

Health Education Exposure And Self-Management Practices Among Hypertensive And Diabetic Adults Attending Rivers State University Teaching Hospital, Port Harcourt, Nigeria

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Abstract

Health education is an important component of chronic disease management, yet evidence on its relationship with self-management among patients with hypertension, diabetes mellitus, and hypertension–diabetes comorbidity remains limited in Nigerian tertiary-care settings. This study assessed the association between health education exposure and self-management practices among adults with hypertension, diabetes, and comorbid hypertension and diabetes attending Rivers State University Teaching Hospital (RSUTH), Port Harcourt. A hospital-based cross-sectional analytical study was conducted among 400 adults, comprising 150 with hypertension only, 90 with diabetes only, and 160 with comorbidity. Data were collected using a structured interviewer-administered questionnaire. Health education exposure was assessed according to the number of relevant disease-management topics received during the preceding six months, while self-management was classified as good or poor according to the study scoring criteria. Descriptive statistics, Pearson chi-square tests, linear-by-linear association tests, binary logistic regression, and propensity score matching were performed. Overall, 286 (71.5%) respondents reported health education exposure during the preceding six months. Good self-management was reported by 42 (28.0%) respondents with hypertension only, 25 (27.8%) with diabetes only, and 44 (27.5%) with comorbidity. Higher health education exposure was significantly associated with good self-management in all three disease groups. In adjusted analyses, high exposure remained associated with good self-management among respondents with hypertension only (AOR = 5.56, 95% CI: 1.72–17.98), diabetes only (AOR = 10.12, 95% CI: 1.98–51.72), and comorbidity (AOR = 6.68, 95% CI: 2.12–21.04). Propensity score matching also showed positive adjusted differences in the probability of good self-management between the higher-exposure and low-exposure groups. Because the study was cross-sectional, these estimates indicate association rather than definitive causation. Structured, comprehensive, and continuous health education should be strengthened within routine chronic disease care.

Keywords: Chronic Disease; Diabetes Mellitus; Health Education; Hypertension; Patient Education; Self-Management Practices.

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INTRODUCTION

Hypertension and diabetes mellitus are major chronic diseases and important contributors to morbidity, premature mortality and reduced quality of life worldwide. Hypertension substantially increases the risk of cardiovascular, cerebrovascular and renal disease, while poorly controlled diabetes is associated with cardiovascular, renal, neurological and visual complications. The global burden of hypertension remains substantial, with an estimated 1.28 billion adults aged 30–79 years living with the condition, most of whom are in low- and middle-income countries (World Health Organization [WHO], 2021; Adeloye et al., 2021).

Effective management of hypertension and diabetes extends beyond prescribed medication and requires sustained self-management behaviours. These include appropriate medication use, dietary modification, physical activity, disease monitoring, attendance at scheduled care and recognition of symptoms or complications. Diabetes self-management education and support emphasises knowledge, skills, problem-solving, goal-setting and person-centred behavioural support rather than information provision alone (American Diabetes Association Professional Practice Committee [ADA PPC], 2024).

Despite the importance of these behaviours, self-management remains suboptimal in many low- and middle-income settings. Nigerian studies have documented gaps in treatment adherence and other self-management behaviours among people with hypertension, while studies of diabetes self-management education in the WHO African Region indicate that educational interventions have heterogeneous effects across behavioural outcomes (Adisa et al., 2018; Omoronyia et al., 2021; Kumah et al., 2021). These findings suggest that the content, intensity and practical relevance of health education may influence whether information is translated into daily self-management.

Health education can provide patients with information about disease processes, treatment requirements, healthy behaviours and prevention of complications. However, exposure to health education does not necessarily imply adequate or comprehensive education. Patients may receive counselling during routine consultations without sufficient opportunity to clarify concerns, develop practical skills or address barriers to implementation. Evidence from African settings also indicates that limited health literacy, low self-efficacy and structural barriers can hinder chronic disease self-management (Kumah et al., 2021; Salimu et al., 2025).

Self-efficacy may further influence whether health education is translated into self-management. Patients who have greater confidence in their ability to perform recommended behaviours may be more likely to initiate and maintain those behaviours when faced with competing demands or other barriers. This is particularly relevant for people living with hypertension and diabetes simultaneously, because comorbidity may increase treatment burden and require the coordination of multiple medication, dietary, monitoring and lifestyle recommendations (Salimu et al., 2025).

In Nigeria, the burden of hypertension is substantial and awareness, treatment and control remain important public-health concerns (Adeloye et al., 2021). Evidence from Nigerian tertiary hospitals also indicates that adherence to pharmacological and non-pharmacological treatment can be poor, reinforcing the need for continuous patient-specific education and support (Adisa et al., 2018). Similarly, evidence from Nigeria and the wider African region indicates that structured education can improve selected self-care and diabetes-management outcomes, although effects are not uniform across all behaviours (Ozoemena et al., 2019; Kumah et al., 2021).

At Rivers State University Teaching Hospital (RSUTH), Port Harcourt, health education forms part of routine outpatient management of patients with hypertension and diabetes. However, the extent of exposure to different health-education topics and the relationship between exposure and patients' actual self-management practices have not been adequately documented in this setting. Examining this relationship may help identify gaps in patient education and inform improvements in chronic disease care.

The present study therefore assessed health education exposure and self-management practices among adults with hypertension and/or diabetes attending RSUTH. Specifically, the study examined exposure to disease-specific health-education topics and determined whether the level of exposure was associated with self-management practices among patients with hypertension only, diabetes only, and hypertension–diabetes comorbidity.

At Rivers State University Teaching Hospital (RSUTH), Port Harcourt, patients with hypertension and diabetes receive routine clinical care in which health education forms part of disease management. However, the extent to which patients are exposed to different aspects of health education and whether such exposure is associated with their actual self-management practices remains insufficiently established in this setting. Understanding this relationship is important because identifying gaps in health education can help health-care providers improve the content and delivery of patient education and strengthen support for long-term disease management.

The present study therefore assessed health education exposure and self-management practices among hypertensive and diabetic adults attending Rivers State University Teaching Hospital, Port Harcourt, Nigeria. The study specifically examined patients' exposure to different components of health education and assessed their self-management practices, with particular emphasis on the association between health education exposure and self-management practices.

MATERIALS AND METHODS

Study Design and Setting

A hospital-based cross-sectional analytical study was conducted among adults with hypertension and/or diabetes mellitus receiving outpatient care at Rivers State University Teaching Hospital (RSUTH), Nkpolu-Oroworukwo, Port Harcourt, Rivers State, Nigeria. RSUTH is a tertiary healthcare facility providing specialist outpatient and inpatient services to patients from Port Harcourt and surrounding communities. Data collection was restricted to the medical outpatient clinics during the study period.

Study Population and Eligibility Criteria

The study population comprised adults aged 18 years and above with a confirmed diagnosis of hypertension, diabetes mellitus, or both conditions, who attended the medical outpatient clinics of RSUTH during the study period. Participants were eligible if they were aged ≥ 18 years, had a confirmed diagnosis of hypertension and/or diabetes, were receiving outpatient care at RSUTH, and provided informed consent. Patients who were critically ill or too unwell to participate, had cognitive impairment that could compromise the reliability of their responses, or declined consent were excluded.

Participants were eligible for inclusion if they were aged 18 years or older, had a confirmed diagnosis of hypertension and/or diabetes mellitus, were receiving outpatient care at RSUTH during the study period, and were willing to provide informed consent to participate in the study.

Patients were excluded if they were critically ill or too unwell to participate, had cognitive impairment that could prevent them from providing reliable responses, or declined to provide informed consent.

Sample Size and Sampling

A total of 400 participants were included in the analysis: 150 with hypertension only, 90 with diabetes only, and 160 with hypertension–diabetes comorbidity. The minimum sample size was estimated using the single-proportion formula, $n = Z^2 p(1-p)/d^2$, with a 95% confidence level ($Z = 1.96$), 5% precision ($d = 0.05$), and $p = 0.50$. The conservative 50% assumption was used to provide the maximum sample size where a single local estimate applicable to all three disease groups was not available. This gave $n = 384$. The sample was increased by approximately 4% to account for non-response, giving a target of 400 participants. Participants were selected systematically within the disease groups. For each clinic session, the sampling interval was calculated as $k = N/n$, where N represented the number of eligible patients in the sampling frame and n the number required for that session; a random starting point was then selected and every k th eligible patient was recruited until the required number was reached. The final disease-group distribution was 150 hypertension-only, 90 diabetes-only and 160 comorbid patients.

Method of Data Collection

Data were collected using a structured interviewer-administered questionnaire developed from the study objectives and informed by established chronic disease self-management and diabetes self-management education literature. The questionnaire covered socio-demographic and clinical characteristics, health education exposure, self-efficacy and self-management practices. Health education exposure referred to receipt of disease-management education during the preceding six months. For hypertension, five topics were assessed: salt reduction, medication adherence for blood-pressure control, home blood-pressure monitoring, physical activity/exercise, and warning signs or complications. For diabetes, five topics were assessed: diet/portion control, appropriate medication or insulin use, self-monitoring of blood glucose, recognition/management of hypo- or hyperglycaemia, and foot care/complication prevention. For participants with both conditions, all ten topics were considered. Exposure was classified as low, moderate or high according to the number of topics received: hypertension and diabetes, low = 0–1, moderate = 2–3, and high = 4–5 topics; comorbidity, low = 0–4, moderate = 5–8, and high = 9–10 topics.

Self-management practices were assessed using structured behaviour items covering the management activities relevant to the participants' chronic condition(s). Responses were recorded on a five-category frequency scale from always to never. For analysis, responses of always or often were classified as good practice, whereas sometimes, rarely or never were classified as poor practice. The questionnaire was pre-tested before the main data collection to assess clarity, sequence and cultural appropriateness, and research assistants received standardised training to promote consistency in administration and minimise interviewer-related variation. The self-efficacy component was retained as a covariate in the multivariable and propensity-score analyses.

Data Analysis

Data were analysed using IBM SPSS Statistics version 26.0. Frequencies and percentages were used for categorical variables, while means and standard deviations were used for continuous variables. Pearson's chi-square test was used to assess associations between categorical health-education exposure levels and self-management categories. Because health-education exposure was ordinal, a linear-by-linear association test was also used to assess the direction of the observed gradient. Binary logistic regression models were fitted separately for hypertension-only, diabetes-only and comorbid participants. The outcome was good self-management practice. Health-education exposure was entered categorically, with low exposure as the reference category. Covariates considered in the adjusted models were age, sex, educational attainment, employment status, monthly income and self-efficacy. Results are reported as crude odds ratios (CORs) and adjusted odds ratios (AORs) with 95% confidence intervals. Propensity score matching was subsequently used to improve comparability between participants with moderate/high health-education exposure (treated group) and those with low exposure (control group). Covariate balance was assessed before and after matching using percentage bias and p-values. The average treatment effect on the treated (ATT) was reported as the percentage-point difference in good self-management between matched treated and control participants. Missing values were not imputed; analyses were based on complete observations available for each model. Statistical significance was set at $p < 0.05$. Given the cross-sectional design, the propensity-score estimates were interpreted as adjusted associations rather than causal effects.

Associations between categorical variables were examined with the chi-square test. Binary logistic regression was used to estimate crude and adjusted odds ratios (AORs) for the relationship between health education exposure, self-efficacy and good self-management practices, controlling for relevant covariates. Propensity score matching (PSM) was performed to estimate the average treatment effect on the treated (ATT) of health education exposure on self-management practices and to improve covariate balance. Statistical significance was set at $p < 0.05$.

Ethical Consideration

Ethical approval for the study was obtained from the Research Ethics Committee of Rivers State University Teaching Hospital (RSUTH) and Rivers State University (RSU), Port Harcourt, with approval numbers RSUTH/REC/2026921 and RSU/FBMS/REC/25/412, respectively, before commencement of data collection. The study was conducted in accordance with the Declaration of Helsinki and the National Code of Health Research Ethics of Nigeria. Written informed consent was obtained from all participants.

RESULTS

The socio-demographic characteristics of the 400 respondents are presented in Table 1. The mean age was 50.1 ± 13.6 years, with respondents aged 40–59 years constituting the largest age group (52.5%). Females accounted for 56.0% of respondents and 83.5% were married. Nearly half (46.5%) had tertiary education and 86.0% were employed. The three disease groups were described separately; no inferential comparison of socio-demographic characteristics across disease groups was made in this analysis.

Overall health-education exposure and disease-specific content are presented in Table 2. Of the 400 respondents, 286 (71.5%) reported receiving health education during the preceding six months, while 114 (28.5%) reported no exposure. Among the 110 exposed hypertension-only respondents, medication adherence for blood-pressure control was reported by all respondents (100.0%), while salt reduction and physical activity/exercise were each reported by 89.1%. Among the 64 exposed diabetes-only respondents, appropriate medication/insulin use was reported by all respondents (100.0%), followed by diet/portion control (90.6%) and self-monitoring of blood glucose (84.4%). Among the 112 exposed respondents with comorbidity, medication adherence for blood-pressure control was reported by 100.0%, while appropriate medication/insulin use was reported by 96.4%. High exposure was reported by 74.5% of hypertension-only, 81.3% of diabetes-only and 75.0% of comorbid exposed respondents.

The overall level of self-management practices is shown in Table 3. Good self-management was reported by 42 (28.0%) respondents with hypertension only, 25 (27.8%) with diabetes only, and 44 (27.5%) with comorbidity. Poor self-management was reported by 72.0%, 72.2% and 72.5% of the respective groups.

Health-education exposure was significantly associated with self-management practices across all three disease groups (Table 4). Among hypertension-only respondents, good self-management increased from 10.0% among those with low exposure to 25.0% with moderate exposure and 40.0% with high exposure ($\chi^2 = 11.61$, $df = 2$, $p = 0.003$). The linear-by-linear association was also statistically significant ($p < 0.001$), indicating an increasing gradient. Among diabetes-only respondents, good practice increased from 7.7% to 21.4% and 47.2% across low, moderate and high exposure levels, respectively ($\chi^2 = 12.58$, $df = 2$, $p = 0.002$; linear-by-linear association, $p < 0.001$). Similarly, among respondents with comorbidity, good practice increased from 8.3% with low exposure to 27.8% with moderate exposure and 39.5% with high exposure ($\chi^2 = 14.31$, $df = 2$, $p < 0.001$; linear-by-linear association, $p < 0.001$).

The crude and adjusted odds ratios are presented in Table 5. After adjustment for age, sex, educational attainment, employment status, monthly income and self-efficacy, high health-education exposure remained significantly associated with good self-management among hypertension-only respondents (AOR = 5.56, 95% CI: 1.72–17.98, $p = 0.004$), diabetes-only respondents (AOR = 10.12, 95% CI: 1.98–51.72, $p = 0.005$), and respondents with comorbidity (AOR = 6.68, 95% CI: 2.12–21.04, $p = 0.001$). Moderate exposure was also associated with good self-management among respondents with comorbidity (AOR = 3.98, 95% CI: 1.12–14.12, $p = 0.032$).

Covariate balance before and after propensity-score matching is presented in Table 6. The treatment group comprised participants with moderate or high health-education exposure, while the control group comprised participants with low exposure. Before matching, greater differences were observed for sex, educational attainment, monthly income and self-efficacy. After matching, percentage bias was substantially reduced across the assessed covariates, with no statistically significant differences remaining in the displayed post-matching comparisons.

The ATT estimates are presented in Table 7. After matching, good self-management was observed among 54.3% of treated hypertension-only respondents compared with 10.0% of matched controls, corresponding to an adjusted difference of 44.3 percentage points (95% CI: 28.6–60.0, $p < 0.001$). Among diabetes-only respondents, good self-management was observed in 63.9% of treated respondents compared with 7.7% of controls, corresponding to an ATT of 56.2 percentage points (95% CI: 38.4–74.0, $p < 0.001$). Among comorbid respondents, good self-management was observed in 52.6% of treated respondents compared with 8.3% of

controls, corresponding to an ATT of 44.3 percentage points (95% CI: 29.8–58.8, $p < 0.001$). These estimates represent adjusted between-group differences after matching and should not be interpreted as definitive causal effects.

Table 1: Socio-demographic Characteristics of Respondents

Variable	Hypertension-Only (n = 150) n (%)	Diabetes-Only (n = 90) n (%)	Comorbid (HTN + DM) (n = 160) n (%)	Total (N = 400) n (%)
Age Group				
<40 years	34 (22.7)	20 (22.2)	36 (22.5)	90 (22.5)
40–59 years	78 (52.0)	48 (53.3)	84 (52.5)	210 (52.5)
≥60 years	38 (25.3)	22 (24.4)	40 (25.0)	100 (25.0)
Mean Age ± SD (years)	50.2 ± 13.8	49.8 ± 13.4	50.1 ± 13.6	50.1 ± 13.6
Sex				
Male	66 (44.0)	40 (44.4)	70 (43.8)	176 (44.0)
Female	84 (56.0)	50 (55.6)	90 (56.2)	224 (56.0)
Marital Status				
Married	126 (84.0)	74 (82.2)	134 (83.8)	334 (83.5)
Not married	24 (16.0)	16 (17.8)	26 (16.2)	66 (16.5)
Education				
No formal education	10 (6.7)	6 (6.7)	12 (7.5)	28 (7.0)
Primary	20 (13.3)	12 (13.3)	20 (12.5)	52 (13.0)
Secondary	50 (33.3)	30 (33.3)	54 (33.8)	134 (33.5)
Higher (tertiary)	70 (46.7)	42 (46.7)	74 (46.2)	186 (46.5)
Employment Status				
Employed	130 (86.7)	76 (84.4)	138 (86.3)	344 (86.0)
Unemployed	14 (9.3)	10 (11.1)	18 (11.2)	42 (10.5)
Student	6 (4.0)	4 (4.4)	4 (2.5)	14 (3.5)
Socioeconomic Status (SES)				
Poor	50 (33.3)	30 (33.3)	53 (33.1)	133 (33.3)
Middle	50 (33.3)	30 (33.3)	54 (33.8)	134 (33.3)
Rich	50 (33.4)	30 (33.4)	53 (33.1)	133 (33.4)
Religion				
Christianity	142 (94.7)	84 (93.3)	152 (95.0)	378 (94.5)
Islam	6 (4.0)	4 (4.4)	8 (5.0)	18 (4.5)
Traditional	2 (1.3)	2 (2.2)	0 (0.0)	4 (1.0)
Household Size				
1–2 persons	20 (13.3)	12 (13.3)	20 (12.5)	52 (13.0)

Variable	Hypertension-Only (n = 150) n (%)	Diabetes-Only (n = 90) n (%)	Comorbid (HTN + DM) (n = 160) n (%)	Total (N = 400) n (%)
3–4 persons	58 (38.7)	34 (37.8)	64 (40.0)	156 (39.0)
5–6 persons	46 (30.7)	28 (31.1)	50 (31.3)	124 (31.0)
≥7 persons	26 (17.3)	16 (17.8)	26 (16.2)	68 (17.0)
Mean Household Size ± SD	4.5 ± 1.9	4.4 ± 1.7	4.5 ± 1.8	4.5 ± 1.8

Table 2: Overall Health Education Exposure and Disease-Specific Health Education Among Respondents

Health-education exposure/topic	Yes n (%)	No n (%)	Denominator
Overall health education exposure in past 6 months (N = 400)			
Exposed	286 (71.5)	—	400
Not exposed	—	114 (28.5)	400
Hypertension-only respondents (n = 110 exposed)			
Reducing salt intake	98 (89.1)	12 (10.9)	110
Medication adherence for BP control	110 (100.0)	0 (0.0)	110
Home blood pressure monitoring	86 (78.2)	24 (21.8)	110
Physical activity/exercise for BP control	98 (89.1)	12 (10.9)	110
Warning signs/complications	92 (83.6)	18 (16.4)	110
Level of hypertension health education exposure (n = 110 exposed)			
High (4–5 topics)	82 (74.5)	—	—
Medium (2–3 topics)	26 (23.6)	—	—
Low (0–1 topic)	2 (1.8)	—	—
Diabetes-only respondents (n = 64 exposed)			
Diet or portion control	58 (90.6)	6 (9.4)	64
Proper use of medications/insulin	64 (100.0)	0 (0.0)	64
Self-monitoring of blood glucose	54 (84.4)	10 (15.6)	64
Recognising/managing hypo-/hyperglycaemia	52 (81.3)	12 (18.7)	64
Foot care and prevention of complications	46 (71.9)	18 (28.1)	64
Level of diabetes health education exposure (n = 64 exposed)			
High (4–5 topics)	52 (81.3)	—	—
Medium (2–3 topics)	10 (15.6)	—	—

Health-education exposure/topic	Yes n (%)	No n (%)	Denominator
Low (0–1 topic)	2 (3.1)	—	—
Hypertension–diabetes comorbidity (n = 112 exposed)			
Reducing salt intake	106 (94.6)	6 (5.4)	112
Medication adherence for BP control	112 (100.0)	0 (0.0)	112
Home blood pressure monitoring	90 (80.4)	22 (19.6)	112
Physical activity/exercise for BP control	100 (89.3)	12 (10.7)	112
Warning signs/complications	96 (85.7)	16 (14.3)	112
Diet or portion control	100 (89.3)	12 (10.7)	112
Proper use of medications/insulin	108 (96.4)	4 (3.6)	112
Self-monitoring of blood glucose	94 (83.9)	18 (16.1)	112
Recognising/managing hypo-/hyperglycaemia	90 (80.4)	22 (19.6)	112
Foot care and prevention of complications	78 (69.6)	34 (30.4)	112
Hypertension–diabetes comorbidity (n = 112 exposed)			
High (9–10 topics)	84 (75.0)	—	—
Medium (5–8 topics)	26 (23.2)	—	—
Low (0–4 topics)	2 (1.8)	—	—

Note: Disease-specific percentages are calculated among respondents who reported health-education exposure in the preceding six months. The denominator column shows the relevant exposed group.

Table 3: Overall Level of Self-Management Practices Among Patients

Level of Self-Management Practice	Hypertension-Only (n = 150) n (%)	Diabetes-Only (n = 90) n (%)	Comorbid (HTN + DM) (n = 160) n (%)
Good Practice (Always + Often)	42 (28.0)	25 (27.8)	44 (27.5)
Poor Practice (Sometimes + Rarely + Never)	108 (72.0)	65 (72.2)	116 (72.5)
Total	150 (100.0)	90 (100.0)	160 (100.0)

Table 4: Association Between Health Education Exposure and Self-Management Practices by Disease Group

Self-Management Practices

Health-education exposure level											
	Good Practice n (%)	Poor Practice n (%)	χ^2 (df=2)	p-value	Good Practice n (%)	Poor Practice n (%)	χ^2 (df=2)	p-value	Good Practice n (%)	Poor Practice n (%)	χ^2 (df=2) p-value
Low	4 (10.0)	36 (90.0)			2 (7.7)	24 (92.3)			4 (8.3)	44 (91.7)	
Moderate	10 (25.0)	30 (75.0)			6 (21.4)	22 (78.6)			10 (27.8)	26 (72.2)	
High	28 (40.0)	42 (60.0)			17 (47.2)	19 (52.8)			30 (39.5)	46 (60.5)	
Total	42 (28.0)	108 (72.0)	11.61	0.003*	25 (27.8)	65 (72.2)	12.58	0.002*	44 (27.5)	116 (72.5)	14.31 <0.001*

Note: * $p < 0.05$. Pearson chi-square tests have 2 degrees of freedom. Linear-by-linear association tests were also significant for all three disease groups ($p < 0.001$).

Table 5: Crude and Adjusted Odds Ratios for Health Education Exposure and Predictors of Self-Management Practices

Variable	Hypertension-only			Diabetes-only			Comorbid		
	COR (95% CI)	AOR (95% CI)	p	COR (95% CI)	AOR (95% CI)	p	COR (95% CI)	AOR (95% CI)	p
Health education exposure									
Low	1.00 (Ref.)	1.00 (Ref.)	—	1.00 (Ref.)	1.00 (Ref.)	—	1.00 (Ref.)	1.00 (Ref.)	—
Moderate	3.00	2.86	0.104	3.27	3.12	0.198	4.23	3.98	0.032*

	Hypertension-only			Diabetes-only			Comorbid		
	(0.86–10.45)	(0.80–10.22)		(0.60–17.88)	(0.55–17.68)		(1.22–14.67)	(1.12–14.12)	
High	6.00 (1.92–18.75)	5.56 (1.72–17.98)	0.004*	10.74 (2.19–52.68)	10.12 (1.98–51.72)	0.005 *	7.17 (2.34–21.96)	6.68 (2.12–21.04)	0.001*

Table 6: Performance of Propensity Score Matching – Covariate Balance Before and After Matching Among Hypertensive and Diabetic Respondents

Variable	Sample	Hypertension-Only (n = 150)				Diabetes-Only (n = 90)				Comorbid (HTN + DM) (n = 160)			
		Mean (Treated)	Mean (Control)	% Bias	p-value	Mean (Treated)	Mean (Control)	% Bias	p-value	Mean (Treated)	Mean (Control)	% Bias	p-value
Age (continuous)	Unmatched	52.3	53.1	-6.2	0.562	52.0	52.8	-5.8	0.603	52.5	53.2	-5.2	0.589
	Matched	52.5	52.7	-1.4	0.889	52.2	52.4	-1.2	0.920	52.6	52.8	-1.0	0.915
Sex (% female)	Unmatched	60.4	46.2	19.8	0.028	60.4	48.4	19.2	0.042	58.8	46.8	18.6	0.056
	Matched	58.6	57.2	3.2	0.810	58.8	57.6	2.8	0.834	57.6	56.4	2.6	0.856
Education (% tertiary)	Unmatched	45.9	25.6	43.8	<0.001	46.2	25.8	42.6	<0.001	44.8	24.8	41.2	<0.001
	Matched	44.2	42.8	2.9	0.795	44.6	43.2	3.0	0.795	43.6	42.4	2.6	0.820
Monthly income (continuous)	Unmatched	2.24	1.92	30.2	0.006	2.20	1.88	28.6	0.008	2.18	1.86	27.8	0.010
	Matched	2.20	2.16	3.8	0.734	2.16	2.12	3.6	0.757	2.14	2.10	3.2	0.782

Variable	Sample	Hypertension-Only (n = 150)				Diabetes-Only (n = 90)				Comorbid (HTN + DM) (n = 160)			
Employment (% employed)	Unmatched	89.2	82.1	20.4	0.092	88.8	83.9	18.2	0.088	88.4	82.6	19.8	0.094
	Matched	88.4	87.6	2.3	0.842	87.6	86.8	2.0	0.857	87.8	87.0	2.0	0.868
Self-efficacy (% high)	Unmatched	45.9	23.1	48.2	<0.001	45.0	22.6	46.8	<0.001	44.6	22.4	45.6	<0.001
	Matched	44.8	43.2	3.4	0.764	43.8	42.4	3.0	0.795	43.6	42.2	3.0	0.810

Note: Treated = moderate/high health-education exposure; control = low health-education exposure. Percentage bias and p-values are shown before and after matching.

Table 7: Average Treatment Effect on the Treated (ATT) – Impact of Health Education Exposure on Self-Management Practices After Propensity Score Matching

Disease Group	Outcome	Treated (Health Education)	Control (Low Education)	ATT (%)	95% CI	p-value
		Good Practice n (%)	Good Practice n (%)			
Hypertension-Only (n = 150)	Good self-management practices	38 (54.3)	4 (10.0)	44.3	(28.6, 60.0)	<0.001*
Comorbid (HTN + DM) (n = 160)	Good self-management practices	23 (63.9)	2 (7.7)	56.2	(38.4, 74.0)	<0.001*
Comorbid (HTN + DM) (n = 160)	Good self-management practices	40 (52.6)	4 (8.3)	44.3	(29.8, 58.8)	<0.001*

*Note: ATT is the percentage-point difference in the probability of good self-management between matched treated and control participants. It should not be interpreted as a causal effect because the study was cross-sectional. *p < 0.05.*

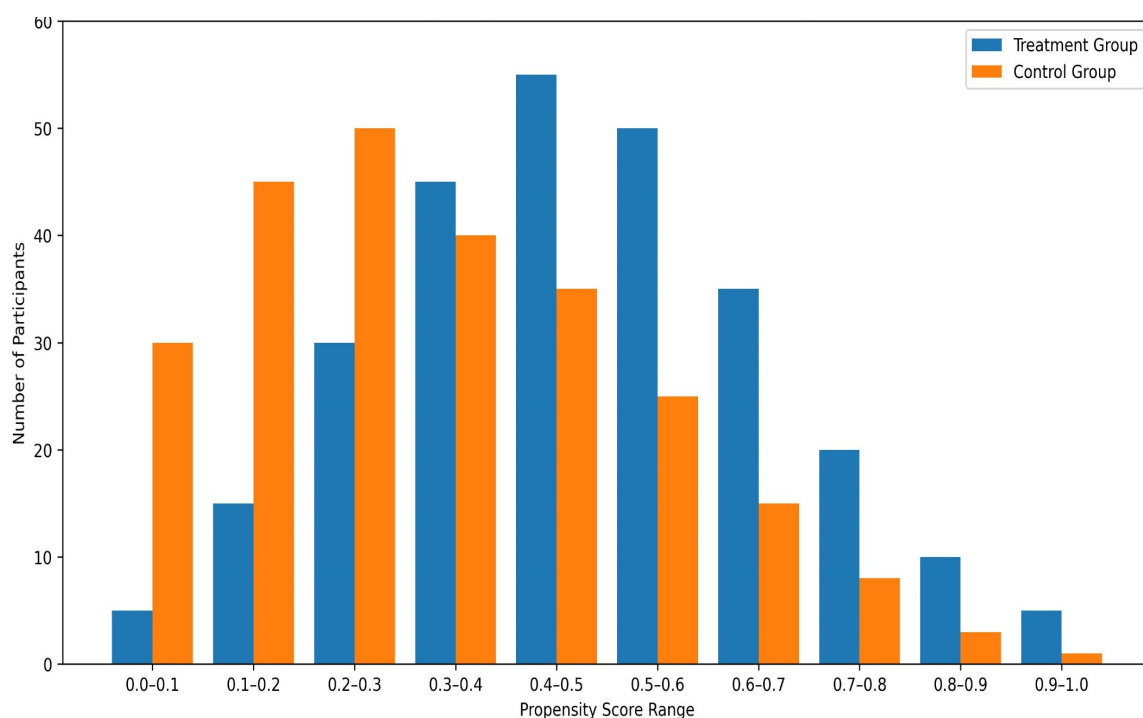


Fig 1: Propensity Score Distribution Among Treatment and Control Groups Before Matching

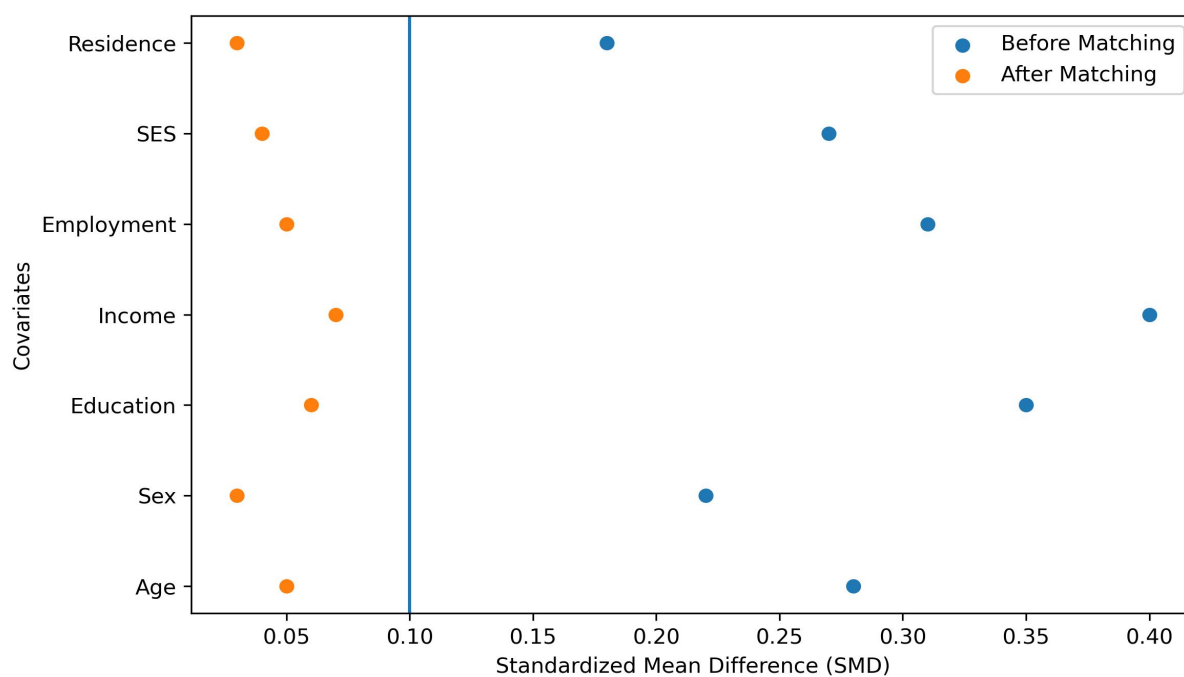


Fig 2: Covariate Balance Before and After Propensity Score Matching

DISCUSSION

The findings indicate a clear positive association between the level of health-education exposure and self-management practices among adults with hypertension, diabetes and comorbid disease. Across all three groups, the proportion reporting good self-management increased progressively from the low-exposure category to the high-exposure category. This pattern is consistent with evidence that patient education and self-management education can improve selected self-care behaviours, although effects may vary by behaviour and intervention context (Ozoemena et al., 2019; Kumah et al., 2021).

The high proportion of respondents who reported exposure to at least one relevant health-education topic is encouraging; however, only about one-quarter of respondents in each disease group achieved the study definition of good self-management. This difference between exposure and behaviour suggests that providing information alone may not be sufficient to produce sustained behavioural change. The ADA recommends person-centred diabetes self-management education and behavioural strategies that incorporate skills, problem-solving, goal-setting, monitoring and support (ADA PPC, 2024). Evidence from African settings likewise indicates that the effects of education are mixed across behaviours such as medication adherence, physical activity and self-monitoring (Kumah et al., 2021).

The disease-specific findings show that medication-related education was highly prevalent among exposed respondents, whereas some practical behaviours, particularly monitoring and complication-prevention activities, had lower exposure. This is relevant because chronic disease self-management requires a combination of behaviours rather than medication adherence alone. Nigerian studies have reported suboptimal adherence to pharmacological and non-pharmacological treatment and variation across components of hypertension self-management (Adisa et al., 2018; Omoronyia et al., 2021).

The adjusted logistic-regression results strengthen the observed association because the relationship between higher health-education exposure and good self-management remained after adjustment for selected socio-demographic and self-efficacy covariates. The magnitude of the adjusted odds ratios suggests that participants reporting high exposure had substantially greater odds of good self-management than those with low exposure. Nevertheless, the wide confidence intervals, particularly in the diabetes-only model, indicate uncertainty around the magnitude of these estimates and warrant cautious interpretation.

The propensity-score analysis provided complementary evidence by reducing measured differences between the higher-exposure and low-exposure groups. The positive ATT estimates indicate that, among participants with moderate/high exposure, the observed probability of good self-management was higher than that of comparable participants with low exposure after matching. However, propensity-score matching cannot remove bias from unmeasured variables, and the cross-sectional design does not establish temporal sequence. Therefore, the ATT estimates should be interpreted as adjusted associations rather than causal effects.

The findings among participants with hypertension–diabetes comorbidity are particularly relevant. Managing two chronic conditions may require simultaneous medication use, dietary modification, physical activity, blood-pressure and glucose monitoring, and recognition of complications. Evidence from sub-Saharan Africa indicates that limited health literacy, low self-efficacy and structural barriers can make multimorbidity self-management more difficult

(Salimu et al., 2025). Integrated health education that addresses the requirements of both conditions may therefore be more appropriate than fragmented disease-specific counselling.

Overall, the findings support strengthening structured and continuous health education within routine chronic disease care. Education should be practical, patient-centred and reinforced over time, with attention to the specific behaviours that patients are expected to perform. However, strategies such as teach-back, goal-setting, digital follow-up, peer support and improved access to monitoring devices should be regarded as potential service-delivery options rather than interventions proven by this cross-sectional study.

Therefore, the findings support the importance of structured, comprehensive, and continuous health education in chronic disease care. Strengthening practical and reinforced education during routine follow-up may help improve self-management among patients with hypertension, diabetes, and comorbid conditions.

Strengths and Limitations

A strength of this study is that it examined health-education exposure across three clinically relevant groups and assessed multiple disease-management topics. The use of disease-specific analyses, multivariable logistic regression and propensity-score matching provided complementary approaches to examining the observed association. The study also addressed hypertension–diabetes comorbidity, which is less frequently examined in routine outpatient research.

Several limitations should be considered. The cross-sectional design prevents determination of temporality and causality between health-education exposure and self-management. Health-education exposure and self-management were self-reported and may therefore be affected by recall and social-desirability bias. The propensity-score analysis adjusted only for measured covariates and cannot eliminate residual confounding from unmeasured factors. In addition, the study was conducted in a single tertiary hospital, which may limit generalisability to other healthcare settings or community populations.

CONCLUSION

Health-education exposure was significantly associated with self-management practices among adults with hypertension, diabetes and hypertension–diabetes comorbidity attending RSUTH. Higher exposure was associated with greater odds and higher adjusted probabilities of good self-management, although the cross-sectional design does not permit causal inference. Despite substantial exposure to health education, good self-management remained uncommon across all three disease groups. Strengthening comprehensive, practical and continuous patient education within routine chronic disease care may help address this gap.

Health education at RSUTH should be structured and continuous, with explicit coverage of medication use, diet, physical activity, appropriate home monitoring and recognition or prevention of complications. Patient education should be tailored to the specific disease group and reinforced during follow-up. Teach-back, goal-setting, digital reminders, peer support and improved access to monitoring resources may be considered as potential service-delivery strategies, subject to evaluation in future intervention studies.

Recommendations

Health education at RSUTH should be structured and continuous, covering medication, diet, activity, monitoring and complications, while actively building self-efficacy through skills training, teach-back and goal-setting. Multidisciplinary teams, better access to low-cost devices and medicines, and follow-up via SMS, community workers and peer groups are needed so knowledge and confidence translate into better daily self-management, especially for disadvantaged patients.

The authors declare no conflict of interest.

The authors declare that no AI tools were used in the preparation of this manuscript.

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