









ORIGINAL RESEARCH

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Nutritional Diet Knowledge and Barriers to Dietary Recommendations Adherence Among Diabetic Patients in Central Region, Ghana: A Cross-Sectional Study

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ABSTRACT

Background and Aim: Diabetes mellitus (DM) presents significant health risks due to elevated blood sugar levels, necessitating adherence to dietary recommendations for effective management. However, diabetic patients often encounter barriers hindering their adherence to dietary guidelines. This study sought to investigate the determinants of good nutritional diet knowledge and adherence to dietary recommendations beyond the barriers faced by diabetic patients in Ghana.

Methods: This was a cross-sectional prospective study that collected data using a tested and structured questionnaire from 100 diabetic patients from January 2024 to June 2024. Data was entered and analyzed using Microsoft Excel 2019 and SPSS (version 26). Bivariate and multivariable logistic regression was used to identify associations between dependent and independent variables. Statistical significance was set at a p -value ≤ 0.05 .

Results: The mean age of the participants was 56.97 ± 11.98 years. Overall, about 74.44% had good nutritional diet knowledge. Being female (adjusted odds ratio [AOR] = 0.65, 95% confidence interval [CI] = [0.41–0.83]), and having complete tertiary education (AOR = 2.05, 95% CI = 0.96–3.82) were the factors associated with good nutritional diet knowledge. About 39% stopped their dietary plan without informing their doctor, and 60% stopped when they felt their condition was under control. The overall adherence to dietary recommendations was poor as only 48% adhered to the recommendations. Being female (AOR = 0.83, 95% CI = [0.49–2.11]), being 75 years or older (AOR = 2.74, 95% CI = 0.99–4.14), and having good nutritional knowledge (AOR = 2.80, 95% CI = 1.61–4.16) were the factors associated with good adherence to dietary recommendation.

Conclusion: The participants had good nutritional diet knowledge but poor adherence to dietary recommendations. Being female and having completed tertiary education were the determinants of good nutritional diet knowledge while being female, being 75 years or older, and having good nutritional knowledge were the factors associated with good adherence. The leading adherence barriers were the discomforts associated with cooking meals that meet their dietary requirements, dietary restrictions, and financial difficulties.

1 | Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by elevated blood sugar levels due to insufficient insulin secretion or ineffective insulin utilization [1]. It poses significant health risks, including acute complications such as diabetic ketoacidosis and long-term complications like heart disease and organ failure [2]. DM encompasses three primary types: Type 1, Type 2, and gestational diabetes mellitus (GDM). Type 1 diabetes is typically diagnosed in children and young adults, and it is characterized by the autoimmune destruction of pancreatic beta cells resulting in absolute insulin deficiency [3]. Type 2 diabetes is more prevalent among middle-aged and those in the older populations who are often associated with insulin resistance and relative insulin deficiency. GDM occurs during pregnancy and is characterized by elevated blood sugar levels. While GDM typically resolves post-childbirth, affected women are at an increased risk of developing Type 2 diabetes later in life [4].

According to the World Health Organisation (WHO), there were 830 million people with diabetes globally in 2022 and the prevalence has been rising more rapidly in low- and middle-income countries than in high-income countries [5]. This number has also been predicted to escalate to 1.3 billion by 2050 and more than two-thirds of the expected rise in diabetes prevalence is anticipated to be in low- and middle-income countries, including those in sub-Saharan Africa [5, 6]. The African continent faces a significant challenge in managing diabetes, with a substantial proportion of individuals remaining undiagnosed. Global projections indicate that Africa will experience a staggering 156% increase in the burden of diabetes by 2045 [7]. Ghana, as one of the countries in the IDF African region, is grappling with a considerable diabetes burden. In 2020, Ghana had over 4.16 million people diagnosed with type 2 diabetes, and the number of prediabetic patients was around 4.6 million [8].

Notably, most major complications associated with diabetes are preventable through effective management of blood glucose levels, blood pressure, and cholesterol levels. Achieving this requires comprehensive education of individuals with diabetes on managing their condition, alongside access to essential resources such as insulin, oral medications, and monitoring equipment [9]. Furthermore, lifestyle modifications have a substantial impact on controlling hyperglycemia, emphasizing the importance of possessing sound knowledge, maintaining a positive attitude, and implementing prudent practices [10].

Despite the availability of dietary recommendations emphasizing healthy eating habits, adherence among diabetic patients remains low. Factors such as inadequate health information and the absence of standardized dietary guidelines contribute to this poor adherence [11, 12]. This study, therefore, sought to investigate the determinants of good nutritional diet knowledge and adherence to dietary recommendations as well as the barriers faced by patients with diabetes in Ghana with the following specific objectives;

1. To assess the level of knowledge of diabetic patients and adherence to dietary recommendations among diabetic patients.
2. To identify the main barriers faced by patients with diabetes in adhering to dietary recommendations.
3. To assess the determinants of good nutritional diet knowledge about diabetes among diabetic patients.
4. To assess the determinants of good adherence to dietary recommendation.

2 | Methods

2.1 | Research Design, Population, and Site

The study employed a cross-sectional prospective study design to investigate the nutritional diet knowledge and the barriers to adherence to dietary recommendations among diabetic patients attending the Diabetes Clinic at Salvation Army Hospital in Agona Duakwa, Agona East, Central Region, Ghana. This clinic served as the primary healthcare facility where diabetic patients received medical care, including consultations, treatment, and management of their condition in the Agona Duakwa, Agona East, Central Region, Ghana.

2.1.1 | Inclusion Criteria

- Diabetic patients aged 18 years and above diagnosed with Type 1 or Type 2 diabetes.
- Diabetic patients who were willing to participate voluntarily in the study.

2.1.2 | Exclusion Criteria

- Diabetic patients below the age of 18 years.
- Diabetic patients with cognitive impairments or communication barriers that hindered their ability to provide informed consent or respond to questionnaire items.
- Patients who refused to participate in the study or withdrew their consent.

2.2 | Sample Size and Sampling Technique

The participants of the study were selected based on the inclusion criteria hence a purposive sampling technique was used. Cochran's Formula was employed to obtain the sample size. By incorporating the estimated proportion, margin of error, and Z-score into the calculation, Cochran's formula provided a more accurate estimate of the required sample size, taking into account the potential variability in responses. The formula accounted for the central tendency of the responses by using the proportion (6%). The desired margin of error (5%) reflects the amount of variability in responses that is acceptable.

$$n = \frac{Z^2 P q}{e^2},$$

where:

n = the estimated sample size,

p = population proportion of patients with diabetes in Ghana (6%) [13],

e = error margin of 5%,

z = Z-value which was obtained from the z -table with 95% level of confidence = 1.96,

$$n = \frac{1.96^2 \times 0.06(1 - 0.06)}{0.05^2},$$

$n = 86.67$,

$n \approx 87$.

Fifteen percent (15%) of the calculated sample size ($n = 13$) was added to the sample size to account for nonresponse rate. Therefore, the sample size used for this study was 100 participants.

2.3 | Data Collection Instrument and Data Collection

The study utilized a structured questionnaire comprising closed-ended questions, designed based on relevant literature and study objectives. Section A captured socio-demographic data of the participants, while Section B evaluated adherence levels to dietary recommendations among diabetic patients. Section C focused on assessing participants' knowledge regarding the dietary management of diabetes. Finally, the last section, Section D, explored the primary barriers perceived by diabetic patients in adhering to dietary recommendations. The participants were given several statements in the third and fourth sections and asked to rate their level of agreement on a five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). Before the main data collection, the questionnaire was pretested at Nana Duoduwaa Polyclinic, with 20 respondents to assess its clarity, appropriateness, and reliability. The necessary modifications were made based on the pretest results. Cronbach's α was used to assess the questionnaire's reliability, and the results indicated that the coefficient of reliability was considerable (Cronbach's α : 0.81). To determine whether the instrument could measure what it was supposed to measure and to identify any mistakes that would obscure its meaning and prevent them from collecting erroneous responses, a validity evaluation was conducted. It was ensured that the items on the instrument covered the scope the instrument was intended to measure to assure content validity. This was determined by experts in the field. During the data collection process, researchers approached eligible participants attending the Diabetes Clinic and explained the purpose of the study. A brief introduction of the study, outlining the goals, objectives, risks, and advantages of the study was given, after

which the participants were asked to confirm their willingness to participate (consent) in the survey. Participants were then asked to complete the questionnaire either in the local language or English, depending on their preference and proficiency. They were also reminded of the option to withdraw from the study at any point in time. Researchers were available to clarify any doubts or questions participants might have had while completing the questionnaire.

2.4 | Data Analysis

The responses were initially organized and entered into Microsoft Excel 2019 Spreadsheet. This was done following a thorough error-checking, validation, and verification process of the data before analysis. The statistical package for the social sciences (SPSS) software for Windows (SPSS Inc. Chicago, IL version 26 was used for the analysis). Data were analyzed using descriptive statistics (including frequencies and percentages) and inferential statistics. The findings were presented in tables. The independent variables were sex, age, gender, and educational level while the dependent variables were level of adherence to dietary recommendations and knowledge of diabetic patients regarding dietary management of diabetes. Participants adhering to at least 70% of the dietary recommendations were categorized as having good adherence, and if not, poor adherence. Participants answering at least 70% of the knowledge-related questions correctly were categorized as having good knowledge, otherwise, poor knowledge. Bivariate and multivariable logistic regression was used to identify associations between dependent and independent variables. Assumptions such as independence of errors, mutually exclusive and exhaustive outcome variable categories, absence of multicollinearity, and lack of strongly influential outliers were met for logistic regression. For the independence of errors, the Durbin-Watson test statistic was used to detect autocorrelation in the residuals from the regression analysis. Cook's distance was calculated to quantify the influence of each observation. Model fitness was assessed using Hosmer-Lemeshow goodness of fit ($p = 0.07$). The Variance Inflation Factor ($VIF = 3$) was used to check for multicollinearity. Explanatory variables which were significant in bivariate analysis at a $p \leq 0.25$ were fed into the multivariable logistic regression analysis. To minimize the impact of confounders and determine the independent effects of each variable on the outcome variable, screened variables were fitted to the multivariable logistic regression model using a backward stepwise approach. Adjusted odds ratios (AORs) with 95% confidence interval [CI] were calculated with statistical significance (two-sided) set at $p \leq 0.05$.

2.5 | Ethical Consideration

The study conformed to the Declaration of Helsinki and was approved by Klintaps College of Health Allied Sciences Ethical Review Committee with the number KCOHASERC/EC/2023/35. Confidentiality and anonymity were ensured, and participants were not required to provide personally identifiable information. The data collected have been stored securely and only used for the purpose of this study. No participant was

harmful during the data collection process. All the respondents consented before participation.

3 | Results

The mean age of the participants was 56.97 ± 11.98 years, spanning from 30 to 86 years. Most of the patients with diabetes were females (79%) and had had the condition for 5 years or below (56%). The remaining results on the socio-demographic characteristics of the participants are shown in Table 1.

The majority of the participants (70%) knew that excessive sugar contributes to diabetes, and 82% understood the importance of maintaining a healthy weight. Additionally, 75% were aware that fruits and vegetables are beneficial, 79% supported eating small, frequent meals, and 82% knew that whole grains high in fibre are healthy sources of carbohydrates. However, only 33% believed that diet and exercise are more important than medication in the management of diabetes (Table 2).

Even though 68% of participants had received nutritional education, the majority (62%) forgot to follow dietary recommendations. About 41% stopped their dietary plan without informing their doctor because they felt it was unnecessary, whilst 63% stopped when they felt their diabetes was under control. Many

participants felt hassled (56%) or deprived (50%) by their dietary plan, and 60% sometimes forgot to include fruits and vegetables. The overall adherence to dietary recommendations was poor as only 48% adhered to the recommendations (Table 3).

In this study, about 33% of participants found the recommended diet restrictions challenging, and 69% did not face any barriers from social pressures. About 68% did not experience any financial difficulties in acquiring recommended foods or ingredients. Cultural and religious restrictions were also no barriers to most of the patients with diabetes (92%). However, the majority (58%) were uncomfortable cooking meals that meet their dietary requirements as shown in Table 4.

After adjusting for sex and age as confounding factors, being female (AOR = 0.65, 95% CI = [0.41–0.83]), and having completed tertiary education (AOR = 2.05, 95% CI = 0.96–3.82) were the factors associated with good nutritional diet knowledge (Table 5).

After adjusting for sex and age as confounding factors, being female (AOR = 0.83, 95% CI = [0.49–2.11]), being 75 years or older (AOR = 2.74, 95% CI = 0.99–4.14) and having good nutritional knowledge (AOR = 2.80, 95% CI = 1.61–4.16) were the factors associated with good adherence to dietary recommendation (Table 6).

TABLE 1 | Socio-demographic characteristics of the participants.

Variables	Category	Frequency (N)	Percentage
Age (years)	30–44	14	14.0
	45–59	45	45.0
	60–74	31	31.0
	75 and above	10	10.0
Sex	Female	79	79.0
	Male	21	21.0
Marital status	Single	2	2.0
	Married	73	73.0
	Divorced	8	8.0
	Widowed	17	17.0
Religion	Christianity	79	79.0
	Islam	20	20.0
	Traditionalist	1	1.0
Educational level	No formal education	18	18.0
	Basic level	61	61.0
	Secondary level	12	12.0
	Tertiary level	9	9.00
Occupation	Government employed	8	8.0
	Self-employed	70	70.0
	Unemployed	22	22.0
Duration of diabetes	5 years or below	56	56.0
	5–10 years	36	36.0
	10 years or above	8	8.0

TABLE 2 | Nutritional diet knowledge about diabetes among participants.

Variables	Good (%)	Poor (%)
Too much sugar and other sweet foods consumption is a cause of diabetes mellitus.	70.0	30.0
Medication is more important than diet and exercise to control your diabetes.	33.0	67.0
Maintaining a healthy weight is important in the management of diabetes.	82.0	18.0
Fruits and vegetables must be eaten because they are good in managing diabetes.	75.0	25.0
It is good to eat small, frequent meals regularly to manage blood sugar.	79.0	21.0
Whole grains high in fiber are recommended as a healthy source of carbohydrate.	82.0	18.0
Eating a large portion of food at once may lead to increased blood sugar.	66.0	34.0
High-fat dairy products including high animal protein consumption must be avoided.	89.0	11.0
It is good to cut back on salty food including high-sodium food such as processed food.	94.0	6.0

TABLE 3 | Adherence to dietary recommendation among participants.

Variables	Good (%)	Poor (%)
I have received diabetes nutritional education before.	68.0	32.0
I sometimes forget to follow the recommended dietary approach for diabetes mellitus.	38.0	62.0
I have stopped following the recommended dietary plan without telling my doctor because I felt it was unnecessary.	59.0	41.0
When I feel like my diabetes is under control, I sometimes stop following my dietary plan.	37.0	63.0
I feel hassled about sticking to my dietary plan.	44.0	56.0
I have feelings of dietary deprivation.	50.0	50.0
I forget to include fruits and vegetables in my dietary plan.	40.0	60.0

TABLE 4 | Barriers to dietary recommendation among participants.

Variables	Barrier (%)	Not barrier (%)	Not sure (%)
I find it difficult to follow a diabetic-friendly diet due to its restrictions.	33.0	62.0	5.0
I am not comfortable cooking meals that meet my dietary requirements.	58.0	41.0	1.0
Social pressure or temptations from friends and family members make it challenging to stick to my dietary recommendations.	30.0	69.0	1.0
I have experienced a lack of support or encouragement from family or friends in following my dietary recommendations.	28.0	69.0	3.0
I have cultural or religious dietary restrictions that make it challenging to follow my diabetic-friendly diet.	4.0	92.0	4.0
I have experienced financial difficulties in affording diabetic-friendly foods or ingredients.	31.0	68.0	1.0
My healthcare team does not provide sufficient support and guidance in following my dietary recommendations.	14.0	83.0	3.0

4 | Discussion

Most patients with diabetes in this study were middle-aged or older adults as 45.00% and 31.00% were 45–59 years and 60–74 years old respectively. These age groups often encounter various health issues that hinder adherence to dietary recommendations. Studies have reported that older adults with physical limitations or chronic conditions are unable to follow dietary advice [14–16]. Mohamed et al., in Mogadishu, Somalia,

also found that 36.7% of participants were aged 40–60 years, indicating comparable demographic trends across different studies [14]. A huge majority of the patients with diabetes were females (79.00%), which is consistent with the findings by Asmelash et al., in Ethiopia. However, they reported a comparatively lower proportion (53.6%) [15]. The reason for the high prevalence of diabetes in females could be due to certain factors like hormonal changes. Literature has reported that women undergo hormonal changes as they age and enter

TABLE 5 | Determinants of good nutritional diet knowledge about diabetes.

Variable	Category	Knowledge		COR COR (CI = 95%)	AOR AOR (CI = 95%)
		Good	Poor		
Sex	Male	10	11	1	1
	Female	61	18	0.79 (0.42–0.98) ^a	0.65 (0.41–0.83)^a
Age (years)	30–44	10	4	1	1
	45–59	20	25	2.17 (1.04–4.32)	1.35 (0.88–3.84)
	60–74	16	15	2.47 (1.24–4.02) ^a	1.95 (0.68–3.94)
	≥ 75	3	7	3.91 (1.69–6.98) ^b	3.37 (1.15–6.14)
Educational level	NFE	8	10	1	1
	Basic level	39	22	1.42 (0.68–3.12) ^b	0.98 (0.56–2.01)
	Secondary level	7	5	0.96 (0.41–2.42) ^a	0.87 (0.39–2.22)
	Tertiary level	8	1	2.43 (1.17–4.02) ^a	2.05 (0.96–3.82)^a

Note: Bold values indicate statistically significant.

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; NFE, no formal education; 1, reference category.

^a $p < 0.05$.

^b $p < 0.25$.

TABLE 6 | Determinants of good adherence to dietary recommendation.

Variable	Category	Adherence		COR COR (CI = 95%)	AOR AOR (CI = 95%)
		Good	Poor		
Sex	Male	12	9	1	1
	Female	58	21	0.94 (0.53–2.12) ^a	0.83 (0.49–2.11)^a
Age (years)	30–44	6	8	1	1
	45–59	13	32	1.54 (1.01–3.12) ^a	1.48 (0.72–3.14)
	60–74	18	13	1.26 (2.31–3.41) ^b	1.05 (0.52–3.20)
	≥ 75	8	2	2.99 (1.98–4.73) ^a	2.74 (0.99–4.14)^a
Educational level	NFE	9	9	1	1
	Basic level	28	33	1.25 (0.58–3.12) ^b	1.03 (0.46–1.99)
	Secondary level	6	6	1.12 (0.61–2.45) ^b	1.01 (0.56–2.01)
	Tertiary level	7	2	1.44 (0.57–3.02) ^a	0.98 (0.63–2.71)
Knowledge	Good	57	18	3.79 (1.98–5.35) ^a	2.80 (1.61–4.16)^a
	Poor	11	14	1	1

Note: Bold values indicate statistically significant.

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; NFE, no formal education; 1, reference category.

^a $p < 0.05$.

^b $p < 0.25$.

menopause affecting how their bodies use insulin, thereby putting women at a higher risk of developing diabetes. Polycystic ovary syndrome (PCOS), a common hormonal disorder among women of reproductive age, is also often associated with insulin resistance, which can lead to elevated blood sugar levels in females [17, 18]. The majority of participants in this study had lived with diabetes for 5 years or less (56.00%), which is in contrast to that of Mohamed et al., where 44.9% had diabetes for more than 10 years [14]. The reason for the disparity cannot be readily elucidated in this study.

The overall nutritional diet knowledge among participants was encouraging as an average of 74.44% had good knowledge. Most participants in this study (70%) knew that excessive

consumption of sugar and sweet foods could lead to DM. This level of awareness is commendable as reducing sugary food intake is a fundamental aspect of managing diabetes. This finding aligns with findings by Herath et al., who found that 90% of participants were aware of the impact of excessive sugar [19]. About 67% of the participants believed that medication was more crucial than diet and exercise in controlling diabetes. Similar findings were observed in a study by Alaofè et al., where there was high regard for medication compared to diet and exercise [20]. Most of the participants in this study understood the significance of healthy weight in managing diabetes, aligning with current medical guidelines. Similar results were reported by Waris et al. [21] However, a study by Mohammadi found a contrary result [22]. The good nutritional knowledge

found in this study implies diabetic patients can make informed food choices, leading to improved blood sugar control. The risk of hospitalizations, emergency department visits, and health-care costs will be reduced as a result of effective diabetes management through good nutritional diet knowledge [16].

A major proportion of participants (79%) knew that eating small and frequent meals was advantageous for managing blood sugar levels, which has also been reported by Rahaman et al. [23]. The alignment with other studies underscores the importance of educating patients on practical meal management strategies. It is also commendable that 94% of the participants knew that cutting back on salty food including high-sodium food such as processed food was good. This high level of awareness is consistent with findings from Waris et al., and Herath et al., where participants understood the impact of sodium on diabetes [19, 21]. A high level of awareness can empower diabetic patients to take control of their condition, thereby making informed decisions about their diet and lifestyle. By understanding the impact of nutrition on their condition, diabetic patients can better manage their diabetes, reducing the risk of complications and improving overall health [10].

In this current study, 68% of participants reported having received diabetes nutritional education, which is contrary to the findings of Ayele et al., where 52.8% of participants had not received any education about dietary recommendations [24]. Despite receiving nutritional education, 59% of participants in this study forget to follow dietary recommendations. This is similar to the findings of Ayele et al., where 84% of participants had difficulty remembering to eat according to their doctor's advice [24]. This could also explain why 32% stopped following the dietary plan without informing their doctor. The reason could also be because they felt their condition was under control. Similar results have been reported by Baral et al. [25]. Disregarding dietary guidelines may result in blood sugar levels that are out of control, which can cause symptoms including weariness, blurred vision, and increased thirst and urination.

In this present study, 33% of participants agreed that they had difficulty following a recommended diet due to its restrictions. This suggests that the restrictive nature of the diet is a major challenge, also corroborated by Ganiyu et al., and Ayele et al., who reported a similar barrier [24, 26]. About 58% of participants were not comfortable cooking meals that meet their dietary requirements which is consistent with findings by Han et al., [27]. Cooking skills and knowledge of recommended recipes among patients with diabetes are therefore areas that need additional support. Social pressures were not identified as a barrier for most participants (69%). The findings of this current study are also consistent with those of Ebrahim et al., and Mkonka et al., thereby emphasizing the importance of family support in adhering to dietary recommendations [28, 29]. Financial difficulty was also not identified as a barrier by a notable majority (68%). However, other studies have reported financial difficulties as a key barrier [24, 25]. Literature posits that participants who could afford the recommended diet are more likely to adhere to it [25]. To overcome the socioeconomic and environmental obstacles to dietary adherence, policy-makers and healthcare institutions should collaborate to create and execute efficient interventions and programs.

Cultural or religious dietary restrictions were overwhelmingly not perceived as a barrier by most of the patients with diabetes (92%). In South Asia, Sohal et al., found a contrary result as cultural influences were identified as a major obstacle among the participants [30]. The low perception of culture as a barrier in this study could be due to food-centric cultures. In some cultures in Africa, food plays a central role in social gatherings, celebrations, and traditions [31]. Diabetic patients from these cultures may be more motivated to follow dietary recommendations to maintain their health and participate in cultural activities [31, 32]. Certain cultural values, such as respect for elders or traditional practices, may influence an individual's perception of barriers to dietary recommendations [31]. For instance, a diabetic patient may be more likely to follow traditional dietary practices if they believe it will bring them good health and fortune. Some religions have specific dietary restrictions that may align with dietary recommendations for diabetic patients. Adhering to these restrictions may be seen as a moral or spiritual obligation, rather than a barrier. Religious beliefs and values, such as the importance of self-care or stewardship of one's body, may influence an individual's perception of barriers to dietary recommendations [33]. For example, a diabetic patient may view following dietary recommendations as a way to honour their body and demonstrate self-love. Diabetic patients actively engaged in their religious community may feel more accountable to their peers and more motivated to manage their condition [33].

Being female, being 75 years or older, and having good nutritional knowledge were the factors associated with good adherence to dietary recommendations as also reported in literature [31, 32]. Studies have reported that females, older people, and those with good nutritional knowledge are more likely to adhere to dietary recommendations [34, 35]. Encouragingly, 83% of participants agreed that their healthcare team provided sufficient support and guidance in following dietary recommendations. This finding underscores the critical role of healthcare providers in facilitating adherence, as highlighted by Alrahbi and Alghenaimi in Oman [36]. The adherence to dietary recommendations was poor, similarly reported by Vitale et al. [37]. This could lead to clinical, economic, psychosocial, and healthcare system implications. For instance, it can increase demand for healthcare services, including emergency department visits, hospitalizations, and outpatient appointments. It can also significantly reduce quality of life, leading to decreased physical function, cognitive decline, and decreased overall well-being [11]. A multidisciplinary team of healthcare providers, including dietitians, nurses, and physicians, should be involved in providing comprehensive care and support to ensure adherence.

5 | Conclusion

This study highlights the significance of nutritional diet knowledge and adherence to dietary recommendations among diabetic patients. The findings suggest that despite having some knowledge about nutritional diets, diabetic patients face numerous barriers to adhering to dietary recommendations, including financial difficulties, discomforts associated with cooking recommended meals, lack of support from family or

friends, difficult restrictions of recommended diet, and socio-cultural and economic factors, resulting in poor adherence to dietary recommendations. Good nutritional diet knowledge was associated with being female and having completed tertiary education, while good adherence to dietary recommendations was linked to being female, 75 years of age or older, and having good nutritional knowledge. The association between good nutritional diet knowledge and adherence to dietary recommendations observed in this study has significant implications for the development of evidence-based guidelines and policies aimed at promoting healthy eating habits among diabetic patients internationally. The findings of this study underscore the importance of addressing knowledge gaps and promoting adherence to dietary recommendations among diabetic patients, which can have far-reaching benefits for public health and healthcare systems globally.

The valuable insights in the study suggest that education alone is not enough to ensure adherence. Instead, a more integrated approach is necessary, combining nutritional guidance with practical support, psychological counselling, and social assistance. Given this, it is essential to address these broader challenges to improve dietary adherence and ultimately enhance healthy outcomes for diabetic patients. The study's results emphasize the need for healthcare providers to play a more active role in educating diabetic patients about nutritional diets and providing personalized dietary advice. Moreover, policymakers and healthcare organizations should work together to develop and implement effective interventions and programs that address the socioeconomic and environmental barriers to dietary adherence.

Educational materials and programs that are sensitive to patients' cultural backgrounds and dietary preferences should be developed. One-on-one counselling sessions can also be provided to address individual dietary needs and concerns. Family members must be encouraged to participate in dietary education and support patients in their dietary efforts in addition to establishing peer support groups where patients can share experiences, advice, and encouragement. There should be programs that provide financial assistance for healthy food purchases, meal delivery, or nutrition education. Workshops on meal planning and budgeting to help patients make informed food choices should be provided as well as offering cooking classes that teach patients how to prepare recommended healthy, affordable meals. These would improve dietary adherence and health outcomes among diabetic patients universally.

6 | Strengths and Limitations of the Study

The study is limited by the number of participants included, however, sufficient sample size was used to ensure reliable and generalizable results. The nutritional status of the subjects was not considered in the study owing to paucity of data, and the participants were not differentiated as Type 1 or Type 2, which are possible limitations. Future studies could consider these areas. The study was conducted at a single healthcare facility which may have limited the generalizability of the findings to other settings. Language differences between researchers and participants may have affected the accuracy and interpretation of the data. However, the study targeted a specific population

(diabetic patients), which allowed for focused data collection and analysis. The study used validated and reliable data collection tools to ensure accuracy and consistency of the data. It also involved collecting data from all diabetic patients (regardless of the Type), to increase the validity and reliability of the findings. Appropriate statistical analysis techniques, such as descriptive statistics, inferential statistics, and regression analysis, were employed to analyze the data. The study provides practical implications for healthcare providers, policymakers, and patients, which can inform the development of effective interventions and policies, highlighting the strengths of the study.

Author Contributions

Margaret Atuahene: conceptualization, methodology, investigation, writing – original draft, writing – review and editing, validation, project administration, formal analysis. **Frank Quarshie:** conceptualization, methodology, data curation; investigation, validation, project administration, writing – original draft, writing – review and editing, formal analysis, visualization, supervision. **Philip N. Gorleku:** conceptualization, methodology, validation, writing – original draft, writing – review and editing, formal analysis, supervision. **Rahmat Taylor:** writing – original draft, writing – review and editing, methodology, investigation, formal analysis, supervision, validation. **Maurice O. Gorleku:** writing – original draft, writing – review and editing, methodology, validation, formal analysis, supervision. **Daniel Eshun:** writing – original draft, writing – review and editing, methodology, investigation, validation. **Martin O. Asante:** writing – original draft, writing – review and editing, validation, investigation, formal analysis, software. **Francis K. Nyasem:** writing – original draft, writing – review and editing, methodology, investigation, validation, data curation, formal analysis, software. **Joseph Otchere:** methodology, writing – original draft, writing – review and editing, validation, formal analysis, resources.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Transparency Statement

The lead author Frank Quarshie affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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