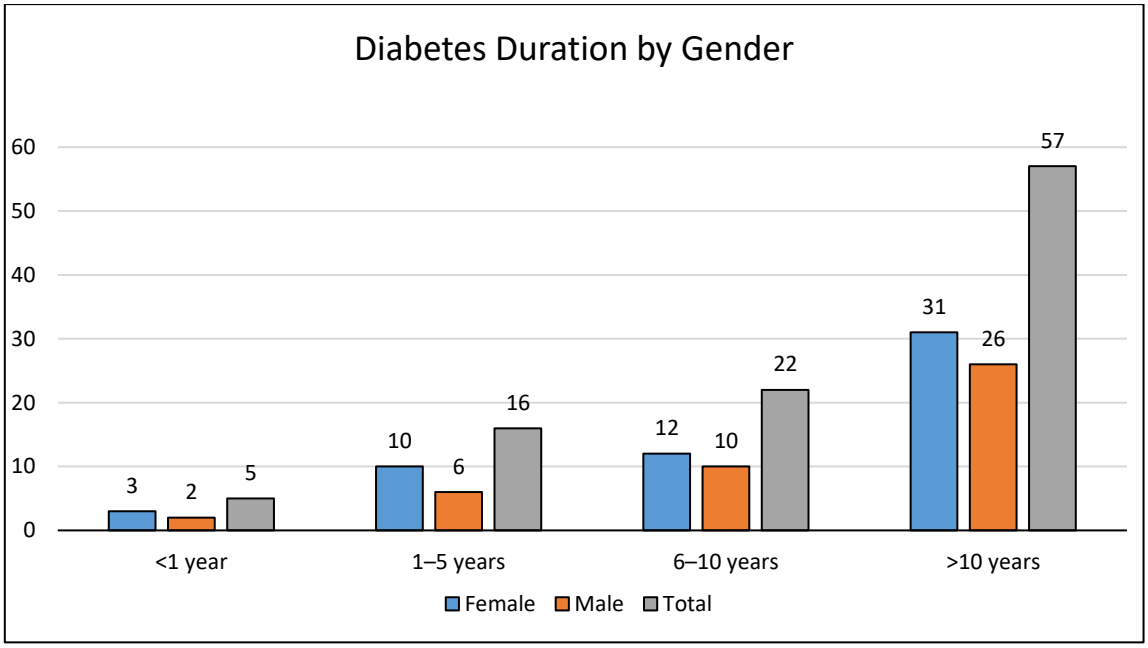

Figure 3: Diabetes Duration by Gender

4.4 Evaluation of Waiting Time and Patient Satisfaction

Operational efficiency was assessed through patients' perceptions of waiting times. As shown in Table 4, the modal response was "Average" (33%), followed by "Good" (28%) and "Poor" (24%). Notably, only 15% of the respondents rated the waiting time as "Excellent." These results reflect a moderate to negative perception of administrative efficiency within the facility.

Table 4 Patient Evaluation of Waiting Time by Gender

Waiting Time	Male	Female	Total %
Excellent	7	8	15%
Good	12	16	28%
Average	15	18	33%
Poor	10	14	24%
Total	44	56	100%

Figure 4: Waiting Time by Gender

Furthermore, when asked to rate their overall satisfaction specifically regarding waiting times (Table 5), the majority of the sample (54%) expressed dissatisfaction, while 46% reported being satisfied. This prevalent dissatisfaction underscores the significant impact that operational delays have on the overall patient experience, necessitating a closer examination of the center's workflow management.

Table (5) Overall Satisfaction Level Regarding Waiting Time

Satisfaction	**Count**	**Percentage**
Satisfied	46	46%
Dissatisfied	54	54%
Total	100	100%

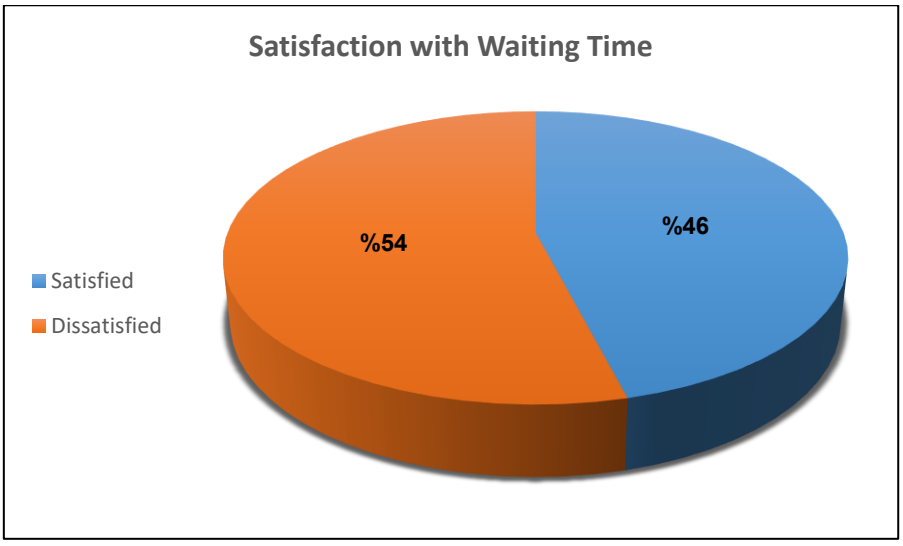

Figure 5: Satisfaction with Waiting Time.

4.4 Diagnostic Accuracy and Patient Confidence

As illustrated in Table 6, the perception of clinical diagnostic accuracy was generally positive. A total of 37% of respondents rated the accuracy as "Accurate," and 34% as "Very Accurate." Combined, over 70% of the sample held a favorable view of the medical staff's diagnostic capabilities. Conversely, only 7% perceived the diagnostic process as "Inaccurate."

Table (6) Perceived Diagnostic Accuracy Categorized by Gender

Accuracy	**Male**	**Female**	**Total**	**%**
Very Accurate	16	18	34	34%
Accurate	15	22	37	37%
Average	10	12	22	22%
Inaccurate	3	4	7	7%
Total	44	56	100	100%

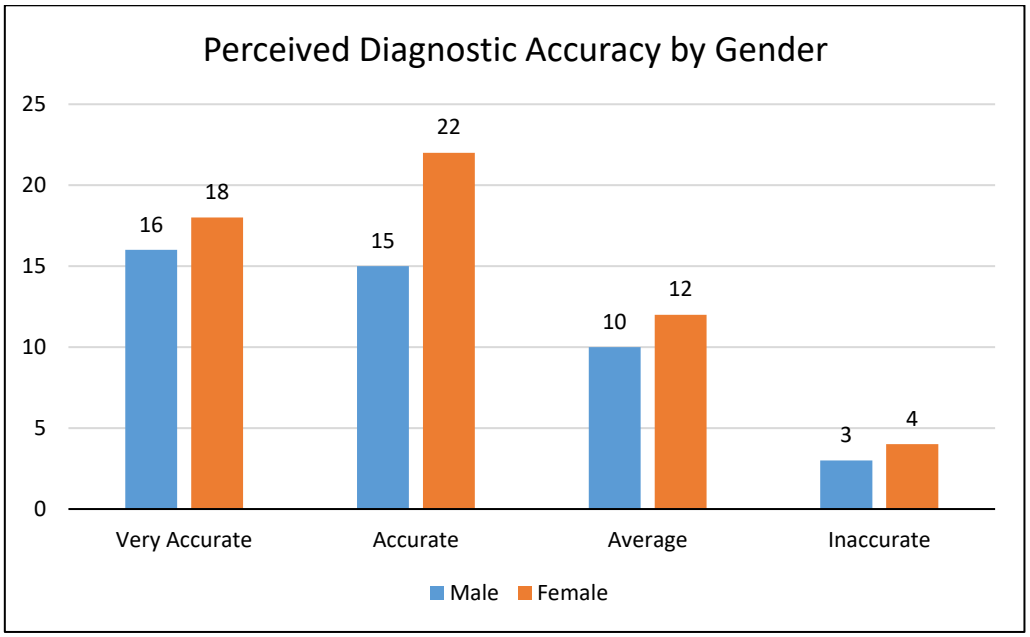

Figure 6: Perceived Diagnostic Accuracy by Gender

This perception of high diagnostic precision is further reflected in the binary satisfaction ratings (Table 7), where 72% of participants expressed satisfaction with the diagnostic outcomes, while 28% reported dissatisfaction.

Table (7) Patient Satisfaction with Diagnostic Outcomes

Satisfaction	**Count**	**Percentage**
Satisfied	72	72%
Dissatisfied	28	28%
Total	100	100%

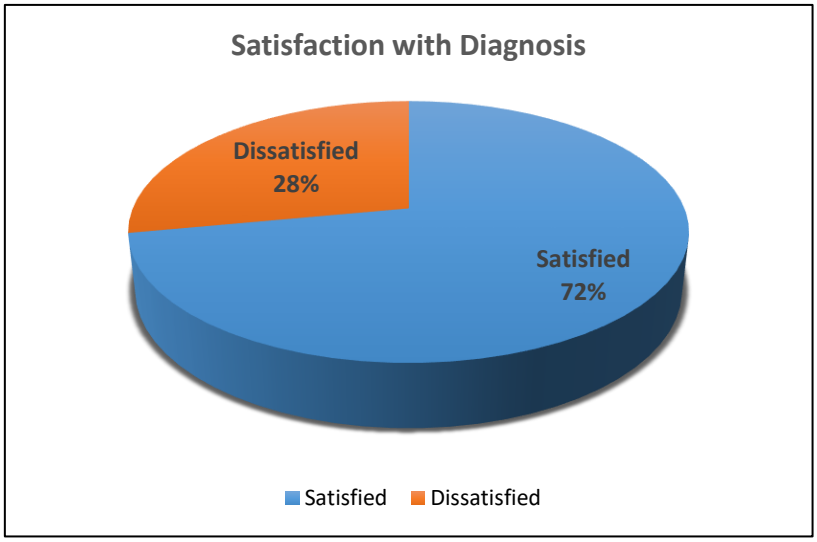

Figure 7: Satisfaction with Diagnosis

4.5 Propensity to Recommend

The study also evaluated the likelihood of patients recommending the center to others. As shown in Table 8, 60% of respondents indicated they were "Likely" to recommend the facility, while 40% expressed reluctance. This suggests that while clinical quality is high, other factors (such as waiting time) may be tempering the patients' willingness to endorse the center.

Table (8) Patient Likelihood of Recommending the Center

Recommendation	**Count**	**%**
Likely	60	60%
Unlikely	40	40%
Total	100	100%

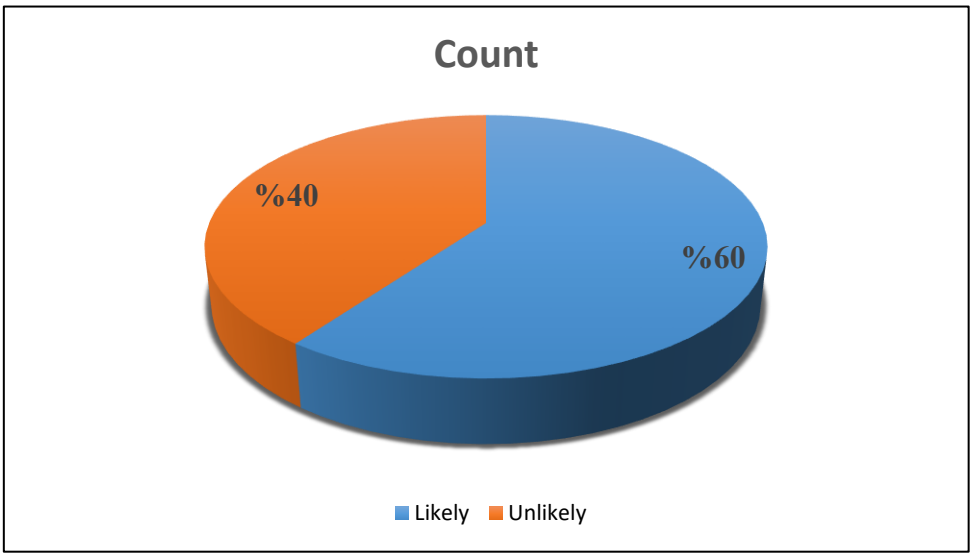

Figure 8: Recommendation (%)

4.6 Descriptive Statistics of Study Variables

Descriptive statistics for the primary variables are summarized in Table 9. Diagnostic Accuracy achieved the highest mean score (M = 3.58, SD = 0.64) on a 5-point scale, followed by General Satisfaction (M = 3.41, SD = 0.61). Waiting Time received the lowest evaluation (M = 3.02, SD = 0.88), indicating that it is the most critical area for operational improvement.

Table (9) Descriptive Statistics: Means and Standard Deviations

Variable	Mean	SD
Diagnostic Accuracy	3.58	0.64
Waiting Time	3.02	0.88
Satisfaction	3.41	0.61

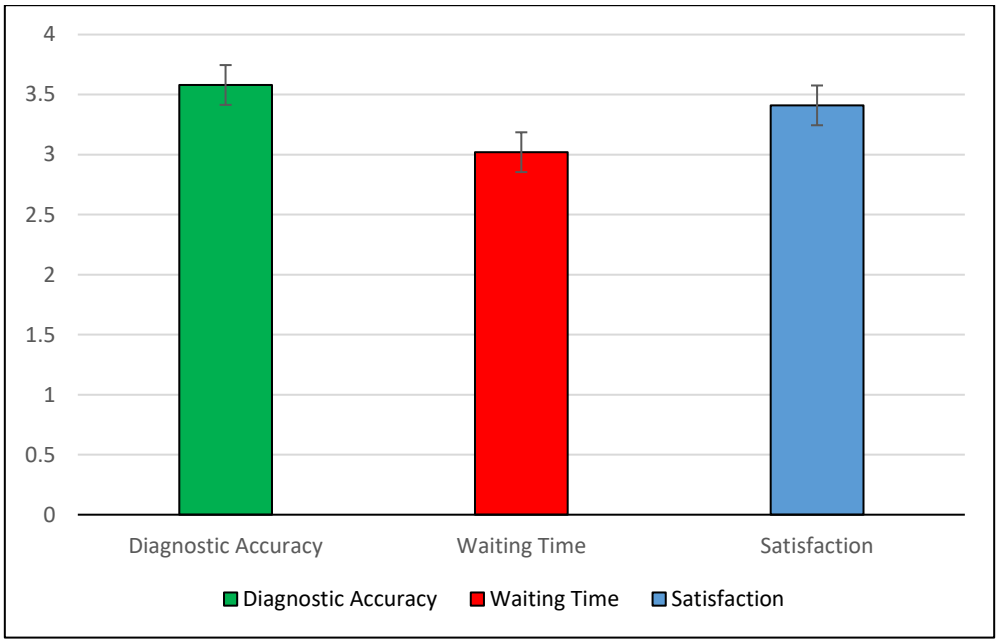

Figure 9: Descriptive Statistics of Study Variables (Means ± SD)

4.7 Correlation Analysis

Pearson correlation coefficients were calculated to examine the bivariate relationships between variables (Table 10). The analysis revealed a strong, statistically significant positive correlation between Diagnostic Accuracy and Patient Satisfaction ($r = 0.87$, $p < 0.001$). In contrast, a strong negative correlation was observed between Waiting Time and Satisfaction ($r = -0.74$, $p < 0.001$). These results suggest that as diagnostic precision increases, satisfaction rises, whereas prolonged waiting times significantly diminish it.

4.8 Multiple Linear Regression Analysis

To determine the relative predictive power of the independent variables on patient satisfaction, a multiple linear regression analysis was performed (Table 11). The results indicate that the model is statistically significant, $F(2, 97) = 177.6$, $p < 0.001$, explaining approximately 79% of the variance in patient satisfaction ($R^2 = 0.79$).

Diagnostic Accuracy emerged as the strongest positive predictor ($B = 0.71$, $p < 0.001$), while Waiting Time was a significant negative predictor ($B = -0.62$, $p < 0.001$). These findings

provide empirical support for the hypothesis that both clinical and operational factors are critical determinants of the patient experience.

Table (10) Multiple Linear Regression Results for Patient Satisfaction

Predictor	**β**	**SE**	**t**	**p-value**
Diagnostic Accuracy	0.71	0.06	11.83	<0.001
Waiting Time	-0.62	0.08	-7.75	<0.001

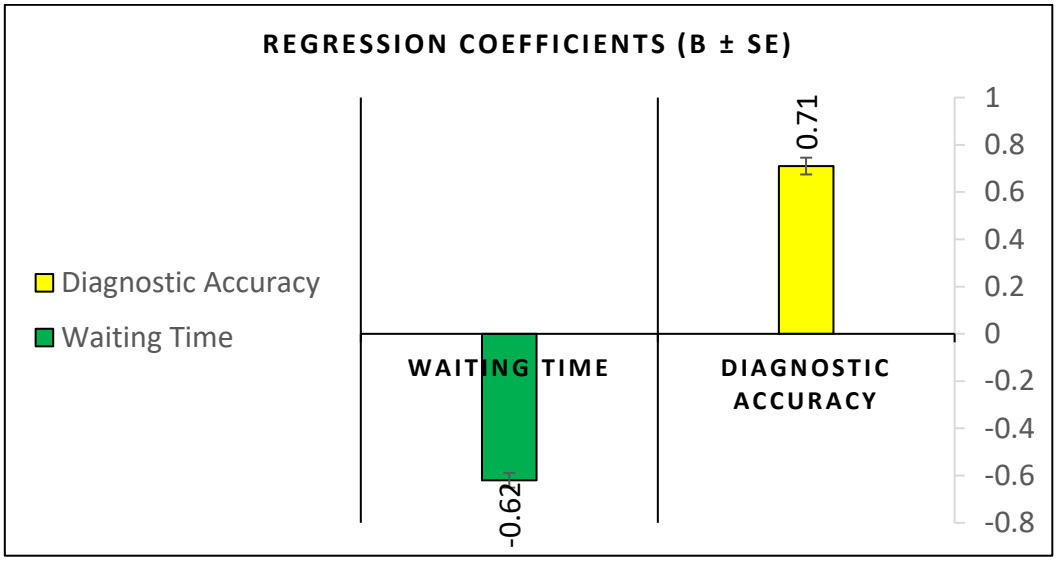

Figure 10: Regression Coefficients (β ± SE)

Model Fit Summary:

- $R^2 = 0.79$
- F (2, 97) = 177.6
- $p < 0.001$

5. Discussion

The primary objective of this study was to examine the intricate relationship between perceived diagnostic accuracy, waiting time, and patient satisfaction within the specialized context of diabetes care in Libya. The empirical findings provide robust evidence that patient satisfaction is a multifaceted construct, significantly influenced by both clinical precision and operational efficiency. The regression model utilized in this research demonstrated high predictive power, with diagnostic accuracy and waiting time collectively accounting for 79% of the variance in patient satisfaction ($R^2 = 0.79$).

The results indicate that diagnostic accuracy is the most potent positive predictor of patient satisfaction (r = 0.87; *B* = 0.71). This strong association suggests that patients at the Benghazi Specialized Diabetes Treatment Center prioritize clinical competence and the clarity of their medical diagnosis above other factors. In the management of chronic pathologies like diabetes mellitus—which require lifelong monitoring, complex medication adjustments, and the prevention of debilitating complications—the patient's confidence in the diagnostic process is paramount. High perceived accuracy likely fosters a sense of psychological safety and enhances the therapeutic alliance between the patient and the physician. This finding aligns

with contemporary literature which asserts that clinical excellence and the integration of advanced diagnostic tools, such as Clinical Decision Support Systems (CDSS), are fundamental to improving both patient outcomes and institutional trust (Alharbi et al., 2025; Almadani et al., 2026).

Conversely, the study identified a significant and substantial negative correlation between waiting time and satisfaction ($r = -0.74$; $B = -0.62$). This underscores the critical role of organizational performance in shaping the patient experience. Even when clinical care is perceived as high-quality, prolonged administrative delays can act as a "dissatisfier," inducing patient frustration and eroding the perceived value of the medical encounter. The descriptive statistics further illuminate this issue; while diagnostic accuracy received relatively high marks ($M = 3.58$), waiting time received the lowest mean score ($M = 3.02$), with 54% of participants expressing explicit dissatisfaction with the wait. This discrepancy suggests that while the center excels in clinical delivery, its administrative workflows represent a significant bottleneck. These findings reinforce the multidimensional theory of healthcare quality, which posits that technical quality (clinical outcomes) and functional quality (the service delivery process) must be optimized simultaneously to achieve high patient satisfaction.

6. Conclusion and Recommendations

6.1 Conclusion

This study concludes that diagnostic accuracy and waiting time are dual pillars of patient satisfaction in specialized diabetes care. While medical expertise and diagnostic precision are the primary drivers of patient trust and satisfaction, operational delays in the form of extended waiting times significantly undermine the overall care experience. The high R^2 value of the model confirms that addressing these two dimensions is essential for any quality improvement initiative. Furthermore, the findings suggest that enhancing these factors will not only improve the immediate satisfaction of diabetic patients but also increase their propensity to recommend the facility, thereby enhancing the center's reputation and clinical efficacy.

6.2 Recommendations

Based on the empirical evidence, the following strategic recommendations are proposed to enhance the quality of care at the Benghazi Specialized Diabetes Treatment Center:

- **Continuous Clinical Professional Development:** The center should invest in ongoing medical education and training programs for clinical staff to maintain and enhance diagnostic precision. Implementing evidence-based diagnostic protocols and integrating digital health tools can further mitigate the risk of clinical errors.
- **Operational Workflow Optimization:** There is an urgent need to re-engineer patient flow management. This could include the adoption of an advanced digital appointment scheduling system to distribute patient loads more evenly throughout the day, thereby reducing peak-hour congestion and waiting periods.
- **Integrated Quality Management:** Management should adopt a holistic approach to quality that balances clinical excellence with administrative efficiency. Regular patient feedback loops should be established to monitor satisfaction levels across both clinical and operational dimensions in real-time.
- **Expansion of Patient Counseling:** Since diagnostic clarity is highly valued, clinicians should devote more time to explaining diagnostic results to patients. This transparency can further bolster patient confidence and satisfaction, even when operational challenges exist.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

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