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Determinants of Health Communication Quality in Diabetes Management in Bamenda Health District Cameroon

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Abstract *Effective communication is essential in diabetes care because it improves patients' understanding of their condition, treatment adherence, and satisfaction with care. This study assessed communication practices, provider–patient interaction, and barriers affecting perceived communication quality among diabetic patients in the Bamenda Health District, Cameroon. A cross-sectional study involving 149 diabetic patients was conducted using structured questionnaires. Data were analyzed using descriptive statistics, Pearson's correlation, one-way ANOVA, and multivariate regression techniques. Findings showed that 86% of participants reported that healthcare providers frequently used simple and understandable language ($p < 0.001$), while only 15% experienced the explain-back method ($p = 0.007$). Although 57% perceived providers as empathetic ($p < 0.001$), only 35.6% reported active involvement in decision-making. Significant positive relationships existed between perceived communication quality and receiving regular updates ($r = 0.407$, $p < 0.001$), consideration of patient emotions ($r = 0.344$, $p < 0.001$), opportunities to ask questions ($r = 0.295$, $p < 0.001$), use of visual aids ($r = 0.240$, $p = 0.003$), and encouragement of self-care practices ($r = 0.262$, $p = 0.001$). One-way ANOVA revealed significant effects of provider–patient interaction factors such as consultation time, active listening, and compassion ($p < 0.001$). Multivariate analysis identified the use of visual aids ($\beta = 0.050$, $p = 0.030$) and adequate consultation time ($\beta = 0.087$, $p = 0.014$) as positive predictors of communication quality, whereas time constraints negatively affected communication ($\beta = -0.081$, $p = 0.009$).*

Keywords *Communication Practices, Diabetes Care, Patient Perception, Provider–Patient Interaction.*

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Introduction

Diabetes mellitus is increasing worldwide and is affecting low- and middle-income countries the most, especially in sub-Saharan Africa. According to the latest International Diabetes Federation estimates, approximately 589 million adults were living with diabetes globally in 2025, with the greatest increases occurring in low- and middle-income countries [1]. Within the Cameroonian context, diabetes represents a significant contributor to both morbidity and mortality, with many patients exhibiting suboptimal glycemic control [2]. Recent evidence from the North West Region of Cameroon demonstrated that healthcare utilization among people with type 2 diabetes is influenced by accessibility of services, continuity of care, and patient-related factors, all of which may affect disease outcomes and patient engagement in care [3]. This situation is not solely attributable to limitations in access to treatment but is also closely linked to gaps in patient knowledge, health literacy, and engagement in self-management practices [2]. Current studies have further shown that diabetes knowledge and medication adherence remain important determinants of treatment outcomes among patients with type 2 diabetes mellitus [4].

In this regard, the management of diabetes extends beyond biomedical interventions and requires a more comprehensive approach that incorporates effective provider–patient communication. Evidence suggests that the quality of interaction between healthcare providers and patients plays a critical role in shaping treatment adherence, patient satisfaction, and overall clinical outcomes [5, 6]. New evidence continues to confirm that patient-centred communication significantly improves self-management behaviours, treatment adherence, and glycaemic outcomes among individuals living with diabetes [7].

Although the importance of effective health communication in enhancing treatment adherence, self-management, and clinical outcomes is well established, its integration into routine healthcare practice remains inconsistent. In many settings, communication continues to be predominantly provider-driven, with limited opportunities for active patient involvement, minimal use of visual or interactive tools, and insufficient consideration of patients' socio-cultural realities. This approach undermines the potential benefits of communication in chronic disease management. Existing literature consistently demonstrates that patient-centered communication is associated with improved patient understanding, satisfaction, and health outcomes, particularly in the context of long-term conditions [8, 9]. However, translating these principles into practice within resource-constrained environments such as Cameroon presents significant challenges. Factors such as language diversity, low levels of health literacy, and high patient load among healthcare providers often limit the effectiveness of communication strategies and reduce opportunities for meaningful patient engagement [10].

Evidence from studies conducted across African settings indicates that suboptimal provider–patient interaction is a significant contributor to poor treatment adherence and adverse health outcomes in chronic disease management [11, 12]. Emerging research further highlights that participatory communication approach, which actively involve patients in the care process, are associated with improved diabetes control and enhanced self-management practices [13].

Despite these insights, much of the existing literature tends to address communication within the broader context of health service delivery, with limited attention given to the specific factors that determine communication quality in chronic disease care. In the Cameroonian context, empirical evidence remains particularly scarce, especially quantitative studies that examine communication practices, provider–patient

interaction, and related barriers from the patient's perspective. This lack of context-specific evidence constrains the ability to develop interventions that are responsive to the realities of diabetes care within the local health system.

This study was undertaken to address the identified gap by examining the determinants of health communication quality in diabetes management within the Bamenda Health District. It specifically investigates communication practices employed by healthcare providers, the nature of provider–patient interactions, and the barriers that influence effective communication. Using a quantitative design, the study generates empirical evidence on the extent to which these factors shape patients' perceptions of communication quality.

A key contribution of this study is its context-specific and integrated assessment of communication within routine diabetes care in public healthcare settings in Cameroon. By bringing together multiple dimensions of communication within a single analytical framework and applying robust statistical techniques, the study identifies critical predictors of communication quality. The findings provide practical insights that can support the development of targeted strategies to strengthen patient-centered communication and improve diabetes care outcomes.

While this study offers valuable contributions, certain limitations should be acknowledged. The cross-sectional design restricts the ability to establish causal relationships, and reliance on patient-reported data may be subject to recall bias. Nonetheless, the findings provide meaningful insights into areas requiring improvement in communication practices within diabetes care.

In the Cameroonian context, the growing burden of diabetes has not been matched by sufficient evidence on the effectiveness of communication during routine clinical care. Existing knowledge remains limited regarding the factors that influence provider–patient interactions, thereby constraining the development of targeted strategies to enhance patient understanding, adherence, and overall health outcomes.

Against this background, the study examined the determinants of health communication quality in diabetes management in the Bamenda Health District, with particular emphasis on communication practices, provider–patient interaction, and barriers to effective communication.

Materials and Methods

The study was carried out in the Bamenda Health District, located in the North West Region of Cameroon, a semi-urban area characterized by a rising burden of chronic conditions, including diabetes mellitus. Data collection was undertaken in two public health facilities, the Bamenda Regional Hospital and the Nkwen District Hospital, which serve as key referral centers within the district and host established diabetic clinics. These facilities were purposively selected based on their patient volume and their central role in the provision of diabetes care.

A descriptive and analytical cross-sectional design was employed to examine the determinants of health communication quality among patients with diabetes. The study assessed communication practices, provider–patient interactions, and barriers to effective communication, with particular attention to how these factors shape patients' perceptions of communication quality.

The study population comprised adult patients diagnosed with diabetes and receiving care in the selected facilities. Eligibility was restricted to patients who had been on treatment for a minimum of six months, thereby ensuring adequate exposure to routine interactions with healthcare providers. Participants were recruited consecutively during routine clinic visits, and all eligible patients present during the data collection period were invited to

participate. This approach allowed for near-complete coverage of the accessible patient population within the study timeframe. In total, 149 patients consented and were included in the study.

Data were collected using a structured questionnaire developed to examine communication practices in diabetes care, focusing on provider–patient interaction and communication barriers. Responses were captured using a Likert-type scale reflecting frequency of occurrence. Given that the study population included participants with varying levels of literacy, trained research assistants administered the questionnaire verbally for some participants, while those who could read and write completed it independently.

The questionnaire was pre-tested among diabetic patients at Ndop District Hospital to improve clarity and contextual relevance. Content validity was established through review by supervisor, and reliability was assessed using Cronbach's alpha, which indicated satisfactory internal consistency across all sections.

The study examined communication practices, quality of provider–patient interactions, and communication-related constraints as explanatory variables, while patients' perception of communication quality was treated as the outcome variable. Sociodemographic and clinical characteristics were accounted for as control factors during analysis.

Following data verification and cleaning, statistical analysis was performed using SPSS version 21 software. Descriptive measures were applied to summarize participant characteristics and key study variables. Relationships between variables were explored using Pearson's correlation, while group differences were assessed through one-way analysis of variance. To identify factors associated with perceived communication quality, binary logistic regression was conducted. A multivariate model was subsequently developed to isolate independent predictors, with results reported as adjusted odds ratios and corresponding confidence intervals. Statistical significance was determined at $p < 0.05$.

Results

Socio-Demographic Data of Participants

Table 1 presents the socio-demographic characteristics of the diabetic clients who participated in the quantitative phase of the study.

Table 1. Sociodemographic Data of Participants

SN	Variable	Options	Frequency	Percentages (%)
1.	Age category	20-40	13	8.7
		41-60	49	32.9
		>60	87	58.4
2.	Gender	Male	48	32.2
		Female	101	67.8
3.	Level of education	None	33	22.1
		Primary	60	40.3
		Secondary	26	17.4
		High school	17	11.4
		University and above	13	8.7

Most of the participants were older adults, with 58.4% aged above 60 years, 32.9% between 41 and 60 years, and only 8.7% between 20 and 40 years. Females were the majority (67.8%), while males made up 32.2%. In terms of education, many participants had low educational levels, with 40.3% having primary education and 22.1% having no formal education, while only a small proportion reached higher education.

The mean age was 61.29 years, with a median of 63 and a standard deviation of 13.43, showing that most participants were around their 60s, with some variation. The study population was mainly older adults, with more women than men and generally low levels of education.

Table 2. Frequency Distribution of the Clinical Profile of Respondents

Sn	Variable	Options	Frequency	Percentages (%)
1.	Duration of diagnosis	6-12 months	11	7.4
		1-2 years	27	18.1
		More than 2 years	111	74.5
2.	Type of treatment	Oral diabetic medication	127	85.2
		Insulin injectable	6	4.0
		Both oral and injectable	16	10.7
3.	Frequency of consultation	Once a week	10	6.7
		Once a month	106	71.1
		Every 3-6months	23	15.4
		Only when i have a problem or complication	10	6.7

From Table 2 above most participants (74.5%) had been living with diabetes for more than two years, while 18.1% had the condition for 1–2 years and 7.4% for less than one year. The majority (85.2%) were on oral medication, 10.7% used both oral drugs and insulin, and only 4.0% relied on insulin alone.

In terms of follow-up, most patients (71.1%) attended consultations monthly, 15.4% every 3–6 months, and 6.7% either weekly or only when complications occurred.

These findings indicate that most patients are long-term cases who are regularly followed up and mainly managed with oral treatment, although a small group still seeks care only when problems arise.

Communication Practices of Healthcare Providers

This section examines how healthcare workers at Bamenda Regional Hospital and District Hospital Nkwen communicate with diabetic patients, focusing on the methods, tools, and techniques they use to share information effectively.

Table 3. Frequency Distribution of Communication Practices used by Healthcare Providers

	Variable	Never n (%)	Rarely	Sometimes	Often	Always
1.	Clarity of language	3 (2%)	0 (0%)	19 (13%)	47 (32%)	80 (54%)
2.	Use of visual aids	90 (60%)	7 (5%)	33 (22%)	11 (7%)	8 (5%)
3.	Understandability of written materials	137 (92%)	5 (3%)	2 (1%)	5 (3%)	0 (0%)
4.	Use of digital tools technological accessibility	131 (88%)	6 (4%)	1 (1%)	6 (4%)	5 (3%)

5.	Teach-back method	43 (29%)	8 (5%)	50 (34%)	26 (17%)	22 (15%)
6.	Follow-up instructions	9 (6%)	5 (3%)	27 (18%)	47 (32%)	61 (41%)
7.	Empathy and consideration of feelings	8 (5%)	2 (1%)	32 (22%)	50 (34%)	57 (38%)
8.	Cultural sensitivity	8 (5%)	9 (6%)	33 (22%)	34 (23%)	65 (44%)
9.	Consideration of educational level	2 (1%)	5 (3%)	20 (13%)	28 (19%)	94 (63%)
10	Opportunities for questions	8 (5%)	5 (3%)	44 (30%)	22 (15%)	70 (47%)
11	.Effectiveness of explanations	1 (1%)	6 (4%)	22 (15%)	31 (21%)	89 (60%)
12	Consistency and accuracy of information	7 (5%)	5 (3%)	13 (9%)	29 (20%)	95 (64%)
13	Encouragement for self-care	32 (22%)	13 (9%)	31 (21%)	24 (16%)	49 (33%)
14	Timely follow-ups/updates	1 (1%)	11 (7%)	57 (38%)	33 (22%)	47 (32%)

Table 3 shows that most patients reported that healthcare providers communicated clearly, with 54% saying clear language was always used. However, supportive communication tools were rarely used. About 60% said visual aids were never used, 92% never received written materials, and 88% reported no use of digital tools.

The teach-back method was also not common, with only 15% saying it was always used. On the positive side, providers showed good interpersonal skills. About 38% of patients always experienced empathy, 44% reported cultural sensitivity, and 63% said their educational level was considered during communication.

Patient engagement was moderate. Around 47% said they were always given the chance to ask questions, and 60% found explanations clear and effective.

However, only 33% reported receiving timely follow-up, and the same proportion said communication always encouraged self-care.

These findings show that while verbal communication is generally good, the use of tools, follow-up, and patient involvement still needs improvement.



Figure 1. Patient's Ratings of Communication Practices used by Healthcare Providers

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Figure 1 shows how patients rated the overall quality of healthcare providers' communication practices. The majority of responses were Fair (57%), indicating that many patients perceived communication practices to be moderately effective. Ratings of Excellent (47%) and Good (33%) reflect generally strong communication by providers. However, a smaller proportion rated communication as Poor (11%) or Very Poor (1%), highlighting dissatisfaction among a minority of respondents. These results suggest that while communication practices are generally viewed positively, there is a need for greater consistency and improvement to ensure high-quality communication across all patient interactions.

Table 4. Summary of all Clients' Ratings Across all Communication Practices

Answer Option Frequency of Responses		**Percentage (%)**
Never	480	29.3%
Rarely	87	5.3%
Sometimes	384	23.5%
Often	393	24.0%
Always	742	45.3%
Total	**1,639**	**100%**
	Mean score	**3.40**
	Median score	**4.00**
	Standard deviation	**1.5**

Table 4 summarizes all 1,639 patient responses across the 14 items assessing provider communication practices. The highest proportion of responses fell under the "Always" category (45.3%), indicating that many clients consistently experienced effective communication. Another 24.0% of responses were marked "Often," reflecting frequent but not universal satisfaction with communication efforts.

However, a notable 23.5% of responses fell under "Sometimes," pointing to inconsistency in the communication approach. Additionally, lower ratings of "Rarely" (5.3%) and "Never" (29.3%) indicate that some clients experienced minimal or no engagement in key communication areas.

The mean score of 3.40 suggests that, on average, patients experienced communication practices between "Sometimes" and "Often," indicating a moderately positive but inconsistent experience. The median score of 4.00 ("Often") shows that at least half of the patients reported frequent positive communication behaviors, such as clarity, empathy, and follow-up instructions. However, the standard deviation of 1.55 reflects high variability in responses, suggesting that patient experiences were not uniform, some encountered consistently strong communication, while others reported significant gaps. This calls for more standardized and dependable communication practices across all diabetes care settings.

Provider-Patient Communication Interactions

This section presents findings on how patients interact with their healthcare providers during diabetes care, focusing on key relationship factors like empathy, trust, and respect, as well as communication behaviors such as clear explanations, active listening, and shared decision-making, to understand how these interactions shape the patient's overall care experience.

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Table 5. Frequency Distribution of Provider-Patient Communication Interactions

Code	Variable	Never	Rarely	Sometimes	Often	Always
1.	Enough time for discussion	9 (6.0%)	4 (2.7%)	42 (28.2%)	43 (28.9%)	51 (34.2%)
2.	Active listening	4 (2.7%)	6 (4.0%)	42 (28.2%)	28 (18.8%)	69 (46.3%)
3.	Empathy, kindness, and respect	4 (2.7%)	8 (5.4%)	29 (19.5%)	23 (15.4%)	85 (57.0%)
4.	Shared decision-making	18 (12.1%)	20 (13.4%)	23 (15.4%)	35 (23.5%)	53 (35.6%)
5.	Comfort in sharing sensitive information	21 (14.1%)	9 (6.0%)	18 (12.1%)	32 (21.5%)	69 (46.3%)
6.	Clarity of explanation and options	7 (4.7%)	12 (8.1%)	29 (19.5%)	24 (16.1%)	77 (51.7%)
7.	Empathy and rapport	11 (7.4%)	12 (8.1%)	33 (22.1%)	32 (21.5%)	61 (40.9%)
8.	Privacy and confidentiality	1 (0.7%)	4 (2.7%)	20 (13.4%)	32 (21.5%)	92 (61.7%)
9.	Trust in provider	7 (4.7%)	9 (6.0%)	19 (12.8%)	30 (20.1%)	84 (56.4%)
10.	Consideration of lifestyle and preferences	25 (16.8%)	12 (8.1%)	29 (19.5%)	25 (16.8%)	58 (38.9%)
11.	Emotional support	4 (2.7%)	7 (4.7%)	39 (26.2%)	32 (21.5%)	67 (45.0%)

Table 5 shows that most patients reported positive communication interactions with providers.

Respect for privacy was the highest-rated aspect, with 61.7% selecting "Always," followed by empathy and respect (57.0%) and trust (56.4%). Nearly half of respondents also felt providers always listened actively (46.3%), gave clear explanations (51.7%), and offered emotional support (45.0%). However, shared decision-making (35.6%) and consideration of lifestyle or preferences (38.9%) were less consistent, with 16.8% saying their preferences were never considered. These results suggest that while provider–patient interactions are generally respectful and supportive, greater effort is needed to personalize communication and involve patients more in decision-making.

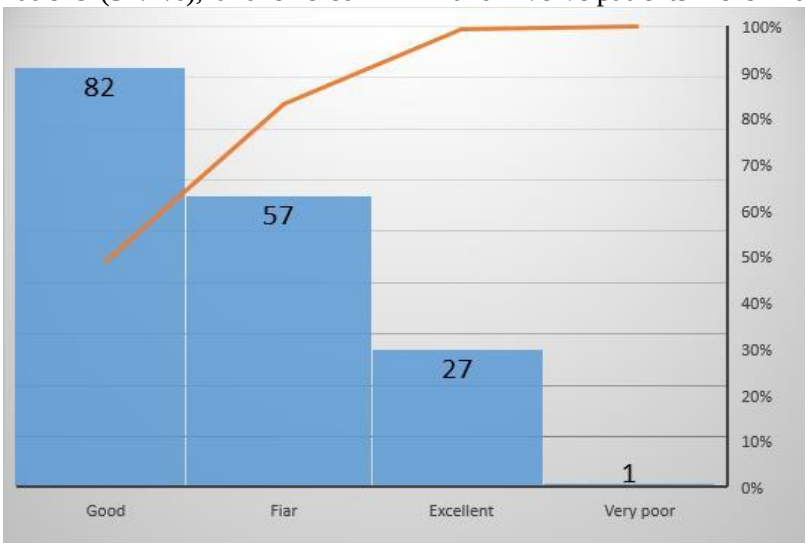

Figure 2. Patients Rating of the Quality of Provider Patient Communication Interactions

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Figure 2 illustrates clients' overall assessment of quality of provider patient communication interaction. A majority rated their interactions to be good (55%) or Very Good (18.1%), reflecting generally positive perceptions. However, 26.2% rated it as Poor, and 0.7% as Very Poor, indicating that a notable group still experienced unsatisfactory communication interactions. While overall ratings are favorable, these findings highlight the need to improve on the interactions.

Table 6. Summary Score of Provider-Patient Communication Interactions

Answer Option	Frequency of Responses	Percentage (%)
Never	111	5.6%
Rarely	103	5.1%
Sometimes	323	16.2%
Often	336	17.0%
Always	766	38.5%
Total	**1,639**	**100%**
	Mean score	**3.94**
	Median score	**4.00**
	Standard deviation	**1.23**

Table 6 summarizes patient responses across 11 key indicators of provider–patient communication interaction. The majority of responses fell under "Always" (38.5%) and "Often" (17.0%), indicating that most patients perceived their interactions with healthcare providers as consistently positive. However, 16.2% of responses were rated "Sometimes," reflecting partial or inconsistent communication experiences. A smaller percentage of patients selected "Rarely" (5.1%) or "Never" (5.6%), suggesting occasional lapses in effective engagement.

The mean score of 3.94 places the overall experience just below "Often," indicating that provider–patient communication behaviors were generally positive but not consistently high across all encounters. The median score of 4.00 ("Often") confirms that more than half of patients reported frequent positive interactions, such as empathy, active listening, and clear explanations. The standard deviation of 1.23, being above 1.0, suggests moderate variability, meaning that while most patients experienced strong interactions, some faced irregular or weaker communication quality. These findings point to a broadly effective provider–patient interaction, yet highlight the need to improve consistency in emotional support, trust-building, and shared decision-making.

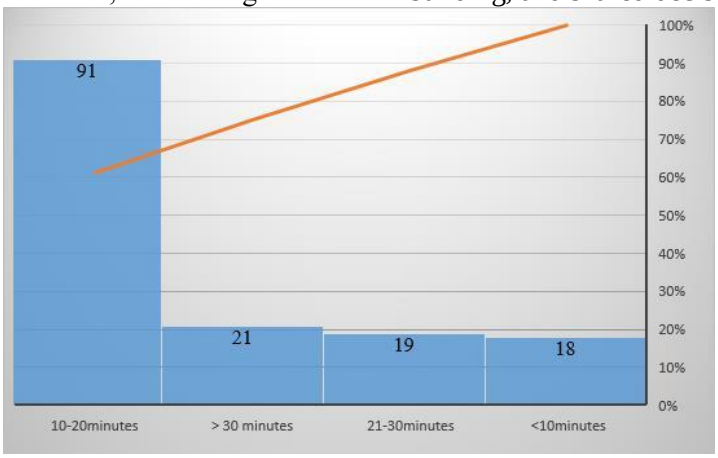

Figure 3. Duration of Consultation Sessions

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The figure 3 indicates that most clients (61.1%) typically spend 10–20 minutes in consultation, making it the most common duration. A smaller proportion, 12.1%, reported consultations lasting less than 10 minutes, while 14.1% experienced sessions longer than 30 minutes. This variability in consultation time may influence communication quality and overall patient satisfaction.

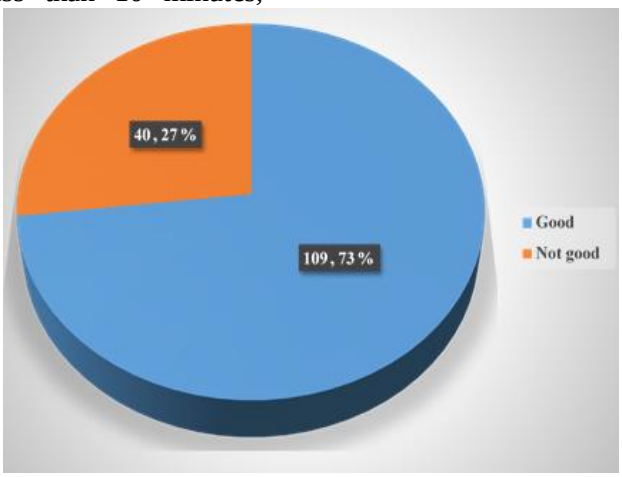

Figure 4. Clients Rating of the Quality of Communication (Practices and Interactions)

The pie chart as seen in figure 4 above shows that 73% of clients rated the quality of communication practices and interactions as good, while 27% rated it as not good. This indicates that most patients viewed provider communication as clear, respectful, and supportive. However, the quarter of clients who rated it negatively point to the need for improved consistency and greater focus on patient centered communication.

Constraints to Effective Communication

This section presents the challenges that make communication between patients and healthcare providers less effective, focusing on issues like language barriers, limited consultation time, and patients' fear of asking questions, all of which can prevent them from fully understanding their condition or being actively involved in their care.

Table 7. Frequency Distribution of Constraints of Effective Communication

No.	Variable	Never	Rarely	Sometimes	Often	Always
1	Language differences	107 (71.8%)	19 (12.8%)	13 (8.7%)	3 (2.0%)	7 (4.7%)
2	Information was too complex	74 (49.7%)	29 (19.5%)	34 (22.8%)	3 (2.0%)	9 (6.0%)
3	Provider rushed due to lack of time	75 (50.3%)	18 (12.1%)	36 (24.2%)	8 (5.4%)	12 (8.1%)
4	Cultural differences	110 (73.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
5	Lack of technological resources	69 (46.3%)	24 (16.1%)	17 (11.4%)	6 (4.0%)	33 (22.1%)
6	Provider's communication style	77 (51.7%)	20 (13.4%)	33 (22.1%)	6 (4.0%)	13 (8.7%)
7	Emotional concerns	68 (45.6%)	32 (21.5%)	31 (20.8%)	5 (3.4%)	13 (8.7%)
8	Too much information	61 (40.9%)	17 (11.4%)	58 (38.9%)	5 (3.4%)	8 (5.4%)
9	Lack of trust in provider	83 (55.7%)	19 (12.8%)	23 (15.4%)	13 (8.7%)	11 (7.4%)

10	Physical and structural barriers	65 (43.6%)	27 (18.1%)	21 (14.1%)	7 (4.7%)	29 (19.5%)
11	Educational level considered	94 (63.1%)	18 (12.1%)	15 (10.1%)	6 (4.0%)	16 (10.7%)

Table 7 shows that most clients did not report language (71.8%) or cultural differences (73.8%) as barriers. However, some challenges were noted. Nearly half of the clients found information too complex, and 8.1% said their provider was always rushed. Technological limitations (22.1%) and physical or structural barriers (19.5%) were also frequent concerns. A smaller portion of clients reported issues with communication style (8.7%), emotional concerns (8.7%), and too much information (5.4%), while 7.4% cited lack of trust in providers. Additionally, 10.7% felt their educational level was not always considered. These findings suggest that while communication was effective for most, barriers related to clarity, provider time, and support tools still affect a notable minority.

Table 8. Summary Score for Constraints to Effective Communication

Answer Option	**Frequency of Responses**	**Percentage (%)**
Never	794	50.6%
Rarely	157	10.2%
Sometimes	336	21.8%
Often	85	5.5%
Always	184	12.0%
Total	**1,556**	**100%**
	Mean score	**2.17**
	Median score	**1.00**
	Standard deviation	**1,41**

Table 8 summarizes patients' cumulative responses across 11 variables measuring constraints to effective communication. A majority of responses (50.6%) were rated "Never," suggesting that most patients did not experience communication barriers. An additional 10.2% indicated "Rarely," pointing to occasional but manageable challenges. However, 21.8% of responses were marked "Sometimes," reflecting intermittent communication difficulties.

Notably, 12.0% of respondents "Always" and 5.5% "Often" experienced communication barriers, suggesting that a subset of patients regularly encounters obstacles such as language issues, emotional discomfort, or provider-related limitations.

The mean score of 2.17 indicates that, on average, patients experienced communication constraints between "Rarely" and "Sometimes," suggesting that such barriers were not frequent but still present in many encounters. The median score of 1.00 ("Never") shows that at least half of the respondents reported no barriers at all, pointing to a generally positive experience in terms of communication flow. However, the standard deviation of 1.41, being greater than 1.0, reflects moderate variability, meaning that while many patients experienced smooth communication, a considerable number encountered inconsistent or recurrent obstacles. This mixed pattern suggests a need to strengthen consistency in communication experiences across all patient groups.

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Relationship between Communication Practices and Patient Perception of Quality of Communication

This section tested Hypothesis 1, which examined whether better communication practices, such as using simple language, offering emotional support, or involving patients in decision-making, are related to patients' perception of communication quality. Pearson's correlation was used because it measures the strength and direction of the relationship between each communication practice and patients' overall perception (categorized as "good" or "not good"). It was appropriate for identifying whether improvements in communication practices were associated with better-rated communication. Results were considered statistically significant when the p-value was less than 0.05.

Table 9. Correlation between Communication Practices and Quality of Communication (n=149)

SN	Communication Practices	Quality of communication (good/ not good) (r)	p-value
1	Provider explains using simple language	0.159	0.052
2	Provider uses pictures, diagrams	**0.24**	**0.003**
3	Handouts given	0.087	0.294
4	Handouts easy to understand	0.054	0.51
5	Provider asks you to explain back	0.136	0.097
6	Clear instructions after visit	**0.218**	**0.008**
7	Provider considers feelings and concerns	**0.344**	**0**
8	Provider communicates to fit culture	**0.198**	**0.016**
9	Provider considers educational level	0.058	0.482
10	Enough chances to ask questions	**0.295**	**0**
11	Explanation helps you manage diabetes	**0.214**	**0.009**
12	Provider encourages better self-care	**0.262**	**0.001**
13	Receive regular updates	**0.407**	**0**

The results in Table 9 reveal that most communication practices were positively associated with patients' perception of communication quality, although the strength and significance of these relationships varied. The strongest correlation was for receiving regular updates from providers ($r = 0.407$, $p < 0.001$). This is a moderate and statistically significant relationship, meaning that patients who consistently received follow-up updates were more likely to perceive communication as effective.

This was followed by providers considering patients' feelings and concerns ($r = 0.344$, $p < 0.001$) and giving enough opportunities to ask questions ($r = 0.295$, $p < 0.001$)—both moderately strong correlations, suggesting that when patients feel heard and involved, they rate communication more positively. In other words, the more patients felt emotionally supported and able to participate, the better they judged the quality of communication.

Other communication elements that showed statistically significant positive correlations included the use of visual aids such as pictures or diagrams ($r = 0.240$, $p = 0.003$), giving clear instructions after visits ($r = 0.218$, $p = 0.008$), tailoring communication to the patient's cultural background ($r = 0.198$, $p = 0.016$), explanations that help patients manage their diabetes better ($r = 0.214$, $p = 0.009$), and encouraging better self-care ($r = 0.262$, $p = 0.001$). Although these associations were moderate, they all showed that better application of these practices tends to enhance patients' evaluation of communication quality.

These findings mean that the more these practices are used—especially those involving empathy, feedback, and practical tools— the better patients rated the quality of communication.

In contrast, certain practices showed weak and statistically non-significant relationships with perceived communication quality. These included giving handouts (r = 0.087, *p* = 0.294), making handouts easy to understand (r = 0.054, *p* = 0.510), and considering patients' educational level (r = 0.058, *p* = 0.482). These results suggest that these components, while potentially useful, did not play a substantial role in influencing how patients judged the quality of communication in this context.

The overall trend was that stronger interpersonal engagement, follow-up, clarity, and emotional sensitivity from providers significantly improved patients' perception of communication. These findings support the hypothesis that effective communication practices play a crucial role in enhancing the quality of communication in diabetes care.

Influence of Provider-patient Interaction on Perception Quality on Communication

This section tested Hypothesis 2, which explored whether provider–patient interaction, such as listening, empathy, and time spent, affects how patients perceive the quality of communication. A one-way ANOVA was used because it helps compare the mean perception scores across different response levels (e.g., from "Never" to "Always") for each interaction behavior. This test was appropriate since it allowed assessment of whether differences in communication behavior led to significant changes in patients' ratings. A p-value below 0.05 indicated a significant effect, and higher F-values reflected stronger influence of specific behaviors on patient perception.

Table 10. One Way Anova Results of Provider-patient Communication Interactions on Quality of Communication

Sn	Variable	Source	Sum of Squares	Df	Mean Square	F	pvalue
1	Provider gives time to talk	Between	5.747	4	1.437	8.798	**0**
		Within	23.515	144	0.163		
2	Provider listens carefully	Between	6.545	4	1.636	10.373	**0**
		Within	22.716	144	0.158		
3	Provider treats with kindness/ respect	Between	2.89	4	0.722	3.945	**0.005**
		Within	26.372	144	0.183		
4	Provider involves in decision-making	Between	5.698	4	1.424	8.705	**0**
		Within	23.564	144	0.164		
5	Comfort sharing personal information	Between	4.344	4	1.086	6.276	**0**
		Within	24.918	144	0.173		
6	Provider shows compassion	Between	7.476	4	1.869	12.353	**0**
		Within	21.786	144	0.151		
7	Provider explains options clearly	Between	4.819	4	1.205	7.098	**0**
		Within	24.442	144	0.17		
8	Provider respects privacy	Between	1.305	4	0.326	1.681	0.158
		Within	27.957	144	0.194		
9	Trust in provider	Between	6.965	4	1.741	11.246	**0**
		Within	22.296		0.155		
10	Suggestions fit lifestyle	Between	8.84	4	2.21	15.583	**0**

		Within n	20.422	1444	0.142		
11	Emotional support during visits	Between	7.732	4	1.933	12.93	**0**
		Within	21.529	1444	0.15		
12	Provider considers education level	Between	3.643	3	1.214	6.873	**0**
		Within	25.619	145	0.177		

The one-way ANOVA results on table 10 above show that several providers–patient communication interactions or behaviors had a significant influence on how clients perceived the overall quality of communication. Notably, when providers listened attentively ($F = 10.373$, $p < 0.001$), showed compassion ($F = 12.353$, $p < 0.001$), gave emotional support ($F = 12.930$, $p < 0.001$), and tailored their suggestions to the patient's lifestyle ($F = 15.583$, $p < 0.001$), patients were more likely to rate communication quality as high. Similarly, clear explanation of options, involvement in decision-making, trust in the provider, and allowing enough time during consultations also showed significant positive effects.

However, privacy was the only area that did not show a significant difference ($p = 0.158$), which may indicate that it was generally not considered by patients well maintained across the board. Overall, the findings highlight that respectful, empathetic, and patient-centered behaviors play a key role in how patients evaluate the quality of communication with their healthcare providers.

Influence of Communication Constraints on Patient Perception of Quality of Communication

This section examines Hypothesis 3, which tested whether specific communication barriers influence how patients rate the quality of communication with their healthcare providers. A linear regression was used to analyze the effect of 11 communication constraints on patient rated communication quality (categorized as "good" or "not good"). This method was chosen because it allows us to measure how each barrier independently contributes to changes in the outcome. Significance was determined using p-values (with $p < 0.05$ considered statistically significant) and standardized Beta values, which show the strength and direction of the relationship. This helped identify the most impactful barriers affecting patients' perception of communication.

Table 11. Linear Regression Results of Constraints of Communication on Quality of Communication

SN	Communication Constraint	B-Unstandardized	Std. Error	Beta (Standardized)	t-value	p value
1	Language differences	0.009	0.029	0.022	0.325	0.746
2	Information was too complex	0.042	0.039	0.110	1.089	0.278
3	**Provider rushed (lack of time)**	**-0.136**	**0.032**	**-0.398**	**-4.302**	**0.000**
4	Cultural differences	0.041	0.035	0.091	1.165	0.246
5	**Lack of technological tools**	**-0.059**	**0.020**	**-0.212**	**-2.941**	**0.004**
6	Provider's communication style	-0.056	0.035	-0.163	-1.610	0.110
7	Emotional concerns	0.014	0.030	0.039	0.454	0.651

8	**Too much information**	**-0.065**	**0.032**	**-0.173**	**-2.014**	**0.046**
9	Lack of trust in provider	-0.031	0.032	-0.093	-0.991	0.323
10	Physical and structural barriers	0.022	0.028	0.077	0.777	0.438
11	**Consideration of educational level**	**-0.054**	**0.023**	**-0.165**	**-2.387**	**0.018**

The regression results on table 11 revealed that several communication constraints had a statistically significant negative impact on how patients rated the quality of communication. Notably, the perception that the provider was rushed or lacked time (B = -0.136, p = 0.000) was the strongest negative predictor, followed by lack of access to technological tools (B = -0.059, p = 0.004), excessive or overwhelming information during consultations (B = -0.065, p = 0.046), and lack of consideration for the patient's educational level (B = -0.054, p = 0.018). These findings suggest that when communication is hurried, poorly supported, or not adapted to the patient's level of understanding, it significantly reduces their perception of communication quality.

On the other hand, barriers such as language differences, cultural misunderstandings, emotional concerns, and trust issues did not show statistically significant associations (p > 0.05), indicating that they may have had less direct influence within this study population. Overall, the model supports the hypothesis that practical and structural communication challenges particularly those related to time, clarity, and personalization are key determinants of how patients evaluate the quality of communication they receive in diabetes care.

Influence Of Sociodemographic and Care-Related Factors on Patient Satisfaction

This section tested Hypothesis 4 by examining whether factors like age, gender, education, and treatment experience influenced how patients rated the quality of communication with their healthcare providers. A multiple linear regression was used because it helps assess the effect of several factors at once. Results were considered significant if $p < 0.05$, and t-values showed how strongly each factor influenced communication ratings.

Table 12. Linear Regression Distribution of Sociodemographic and Clinical Characteristics of Patients and Quality of Communication

SN	Independent Variable	Unstandardized Coefficient (B)	Std. Error	Standardized Coefficient (Beta)	t-value	p-value
1.	Age category	-0.065	0.065	-0.095	-0.997	0.321
2.	Gender	-0.018	0.083	-0.019	-0.216	0.830
3.	Level of education	0.036	0.033	0.098	1.086	0.279
4.	Duration of care	0.037	0.070	0.050	0.526	0.600
5.	Type of treatment	-0.102	0.060	-0.147	-1.702	0.091
6.	Frequency of care	-0.049	0.057	-0.074	-0.870	0.386

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As presented in Table 12, none of the variables showed a statistically significant association with the perceived quality of communication. For instance, age (p = 0.321), gender (p = 0.830), and education level (p = 0.279) had no significant effects. Similarly, duration of care (p = 0.600), type of treatment (p = 0.091), and frequency of care (p = 0.386) also did not significantly predict patient ratings of communication quality.

These findings suggest that patients' perceptions of how well providers communicate are not influenced by their demographic background or treatment characteristics. Instead, the quality of communication appears to depend more on the communication behaviors of the providers themselves. Therefore, Hypothesis 4 was not supported in this study.

Multiple Regression Analysis: Predictors of Patient Perception of Quality of Communication

This section presents a multiple linear regression analysis used to identify which communication behaviors significantly influence patients' perception of communication quality. The dependent variable was whether communication was rated as "good" or "not good." The 24 predictors included only those variables that were significant in earlier individual tests.

This method was chosen because it examines all predictors together while controlling for confounding effects, allowing us to see which factors independently affect patient perception. Significance was set at $p < 0.05$.

Table 13. Multiple Regression Results of all Significant Variables and Quality of Communication

SN	Communication Variable	B (Unstandardized)	Std. Error	t-value	p-value
1	Provider explains using simple language	0.016	0.034	0.473	0.637
2	Provider uses pictures/diagrams	0.050	0.023	2.198	0.030**
3	Clear instructions after visit	-0.017	0.028	-0.603	0.548
4	Provider considers feelings, concerns	0.003	0.037	0.086	0.931
5	Provider communicates to fit culture	0.016	0.031	0.524	0.601
6	Chances to ask questions	0.003	0.032	0.090	0.928
7	Explanation helps manage diabetes	-0.001	0.043	-0.012	0.990
8	Provider encourages self-care	0.045	0.032	1.419	0.158
9	Receive regular updates	-0.009	0.024	-0.372	0.711
10	Gives time to talk and share concerns	-0.036	0.040	-0.910	0.365
11	Listens carefully without interruption	0.053	0.041	1.283	0.202
12	Treats with kindness and respect	-0.063	0.033	-1.940	0.055

13	Involves you in decision-making	0.051	0.026	1.962	0.052
14	Comfortable sharing personal info	-0.022	0.028	-0.797	0.427
15	Shows understanding and compassion	0.069	0.038	1.815	0.072
16	Explains options & helps choose best	-0.003	0.028	-0.103	0.918
17	Trust in provider	0.017	0.038	0.436	0.664
18	Suggestions fit lifestyle	-0.039	0.033	-1.179	0.241
19	Supports you emotionally	0.049	0.037	1.313	0.192
20	Duration of consultation	0.087	0.035	2.495	0.014
21	Provider rushed / lack of time	-0.081	0.031	-2.663	0.009
22	Lack of technological style	-0.028	0.021	-1.324	0.188
23	Too much information	-0.086	0.032	-2.717	0.008
24	Considers educational level	-0.042	0.025	-1.718	0.088

The multiple regression analysis on table 13 revealed that out of the 24 communication-related variables tested, four were statistically significant predictors of how patients rated the overall quality of communication. The use of pictures or diagrams had a positive effect (B = 0.050, p = 0.030), suggesting that visual aids help improve patients' understanding and overall perception of good communication. Longer consultation time was also a significant positive factor (B = 0.087, p = 0.014), indicating that when providers spend more time with patients, communication is perceived more positively.

On the other hand, two variables negatively influenced communication quality. Patients who felt providers were rushed (B = -0.081, p = 0.009) or overwhelmed with too much information (B = -0.086, p = 0.008) were less likely to rate communication as good. This highlights the importance of pacing communication and ensuring patients are not overloaded.

Although some factors like provider kindness and patient involvement in decisions came close to significance, they did not meet the $p < 0.05$ threshold in the full model. Overall, the results suggest that time, clarity, and the appropriate use of visual aids are crucial for enhancing communication quality, even when controlling for other communication practices, interactions, and constraints.

Discussion

The results indicate that most participants were older adults, with an average age of 61.29 years, and the majority had been living with diabetes for more than two years. This reflects a population largely engaged in long-term disease management, which is typical of ageing groups. This finding is consistent with recent evidence from the North West Region of Cameroon where diabetes care utilization was highest among older adults with long-standing disease, reflecting the chronic nature of diabetes and the need for continuous engagement with healthcare services [3]. Comparable patterns have been observed in Cameroon and other parts of sub-Saharan Africa, where the prevalence of diabetes tends

to rise with age due to prolonged exposure to behavioral and metabolic risk factors [2, 14]. The predominance of female participants aligns with findings from studies conducted in Ghana and Nigeria, where women are generally more likely to utilize healthcare services and maintain regular follow-up [15, 16]. These observations highlight the need to tailor communication approaches to older individuals, many of whom may also have limited formal education.

Findings from this study also show that communication practices were moderately effective. Patients commonly reported that healthcare providers used simple language and delivered explanations that were easy to understand, suggesting that verbal interaction remains the primary mode of communication in this setting. Similar observations have been reported in South Africa, where clear explanations are considered essential for managing chronic conditions [17]. These findings are consistent with recent recommendations emphasizing health literacy-sensitive communication approaches that adapt information to patients' comprehension levels and cultural context. [18]. Despite this strength, notable gaps were identified, particularly the limited use of visual aids, written materials, and digital tools. Comparable challenges have been documented in Ethiopia and Kenya, where communication often relies heavily on verbal exchange due to resource constraints and the absence of structured educational materials [19, 20]. New studies indicate that visual educational materials improve patient understanding, recall of information, and diabetes self-management, particularly among populations with limited literacy skills [21]. Emerging evidence indicates that incorporating visual and digital support tools can enhance patient understanding and participation, especially among individuals with low health literacy [22, 23].

The statistical analysis further reinforces these findings. Communication elements such as regular follow-up, emotional support, and opportunities for patient questions showed significant associations with better perceived communication quality. This points to the fact that the effectiveness of communication is shaped not only by how clearly information is presented but also by how actively patients are engaged during consultations. Comparable evidence from South Africa demonstrates that sustained interaction and patient involvement are linked to improved health outcomes [24]. In addition, regression results revealed that the use of visual aids contributed positively to communication quality, whereas providing excessive information had a negative effect. This emphasizes the importance of structuring communication in a way that aligns with patients' level of understanding. Studies from Uganda and Tanzania similarly report that simplified and structured communication approaches, including the use of visual tools, improve comprehension and support better self-management among patients with chronic conditions [25].

The results related to provider–patient interaction show that many patients experienced positive relationships with healthcare providers, particularly in areas such as respect, empathy, trust, and privacy. These elements reflect strong interpersonal communication and are consistent with the principles of patient-centered care. Comparable findings have been reported in Ghana, where respectful engagement and trust were identified as major contributors to patient satisfaction [26]. However, aspects such as shared decision-making and the integration of patients' daily realities into care were less consistently observed, suggesting that clinical interactions still tend to be driven largely by providers. Current evidence suggests that shared decision-making remains one of the strongest predictors of patient satisfaction and long-term adherence among people living with chronic diseases [27] This pattern has also been described in Cameroon and other African settings, where

hierarchical structures in healthcare can limit active patient participation in decision-making processes [28, 29].

Further statistical analysis strengthens the importance of interaction quality in shaping patient perceptions. The ANOVA results demonstrated that behaviors such as attentive listening, compassion, emotional support, and involving patients in decisions had a significant effect on how communication was perceived. This indicates that the relational aspect of care is central to patient experience. Evidence from Kenya and Tanzania similarly shows that when patients feel heard and respected, they are more likely to adhere to treatment and report better health outcomes [20, 29]. In addition, the correlation analysis revealed that providing opportunities for patients to ask questions and offering emotional support were strongly linked to improved perceptions of communication, highlighting the value of interactive and participatory approaches.

Although communication barriers were not widely reported, several important challenges emerged from the findings. These included the use of complex medical language, limited time during consultations, insufficient technological support, and communication that is not always adapted to patients' educational background. Similar barriers continue to be reported globally, particularly in resource-constrained settings where heavy patient loads limit opportunities for individualized communication and patient education [30] These challenges reflect both system-level limitations and provider-related factors. Similar constraints have been documented in Nigeria and Ethiopia, where high patient volumes and short consultation times reduce the effectiveness of communication [31, 10]. Broader evidence also indicates that time constraints and low health literacy continue to hinder effective communication in the management of chronic conditions [22].

The regression analysis provides additional insight into these challenges by identifying key factors that negatively influence communication quality. Short consultation time, excessive information delivery, and lack of technological support were all associated with poorer communication outcomes. These findings are important because they point to areas that can be improved within the health system. At the same time, longer consultation time was found to enhance communication quality, reinforcing the importance of allowing sufficient time for patient interaction. Similar observations have been reported in Tanzania and Uganda, where adequate consultation time improves patient understanding and supports better adherence to treatment [25].

It is also noteworthy that patients' sociodemographic and clinical characteristics did not significantly affect their perception of communication quality. This indicates that how providers communicate, as well as how services are organized, plays a more important role than individual patient characteristics. Alike conclusions have been drawn in studies conducted in Cameroon, where provider communication style was identified as a key determinant of patient satisfaction regardless of age, gender, or level of education [28].

Taken together, these findings point to the need for practical interventions aimed at improving communication in diabetes care. Strengthening healthcare provider training in patient-centered communication, ensuring adequate consultation time, and introducing simple supportive tools such as visual aids and teach-back methods could improve patient understanding and engagement. Further research is needed to assess the impact of these strategies and to explore how digital health solutions can be adapted effectively within low-resource settings.

Conclusion

This study examined factors influencing the quality of health communication in diabetes care within the Bamenda Health District, focusing on communication practices,

provider–patient interaction, and existing barriers. The findings indicate that communication is generally satisfactory, particularly in the use of clear language and in maintaining respectful and supportive relationships between providers and patients. Despite these strengths, gaps persist in the use of structured communication approaches, patient participation in decision-making, and consistency in how information is delivered.

The results further show that communication quality is largely shaped by factors that can be improved at the provider and system levels. Practices such as clear explanations, emotional support, and opportunities for patient involvement were linked to better communication experiences. In contrast, limited consultation time, excessive information, and poor adaptation to patients' level of understanding negatively affected communication. The positive contribution of visual aids and adequate consultation time also highlights practical areas where improvements can be made. The absence of significant influence from sociodemographic and clinical characteristics suggests that enhancing communication practices can benefit all patients.

Improving communication in diabetes care therefore requires targeted actions, including strengthening provider skills in patient-centered communication, promoting the use of simple supportive tools, and ensuring adequate time for patient interaction. Addressing these areas can improve patient understanding, treatment adherence, and overall care outcomes.

Further research should assess the impact of structured communication approaches and digital tools in similar settings. In addition, qualitative studies are needed to explore in more depth the experiences and perspectives of both patients and healthcare providers, which will complement these findings and support the development of context-appropriate communication strategies.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon reasonable request.

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Conflict of Interest

The authors declare that there is no conflict of interest related to this study.

Ethical Approval

Ethical approval for the study was obtained from ethical review board of the regional delegation of public health for the North West region Bamenda Cameroon, the appropriate institutional and administrative authorities prior to data collection. Permission to conduct the study was granted by the management of the participating health facilities. Written informed consent was obtained from all participants before enrollment, and confidentiality and anonymity were strictly maintained throughout the study. Participation was voluntary, and respondents were free to withdraw at any stage without any consequences.

Author Contributions

Eyong Manyiyong Queenta conceived and designed the study, supervised the research process, conducted data analysis, interpreted the findings, and drafted the manuscript. Fietsop Ernestine Nkemta, Frida Bessem Taku Bate, Yuyeh Virginia Mawo, and Egbe Derick Agbor contributed to data collection, data cleaning, and manuscript revision. Bodzewan Emmanuel provided overall academic oversight and guidance. All authors reviewed and approved the final version of the manuscript.

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