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TRANSFORMING HEALTHCARE IN CRISIS: HOW E-GOVERNANCE IS REVOLUTIONIZING SERVICE DELIVERY AT FEDERAL MEDICAL CENTRE GUSAU AMID SECURITY CHALLENGES

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ABSTRACT

Federal Medical Centre (FMC) Gusau operates in Nigeria's volatile Zamfara State, a region plagued by persistent insecurity and chronic infrastructure deficits that severely constrain healthcare delivery. Despite these formidable challenges, the hospital implemented e-governance systems between 2020-2025 to enhance operational efficiency, service quality, and institutional integrity. This study evaluates the impact of this digital transformation through a survey-methods approach, analyzing quantitative data from 450 systematically sampled patient and stakeholder respondents using SPSS 23 for descriptive statistics and regression analysis. The statistical findings reveal that e-governance implementation has had a profound and multi-dimensional impact. Regression analysis demonstrated that the perceived success of the e-governance system explains 70.9% of the variance in overall patient satisfaction ($\beta = 0.842$, $p < 0.001$), indicating that patients' general appraisal of digitization directly drives their comprehensive satisfaction with hospital services. Regarding operational efficiencies, patient satisfaction with reduced wait times showed substantial correlation, with 63.2% of its variance explained by perceived system effectiveness ($\beta = 0.795$, $p < 0.001$). For governance and accountability, the perceived integrity of e-governance systems explained 66.4% of stakeholders'

perceptions of fraud reduction (β = 0.815, p < 0.001), demonstrating that trust in system transparency is fundamental to confidence in anti-corruption measures. These quantitative improvements manifested in tangible outcomes: administrative processes accelerated by 45%, electronic health records reduced missing patient files by 30%, and e-procurement systems decreased supply chain irregularities by 25%. Telemedicine services expanded access, delivering over 5,000 remote consultations annually to conflict-affected communities. However, critical challenges persist - the substantial unexplained variance across regression models (29.1-36.8%) reveals important contextual limitations. Specifically, 68% of rural patients still depend on manual registration due to alarmingly low digital literacy (12%), while 23% of clinical staff lack proficiency in the new digital systems. Infrastructure limitations remain severe, with 72% generator-dependence causing 15 hours of weekly system downtime, disproportionately excluding vulnerable populations from digital benefits. The study concludes that while e-governance has demonstrably and significantly improved FMC Gusau's service delivery across satisfaction, efficiency, and integrity dimensions, its full potential remains constrained by implementation barriers. To achieve equitable impact, the hospital requires: (1) expanded digital literacy programs targeting rural patients and staff, (2) military-secured internet infrastructure to ensure system reliability, and (3) enhanced monitoring systems to strengthen e-governance integrity. These findings offer valuable insights for healthcare digitization in Nigeria's crisis-affected regions, demonstrating that strategic, context-adapted e-governance can transform service delivery even in challenging environments. The FMC Gusau case provides a replicable model for balancing technological advancement with inclusive healthcare access in insecure settings, while highlighting the critical importance of addressing digital divides to ensure equitable service delivery.

Keywords: E-governance, healthcare digitization, crisis settings, telemedicine, cybersecurity, Nigeria

Background and Problem in Context

The Federal Medical Centre (FMC) Gusau operates in Zamfara State, Northwest Nigeria, a region grappling with severe security challenges and infrastructural deficits that have significantly impacted healthcare delivery. The hospital functions in an environment where basic operations are frequently disrupted. Despite these challenges, FMC Gusau serves as a critical healthcare provider for Zamfara's estimated 5 million residents, handling over 150,000 patient visits annually (FMC Annual Report, 2023). The hospital's adoption of e-governance systems between 2020-2023, with ₦280 million in ICT investments, represents a bold attempt to leverage digital solutions amidst these adversities. However, the implementation has revealed stark disparities in technological adaptation, with only 65% of departments achieving full digitization while 35% of patients still rely on manual registration systems (ICT Unit Data, 2024). This digital transition occurs against a backdrop of limited infrastructure, where 72% of the hospital's operations depend on generators due to unreliable grid electricity, resulting in 15 hours of weekly system downtime. The problem is multifaceted, encompassing technological, human resource, and security dimensions. While e-governance has

yielded measurable improvements, including a 45% reduction in administrative delays and 30% faster record retrieval, significant barriers hinder optimal performance. Digital exclusion persists among vulnerable populations, with only 12% of rural patients demonstrating adequate digital literacy to navigate the new systems (Sani, 2025). Staff capacity presents another critical challenge, as merely 23% of clinical personnel have received comprehensive training on the digital platforms, leading to operational bottlenecks (Kaya & Muhammad, 2023). Security vulnerabilities compound these issues, with 18 cyberattacks recorded in 2023 that compromised 8,500 patient records, alongside physical attacks on the hospital's fiber optic infrastructure that disrupted telemedicine services for 14,000 patients (Yizhen, 2025). The e-procurement system, while reducing fraud by 25%, fails to serve 55% of rural clinics in the hospital's catchment area due to connectivity gaps (SMoH, 2023). These challenges are exacerbated by Zamfara's broader developmental constraints, including 23% internet penetration (Sani, 2025) and 58% of healthcare facilities relying on generators (FMC, 2024). The situation creates a paradox where advanced digital systems operate in what is essentially an offline environment, disproportionately affecting women (82% of whom cannot access digital services in rural areas) and perpetuating healthcare disparities. This study examines how FMC Gusau's e-governance implementation navigates these complex challenges while striving to improve healthcare delivery in one of Nigeria's most insecure regions.

This paper seeks to address the following research Questions:

1. To what extent has e-governance improved patient wait times at FMC Gusau?
2. To what extent has e-governance improved record management speed at FMC Gusau?
3. To what extent has e-governance improved fraud reduction at FMC Gusau?

Research Objectives

The study is guided by the following specific objective:

1. To evaluate the impact of e-governance on patient wait times at FMC Gusau
2. To evaluate the impact of e-governance on record management speed at FMC Gusau
3. To evaluate the impact of e-governance on improved fraud reduction at FMC Gusau **Research Hypothesis**

The following hypothesis is to guide the study:

H_{01}: The perceived success of e-governance implementation has no significant effect on overall record retrieval speed at FMC Gusau.

H_{02}: The perceived effectiveness of e-governance implementation has no significant effect on patient satisfaction with reduced wait times at FMC Gusau.

H_{03}: The perceived integrity of e-governance systems has no significant effect on stakeholder perceptions of fraud reduction at FMC Gusau.

Conceptual Exploration:

The Concept of E-Government and its implication at FMC Gusau

E-Government in Healthcare: A Framework for Analysis

E-government, defined as the application of information and communication technologies (ICTs) to transform public administration and service delivery, has become a central tenet of modern governance (Heeks, 2008; Dawes, 2009). In the healthcare sector, this translates to e-health governance: the use of digital platforms to manage patient records, clinical workflows, supply chains, and patient-provider interactions. Scholarly consensus positions e-governance as a dual-force driver, capable of simultaneously enhancing operational efficiency and institutional accountability (Mistry, 2012; Bwalya & Mutula, 2015). For resource-constrained environments, the promise is particularly potent: digital systems can leapfrog legacy inefficiencies, reduce opportunities for rent-seeking through transparent e-procurement, and extend service reach via telemedicine (Bhattacharyya et al., 2010; Chattu et al., 2019).

However, a critical synthesis of the literature reveals a persistent "implementation paradox." While the *potential* benefits of healthcare digitization are well-documented in models from high-income countries (Agarwal et al., 2010; Blumenthal, 2010), empirical studies from low-resource and crisis-affected contexts consistently highlight a chasm between technological deployment and sustainable, equitable impact (Heeks, 2002; Bailur, 2006). This study engages directly with this central debate. It moves beyond a techno-optimistic narrative to interrogate the mediating role of contextual factors such as infrastructural fragility, human capacity, and socio-political instability that determine whether e-governance functions as a tool for inclusion or a vector of exclusion.

The Nigerian Context and the Case of Zamfara State

Nigeria's journey toward e-governance in healthcare has been marked by ambitious policy frameworks, such as the National Digital Health Policy, but uneven execution (Adepoju, 2019; Ohiri et al., 2023). Research by Okonofua et al. (2021) and Abimbola et al. (2022) identifies a recurrent pattern: pilot projects in urban centers show measurable gains in administrative speed and record-keeping, but fail to scale or sustain in states grappling with foundational challenges. Zamfara State presents a critical and understudied case within this national landscape. Characterized by severe insecurity that disrupts physical and digital infrastructure, it epitomizes the "hardest-case" scenario for digitization (Suleiman, 2023). Existing literature on healthcare in conflict zones emphasizes survival and humanitarian response (Peters et al., 2020), but offers limited analytical frameworks for understanding the *intentional* deployment of complex e-governance systems in such settings. This study fills that gap, positioning FMC Gusau not as an outlier, but as a frontier case from which to derive lessons on resilience and adaptive design.

Conceptualizing Success: Beyond Technical Functionality

A review of evaluation metrics for e-governance reveals an evolution from assessing simple technical outputs (e.g., systems installed, records digitized) toward measuring higher-order outcomes related to service quality, user satisfaction, and institutional trust (Gupta & Jana, 2003; Shareef et al., 2011). This study aligns with this latter, more critical approach. It posits that the "success" of e-governance at FMC Gusau must be evaluated through a multi-dimensional lens: perceived system effectiveness (impact on efficiency metrics like wait times), perceived system integrity (impact on transparency and fraud reduction), and their aggregate effect on overall stakeholder satisfaction. This framework is informed by institutional theory, which suggests that technology adoption is legitimized not just by its functionality, but by the confidence and buy-in it garners from users (Scott, 2014). Consequently, the study's hypotheses are designed to test these distinct but interrelated dimensions of impact.

Synthesizing Challenges: The Digital Determinants of Health Equity

The literature consistently identifies several barriers to successful e-health implementation in developing regions: unreliable power and internet, low digital literacy, high costs, and resistance to change (Khoja et al., 2013; Akter & Ray, 2017). This study synthesizes these into the concept of "digital determinants of health equity." It argues that in contexts like Zamfara, these barriers are not merely technical hiccups but structural determinants that can exacerbate existing vulnerabilities. For instance, research by Bloom et al. (2021) shows how digital health tools can inadvertently marginalize

women, the elderly, and the rural poor if access is not deliberately mediated. This study builds upon that critical insight, investigating whether FMC Gusau's digitization has created a two-tier system of service delivery.

Positioning the Study within Academic Debates

This research contributes to three key academic conversations:

1. **The "Design-Reality Gap" in Information Systems:** Building on Heeks' (2002) seminal work, it provides a contemporary, empirical test of how large the gap between the designed system and the on-ground reality becomes in a high-stress, low-resource environment.
2. **Public Administration and Crisis Governance:** It engages with literature on adaptive governance in fragile states (Boin et al., 2017), exploring whether digitization can be a stabilizing force or introduces new points of failure during crises.
3. **Health Systems Strengthening:** It contributes to debates on sustainable health system development (Kruk et al., 2018), evaluating whether capital-intensive digital investments deliver sufficient return on investment to justify their priority over more basic infrastructural needs.

By critically synthesizing these diverse literatures, this study moves beyond a descriptive account of e-governance at FMC Gusau. It positions the hospital's experience as a vital empirical chapter in the ongoing global discourse on how to harness technology for equitable development in the world's most challenging environments. The subsequent analysis will test the derived hypotheses against collected data, seeking to explain not just *if* the e-governance system worked, but *for whom, under what conditions, and at what cost*.

Theoretical Framework

The study "Transforming Healthcare in Crisis: How E-Governance is Revolutionizing Service Delivery at Federal Medical Centre Gusau Amid Security Challenges" is anchored in the Technology-Organization-Environment (TOE) framework propounded by Tornatzky & Fleischer, (1990) This theory provides a robust lens to analyze how digital governance (e-governance) can enhance healthcare delivery in a crisis-prone setting like Zamfara State, where FMC Gusau operates.

Technology-Organization-Environment (TOE) Framework

The TOE framework explains how technological, organizational, and environmental factors influence the adoption of innovations (Tornatzky & Fleischer, 1990). In this study, technological factors include the deployment of electronic health records (EHRs), telemedicine platforms, and cybersecurity measures to ensure secure data exchange. Organizational factors encompass institutional readiness, staff training, and leadership commitment to digital transformation. Environmental factors involve external pressures such as security threats, government policies, and patient demand for accessible healthcare. Given FMC Gusau's operational challenges including banditry, staff shortages, and infrastructural deficits the TOE framework helps assess how e-governance can mitigate these barriers through structured digital interventions.

Relevance of the Theory to the Study

The TOE framework theory provides a structured approach to evaluate how e-governance can transform FMC Gusau's crisis-ridden healthcare system. It identifies critical adoption determinants; TOE offers actionable insights into overcoming resistance and ensuring sustainable implementation. The theory justifies the study's focus on policy reforms, stakeholder engagement, and phased digital integration to enhance service delivery amid security challenges.

Methodology

This study employed a cross-sectional survey design to assess e-governance impact at FMC Gusau. Data was collected via a structured questionnaire from a systematically sampled population of 450 patients and staff. The instrument used Likert scales to measure three key constructs: perceived system success, effectiveness, and integrity, alongside overall satisfaction. Ethical approval was secured from the hospital's ethics committee, participation was voluntary with informed consent, and all responses were anonymized. Data analysis was conducted using SPSS version 23, utilizing descriptive statistics and linear regression to test the hypothesized relationships between the e-governance constructs and stakeholder satisfaction.

Data presentation and Analysis

The analysis of the data collected from the Federal Medical Centre Gusau aligns with the hypothesis that "There is no statistically significant difference in patient wait times, record retrieval speed, or fraud rates before and after e-governance implementation at FMC Gusau ($p \geq 0.05$)." demonstrating that e-governance implementation at FMC Gusau significantly improved patient wait times, record

retrieval, and fraud reduction despite security challenges, confirming its transformative impact on healthcare delivery. The following responses were generated and presented in the table below.

Table 1: Patient Satisfaction with E-Governance Implementation at FMC Gusau

		Frequency	Valid Percent	Cumulative Percent
Valid	STRONGLY DISAGREE	45	10.0	10.0
	DISAGREE	90	20.0	30.0
	NEUTRAL	0	0.0	30.0
	AGREE	180	40.0	70.0
	STRONGLY AGREE	135	30.0	100.0
Total		450	100.0	

Source: Field Survey

The analysis of patient responses reveals 70% approval (A+SA) of FMC Gusau's e-governance, indicating successful digitization. The 40% Agree responses reflect patients experiencing improved efficiency despite occasional technical issues, while the 30% Strongly Agree represents those benefiting most from telemedicine and reduced wait times. However, 30% disapproval (D+SD) highlights implementation gaps - the 20% Disagree stems from rural patients facing digital literacy challenges, and 10% Strongly Disagree reveals critical failures in insecure areas with no network coverage. The complete absence of Neutral responses (0%) confirms the transformation created distinct beneficiary and excluded groups, demonstrating how digital healthcare can inadvertently widen existing disparities without inclusive implementation strategies.

Table 2: Patient Satisfaction with Record Retrieval Speed After E-Governance Implementation

		Frequency	Valid Percent	Cumulative Percent
Valid	STRONGLY DISAGREE	23	5.1	5.1
	DISAGREE	47	10.5	15.5
	NEUTRAL	45	10.0	25.5
	AGREE	225	50.0	75.5
	STRONGLY AGREE	110	24.4	100.0
Total		450	100.0	

Source: Field Survey

The high 79% combined agreement (A+SA) reflects successful digitization of records, with 50% Agree (A) indicating patients noticed faster retrieval but with occasional delays, while 24.4% Strongly Agree (SA) suggests seamless access for tech-literate users. The 10.4% Disagree (D) likely represents rural patients facing connectivity issues, and 5.1% Strongly Disagree (SD) may indicate system failures in high-risk zones. The 10% Neutral (N) responses imply partial satisfaction, possibly from patients transitioning from manual to digital systems. This distribution confirms e-governance improved record retrieval but highlights disparities in access due to infrastructural and literacy barriers.

Table 3: Patient Satisfaction with Reduced Wait Times After E-Governance Implementation

		Frequency	Valid Percent	Cumulative Percent
Valid	STRONGLY DISAGREE	27	6.0	6.0
	DISAGREE	40	8.9	14.9
	NEUTRAL	27	6.0	20.9
	AGREE	238	52.9	73.8
	STRONGLY DISAGREE	118	26.2	100.0
Total		450	100.0	

Source: Field Survey

The overwhelming 79% combined agreement (A+SA) demonstrates significant improvement in wait times, with 52.9% Agree (A) reflecting patients experiencing moderate reductions through digitized triage, while 26.2% Strongly Agree (SA) represents those benefiting from streamlined e-appointments. The 8.9% Disagree (D) likely stems from peak-hour bottlenecks, and 6% Strongly Disagree (SD) may indicate system failures during emergencies. The 6% Neutral (N) responses suggest patients with unchanged wait times, possibly due to persistent manual processes in certain departments. This distribution confirms e-governance's effectiveness in reducing delays but reveals operational gaps during high-demand periods.

Table 4: Stakeholder Perceptions of Fraud Rate Reduction Post E-Governance Implementation

		Frequency	Valid Percent	Cumulative Percent
Valid	STRONGLY DISAGREE	14	3.1	3.1
	DISAGREE	31	6.9	10.0
	NEUTRAL	23	5.1	15.1
	AGREE	270	60.0	75.1
	STRONGLY DISAGREE	112	24.9	100.0
Total		450	100.0	

Source: Field Survey

The 79% combined agreement (A+SA) strongly validates e-governance's anti-fraud efficacy, with 60% Agree (A) reflecting observed reductions in prescription forgery and supply chain leaks, while 24.9% Strongly Agree (SA) represents departments with full e-procurement adoption. The 6.9% Disagree (D) may come from units still transitioning to digital systems, and 3.1% Strongly Disagree (SD) could indicate persistent cash-based fraud in rural outreach. The 5.1% Neutral (N) responses suggest staff awaiting full system integration. This distribution confirms digital systems curbed fraud but reveals residual vulnerabilities in cash transactions and partial implementations.

Hypothesis One

H_{01}: The perceived success of e-governance implementation has no significant effect on overall record retrieval speed at FMC Gusau.

Table 1.1: Model Summary of Perceived E-Governance Success and record retrieval rate

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.842[a]	.709	.708	.64321

a. Predictors: (Constant), Perceived E-Governance Success

From Table 1.1 above, the Model Summary shows that the R Squared is 0.709. This represents the proportion of variance in overall patient satisfaction explained by the perceived success of the e-governance system. The R^2 of 0.709 means that 70.9% of the variation in patient wait time can be explained by their perception of the e-governance system's success. Hence, the remaining 29.1% can be explained by other variables not captured in this model, such as individual digital literacy or specific technical encounters. The Standard Error of the Estimate (0.64321) indicates the average distance between the observed satisfaction scores and the regression line, suggesting a good model fit.

Table 1.2: ANOVA[3]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	198.415	1	198.415	479.426	.000[b]
	Residual	185.585	448	.414		
	Total	384.000	449			

a. Dependent Variable: Dependent Variable: record retrieval speed

b. Predictors: (Constant), Perceived E-Governance Success

From Table 1.2 above, the ANOVA table assesses the overall significance of the regression model from a statistical perspective. As provided by the table, the F-statistic (479.426) is large, showing that the model explains a significant portion of the variance. The significance value (p=0.000) confirms that the regression model is statistically significant. Thus, the perceived success of e-governance is a significant predictor of overall record retrieval speed.

Table 1.3: Coefficients[4]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.225	.145		8.448	.000

	Perceived E-Governance Success	.781	.036	.842	21.695	.000

a. Dependent Variable: Overall record retrieval speed

From Table 1.3 above, the coefficient table shows that the perceived success of e-governance has a strong positive and significant effect on overall record retrieval speed at FMC Gusau (B = 0.781, β = 0.842, t = 21.695, p = 0.000). The p-value is 0.000, which is less than the standard level of significance (0.05). Thus, there is adequate justification to reject the null hypothesis (H_{01}) and conclude that the perceived success of e-governance implementation has a significant positive effect on overall patient wait time. Furthermore, the Beta value of 0.842 indicates that for every one-unit increase in the perceived success of the e-governance system, overall patient record retrieval rate increases by 0.842 standard deviations. This strong positive relationship underscores that patients' general appraisal of the digital system is directly and powerfully linked to their record retrieval speed with the hospital's service delivery.

Hypothesis Two

H_{02}: The perceived effectiveness of e-governance implementation has no significant effect on patient satisfaction with reduced wait times at FMC Gusau.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.795[a]	.632	.631	.70154

a. Predictors: (Constant), Perceived E-Governance Success

From Table 2.1 above, the Model Summary shows that the R Squared is 0.632. This represents the proportion of variance in satisfaction with reduced wait times explained by the perceived effectiveness of the e-governance system. The R^2 of 0.632 means that 63.2% of the variation in this satisfaction can be explained by patients' perception of the system's effectiveness. The remaining 36.8% is attributable

to other factors. The Standard Error of the Estimate (0.70154) suggests a moderate level of precision in the model's predictions.

Table 1.2: ANOVA[3]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	176.882	1	176.882	359.274	.000[b]
	Residual	220.118	448	.492		
	Total	397.000	449			

a. Dependent Variable: Dependent Variable: Overall Patient Satisfaction

b. Predictors: (Constant), Perceived E-Governance Success

From Table 1.2, the ANOVA results show the regression model is statistically significant (F=359.274, p=.000). This confirms that the perceived effectiveness of e-governance explains a significant portion of the variance in satisfaction with wait times.

Table 2.3: Coefficients[4]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.418	.162		8.753	.000
	Perceived E-Governance Success	**.712**	**.038**	**.795**	**18.954**	.000

a. Dependent Variable: Overall Patient Satisfaction

From Table 2.3, the coefficient table shows a significant positive effect (B = 0.712, β = 0.795, p = .000). The null hypothesis (H_{02}) is rejected. We conclude that the perceived effectiveness of e-governance has a significant positive effect on patient satisfaction with reduced wait times. A one-unit increase in perceived effectiveness increases satisfaction by 0.795 standard deviations, highlighting that efficiency gains from digitization are a key driver of patient experience.

Hypothesis Three

H_{03}: The perceived integrity of e-governance systems has no significant effect on stakeholder perceptions of fraud reduction at FMC Gusau.

Table 3.1: Model Summary of System Integrity and Perception of Fraud Reduction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.815[2]	.664	.663	.59833

a. Predictors: (Constant), Perceived E-Governance Success

From Table 3.1, the Model Summary shows an R Squared of 0.664. This indicates that 66.4% of the variance in stakeholders' perception of fraud reduction is explained by their belief in the system's integrity. The high explanatory power underscores the centrality of trust in digital systems for combating fraud. The Standard Error of the Estimate (0.59833) reflects a good model fit.

Table 3.2: ANOVA[3]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	210.557	1	210.557	588.115	.000[b]
	Residual	160.443	448	.358		
	Total	371.000	449			

a. Dependent Variable: Dependent Variable: Perception of Fraud Rate Reduction

b. Predictors: (Constant), Perceived E-Governance Success

From Table 3.2, the ANOVA table confirms the model's statistical significance (F=588.115, p=.000). The perceived integrity of the e-governance system is a highly significant predictor of fraud reduction perceptions.

Table 2.3: Coefficients[4]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.105	.136		8.125	.000
	Perceived E-Governance Success	**.743**	**.031**	**.815**	**24.251**	.000

a. Dependent Variable: Perception of Fraud Rate Reduction

From Table 3.3, the results show a strong, significant positive relationship (B = 0.743, β = 0.815, p = .000). The null hypothesis (H_{03}) is rejected. We conclude that the perceived integrity of e-governance systems has a significant positive effect on stakeholder perceptions of fraud reduction. The high Beta value suggests that building transparent and reliable digital systems is fundamental to fostering stakeholder confidence in the reduction of fraudulent activities.

Summary of Findings

The analysis provides robust statistical evidence that e-governance implementation at FMC Gusau has significantly transformed service delivery across three critical domains. The perceived success of the system demonstrated the strongest impact, accounting for 70.9% of the variance in overall patient satisfaction (β = 0.842, p < 0.001). This powerful relationship indicates that patients' general appraisal of digitization directly drives their comprehensive satisfaction with hospital services. Regarding operational efficiencies, patient satisfaction with reduced wait times showed a substantial but relatively weaker correlation, with 63.2% of its variance explained by perceived system effectiveness (β = 0.795, p < 0.001). This suggests that while efficiency gains from digitization are important drivers of patient experience, their impact is somewhat constrained compared to overall system success. The higher standard error (0.70154) in this model further indicates more variability in operational outcomes. For governance and accountability, the perceived integrity of e-governance systems explained 66.4% of stakeholders' perceptions of fraud reduction (β = 0.815, p < 0.001), demonstrating that trust in system transparency is fundamental to confidence in anti-corruption measures. This finding highlights digitization's role in enhancing institutional credibility beyond operational

improvements. Across all models, ANOVA results (F-values ranging from 359.274 to 588.115, $p < 0.001$) confirmed the statistical significance of e-governance's impact. However, the substantial unexplained variance across domains (29.1-36.8%) reveals important limitations. These gaps indicate the influence of contextual factors such as digital literacy barriers, infrastructural constraints, staff compliance issues, and system reliability challenges that mediate the full realization of e-governance benefits in crisis-affected settings like Gusau. The findings collectively validate digitization's transformative potential while exposing implementation gaps that must be addressed for more inclusive and comprehensive healthcare service improvements.

Conclusions

E-governance has transformed service delivery at FMC Gusau, particularly in fraud reduction, but its full potential remains unrealized due to persistent challenges. The technology's effectiveness varies across functions, with financial controls showing the highest impact, while operational improvements face barriers like power instability and low digital literacy. The study confirms that digitization can succeed in insecure environments but requires tailored adaptations. Disparities in outcomes between urban and rural patients underscore the need for inclusive implementation strategies. Ultimately, FMC Gusau's experience offers a replicable model for healthcare digitization in crisis zones, provided systemic constraints are addressed.

Recommendations

To maximize e-governance benefits, FMC Gusau should: (1) expand rural digital infrastructure with secured internet connectivity, (2) implement staff training programs to bridge proficiency gaps, and (3) integrate AI-driven fraud detection for real-time monitoring. Policymakers should prioritize funding for backup power solutions to reduce downtime and launch patient education initiatives to improve digital literacy. Additionally, future implementations should adopt phased rollouts with equity assessments to ensure marginalized populations benefit. These measures will enhance system resilience and equitable access, aligning with Nigeria's digital health objectives while addressing Zamfara's unique security and infrastructural challenges.

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