Common dietary patterns and their effects on blood pressure control among hypertensive clients at Mukono General Hospital. A cross-sectional analytical study.

[1]*Joanita Bayiga, [2]Gordon Kibirige, [3]Patrick Sentongo
[1]Uganda Christian University
[2]Mildmay Institute of Health Sciences
[3]Mukono General Hospital.

Abstract.
Background
The DASH diet is characterized by high intake of fruits, vegetables, whole grains, low-fat dairy, reduced salt, legumes, and nuts. This study investigates common dietary patterns and their effect on hypertension control among clients at Mukono General Hospital.

Methodology
A cross-sectional analytical design was employed. A sample of 101 hypertensive outpatients aged 18-75 years was selected using systematic random sampling from the NCD clinic in June 2025. Primary data were collected via researcher-administered structured questionnaires, including a Food Frequency Questionnaire (FFQ) to assess dietary patterns and a digital sphygmomanometer for blood pressure (BP) measurements (average of two readings taken. Data were analyzed using SPSS version 26, with descriptive statistics for dietary patterns, chi-square tests for bivariate associations, and binary logistic regression for adjusted odds ratios (AOR) at $p<0.05$ significance.

Results:
Out of the 101 participants, 72 (80%) were female, and 18 (20%) were male. The DASH diet was the most commonly followed dietary pattern among participants (75.6%, 95% CI: 66.7-84.4), followed by the detox diet (62.2%, 95% CI: 52.2-72.2). (42.2%, 95% CI: 32.0-52.4) Of respondents followed the Mediterranean diet, and the least commonly followed was the Ketogenic diet (8.9%, 95% CI: 3.0-14.8). Among the dietary patterns assessed, adherence to the DASH diet showed a statistically significant association with blood pressure control ($p < 0.001$). In contrast, no significant association was found between following Mediterranean (p= 0.818), detox (0.152), and Ketogenic (p=0.065). Participants who adhered to the DASH diet were less likely to have uncontrolled blood pressure compared to the non-adherents (AOR=0.084, P=0.001).

Conclusion
The most commonly followed dietary pattern was the DASH diet.
Participants who adhered to the DASH diet were less likely to have uncontrolled blood pressure compared to the non-adherents.

Recommendation
Policymakers should support affordable access to DASH-compatible foods via subsidies and labeling regulations.
 Health facilities should integrate targeted nutrition education and follow-up programs to boost evidence-based dietary adherence.

Background of the study

Hypertension, also known as high blood pressure, is a long-term cardiovascular condition where pressure in blood vessels is too high (140/90mmHg or higher) according to the WHO (2025). The global burden and threat of non-communicable diseases constitutes a major public health challenge, according to the WHO, Global NCD action plan (2013-2020), 2013. Non-communicable diseases killed at least 43 million people in 2021, equivalent to 75% of non-pandemic-related deaths globally (WHO, 2024).

Hypertension is the leading cause of death worldwide, affecting more than 1.4 billion people and accounting for more than 28,000 deaths each day (WHO, 2025). An estimated 1.28 billion adults aged 30-79 years worldwide have hypertension, yet 1in 5 has it under control (Kibone et al, 2023), with a considerable burden on the healthcare system. The prevalence of hypertension in sub-Saharan Africa is estimated at 30% due to a rapid increase projected over the coming decades due to urbanization, dietary changes, and population aging (WHO, 2025). In Uganda, approximately 25% of adults have high blood pressure (Uganda Heart Institute, 2024), indicating a significant public health concern. Despite the growing burden, awareness and control rates remain low across the region. The burden also continues to grow due to unhealthy diets, sedentary lifestyles, and poor access to preventive healthcare. Studies globally and within Africa have demonstrated that healthy patterns such as the DASH diet coupled with regular physical activity can control hypertension (Yanzhou Z et al., 2024).

The DASH diet was developed by the U.S National Institute of Health as a dietary strategy to prevent and control hypertension. It was first tested and validated in the landmark DASH study (Appel et al., 1997), which showed significant reductions in blood pressure among individuals consuming a diet rich in fruits, vegetables, and low-fat dairy products. The DASH diet is characterized by high intake of fruits, vegetables, whole grains, low-fat dairy, reduced salt, legumes, and nuts. Moderate intake of fish and poultry. Low intake of red meat, sweets, and sugar-sweetened beverages. Nutrient focus rich in potassium, calcium, magnesium, and dietary fiber, low in saturated fat, total fat, and sodium. This nutrient profile is designed to improve vascular function, reduce oxidative stress, and balance fluid electrolyte status, all of which are important in controlling blood pressure. This study investigates common dietary patterns and their effect on hypertension control among clients at Mukono General Hospital.

Methodology
Research design

A cross-sectional analytical research design was adopted in this study aimed to examine the effects of selected dietary patterns on hypertension control among hypertensive clients from Mukono General Hospital.

Study population

The target population was hypertensive outpatient clients aged 18 to 75years who were diagnosed with hypertension and received treatment and follow-up care at the outpatient NCD clinic of Mukono General Hospital for the month of June 2025 and consented. Adults aged 18years and above were legally and ethically capable of providing informed consent; they comprehend the research process, understand dietary-related questions, and provide meaningful responses.

Sampling and sampling techniques
Sample size determination

The sample size was determined using Yamane's formula for known finite populations, depending on the known or estimated hypertensive population in Mukono general hospital NCD clinic of N=120. The formula used:

$$n = \frac{N}{1 + N(e)^2}$$

Where n= required sample size

N =total population of hypertensive clients = 120

e= desired margin of error (commonly 0.05 for 95% confidence level)

$$n = \frac{120}{1 + 120(0.05)^2}$$

= 92.3

= 92

To account for potential non-response or incomplete questionnaires, a 10% adjustment will be applied

92 + (10% 0f 92) = 109 + 9.2 =101.2

The final required sample size is 101 hypertensive clients

Sampling procedure

Participants were identified using a systematic random sampling technique from the clinic registers on appointment days. Data collection was carried out for one month to obtain a sample size of 101. This was done by obtaining records of all hypertensive patients expected to visit the medical outpatient NCD clinic on the clinic day at the hospital. Respondents were identified by dividing the estimated population size N by the sample size n. The first respondent was picked randomly, and the subsequent clients were picked at every second interval. This exercise was repeated on every clinic day until the sample size of 101 clients was met. To ensure that clients were only interviewed once, a record of the client number was entered in the questionnaire. This sampling technique ensured random and unbiased selection from the NCD clinic hypertensive population and improved representativeness across the district.

Data collection
Data collection instruments

Primary data was collected using structured researcher-administered questionnaires from real patients covering social demographic data (age, gender, marital status, income, and education level), dietary patterns (frequency and types of food consumed), and factors influencing

adherence to healthier dietary patterns. Tools were pretested prior to data collection on a subset of 10% of clients in a nearby facility not included in the main study. The food frequency questionnaire assessed habitual dietary patterns over the past month. The questionnaire was crucial for obtaining standardized data from participants, and the FFQ specifically identified dietary behaviors and patterns that affected blood pressure control. Blood pressure measurements were taken using a digital sphygmonometer; two readings were taken 5 minutes apart, and the average was recorded. Controlled BP was defined according to Uganda clinical guidelines. The blood pressure monitor provided up-to-date, standardized blood pressure data to accurately determine control status.

Data analysis plan

Data was entered in Microsoft Excel and analyzed using SPSS version 26. Cleaning, coding, and consistency checks were performed prior to analysis.

To identify the common dietary patterns followed by hypertensive clients from Mukono General Hospital. Descriptive statistics were used to summarize frequencies and percentages for food group intake. Outcomes included lists and descriptions of dietary patterns.

To determine how dietary patterns affect hypertension control among hypertensive clients from Mukono General Hospital. Chi-square tests were used to determine the association between dietary patterns and BP control (controlled versus uncontrolled). Binary logistic regression determined the odds of BP control for each dietary pattern and reported adjusted odds ratios. Significance level of $p<0.05$.

Validity and reliability of research instruments
Validity

Content validity, the structured questionnaire, and the dietary assessment tool were developed based on existing validated instruments used in similar studies and aligned with WHO guidelines on dietary assessment. Subject matter experts in nutrition reviewed the instruments and ensured they comprehensively covered key concepts. The researcher was trained and standardized in data collection techniques, including BP measurement and dietary questions.

Dietary pattern sections were aligned with validated constructs such as the DASH diet and WHO guidelines. Internal consistency between dietary components was evaluated through double data checks.

Reliability

Cronbach's alpha was calculated for the questionnaire section where a threshold of a $\geq$ was considered acceptable. A subgroup of 10% of participants was re-examined after one week using the same questionnaire and assessed the temporal stability of responses, especially for food frequency and dietary practices. A pilot study on a small sample of hypertensive clients in the nearby facility, not selected for the main study, was conducted. Digital blood pressure monitors were calibrated before the start of data collection and checked weekly, ensuring measurement accuracy.

RESULTS

Table 1: Summary of characteristics of 90 hypertensive respondents from Mukono General Hospital

Variable	Category	Frequency (n=90)	Percentage (%)
Gender	Male	18	20.0
	Female	72	80.0
	Single	2	2.2
Marital status	Married	34	37.8
	Divorced	22	24.4
	Widowed	32	35.6
	None	19	21.1
Level of education	Primary	45	50.0
	Secondary	25	27.8
	Tertiary	1	1.1
Employment status	Employed	10	11.1
	Self-Employed	45	50.0
	Unemployed	33	36.7
	Retired	2	2.2
Monthly household income	<100,000	8	8.9
	100,000-300,000	26	28.9
	300.001-600,000	37	41.1
	>600,000	19	21.1
Age group	18-36	3	3.3
	37-55	29	32.2
	56-75	58	64.4
Residence	Urban	48	53.3
	Semi-Urban	23	25.6
	Rural	19	21.1

Table 1 shows that most of the participants, 72 (80%), were female, and 18 (20%) were male. Also, respondents (37.8%) were married, 35.6% were widowed, 24.4% were divorced, and 2.2% were single. 21.1% had not attended any school, 50% had completed primary education, 27.8% had secondary education, and 1.1% had tertiary education. 50% of the respondents were self-employed, 36.7% were unemployed, 11.1% were employed in the formal sector, and 2.2% were retired. Monthly income was categorized as less than 100,000 UGX 8.9%, 100,000- 300,000 UGX 28.9%, 300,000- 600,000 UGX 41.1% and above 600,000 UGX 21.1%.

Table 2: Summary of characteristics of 90 hypertensive respondents from Mukono General Hospital

Characteristics	Frequency(n=90)	Percentage (%)
Followed a detox diet		
No	34	37.8
Yes	56	62.2
Followed the Ketogenic diet		
No	82	91.1
Yes	8	8.9
Followed the Mediterranean diet		
No	52	57.8
Yes	38	42.2
Followed the DASH diet		
No	22	24.4
Yes	68	75.6
Adherence		
doesn't adhere	19	21.1
adheres	71	78.9
Is the blood pressure controlled		
No	39	43.3
Yes	51	56.7
Have comorbidity		
None	70	77.8
Yes	20	22.2

Identifying dietary patterns followed by hypertensive clients in Mukono General Hospital

Respondents were asked about their consumption frequency of various food items aligned with known dietary patterns, including the DASH, Mediterranean, Ketogenic, and detox diets. Their responses were used to categorize the dominant dietary patterns.

Table 3: showing the distribution of dietary patterns among hypertensive clients from Mukono General Hospital

Dietary patterns	Frequency (n=90)	Percentage (%)	95% CI
DASH diet No	22	24.4	
Yes Mediterranean diet	68	75.6	66.7-84.4
No	52	57.8	
Yes Ketogenic diet	38	42.2	32.0-52.4
No	82	91.1	
Yes Detox diet	8	8.9	3.0-14.8
No	34	37.8	
Yes	56	62.2	52.2-72.2

As shown in Table 3, the DASH diet was the most commonly followed dietary pattern among participants (75.6%, 95% CI: 66.7-84.4), followed by the detox diet (62.2%, 95% CI: 52.2-72.2). (42.2%, 95% CI: 32.0-52.4) Of respondents followed the Mediterranean diet, and the least commonly followed was the Ketogenic diet (8.9%, 95% CI: 3.0-14.8)

Determining the effects of dietary patterns on blood pressure control among hypertensive clients from Mukono General Hospital

Blood pressure control was categorized as controlled BP, less than 140/90, and not controlled BP greater than 140/90. Participants' adherence to dietary patterns was compared with their BP control status using bivariate analysis. Logistic regression was also conducted to examine the strength of association between dietary patterns and the likelihood of having controlled BP

Bivariate analysis

Table 4: Chi-square test results on associations between dietary patterns and BP control of hypertensive clients from Mukono general hospital

Dietary pattern	Uncontrolled n (%)	Controlled n (%)	χ^2	p-value
DASH Yes	37 (54.4)	31 (45.6)	13.904	0.000
No	2 (9.1)	20 (90.9)		
Mediterranean Yes	11 (28.9)	27 (71.1)	0.053	0.818
No	18 (34.6)	34 (65.4)		
Ketogenic Yes	1 (12.5)	7 (87.5)	3.399	0.065
No	28 (34.1)	54 (65.9)		
Detox Yes	13 (23.2)	43 (76.8)	2.054	0.152
No	16 (47.1)	18 (59.2)		

A chi-square test of independence was performed to determine if there was a significant association between dietary pattern and blood pressure control. Among the dietary patterns assessed, adherence to the DASH diet showed a statistically significant association with blood pressure control ($p < 0.001$). In contrast, no significant association was found between following Mediterranean (p= 0.818), detox (0.152), and Ketogenic (p=0.065)

Logistic regression analysis

Table 5: showing binary logistic regression analysis of dietary patterns on hypertension control among hypertensive clients from Mukono general hospital

Variable	B	S.E.	Wald	AOR(B)	P value	95% AOR(B)	
						Lower	Upper
followed the DASH diet	-2.48	0.781	10.091	0.084	0.001	0.018	0.387

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Multivariable logistic regression analysis using the forward likelihood ratio method was performed to identify significant predictors of blood pressure control. Only variables retained in the final model were presented in the table. After stepwise selection, adherence to the DASH diet was significantly associated with blood pressure control. Participants who adhered to the DASH diet were less likely to have uncontrolled blood pressure compared to the non-adherents (AOR=0.084, P=0.001). Adherence to the DASH diet reduced the odds of uncontrolled blood pressure by 16%. Ketogenic and detox were excluded from the final model because they did not significantly contribute to the prediction of blood pressure control.

Discussion of findings
Socio-demographic characteristic

The majority, 72 (80%) of the participants were female, indicating a potential gender disparity in either the prevalence or healthcare-seeking behavior related to hypertension within the sample population. 64.4% were aged **56 years and above**, highlighting the heightened vulnerability of older populations to hypertension.

The largest groups were married individuals, constituting 37.8% (n=34), while single clients made the smallest proportion at 2.2% (n=2). These variations in marital status influenced dietary behaviors and nutritional support systems, as marital status often correlates with lifestyle factors such as meal preparation, food access, and social support, which in turn affect hypertension control.

Half (50.0%, n=45) had attained primary education, which suggested potential challenges in accessing or understanding complex dietary information, highlighting the need for tailored, accessible nutritional interventions to effectively address hypertension in this setting. 50.0% were self-employed, which suggested that many clients may rely on irregular or limited incomes, which could influence their access to healthy diets necessary for hypertension management. For instance, financial instability may restrict the ability to purchase fresh fruits, vegetables, or low-salt foods, thereby increasing reliance on cheaper, processed alternatives that heighten hypertension risks.

More than half of the respondents (53.3%) resided in urban areas, followed by 25.6% from semi-urban areas. These findings suggested that most clients live in urban and semi-urban settings where access to both healthy and unhealthy food options is higher. Urban residents are likely to have better physical access to markets, supermarkets, and health facilities, which could facilitate the adoption of healthier dietary practices such as increased fruit and vegetable consumption. However, urban living is also strongly associated with the availability and consumption of processed and fast foods, often high in salt, fat, and sugar, which may negatively affect hypertension control.

Identifying common dietary patterns followed by hypertensive clients in Mukono General Hospital

The results showed that the most commonly followed dietary pattern among hypertensive clients at Mukono General Hospital was the **DASH diet** with (75.6% n=68) adherence, reflecting positive uptake of a scientifically recommended approach that directly supports blood pressure control through increased consumption of fruits, vegetables and low-sodium foods, these findings are consistent with research indicating the DASH style diets are increasingly recognized in clinical settings for hypertension control (Filippou et al., 2020). This was followed by the **Detox diet** (62.2% n=56), which, although popular, is less evidence-based and may reflect social influences or misconceptions about controlling hypertension.

The **Mediterranean diet** is practiced by (42.2% n=38) of respondents, suggesting moderate awareness and adoption of another heart-healthy dietary pattern, though its uptake remains lower than DASH. The relatively lower adoption of the Mediterranean diet may reflect its cultural unfamiliarity and limited access to typical Mediterranean foods like olive oil and seafood in Uganda. In contrast, the **Ketogenic diet** is the least practiced, with only 8.9% of respondents adhering to it, highlighting its limited suitability or acceptance among hypertensive clients. These findings suggest that while many patients are adopting recommended dietary strategies, the significant reliance on less evidence-based patterns, such as detox diets, calls for targeted nutritional education to strengthen adherence to clinically proven dietary approaches for effective hypertension control.

Determining the effect of dietary patterns on blood pressure control among hypertensive clients from Mukono General Hospital

Multivariable logistic regression analysis was performed to identify significant predictors of blood pressure control. Adherence to the DASH diet was significantly associated with blood pressure control. Participants who adhered to

the DASH diet were less likely to have uncontrolled blood pressure compared to the non-adherents (AOR=0.084, P=0.001). Adherence to the DASH diet reduced the odds of uncontrolled blood pressure by 16%.

These results align with clinical evidence that supports the DASH diet as the first-line dietary approach for lowering blood pressure, due to its low sodium and high fiber content (Filippou et al., 2020). In contrast, Ketogenic diets, which are typically high in fats and low in carbohydrates, have shown mixed results, and the long-term effect on hypertension remains uncertain (Mohammad R et al., 2024).

conclusion

The most commonly followed dietary pattern was the DASH diet

Participants who adhered to the DASH diet were less likely to have uncontrolled blood pressure compared to the non-adherents

Recommendations

Based on the findings of this study on dietary patterns and their effects on hypertension control among hypertensive clients from Mukono General Hospital, the following recommendations are proposed.

For policymakers to ensure policies support local food production and the affordability of healthy foods through community gardens and agricultural extension programs. The government should enforce clear food labeling and regulate processed foods high in salt and fat. The Ministry of Health should integrate evidence-based dietary guidelines into national hypertension management protocols.

For health facilities and program managers to establish community-based nutrition support programs or group education sessions to raise awareness about healthier dietary patterns for hypertension control. Implement follow-up mechanisms like dietary recall reviews and adherence checklists to monitor progress and provide reinforcement.

Acknowledgement

List of Abbreviations

NCDs: Non-communicable Diseases
WHO: World Health Organization
DASH diet: Dietary Approaches to Stop Hypertension
CI: Confidence Interval
FFQ: Food frequency questionnaire
BP: Blood pressure
mmHg: Millimeters of mercury
US: United States
SPSS: Statistical package for social sciences

Conflict of interest

The author declared no conflict of interest

Author contributions

Bayiga Joanita was the principal investigator
Kibirige Gordon supervised the research.
Patrick Sentongo supervised the research.

Data availability

Data is available on request

Author Biography

Joanita Bayiga is a student at Uganda Christian University
Gordon Kibirige is a lecturer at Mildmay Institute of Health Sciences
Patrick Sentongo is a hospital nutritionist at Mukono General Hospital

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