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Original article

Association of socio-demographic profile and the underlying risk factors of hypertension among the locals of Prosperidad, Agusan del Sur, Philippines

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Abstract

Background: Hypertension is a leading risk factor for cardiovascular diseases, including heart disease and stroke, which are significant causes of morbidity and mortality worldwide. Its prevalence varies across regions and is influenced by genetic, environmental, and lifestyle factors.
Objectives: This study aimed to determine the socio-demographic profile, the prevalence of hypertension, and the risk factors and associate these with the prevalence of hypertension in Prosperidad, Agusan del Sur.
Methods: Data were gathered through a survey involving respondents aged 25–75 years from November 2022 to February 2023. Multivariate logistic regression was used to determine the association between the socio-demographic profile and the risk factors for the prevalence of hypertension.
Results: The study identified several key factors significantly associated with hypertension, including non-indigenous status ($P < 0.01$), marital status ($P < 0.05$), occupation ($P < 0.01$), educational attainment ($P < 0.05$), and monthly income ($P < 0.01$). Whereas there was no significant correlation between hypertension and variables such as alcohol consumption ($P = 0.85$), physical activity ($P = 0.67$), and dietary salt reduction ($P = 0.45$), a strong association was recorded between hypertension and factors such as dietary habits ($P < 0.01$), recreational activities ($P < 0.05$), personal history of elevated blood pressure and cardiovascular diseases ($P < 0.01$), tobacco cessation ($P < 0.01$), and reduced intake of sugary beverages ($P < 0.01$).
Conclusion: The study revealed a high prevalence of hypertension (89.7%) in Prosperidad, Agusan del Sur, with significant socio-demographic and lifestyle risk factors, including poor dietary habits and lack of lifestyle changes. These findings emphasize the urgent need for targeted public health interventions to promote healthier behaviors and reduce the burden of hypertension in the community.

Keywords: Arterial blood pressure, cardiovascular disease.

One of the primary causes of the global disease burden is hypertension. Over a billion people worldwide have high blood pressure, which causes about 9.4 million annual deaths. [1] Hypertension (HTN) is a major public health problem due to its high prevalence globally. Hypertension is the leading cause of cardiovascular disease and premature death worldwide. Owing to the widespread use of antihypertensive medications, global mean blood pressure (BP) has remained constant or decreased slightly over the past four decades. [2] The prevalence of HTN and its global influence are crucial in guiding diagnosis, treatment, and surveillance to monitor progress toward its management. HTN that is not kept under control leads to several complications, such as stroke, myocardial infarction, hypertensive retinopathy, hypertensive nephropathy, and paralysis. [3] Hypertensive patients report symptoms that they believed are associated with high BP, and, consequently, they used them to estimate their BP and make decisions about the treatment to be followed. [4] HTN is also a leading risk factor for cardiovascular diseases, including heart disease and stroke, which are major causes of morbidity and mortality worldwide. [5] Its prevalence varies across various

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regions and is influenced by genetic, environmental, and lifestyle factors.

Numerous factors contribute to the development of HTN, including both non-modifiable and modifiable risk factors. Non-modifiable risk factors include age, gender, and genetic predisposition, whereas modifiable risk factors encompass lifestyle choices, such as dietary habits, physical activity, tobacco use, and alcohol consumption. [6, 7] BP is strongly associated with age, and its elevation is one of the most important modifiable cardiovascular risk factors worldwide. Mediated by several structural and physiological changes, prevalence of HTN progressively increases with age. [8] Gender is also a non-modifiable risk factor, with evidence suggesting that men are more likely to develop hypertension than women, particularly at younger ages. [6] However, after menopause, the incidence of HTN in women catches up to that of men, emphasizing the influence of hormonal changes on BP regulation. [9] Genetic predisposition plays a crucial role, with familial clustering and heritability estimates supporting the genetic influence on BP regulation. Modifiable lifestyle factors significantly contribute to the development and management of HTN. Dietary habits, such as high sodium and low potassium intake, have been linked with high BP. [6, 10] Physical inactivity is another risk factor, as regular exercise lowers BP and improves cardiovascular health. Unhealthy behaviors, including tobacco use and excessive alcohol consumption, have also been linked to elevated BP levels. [6, 11]

An extensive nationwide survey was conducted in the Philippines, focusing on HTN. A higher prevalence of HTN was recorded in men than in women. [12] HTN was also commonly observed among elderly Filipinos. Regional variations were observed in the prevalence of HTN, and Region 7 (Central Visayas) exhibited the highest cases of hypertension, followed by the National capital Region and Region 10 (North Mindanao). Additionally, a high prevalence of HTN was observed in urban areas and individuals with the socioeconomic class Broad C. [13] Numerous factors leading to HTN being the top cause of mortality in the Philippines are associated with a lack of awareness, poor compliance, and inadequate BP control. Many individuals consult non-physicians, which continually exposes them to improper management and traditional beliefs and practices. [14]

Prosperidad Agusan del Sur is a municipality with over 32 barangays. However, to date, there are no studies or reports on the prevalence and associated risk factors of HTN. Prosperidad, a provincial capital of Agusan del Sur in the Philippines, is home to a diverse population. Information on the prevalence of HTN, specifically within the Prosperidad municipality, is limited. By examining the prevalence of HTN in Prosperidad, this study aimed to fill this knowledge gap and provide valuable insights into the local burden of the condition.

This study aimed to investigate the risk factors of HTN among individuals aged 25–75 years,shedding light on the factors contributing to the development and progression of this condition. Exploring and understanding the risk factors associated with HTN among individuals aged 25–75 years can contribute to the existing body of knowledge and inform preventive strategies and interventions. The findings can also aid healthcare professionals, policymakers, and individuals in making informed decisions on how to reduce the burden of HTN and improve public health outcomes. Furthermore, this survey will serve the Prosperidad, Agusan del Sur community by tracking down records of every sole, which will benefit the medical or health-affiliated offices.

Materials and methods

This study was reviewed and approved by the Ethics Review Committee of the Department of Biology, Caraga State University. The ethics committee does not issue IRB no., but the study was conducted under their approval guidelines. All procedures performed followed the ethical standards of the Institution and the Rural Health Unit and Reproductive Health Center of Prosperidad, Agusan del Sur.

All respondents were informed that participation was voluntary and no incentives would be offered. Additionally, all participants signed a consent form before participation and were assured anonymity and data protection. The respondents were also informed that the study would be conducted for academic purposes only.

Research design

This study used a cross-sectional, descriptive, and quantitative design to assess socio-demographic profiles, risk factors, and HTN prevalence. The cross-sectional approach allows data collection at a single point, providing a snapshot of HTN's impact. Quantitative analysis facilitates accurate prevalence

measurement, highlights specific high risk subgroups for targeted public health intervention, and enables generalization to the broader population. Although this study is not causal, its design identifies statistically significant associations between risk factors and HTN prevalence, offering a robust foundation for public health insights and future research.

Location of the study

Prosperidad is provincial capital of the landlocked province of Agusan del Sur. The municipal center of Prosperidad is approximately 8° 36' North, 125° 55' East, on the island of Mindanao. Elevation at these coordinates is estimated at 42.9 meters or 140.7 feet above mean sea level. The municipality's population expanded by 86,109 over 102 years, going from 2,212 people in 1918 to 88,321 in 2020.

The most recent census, conducted in 2020, revealed a growth rate of 1.4%, or an increase of 5,690 people from the previous population count of 82,631 in 2015. Administratively, Prosperidad is subdivided into 32 Barangays, 7 barangays (Poblacion, Patin-ay, Santa Irene, Lucena, San Jose, San Salvador, and Santa Maria). The selection of the study sites was based on availability of comprehensive records of hypertension from the Rural health unit office, environmental factors, and safety of the location (**Figure 1**).

Respondents of the study

The respondents selected for this study had to meet specific inclusion criteria to ensure relevance and accuracy in data collection. Participants were required to **A)** be current residents of Prosperidad; **B)** be adults aged between 25 and 75 years; **C)** have a recorded diagnosis of HTN or high BP documented within the past 12 months in their respective barangay health records; and **D)** voluntarily consent to participate by signing an informed consent form. Exclusion criteria included being outside the specified age range, being a non-resident of Prosperidad, those without a documented hypertension diagnosis in the past year, and being unwilling to provide consent. These criteria were implemented to establish a clear and targeted

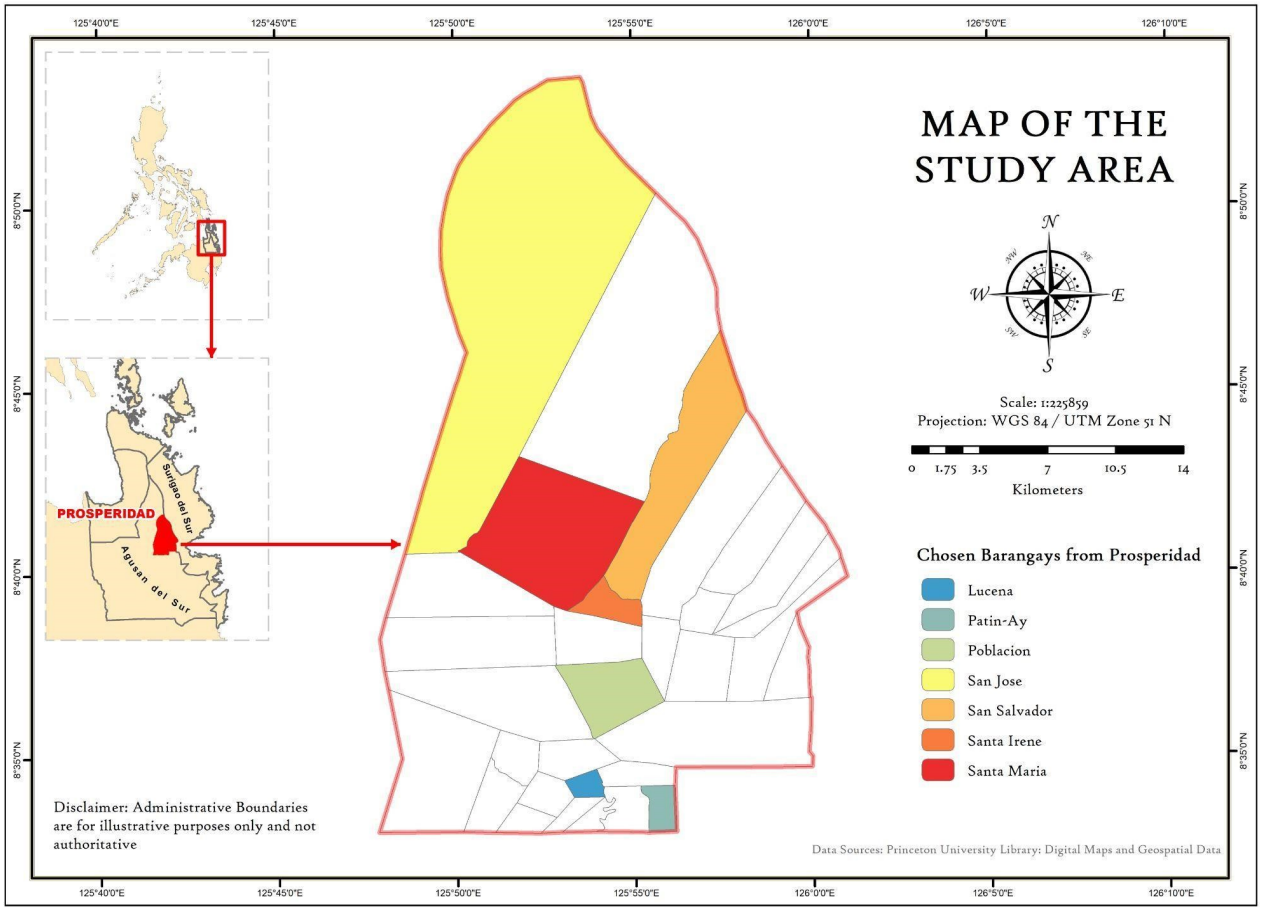

Figure 1. Map of Prosperidad, Agusan del Sur, Mindanao, Philippines, showing the sampling area

selection process, ensuring that participants accurately represent the focus population of the study.

Sampling design

Cochran's formula was used to estimate the appropriate sample size of the respondents (**Table 1**) in Prosperidad, Agusan del Sur. Obtained records of HTN individuals from the rural health unit office of Properidad, Agusan del Sur, showed a total of 395 hypertensive individuals, which was calculated by using this equation: $n = n\,0 / 1 + (n\,0 - 1) / N$ where n0 is Cochran's sample size recommendation, N is the population size, and n is the new, adjusted sample size. A total of 195 individuals were interviewed in this study.

The distribution of respondents across barangays in Prosperidad was organized to capture a representative sample of the local population, ensuring each barangay's demographic and health characteristics were included in the study. Respondents were selected based on HTN prevalence rates, which have been increasing in the Philippines; recent national data indicate that approximately 37.0% of Filipino adults have high BP, making HTN a growing public health issue. This national situation is reflected locally as Prosperidad, Agusan del Sur, exhibits a similarly high prevalence, with recent regional health assessments identifying rising HTN cases, especially among non-indigenous and socio-economically disadvantaged groups. Selecting Prosperidad as the study site, therefore, allowed for an in-depth exploration of HTN within a community facing challenges aligned with national trends, reinforcing the importance of understanding localized risk factors in addressing broader health disparities in the Philippines. A simple random sampling was used to make statistical inferences about the population in Prosperidad, Agusan del Sur. Random sampling ensures high internal validity and reduces the impact of confounding variables.

Survey instruments

A modified questionnaire adapted from the WHO stepwise approach to chronic disease risk factor surveillance instrument v 2.1 was used to assess HNT respondents' socio-demographic profile and common risk factors in Prosperidad, Agusan del Sur. The modified questionnaire was tested before the face-to-face interview to test the accuracy of the questions. There were four main parts of the modified questionnaire: Part 1 was the survey information; Part 2 was informed consent; Part 3 had questions on demographic information (sex, age, ethnicity, marital status, level of education, work status, as well as every household's monthly salary); and Part 4 was on risk factors.

The core items were questions on survey information, demographic information, behavioral measurements, and physical measurements. Expanded items were complex questions requiring information to calculate variables related to common risk factors, which were preferably answerable with yes or no. Sufficient intake of fruits and vegetables has been associated with a low risk of chronic diseases and body weight management, but their exact mechanism is unknown. Therefore, enhancing strategies to promote fruit and vegetable intake is essential for health promotion among the population. [15]

Data gathering procedure

Data collection involved a structured, face-to-face survey interview process to ensure accuracy and control for potential confounding variables. Before data collection, necessary permits and informed consent were obtained, including entry letters for selected barangays and approvals from the municipal health center and Municipal Rural Health Unit (RHU) office, as well as the barangay health centers in Prosperidad, Agusan del Sur. Each respondent participated in a standardized interview in which

Table 1. Distributed number of respondents per barangay along with the total number of the adjusted sample size

Barangay	Number of respondents
Poblacion	50
Patin-ay	35
Sta. Irene	30
Lucena	30
San Jose	15
Sta. Maria	15
San Salvador	15
Total	**195**

response on socio-demographic and health-related variables were documented. To minimize confounding, the survey incorporated standardized questions addressing known variables (e.g., lifestyle factors, comorbidities) that could impact prevalence of HTN. Data collectors were trained for consistency, particularly in documenting responses on risk factors and health conditions, which helped reduce potential interviewer bias. This approach provided a comprehensive dataset while effectively controlling for confounding factors in the assessment of HTN prevalence.

For physical measurements, the study adapted WHO's protocol, which involves taking three readings of BP and heart rate per participant. This was performed to ensure accuracy and consistency in the measurement of each participant's BP and heart rate. Measurements were taken using validated digital sphygmomanometers, with participants in a seated position, and measurements were spaced out to account for any potential variances due to physical or psychological factors. Each participant's three readings were averaged for the analysis, enhancing the reliability of the recorded data. Although the individual readings were not displayed in the final results, this three-reading approach ensured that each participant's BP was accurately captured and that any outliers or temporary fluctuations were minimized.

Statistical analysis

The data gathered were processed using standard descriptive statistics to characterize the prevalence of hypertension, with frequencies and percentages calculated to provide a clear population profile. Analysis was conducted using the Statistical Package for Social Sciences (SPSS) Windows version 16.0 (SPSS, Inc., Chicago, IL, USA). Data were presented as means ± standard deviation (SD) and percentages. To evaluate the significance of relationships between variables, a chi-square test was conducted, setting the level of significance at

To examine the association between socio-demographic factors, risk factors, and hypertension prevalence, a multivariate logistic regression analysis was applied. This allowed the simultaneous testing of multiple variables, identifying those significantly associated with hypertension. To evaluate model adequacy, a model fit table was utilized, summarizing fit statistics to determine how well the models with estimated parameters represented the data. Additionally, multicollinearity diagnostics were performed to assess any potential correlation among predictor variables within the regression model, ensuring robustness in the analysis by confirming that variables were independent and could reliably contribute to the association model. This comprehensive approach to data processing and analysis enhances the reliability and reproducibility of the study's findings. $P < 0.05$ was considered as statistically significant.

Results

Socio-demographic profile of the respondents

Face-to-face survey interviews were conducted among the seven chosen barangays in Prosperidad, Agusan del Sur, starting from November 2022 to February 2023. Primarily, the results showed the ethnicity of the respondents, indicating that most [150 (76.9%)] of them were non-indigenous. The ages of the respondents were categorized into three age groups. Most of the respondents (56.4%) in the study belonged to the middle-aged group, followed by those in the elderly group (33.9%), and young adults (9.7%). Additionally, most of the respondents (61.5%) were females and 38.5% were males.

Based on marital status, most of respondents were married (80.5%, n = 157), and some were widowed (9.7%, n = 19). The level of education was also captured, indicating that most of the respondents were in high school (48.2%, n = 94) and 39.5%, n = 77 were in college. Analysis of the work status of the respondents revealed that (32.3%, n = 63) of them were government employees and (16.4%, n = 32) were homemakers. Furthermore, respondents were categorized into four groups by level of monthly income. Most of the respondents (47.2%, n = 92) had a monthly income between 500 and 10,000 and 46.2% (n = 90) earned between 10,000 to 30,000 (n = 90, 46.2%), (**Table 2**).

Table 2. A sociodemographic profile of the respondents among 7 barangays was chosen in the study. The number of respondents' answers to each category per variable shows the frequency and percentage.

Variables	(n = 195)	(%)
Ethnicity		
Non-indigenous people	150	76.9
Indigenous people	45	23.1
Age		
20 - 39 years old (young adults)	19	9.7
40 - 59 years old (middle-aged)	110	56.4
60 - 75 years old (elderly-aged)	66	33.9
Sex		
Female	120	61.5
Male	75	38.5
Marital status		
Single	12	6.2
Currently married	157	80.5
Separated	3	1.5
Annulled	2	1.0
Widowed	19	9.7
Cohabitating	2	1.0
Level of education		
No formal Ed.	8	4.1
Elementary	16	8.2
High school	94	48.2
College	77	39.5
Work status		
Government employee	63	32.3
NGO employee	29	14.9
Self-employed/Private business	31	15.9
Homemaker	32	16.4
Retired	14	7.2
Unemployed (able to work)	11	5.6
Unemployed (unable to work)	15	7.7
Monthly salary (Pesos)		
500 - 10,000	92	47.2
10 - 30,000	90	46.1
30 - 40,000	12	6.2
Refused	1	0.5

Prevalence of HNT, BP readings and physical measurements

A total of 195 respondents willingly participated in this study. Out of the 195 respondents who participated in the survey, 175 (89.7%) were diagnosed with high BP, and 20 (10.3%) had low or normal blood pressure.

The physical measurements taken on the respondents were presented as mean ± SD. Respondents had a mean height of 160.8 ± 9.3 cm , mean weight of (66.5 ± 8.4 kg , mean waist circumference of 82.9 ± 10.9 cm, mean hip circumference of 83.5 ± 10.9 cm, and mean heart/ pulse rate of 20.1 ± 2.1 beats/min.

Table 3. Risk factors for hypertension among the 195 respondents in the six barangays of Prosperidad, Agusan del Sur. The common risk factors shown were determined through statistical analysis based on the number of respondents who answered to each category per question and their percentage.

Variables	Indicators	Frequency (n)	(%)	*P* = 0.05
Tobacco use	Yes	33	16.9	0.401
	No	162	83.1	
Alcohol	Yes	76	39.0	0.652
	No	119	53.9	
Diet: fruits	Good diet	79	40.5	**0.002***
	Low diet	116	59.5	
Diet: vegetables	Good diet	93	53.1	**0.003***
	Low diet	102	58.3	
Physical activity	Yes	31	15.9	0.319
	No	164	84.1	
Recreational activity	Yes	4	2.1	0.113
	No	191	98.0	
Blood pressure	Yes	159	81.5	**0.024***
	No	36	18.5	
History of cardiovascular diseases	Yes	46	23.6	**0.002***
	No	149	76.4	
Lifestyle advice	Yes	2	1.0	0.791
	No	193	99.0	
Quit tobacco	Yes	29	14.9	**0.003***
	No	166	85.1	
Reduce salt in diet	Yes	172	88.2	0.165
	No	23	11.8	
Eat at least five servings of fruit and/or vegetables each day	Yes	41	21.0	0.123
	No	154	79.0	
Reduce fat in your diet	Yes	45	23.1	0.593
	No	150	77.0	
Start or do more physical activity	Yes	149	76.4	0.993
	No	46	23.6	
Maintain a healthy body weight or lose weight	Yes	17	8.7	**0.044***
	No	178	91.3	
Reduce sugary beverages in your diet	Yes	25	12.8	**0.026***
	No	170	87.2	
Salt consumption	High	194	99.5	0.991
	Normal	1	0.5	

*$P < 0.05$ = statistically significant. Risk factor variables were measured using a modified WHO Stepwise Approach to Chronic Disease Risk Factor Surveillance Instrument v2.1.

Risk factors for hypertension

The risk factors that exhibited significant effect on HTN are shown in **Table 3**. The following factors: diet ($P = 0.002$), history of raised BP ($P = 0.024$), history of cardiovascular diseases ($P = 0.002$), quitting tobacco ($P = 0.003$), maintaining weight or losing pounds ($P = 0.044$), and reducing sugary beverages ($P = 0.026$) had statistically significant factors for HTN. However, variables including recreational activity ($P = 0.113$), reducing salt intake ($P = 0.165$), eating five servings of fruit and vegetables ($P = 0.123$), and reducing fat in one2 s diet ($P = 0.593$) had no statistically significant effect on the prevalence of HTN. Nonetheless, these variables can be considered as predictors of HTN.

The results revealed a high percentage of a poor diet (59.5% and 58.3%, respectively), indicating that most of the respondents had poor diet and nutrition. Additionally, 81.5% of respondents answered "yes" to a history of raised BP were, whereas 23.6% answer "yes" to cardiovascular diseases. Furthermore, 85.1% of respondents answered "no" to quitting tobacco, 91.3% answered "no" to maintaining a healthy body or lose weight and 87.2% answered "no" to reducing sugary beverages. These three variables were associated with the question, "During any of your visits to a doctor or other health worker in the past 12 months, were you advised to do any of the following and apply it?" on the modified questionnaire. These risk factors were highlighted mainly because they showed relevance to the study (**Table 3**).

Association of the socio-demographic profile and the risk factors on the prevalence of hypertension

The results revealed that respondents who were single (OR: 18.6, 95% CI = 0.3–13.0), separated (OR: 17.2, 95% CI = 0.1–28.2), annulled (OR: 63.7, 95% CI = 0.3–14.1), or widowed (OR: 16.6, 95% CI = 0.2–12.4) had significantly higher odds of being associated with HTN after controlling for socio-demographic covariates (**Table 4**).

Additionally, the results showed that in terms of work status, only those respondents who are homemakers were associated with higher odds of HTN, and other categories, such as government employee, non-government employee, retired, self-employed, and unemployed (both able and unable) were not significantly associated with HTN. Findings on monthly income showed that respondents with a salary in the ranges 10,000–30,000 pesos or 30,000–40,000 pesos had high odds of being associated with HTN.

A noteworthy finding from the analysis is the association between the risk factors and the prevalence of hypertension. The results revealed that risk factor variables such as low diet (OR: 69.8, 95% CI = 2.4–20.7), no recreational activities (OR: 8.0, 95% CI = 0.1–4.4), history of raised BP (OR: 2.3, 95% CI = 2.3, 95% CI = 0.6–8.6), history of cardiovascular diseases (OR: 5.2, 95% CI = 0.2–25.5), not quitting tobacco (OR: 8.0, 95% CI = 0.0–0.6), not reducing salt (OR: 3.2, 95% CI = 0.3–30.5), not reducing sugary beverages (OR: 9.2, 95% CI = 0.0–0.9) had had a relatively strong association with hypertension.

However, the findings did not show an association between the risk factors, even after considering variables such as alcohol (OR = 0.5, 95% CI = 0.2–9.3), and maintaining a healthy body or losing weight (OR = 0.0, 95% CI = 2.0–5.4) (**Table 4**).

Discussion

Several studies have reported that belonging to certain racial and ethnic minority groups in various regions may contribute to the occurrence of HTN, making ethnicity a predictor. Various factors might explain how ethnicity can be associated with the condition. [16] However, the findings reveal that the prevalence is high among the non-indigenous, which will not indicate which ethnicity is more likely to experience HTN.

Muli S, *et al.* [17] reported that prevalence (73.8%) of HTN is high in adults aged 65–94 years, translating to 3 out of 4 older adults having high BP, which makes age an important factor and a contributor on the risk of acquiring hypertension.

Additionally, a previous study reported that HTN was more prevalent in females than in males of the same age group. [18] Similar results were obtained in this study, showing a higher prevalence of HTN among the female respondents. However, the results show that sex does not significantly contribute to the occurrence of hypertension in the study area, most probably, owing to the overrepresentation of female respondents.

Do HT, *et al*. [19], reported that divorcees exhibited the highest prevalence of HTN, followed by those who are currently married. Additionally, participants with elementary school education and below exhibited a higher risk of being newly diagnosed with HTN than those with at least middle school. [20]

Finally, some previous studies also found that a combination of work status and monthly salary is a predictor for HTN, and most government employees experienced HTN, as well as those employees that had a monthly income ranging from 10,000 to 30,000 pesos. The results of this study revealed that it is crucial to examine how these socioeconomic variables influence HTN. Socio-demographic factors may impact chances of HTN occurrence by influencing an individual's ability to acquire knowledge, communicate effectively with their health care providers, and obtain effective social support around their diagnosis. [21]

Table 4. Multivariate fixed-effect logistic regression for the prevalence of hypertension and its association with the sociodemographic profile of the respondents and the underlying risk factors.

Variables	Indicators	Hypertensive	Non-hypertensive	*P*-value	Adj. OR*	95% CI lower	95% CI upper
Marital status	Currently married	157	14	Ref	1.0	Ref	Ref
	Single	12	2	0.200	18.6	0.3	1299.5
	Separated	3	1	0.110	17.2	0.1	2819.2
	Annulled	2	3	0.361	63.7	0.3	14076.0
	Widowed	19	0	0.990	16.6	0.2	1238.1
Work status	Government employee	63	6	Ref	1.0	Ref	Ref
	Homemaker	32	2	0.026	9.4	0.9	98.0
Monthly salary	500 - 10K	92	12	Ref	1.0	Ref	Ref
	10 - 30K	90	6	0.148	8.43e + 6	0.0	Inf
	30 - 40K	12	1	0.532	2.02e + 6	0.0	Inf
Diet: DQ1: fruit servings	Good diet	75	4	Ref	1.0	Ref	Ref
	Low diet	100	16	0.048	69.8	2.4	2066.7
RA: Recreational activities	Yes	2	2	Ref	1.0	Ref	Ref
	No	173	18	0.028	8.0	0.1	441.0
HRBP	Yes	146	13	Ref	1.0	Ref	Ref
	No	29	7	0.061	2.3	0.6	8.6
HCD	Yes	37	9	Ref	1.0	Ref	Ref
	No	138	11	0.328	5.2	0.2	25.5
HQ1: quit tobacco	Yes	28	1	Ref	1.0	Ref	Ref
	No	147	19	0.235	8.0	0.0	0.6
HQ2: reduce salt in diet	Yes	156	16	Ref	1	Ref	Ref
	No	27	4	0.238	3.2	0.3	30.5
HQ7: reduce sugary beverages	Yes	18	7	Ref	1	Ref	Ref
	No	157	13	0.004	9.2	0.0	0.9

*$P < 0.05$; ref, reference group; Adj OR, adjusted odds ratio; Variables included, sociodemographic profile; DQ1, (Diet questions: number of servings); HRBP, (history of raised blood pressure); HCD, (history of cardiovascular diseases) and the risk factors for hypertension.

According to the Philippine Heart Association [13], hypertension prevalence in the Philippines has increased to 37.0%, signaling a "progressive rise" of high BP among Filipinos. In a cross-sectional analysis, the prevalence of hypertension was 44.0%. 53.3% of them were under treatment, and controlled BP was reported in 37.6% of the patients under treatment. [22] As a result of population aging, increased exposure to lifestyle risk factors such as deficient diets (high salt and low potassium intake), and a lack of physical activity, the prevalence of hypertension continues to rise worldwide and, most importantly, nationwide.

Managing risk factors, such as obesity and smoking, should be part of management. A multisectoral approach in managing HTN should be part of the strategy to lower it in the country. [12] Hypertension prevalence greatly varies among geographical regions, and this is partly explained by known lifestyle and socioeconomic factors. [23] In contrast, HTN is now more common, particularly in low and middle-income countries.

Accordingly, 31.1% of individuals globally (1.4 billion) had HTN in 2010. [24] The prevalence of HTN varies significantly among different ethnic groups due to a combination of genetic, lifestyle, and socio-demographic factors. The findings highlight that addressing these socio-demographic factors and promoting healthier lifestyle choices are crucial in reducing the prevalence of hypertension among at-risk populations, underscoring the need for targeted public health interventions to improve health outcomes and reduce disparities in hypertension prevalence across different ethnic groups. Moreover, the observed discrepancies in hypertension awareness among ethnic groups may be explained by differences in dietary and cultural practices. [25] Lastly, those people who were less likely to be aware of the diagnosis of hypertension were those who were older, married or widowed, and had lower educational levels. [26]

According to Li G, *et al*. [27], revealed that former smokers were more significantly experiencing HTN than those smokers who had only started in a few previous months ago. In contrast to the results of this study, tobacco users did not experience HTN more than other groups.

Mozaffarian D, *et al*. [10], stated that heavy alcohol intake increases the risk of HTN, and the relationship between light-to-moderate alcohol consumption and the prevalence of hypertension was significant in both women and men between 10.9 and 21.8 years of follow up. These findings of contradict those of this study, as the frequency of respondents who had alcohol for the past 12 months was less than the number of respondents who had no alcohol consumption.

Although there is sufficient evidence linking dietary salt intake to BP, several contradictory studies have recently been published, adding to the debate over whether there is a connection, salt intake and maintaining a healthy body or whether losing weight reduces the risk of cardiovascular events and death, and what the "ideal" level of salt intake and diet is for lowering BP, cardiovascular events, and death. [7]

It is widely accepted that regular physical activity is beneficial for cardiovascular health. Frequent exercise is associated with a decrease in cardiovascular mortality and the risk of developing cardiovascular disease. Physically active individuals have lower BP, higher insulin sensitivity, and a more favorable plasma lipoprotein profile. [28]

Positive effects from sports are achieved primarily through physical activity, but secondary effects bring health benefits such as psychosocial and personal development and less alcohol consumption. [29]

Finally, in hypertensive patients, there were more subjects with a family history of HTN and associated with common cardiovascular diseases among those with the highest scores of HEI-2015 than those with the lowest scores, indicating that they are high risk factors for hypertension. [30]

Intermountain healthcare advises that once BP is controlled, that is need to follow up with one's primary care provider and check BP in every 6 to 12 months. The respondents were asked if they had visited a doctor or a health worker during the past 12 months, to which 193 (99.0) answered "no." The number of respondents who answered "no" has revealed that lifestyle advice is not relatively significant as part of the risk factors that are associated with hypertension.

Norouzzadeh M, *et al*.[31] reported a strong relationship between the non-stop smoking of tobacco, the amount of salt consumed, cholesterol levels, servings of fruit and vegetables consumed daily, and the sugary beverages an individual drinks in acquiring cardiovascular diseases. However, in this study, reducing salt intake and eating five servings of fruit and vegetables had no relative significance to the prevalence of HTN. Nonetheless, these variables can be considered closer to being a predictor of hypertension.

Smoking and poor diet share common disease-causing mechanisms that can interact and increase the risk of cardiovascular diseases over time. Smokers often adopt unhealthy dietary habits, which are characterized by a lower intake of fiber and higher consumption of fats and sugar. Empirical evidence suggests that smokers with inadequate nutritional status are at a greater risk of developing cardiovascular diseases than smokers with healthier diets. [31]

The findings of this study contradict those of Tuoyire DA, Ayetey H. [32], who reported that there was no significant association between marital status and prevalence of HTN, especially among the locals who were annulled and separated. However, the data also revealed that those people who were single and widowed had higher odds of acquiring HTN than those who were married.

Similarly, with regards to occupation categories or work status, and taking government employees as a baseline or reference, homemakers had significantly higher odds of HTN. This is can be explained as the effects of non-modifiable factors. [33]

Moreover, the results showed no significant association between HTN and monthly per capita income. [33] However, recent studies have shown that monthly salary influences the odds of being associated with HTN, especially in the Philippines, as most of the locals who fall into the condition have high salaries. [34]

A more recent study by Ozemek C, *et al.* [35] revealed that regular consumption of a diet high in sodium, energy-dense foods, fat content, refined carbohydrates, added sugar, and low in fruits, and vegetables, and taking deficient diets and unhealthy lifestyle have high odds of contributing to the increased risk of HTN and cardiovascular diseases.

Furthermore, a study conducted in rural Nepal also reported that people with cardiovascular diseases who do not engage in recreational activities contributed were threefold more vulnerable to the occurrence of HTN than those who did during the past 25 years. [36] There is much documented evidence showing that a history of raised BP and cardiovascular diseases increase the odds of developing HTN in various regions of every country. [37]

High BP, cigarette smoking, diabetes mellitus, and lipid abnormalities are major modifiable risk factors for cardiovascular disease. Among these, high BP is associated with the most substantial evidence for causation and has a high prevalence of exposure. [37] Nonetheless, Manimunda *et al.* [38] revealed that HTN was significantly higher in individuals who did not quit using tobacco products than those who quitted. Tobacco use has also been reported as an independent risk factor associated with HTN. [39]

Finally, Dhungana RR, *et al*. [40] reported that excess sugar intake or not reducing or lessening the amount of sugary intake are strong predictors of HTN and could eventually lead to other cardiovascular diseases, and diabetes.

Conclusion

This study revealed significant socio-demographic and lifestyle risk factors associated with the prevalence of hypertension among the respondents of Prosperidad, Agusan del Sur. The high prevalence of hypertension suggests that it is a critical health concern within the community, with middle-aged individuals, females, and married individuals representing the majority of those affected.

These findings underscore the need for targeted public health interventions that promote healthier dietary practices, support weight management, and encourage lifestyle changes. Health education campaigns and preventive measures addressing these risk factors are essential to mitigate the impact of hypertension on individuals and the community at large. By addressing these modifiable risk factors, local health authorities and policymakers can work toward reducing the overall burden of hypertension to improve community health outcomes in Prosperidad, Agusan del Sur.

Future research should focus on developing multidimensional implementation strategies for the prevention and control of hypertension, particularly in low-income countries or low-income populations. It is highly recommended to use a larger sample size for better representation of the population and, hence providing more accurate results, as well precisely calculating the financial cost of hypertension globally.

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Conflict of interest statement

The authors declare that there are no conflicts of interest regarding the publication of this article.

Data sharing statement

All data generated or analyzed during the present study are included in this published article and the citations herein. Further details, opinions, and interpretations are available from the corresponding author on reasonable request.

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