

AN ANALYTICAL STUDY ON THE RELATIONSHIP BETWEEN NUTRITIONAL LITERACY AND ADHERENCE TO DIETARY PROTOCOLS AMONG INDIVIDUALS WITH DIABETES IN CROSS RIVER STATE, NIGERIA

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Abstract

Diabetes mellitus, a growing public health challenge in Nigeria, demands effective dietary management to mitigate complications. This study investigates the relationship between nutritional literacy and adherence to dietary protocols among individuals with type 2 diabetes in Cross River State, Nigeria. A cross-sectional design was employed, utilizing a structured questionnaire and 24-hour dietary recall to collect primary data from 384 participants across urban and rural communities. Nutritional literacy was assessed using a validated Nutrition Literacy Assessment Instrument, while adherence was measured via the Dietary Adherence Scale. Findings revealed that 42.7% of participants had adequate nutritional literacy, with higher literacy levels in urban areas (OR = 1.62, 95% CI: 1.12–2.34). Adherence to dietary protocols was low (36.2%), with significant associations between nutritional literacy and adherence ($p < 0.001$). Socio-demographic factors, including education ($p = 0.002$), income ($p = 0.015$), and urban residence ($p = 0.008$), influenced both literacy and adherence. Barriers such as cultural food preferences and limited access to healthy foods were identified. The study underscores the need for targeted nutrition education interventions to enhance dietary adherence and improve health outcomes. Recommendations include integrating nutrition literacy programs into diabetes care and addressing socio-economic barriers to healthy eating.

Keywords: Nutritional Literacy, Dietary Adherence, Type 2 Diabetes, Socio-demographic Factors, Nutrition Education

Introduction

Diabetes mellitus, particularly type 2, is a burgeoning epidemic in sub-Saharan Africa, with Nigeria bearing a significant burden. The International Diabetes Federation estimates a 4.04% prevalence of diabetes in Nigeria, projected to rise due to urbanization, dietary shifts, and lifestyle changes. Effective management of diabetes hinges on adherence to dietary protocols, which requires a robust understanding of nutritional literacy, the ability to access, understand, and apply nutrition-related information to make informed dietary choices. In Cross River State, a region characterized by diverse cultural and dietary practices, the interplay between nutritional literacy and dietary adherence remains underexplored.

Nutritional literacy is a critical determinant of health outcomes in chronic disease management. Studies indicate that individuals with higher nutritional literacy are more likely to adhere to dietary recommendations, leading to better glycemic control and reduced complications. For instance, a study in Lagos, Nigeria, found that only 37% of diabetic patients had adequate nutritional knowledge, correlating

with poor dietary habits and high obesity rates. Similarly, global research highlights that low nutritional literacy is associated with increased hospitalizations and poorer self-management in diabetes.

Socio-demographic factors, such as education, income, and residence, significantly influence nutritional literacy and adherence. In Burkina Faso, urban dwellers exhibited lower adherence to traditional dietary patterns due to access to processed foods, while rural residents faced barriers related to food availability. In Nigeria, cultural preferences for high-carbohydrate staples and economic constraints further complicate adherence. Despite these insights, few studies have employed primary data collection to explore these dynamics in Cross River State, where unique socio-cultural and economic contexts may shape outcomes.

This study addresses this gap by examining the relationship between nutritional literacy and adherence to dietary protocols among individuals with type 2 diabetes in Cross River State. It hypothesizes that higher nutritional literacy is associated with better adherence and explores the mediating role of socio-demographic factors. By using primary data, the study aims to provide actionable insights for public health interventions tailored to this region.

Methodology

Study Design and Setting

A descriptive cross-sectional study was conducted in Cross River State, Nigeria, from January to April 2025. The state, located in the South-South geopolitical zone, comprises 18 local government areas (LGAs) with a mix of urban and rural communities. The study targeted adults diagnosed with type 2 diabetes attending outpatient clinics in selected healthcare facilities.

Sample Size and Sampling

The sample size was calculated using the formula for cross-sectional studies:

$$n = \frac{Z^2 \cdot p \cdot (1 - p)}{E^2}$$

where $Z = 1.96$ (95% confidence level), $p = 0.5$ (estimated proportion of adherence), and $E = 0.05$ (margin of error). Accounting for a 10% non-response rate, a minimum sample of 384 participants was determined. A multi-stage sampling technique was employed:

- Stage 1: Three LGAs (Calabar Municipal, Akpabuyo, and Ogoja) were randomly selected to represent urban, semi-urban, and rural areas.
- Stage 2: Two healthcare facilities per LGA were purposively selected based on high diabetic patient turnout.
- Stage 3: Systematic random sampling was used to select participants from clinic registers, with every third patient invited to participate.

Inclusion and Exclusion Criteria

Eligible participants were adults aged 18–65 years, diagnosed with type 2 diabetes for at least six months, and willing to provide informed consent. Those with cognitive impairments or severe comorbidities affecting dietary intake were excluded.

Data Collection

Primary data were collected using a pre-tested, interviewer-administered questionnaire comprising three sections:

- Socio-demographic Characteristics: Age, gender, education, income, occupation, and residence.
- Nutritional Literacy: Assessed using the Nutrition Literacy Assessment Instrument (NLAI), a 28-item tool with scores ranging from 0 to 28. Scores ≥ 20 were classified as adequate, 15–19 as marginal, and < 15 as inadequate.
- Dietary Adherence: Measured via the Dietary Adherence Scale (DAS), a 10-item tool assessing compliance with diabetic dietary guidelines (e.g., low glycemic index foods, portion control). Scores ≥ 7 indicated high adherence, 4–6 moderate, and < 4 low.

A 24-hour dietary recall was used to validate dietary habits, capturing food types, quantities, and preparation methods. Trained research assistants conducted interviews in English, Pidgin English, or local dialects (Efik/Ibibio) to ensure comprehension.

Data Analysis

Data were analyzed using IBM SPSS Version 25. Descriptive statistics (frequencies, means, standard deviations) summarized socio-demographic characteristics, nutritional literacy, and adherence levels. Chi-square tests assessed associations between categorical variables, while logistic regression models evaluated the influence of nutritional literacy and socio-demographic factors on adherence ($p < 0.05$). Odds ratios (OR) with 95% confidence intervals (CI) were reported.

Ethical Considerations

Ethical approval was obtained from the Cross River State Health Research Ethics Committee (CRS-HREC/2024/015). Informed consent was secured, and data confidentiality was maintained using anonymized identifiers.

Results

Socio-demographic Characteristics

A total of 384 participants completed the study (response rate: 95.3%). Table 1 presents the socio demographic profile.

Table 1
Socio-demographic Characteristics of Participants

Variable	Frequency (n)	Percentage (%)
Age (years)		
18–30	45	11.7
31–45	132	34.4

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46–65	207	53.9
Gender		
Male	176	45.8
Female	208	54.2
Education		
None/Primary	98	25.5
Secondary	165	43.0
Tertiary	121	31.5
Income (NGN/month)		
< 50,000	142	37.0
50,000–100,000	126	32.8
> 100,000	116	30.2
Residence		
Urban	198	51.6
Rural	186	48.4
Occupation		
Civil Servant	102	26.6
Trader/Artisan	134	34.9
Farmer	88	22.9
Unemployed	60	15.6

Nutritional Literacy and Adherence Levels

Nutritional literacy was adequate in 164 participants (42.7%), marginal in 135 (35.2%), and inadequate in 85 (22.1%). Adherence to dietary protocols was high in 139 (36.2%), moderate in 162 (42.2%), and low in 83 (21.6%). Urban residents had higher nutritional literacy (OR = 1.62, 95% CI: 1.12–2.34, $p = 0.010$) and adherence (OR = 1.48, 95% CI: 1.03–2.12, $p = 0.033$) compared to rural counterparts.

Table 2
Nutritional Literacy and Adherence Levels by Residence

Variable	Urban (n=198)	Rural (n=186)	p-value
Nutritional Literacy			0.008
Adequate	98 (49.5%)	66 (35.5%)	
Marginal	65 (32.8%)	70 (37.6%)	
Inadequate	35 (17.7%)	50 (26.9%)	
Adherence Level			0.015
High	84 (42.4%)	55 (29.6%)	
Moderate	80 (40.4%)	82 (44.1%)	
Low	34 (17.2%)	49 (26.3%)	

Associations and Predictors

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Chi-square analysis revealed a significant association between nutritional literacy and adherence ($\chi^2 = 24.67$, $p < 0.001$). Logistic regression (Table 3) showed that adequate nutritional literacy increased the odds of high adherence (AOR = 2.15, 95% CI: 1.45–3.19, $p < 0.001$). Tertiary education (AOR = 1.89, 95% CI: 1.22–2.93, $p = 0.002$) and higher income ($> 100,000$ NGN/month) (AOR = 1.67, 95% CI: 1.09–2.56, $p = 0.015$) were significant predictors of adherence.

Table 3

Logistic Regression Analysis of Factors Influencing Dietary Adherence

Variable	AOR (95% CI)	p-value
Nutritional Literacy (Ref: Inadequate)		
Adequate	2.15 (1.45–3.19)	< 0.001
Marginal	1.42 (0.92–2.18)	0.112
Education (Ref: None/Primary)		
Secondary	1.35 (0.87–2.09)	0.181
Tertiary	1.89 (1.22–2.93)	0.002
Income (Ref: $< 50,000$ NGN)		
50,000–100,000	1.28 (0.83–1.97)	0.267
$> 100,000$	1.67 (1.09–2.56)	0.015
Residence (Ref: Rural)		
Urban	1.48 (1.03–2.12)	0.033

Barriers to Adherence

Qualitative insights from open-ended responses highlighted barriers including cultural preference for high-carbohydrate staples (e.g., fufu, yam), limited access to low-glycemic foods in rural areas, and economic constraints. Participants also reported inadequate dietary counseling in healthcare settings.

Discussion

The findings confirm a significant relationship between nutritional literacy and adherence to dietary protocols among individuals with type 2 diabetes in Cross River State. The 42.7% prevalence of adequate nutritional literacy aligns with studies in Lagos, where only 37% of diabetic patients demonstrated good nutritional knowledge. The low adherence rate (36.2%) reflects global trends, as seen in a U.S. study where only 30% of diabetic patients adhered to dietary guidelines.

Socio-demographic factors played a pivotal role. Higher education and income were associated with better literacy and adherence, likely due to increased access to information and resources. Urban residents exhibited higher adherence, possibly due to greater availability of diverse foods and healthcare services. However, cultural preferences for energy-dense staples, as noted in a Burkina Faso study, pose challenges across both settings.

Limitations include potential recall bias in dietary assessments and the cross-sectional design, which limits causal inferences. Future longitudinal studies could explore temporal relationships.

Conclusion

This study highlights the critical role of nutritional literacy in promoting dietary adherence among individuals with type 2 diabetes in Cross River State. Low adherence rates and socio-demographic disparities underscore the need for targeted interventions. Enhancing nutritional literacy through education and addressing barriers like cultural preferences and economic constraints can improve diabetes management.

Recommendations

- Implement community-based nutrition education programs tailored to cultural and economic contexts.
- Integrate nutritional counseling into routine diabetes care in healthcare facilities.
- Develop policies to improve access to affordable, low-glycemic foods in rural areas.
- Conduct longitudinal studies to assess the long-term impact of nutritional literacy interventions.

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