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Determinants of blood pressure control: the role of socioeconomic status and family support among hypertensive adults in Kano, Nigeria

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Abstract

Hypertension remains a critical global public health challenge and a leading cause of preventable premature mortality. Its adverse effects are amplified by coexisting risk factors, increasing the likelihood of cardiovascular and renal complications. This study described the influence of socioeconomic status and family support on blood pressure control among hypertensive adults attending the General Outpatient Clinic at Aminu Kano Teaching Hospital, Kano, Nigeria. A cross-sectional study was held, recruiting 382 systematically selected participants. Data were collected on socio-demographic characteristics, cardiovascular risk factors, socioeconomic status, family support (measured using the Perceived Social Support Family Scale), anthropometric indices, and laboratory parameters. Socioeconomic class was categorized as I, II, or III. Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 20 with significance set at $p<0.05$. Participants had a mean age of 49.1±11.3 years and 35.1% were males. Overall, 37.4% achieved good blood pressure control, with controlled systolic and diastolic pressures in 45.5% and 44.8%, respectively. Most participants (94.5%) reported strong family support. Bivariate analyses showed significant associations between blood pressure control with higher education, occupation, medication adherence, salt reduction, exercise, and strong family support. Logistic regression identified tertiary level of education (Odds Ratio, OR 0.381; 95% Confidence Interval, CI 0.192-0.756; p=0.006) and socioeconomic class III (OR 3.057, 95% CI 1.395-6.699; p=0.005) as independent predictors of good blood pressure control. High level of educational attainment and socioeconomic status independently predict good blood pressure control among hypertensive patients. Physicians and other caregivers should prioritize patient education and address social determinants of health to improve hypertension management to achieve better outcomes.

Key words: hypertension; blood pressure control; socioeconomic status; family support.

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Introduction

Hypertension is a significant global health challenge, contributing to preventable premature deaths and increasing the burden of cardiovascular diseases.[1] Despite advancements in awareness and treatment, blood pressure control remains suboptimal, particularly in developing countries like Nigeria, where socioeconomic disparities and healthcare access barriers exacerbate the problem.[2] Globally, hypertension affects approximately one billion people, and is a leading cause of cardiovascular morbidity and mortality.[3] In sub-Saharan Africa, the prevalence is alarmingly high, with Nigeria reporting rates between 8% and 46.6%, depending on the population studied.[2] Poor blood pressure control worsens complications such as stroke, heart failure, and kidney disease, disproportionately affecting low-income regions, where healthcare systems are often overburdened.[4] While developed nations have made progress in hypertension management, through public health campaigns and improved treatment adherence, many low- and middle-income countries still struggle with low awareness, inadequate treatment, out of pocket payments and poor control rates.

Socioeconomic Status (SES) - encompassing education, income, and occupation - plays a crucial role in hypertension outcomes.[5,6] Studies consistently show that individuals with lower SES face greater challenges in accessing healthcare, affording medications, and adhering to treatment plans.[7-10] For instance, those with higher education levels are more likely to understand hypertension risks and follow medical advice, while lower-income groups may prioritize immediate financial needs over long-term health management.[11,12] In Nigeria, where poverty and limited healthcare infrastructure persist, these socioeconomic barriers further hinder effective blood pressure control.[13,14] Addressing these disparities requires tailored interventions that consider the financial and educational constraints faced by vulnerable populations.

Beyond socioeconomic factors, family support has recently emerged as a critical determinant of chronic disease management.[14] Emotional encouragement, practical assistance, and reminders from family members can significantly improve medication adherence and lifestyle modifications.[14,15] In Nigeria, where strong family and communal ties are deeply rooted in culture, leveraging family support could enhance hypertension control. However, the extent of this influence remains underexplored in clinical research, particularly in northern Nigeria, where cultural

and religious norms may shape health-seeking behaviours. Understanding how family dynamics contribute to treatment adherence and lifestyle changes could provide valuable insights for developing patient-centred care strategies.

This study seeks to bridge these gaps by evaluating the interplay between socioeconomic status, family support, and blood pressure control among hypertensive patients in Kano. By analysing these factors, the research aims to identify modifiable factors that can inform healthcare policies, and clinical practices. The findings will contribute to the growing body of evidence on hypertension management in low-resource settings, and highlight the need for holistic approaches that integrate medical treatment with social and economic support systems. Ultimately, improving blood pressure control in Nigeria requires not only better access to medications but also community-based interventions that empower patients and their families to take an active role in managing hypertension. The results of this study will provide a foundation for such interventions, offering practical recommendations for healthcare providers, and policymakers working to reduce the burden of hypertension in similar populations.

This study also examines the effect of SES and family support on blood pressure control among hypertensive adults attending the General Outpatient Clinic (GOPC) of Aminu Kano Teaching Hospital (AKTH) in Kano, Nigeria. The findings aim to enhance physician awareness and inform targeted strategies to improve hypertension management in similar resource-limited settings.

Materials and Methods

Study design and setting

This cross-sectional study was conducted at the General Out-Patient Clinic (GOPC) of Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria, between the months of January and March 2016. The hospital serves as a tertiary referral center for Kano State and neighboring regions, with the GOPC attending to an average of 250 adult patients daily, and approximately 20% of whom present with hypertension.

Study population

We enrolled 382 adult hypertensive patients (aged ≥18 years) that had satisfied the diagnostic criteria of hypertension who have been on antihypertensive treatment for at least six months. Pregnant women and patients with diabetes mellitus or renal failure were excluded due to their distinct pathophysiology and treatment challenges that could confound blood pressure control assessment.

Sample size determination

The minimum sample size was calculated using Fischer's formula:

$n=(Z_\alpha)^2\, pq/d^2$

where:
p = prevalence rate of blood pressure control (34.5%) adopted from the study of blood pressure control among hypertensives patients in a tertiary heath centre in Northern Nigeria[17]
d = level of precision, usually set at 5%

Thus, $n=\frac{1.96^2 \times 0.345 \times (1-0.345)}{(0.05)^2} = 347$

This yielded 347 participants; we added 10% to account for potential non-response, resulting in a final sample of 382.

Sampling technique

Participants were selected via systematic sampling (sampling interval =7) from daily clinic attendance registers. The first participant was chosen by simple random sampling using a random number table.

Data collection procedures

Trained research assistants collected data using: i) a structured questionnaire (English/Hausa versions), with socio-demographics (age, sex, education, occupation, income), clinical history (duration of hypertension, medication regimen), lifestyle factors (diet, exercise, substance use), and adherence assessment (8-item Morisky scale); ii) the Perceived Social Support-Family Scale (PSS-Fa), a 20-item validated instrument scored 0-20, with support levels Strong (≥11), Weak (7-10), and None (≤6); iii) clinical measurements, blood pressure was measured twice (5-min interval) using calibrated mercury sphygmomanometers (Accoson®), following JNC protocols, anthropometrics were taken including weight (Hanson® scale), height (Hospitex® stadiometer), Body Mass Index (BMI), and laboratory test were done including fasting blood glucose (fluoride-oxalate tubes), and urinalysis (Medi-test Combi-9® strips).

Operational definitions

Hypertension was considered in case of SBP ≥140 mmHg and/or DBP ≥90 mmHg, or current antihypertensive use.

Controlled Blood Pressure (BP) was considered in case of SBP <140 mmHg and DBP <90 mmHg. SES was classified quantitatively using Oyedeji's model (scores 1 to 5 and Classes I-III) integrating education, occupation, and income.[16]

Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics summarized baseline characteristics. Categorical variables were compared using χ^2 or Fisher's exact tests. Multivariable logistic regression identified independent predictors of BP control, with Adjusted Odds Ratios (aOR) and 95% Confidence Intervals (CI) reported. Statistical significance was set at $p<0.05$.

Ethical considerations

The study protocol was approved by AKTH's Health Research Ethics Committee (NHREC/21/08/2008/ALTH/EC/1123). Written informed consent was obtained from all participants. Data confidentiality was maintained through anonymized coding, and results were communicated to participants with appropriate referrals when needed.

Results

Of the 382 participants, 134 (35.1%) were males and 248 (64.9%) females. The mean age was 49.1±11.3 years. Most participants were married, of Hausa ethnicity, and had tertiary education as seen in Table 1. Regarding socioeconomic status, 58.3% of par-

ticipants were in Class III, 31.8% in Class II, and 9.9% in Class I.

Blood pressure control was achieved in 37.4% of participants (Figure 1). Controlled systolic and diastolic pressures were recorded in 45.5% and 44.8%, respectively. Blood pressure control was most prevalent among individuals aged 50-59 years.

Perceived family support was strong in 94.5% of respondents, weak in 3.9%, and absent in 1.6% (Figure 2).

Tables 2 and 3 present the bivariate analysis, showing that blood pressure control was significantly associated with educational level (p=0.004), employment status (p=0.002), dosing type (p=0.030), salt intake reduction (p=0.001), and physical activity (p=0.001). Table 4 showed a statistically significant association between strong family support and blood pressure control (p=0.035). However, in the binary logistic regression analysis (Table 5), only tertiary education (OR 0.381; 95% CI 0.192-0.756; p=0.006) and socioeconomic Class III (OR 3.057; 95% CI 1.395-6.699; p=0.005) remained independent predictors of controlled blood pressure. Participants with tertiary education were about 62% less likely to have uncontrolled blood pressure compared with those with lower levels of education, indicating a protective effect of higher education on hypertension control. Conversely, participants in socioeconomic Class III had more than three times higher odds of achieving blood pressure control compared with those in higher classes.

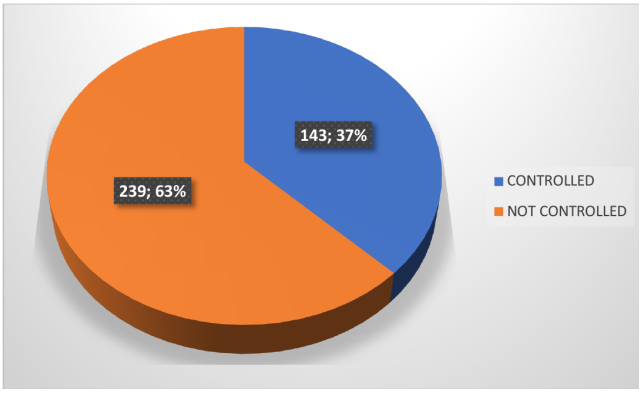

Figure 1. Pie chart showing prevalence of blood pressure control among the study participants.

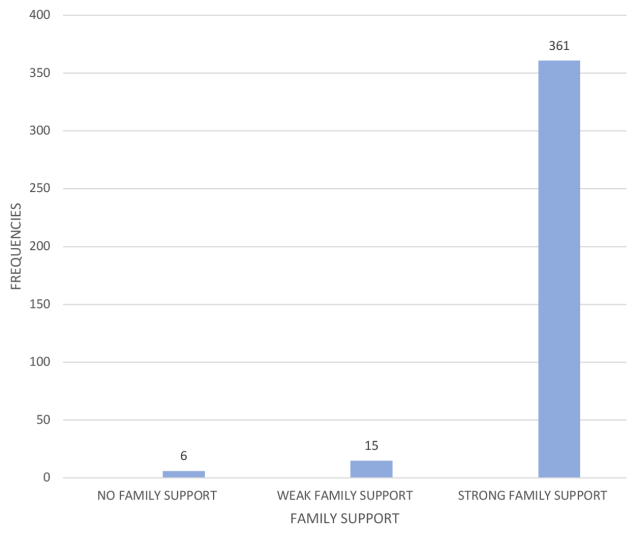

Figure 2. Bar chart showing perceived family support among the study participants.

Table 1. Socio demographic characteristics of the study participants.

Characteristic	Frequencies (N=382)	Percentages (%)
Age		
18-29	14	3.7
30-39	73	19.1
40-49	103	27.0
50-59	113	29.6
60-69	62	16.2
>70	17	4.4
Sex		
Male	134	35.1
Female	248	64.9
Tribe		
Hausa	277	72.5
Fulani	39	10.2
Yoruba	19	5.0
Igbo	12	3.1
Others (specify)	35	9.2
Religion		
Christianity	29	7.6
Islam	353	92.4
Marital status		
Single	22	5.8
Married	296	77.5
Divorced	15	3.9
Widowed	49	12.8
Residence		
Urban	312	81.7
Rural	70	18.3
Educational level		
None	29	7.6
Quranic	113	29.6
Primary	50	13.0
Secondary	119	31.2
Tertiary	71	18.6
Occupation		
Civil servant	111	29.1
Self employed	50	13.1
Artisan	102	26.7
Housewife	77	20.2
Unemployed	38	9.9
Retired on pension	4	1.0
Household income (₦)		
<18,500	33	8.6
18,500-85000	226	59.2
>85000	123	32.2
Family type		
Nuclear	248	64.9
Extended	134	35.1
Family size		
1-5	83	21.7
6-10	18	47.6
11-5	100	26.2
16-20	11	2.9
>20	6	1.6

Although family support showed a significant relationship with blood pressure control on bivariate analysis, this association was not retained in the multivariate regression (p=0.165, AOR=0.524, 95% CI=0.210-1.306). This indicates that while strong family support was not an independent predictor of blood pressure control when other factors, such as education and socioeconomic class, were considered.

Table 2. Relationship between sociodemographic factors and blood pressure control.

Variable	Controlled n (%)	Uncontrolled n (%)	Total	χ^2	p
Age			5.984**	20.314	
18-29	6 (42.9%)	8 (57.1%)	14 (100%)		
30-39	27 (37.0%)	46 (63.0%)	73 (100%)		
40-49	39 (37.9%)	64 (62.1%)	103 (100%)		
50-59	49 (43.4%)	64 (56.6%)	113 (100%)		
60-69	19 (30.6%)	43 (69.4%)	62 (100%)		
≥70	3 (17.6%)	14 (82.4%)	17 (100%)		
Sex			3.270	0.077	
Male	42 (31.3%)	92 (68.7%)	134 (100%)		
Female	101 (40.7%)	147 (59.3%)	248 (100%)		
Residence				0.047	0.891
Urban	116 (37.2%)	196 (62.8%)	312 (100%)		
Rural	27 (38.6%)	43 (61.4%)	70 (100%)		
Marital status				4.267	0.234
Single	10 (45.5%)	12 (54.5%)	22 (100%)		
Married	103 (34.8%)	193 (65.2%)	296 (100%)		
Divorced		8 (53.3%)	7 (46.7%)	15 (100%)	
Widowed	22 (44.9%)	27 (55.1%)	49 (100%)		
Religion				0.117	0.843
Christianity	10 (34.5%)	19 (65.5%)	29 (100%)		
Islam		133 (37.7%)	220 (62.3%)	353 (100%)	
Tribe				3.074**	0.550
Hausa	105 (37.9%)	172 (62.1%)	277 (100%)		
Fulani	17 (43.6%)	22 (56.4%)	39 (100%)		
Yoruba	4 (21.1%)	15 (78.9%)	19 (100%)		
Igbo	5 (41.7%)	7 (58.3%)	12 (100%)		
Others (specify)	12 (34.3%)	23 (65.7%)	35 (100%)		
Educational level				10.035	0.039*
None	10 (34.5%)	19 (65.5%)	29 (100%)		
Quranic	47 (41.6%)	66 (58.4%)	113 (100%)		
Primary	18 (36.0%)	32 (64%)	50 (100%)		
Secondary	33 (27.7%)	86 (72.3%)	119 (100%)		
Tertiary level	35 (49.3%)	36 (50.7%)			
Occupation				14.141**	0.015*
Civil servant	37 (34.2%)	73 (65.8%)	110 (100%)		
Self employed	9 (18.0%)	41 (82%)	50 (100%)		
Artisan	49 (48.0%)	53 (52.0%)	102 (100%)		
Housewife	30 (39.0%)	47 (61%)	77 (100%)		
Unemployed	16 (42.1%)	22 (57.9%)	38 (100%)		
Retired on pension	1 (25.0%)	3 (75%)	4 (100%)		
Household income				1.034	0.585
<18,500	15 (45.5%)	18 (54.5%)	33 (100%)		
18,500-85,000	82 (36.3%)	144 (63.7%)	226 (100%)		
>85,000	46 (37.4%)	77 (62.6%)	123 (100%)		
Type of family settings				3.644	0.060
Polygamous	58 (43.9%)	74 (56.1%)	132 (100%)		
Monogamous	85 (34.0%)	165 (66.0%)	250 (100%)		
Size of family				6.202**	0.221
1-5	34 (41.0%)	49 (59.0%)	83 (100%)		
6-10	57 (31.3%)	125 (68.7%)	182 (100%)		
11-15	45 (45.0%)	55 (55.0%)	100 (100%)		
16-20	4 (36.4%)	7 (63.6%)	11 (100%)		
>20	3 (50%)	3 (50%)	6 (100%)		

*Statistically significant; **Fisher's exact.

Discussion

This study revealed that blood pressure control among patients with hypertension at AKTH remains suboptimal, aligning with national trends reported in previous Nigerian studies.[17,18] The prevalence of blood pressure control of 37.4% is consistent with findings from other sub-Saharan African populations, emphasizing the ongoing challenge of achieving optimal hypertension management in resource-limited settings of Low- and Middle-Income Countries (LMICs).

Educational level emerged as a strong independent predictor of blood pressure control, which showed participants with tertiary education were less likely to have uncontrolled hypertension compared with those with lower educational level attainment. This association likely reflects the role of health literacy in improving awareness of the disease, adherence to prescribed medication, patronizing alternative payment methods like health insurance and adoption of recommended lifestyle modifications, such as salt reduction and regular physical activity. Previous studies have similarly shown that education enhances patient-centred empowerment, good communication with healthcare providers, and overall better treatment outcomes.[2,11,19]

Socioeconomic status also significantly influenced blood pressure control, where patients in Class III had more than three-fold higher odds of achieving control compared with those in higher socioeconomic classes. One possible explanation is that individuals in the lower classes may tend to walk both short and long distances to cut cost of transport thereby unintentionally adopting a healthy lifestyle that may influence BP control. In addition, they may have fewer occupational and social stressors, more time to attend clinic appointments, or greater reliance on hospital-based care as their primary health option. Alternatively, this finding may reflect context-specific dynamics in Kano, such as subsidized care or stronger engagement with treatment among lower-income

Table 3. Relationship between clinical correlates and blood pressure control.

Variable	Controlled n (%)	Uncontrolled n (%)	Total	χ^2	p
Dosing type				6.915**	0.032*
Once daily	105 (34.4)	200 (65.6)	305 (100)		
Twice daily	37 (50.7)	36 (49.3)	73 (100)		
> twice daily	1 (25.0)	3 (75.0)	4 (100)		
Exercise level				11.766	0.008*
Daily	23 (35.9)	41 (64.1)	64 (100)		
>3 times a week	30 (37.0)	51 (63.0)	81 (100)		
3 times a week	32 (55.2)	26 (44.8)	58 (100)		
<3 times a week	14 (24.6)	43 (75.4)	57 (100)		
Salt reduction					
Yes	120 (41.2)	171 (58.8)	291 (100)	7.542	0.006*
No	23 (25.3)	68 (74.7)	91 (100)		
Social class				11.951	0.001*
Class I	38(34.2)	73(65.8)	111(100)		
Class II	9(18.0)	41(82.0)	50(100)		
Class III	96(43.3)	125(56.6)	221(100)		

*Statistically significant; **Fisher's exact

Table 4. Relationship between social support and blood pressure control of participants.

	Blood pressure controlled n(%)	Blood pressure uncontrolled n(%)	Total	Fisher's exact	p
Perceived family support scale				15.170**	<0.001*
Strong	143(39.6)	218(57.1)	361(100)		
Weak	0(0)	15(100)	15(100)		
No	0(0)	6(100)	6(100)		
Total	143(37.4)	239(62.6)	382(100)		

*Statistically significant; **Fisher's exact.

Table 5. Output of binary logistic regression analysis of factors associated with blood pressure control.

Variable	Adjusted odds ratio	95% Confidence interval	p
Education level	0.381	0.192-0.756	0.006*
Occupation	0.977	0.326-2.928	0.967
Social class	3.057	1.395-6.699	0.005*
Drug dosing type	1.819	0.959-3.450	0.067
Salt reduction	0.699	0.336-1.455	0.339
Exercise level	0.883	0.508-1.533	0.658
Strong family support	0.524	0.210-1.306	0.165

*Statistically significant.

groups. Further qualitative research is warranted to explore these patterns. Family support, although significantly associated with blood pressure control on bivariate analysis, was not an independent predictor in the regression model. This suggests that while strong family involvement may improve adherence and lifestyle practices,[20] its influence may be mediated through other factors such as education and socioeconomic conditions. The uniformly high proportion of respondents reporting strong family support (94.5%) may also have limited the variability needed to demonstrate a strong independent effect, which could be due to response bias. Nevertheless, the role of family support should not be underestimated in a setting like Nigeria, where cultural and social structures emphasize family networks as central to health decision-making.[21] Integrating family-based counselling into hypertension care may still enhance long-term outcomes.

Other behavioral factors such as once-daily dosing, salt restriction, and regular exercise were associated with control in bivariate analysis, highlighting the importance of simple, feasible lifestyle and treatment-related interventions in hypertension management.[19,22] Although these associations lost significance in multivariate analysis, they remain clinically relevant and should be encouraged by family physicians as part of holistic patient-centered care.

Overall, this study reinforces the need to address social determinants of health in hypertension management. Beyond pharmacological treatment, patient education, social support, and consideration of socioeconomic context are essential for improving outcomes. For family physicians, this means integrating health literacy initiatives, tailored lifestyle counselling, and engagement of family members into routine practice. Policymakers should also prioritize public health strategies that reduce disparities in access and adherence to care.

Strengths and limitations

This study provides valuable insights into the role of socioeconomic status and family support in blood pressure control among hypertensive patients in northern Nigeria. It is strengthened by its systematic sampling approach, relatively large sample size, and focus on an underexplored population. However, the cross-sectional design limits the ability to infer causality between socioeconomic status, family support, and blood pressure outcomes. Self-reported measures of lifestyle practices and adherence may have introduced recall or social desirability bias. The uniformly high levels of family support reported reduced variability and may have masked its independent effect on blood pressure control. Other factors like medication type, clinic follow up, home BP monitoring, payment for health option and source of medications can be explored in further studies. Multi-centered studies, community-based studies and longitudinal studies to assess sustained blood pressure control over time are needed in future to allow generalizability of this research findings to other settings.

This study adds to existing knowledge by providing context-specific evidence from northern Nigeria on the social determinants of blood pressure control. It demonstrates that tertiary education is a strong independent predictor of blood pressure control, underscoring the importance of health literacy in chronic disease management. It also highlights a paradoxical finding that patients in the lowest socioeconomic class had better blood pressure control than those in higher classes, suggesting context-driven dynamics that challenge conventional assumptions. Furthermore, while family support showed an association with control in bivariate analysis, it was not an independent predictor after adjustment, indicating its effect may be mediated through other social and educational factors. These insights broaden the understanding of how socioeconomic and family contexts influence hypertension outcomes and provide practical guidance for family physicians to incorporate these determinants into holistic patient care.

Conclusions

The prevalence of controlled blood pressure among the hypertensives in this study was low. Socioeconomic status and educational attainment significantly influence blood pressure control among hypertensive adults. Health care practitioners should incorporate social support assessments and address educational gaps during hypertension management. Policymakers should also consider SES-related disparities when designing public health strategies to improve hypertension outcomes.

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Informed consent: written informed consent was obtained from all participants. Data confidentiality was maintained through anonymized coding, and results were communicated to participants with appropriate referrals when needed.

Patient's consent for publication: the patient gave their written consent to use their personal data for the publication of this case report and any accompanying images.

Availability of data and materials: all data generated or analyzed during this study are included in this published article.