

# Blood pressure screening results in adults in Thua Thien Hue province through the program “May measurement month” 2023 of the international society of hypertension

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## Abstract

**Background:** Hypertension is the leading disease in Vietnam and the leading risk factor for non-communicable diseases worldwide. It is a manageable and treatable condition, according to the guidelines of the Ministry of Health and the clinical practice recommendations of the Vietnam Society of Cardiovascular and the Vietnam Society of Hypertension. Therefore, hypertension screening is necessary to develop policies and intervention programs. **Aim:** The program “May Measurement Month” 2023 aims to survey the prevalence of hypertension, the treatment situation, control of hypertension in people in Thua Thien Hue province and associated factors surrounding hypertension. **Methods:** This cross-sectional study on 1033 people collected data from adult volunteers ( $\geq 18$  years old) in Thua Thien Hue province between 7/2023 and 8/2023. Sitting blood pressure was measured in triplicate according to standardized specified methods of the International Society of Hypertension. **Results:** Average age  $47.58 \pm 15.67$ , there were 235 people (22.7%) had hypertension, 37 (15.7%) of whom had never been treated for hypertension before screening. A total of 198 people were on treatment with one or more types of drugs; however, 71 people (35.95%) had uncontrolled blood pressure. Factors related to hypertension include age, sex, overweight/obesity, smoking, and a medical history of conditions such as diabetes, and irregular heartbeat. History of diabetes had the most significant impact on blood pressure control. **Conclusion:** The hypertension percentage in Thua Thien Hue population is still high, and the rate of blood pressure control is still limited. It is necessary to intervene promptly to reduce associated factors to reduce the risk of hypertension, ensure early diagnosis, enhance cooperation between patients and doctors for personalized treatment, increase treatment effectiveness and reduce the rate of complications.

**Keywords:** hypertension, non-communicable diseases, “May Measurement Month” 2023.

## 1. BACKGROUND

Hypertension is the most common chronic disease in Vietnam and causes a heavy burden of disease and its consequences. Hypertension is a leading risk factor for non-communicable diseases worldwide[1, 2]. The rate of hypertension is rapidly increasing in Vietnam. It is predicted that the incidence of hypertension in Vietnam will continue to increase and the population will become increasingly younger. Statistics show that each year, the rate of hypertension in men and women will increase by 1.1% and 0.9%, respectively. The global burden of hypertension was estimated at 1.4 billion people in 2010, and at the current rate of progress, it is estimated that by 2025, the number of people with hypertension will exceed the figure of 1.6 billion[3].

The most recent estimates show that 49.8-70% of patients receive treatment and only 36.3% of patients have their blood pressure controlled with medication[4, 5]. Although treatment with

antihypertensive drugs is widespread, the results of screening for hypertension remain unacceptable. This can lead to consequences because hypertension is the leading risk factor for non-communicable disease and causes many serious complications in target organs (brain, eyes, kidneys, heart, blood vessels). Hypertension is a disease that can be completely managed and treated according to the guidelines of the Ministry of Health and the clinical practice recommendations of the Vietnam Cardiology Association and Vietnam Hypertension Association. Therefore, hypertension screening is necessary to develop policies and intervention programs.

Having gone through 3 years of the COVID–19 pandemic, following the success of the program “May Measurement Month” organized from 2017 - 2019 initiated by the International Society of Hypertension, the program “May Measurement Month” 2023 has been rebooted. With the permission of the Thua Thien Hue Cardiovascular

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Association, the Vietnam Hypertension Association, the Vietnam Cardiology Association, the Department of Health of Thua Thien Hue province, and the People's Committee of Thua Thien Hue province, we conducted the research from 2017 - 2019 and achieved unexpected success[6, 7]. Hue - as the leading healthcare center in the Central region and one of the three largest healthcare centers in Vietnam, once again participated in this program.

## 2. METHODS

This was a cross-sectional, descriptive survey. The campaign period was from July to August 2023. The survey was conducted in hospitals, clinics, pharmacies, health stations, dormitories, and public areas (outdoor and indoor) in Thua Thien Hue province.

Convenience sampling resulted in the voluntary participation of people aged  $\geq 18$  years. The sampling criteria were as follows: people aged 18 years or older, physically and mentally healthy, alert, do not smoke, use caffeinated beverages and exercise within 30 min before measuring blood pressure, do not use sympathomimetic drugs before measuring blood pressure, are not currently being treated for hypertension in the hospital, and complete the full set of research questions and to measure blood pressure three times. Exclusion criteria were those who refused to participate in the study voluntarily or did not have enough time to complete the full set of research and to measure blood pressure three times.

Data collection and classification tools:

- A set of 33 questions was developed by the International Society of Hypertension and the World Hypertension League. It was used by the Vietnam Hypertension Association for the program "May Measurement Month" 2023.

- Blood pressure index: OMRON HEM-7121 semi-automatic blood pressure monitoring, Omron Healthcare, Tokyo, Japan.

- Hypertension was defined as systolic blood

pressure (SBP)  $\geq 140$  mmHg and/or diastolic blood pressure (DBP)  $\geq 90$  mmHg or treatment for hypertension [8].

Study variables:

- Variables collected in the study include age, sex, height, weight, smoking, alcohol use, being diagnosed with hypertension, being treated for hypertension, number of drugs used to treat hypertension, systolic blood pressure, diastolic blood pressure, heart rate, history of diabetes, history of coronary artery disease, history of stroke, history of heart failure, history of kidney failure, history of irregular heartbeat.

- Hypertension: classified according to blood pressure level (mmHg) according to the "Summary of recommendations for diagnosis and treatment of hypertension VNHA/VSH 2021"[9].

- Body mass index (BMI): classified according to the 2000 IDI & WPRO standards for Asians [10].

- Smoking: classified according to the 2022 MMM Training Program [11].

Smoking: includes those who are currently smoking or have ever smoked.

Non-smoking: includes those who have never smoked.

- Alcohol use: classified according to the 2022 MMM Training Program [11].

Low alcohol use: includes those who drink alcohol  $\leq 1-3$  times/month.

High alcohol use: includes those who drink alcohol  $\geq 1-6$  times/week.

Implementation process:

Community blood pressure measurement process: carried out according to the guidelines International Society of Hypertension in 2020[12].

Data analysis and processing:

- Data is entered using Microsoft Excel 2021 software.

- Data is processed using SPSS 26.0 software.

- Date is filtered and checked before entering and after entering to control errors during data entry.

## 3. RESULTS

**Table 1.** Characteristics of the objects participating in the study

Research Characteristics		Male		Female		Total	
		N	%	N	%	N	%
Age		48.12 $\pm$ 16.24		47.24 $\pm$ 15.31		47.48 $\pm$ 15.67	
BMI		22.42 $\pm$ 3.11		21.81 $\pm$ 3.01		22.05 $\pm$ 3.06	
Smoking	Yes	142	35.6	11	1.7	153	14.8
	Former	97	24.3	36	5.7	133	12.9
	No	160	40.1	587	92.6	747	72.3

Alcohol consumption	High	101	25.3	10	1.6	111	10.7
	Low	298	74.7	624	98.4	922	89.3
Currently under hyper-tension treatment	Yes	81	20.3	117	18.5	198	19.2
	No	318	79.7	517	81.5	835	80.8
History of diabetes	Yes	28	7.0	29	4.6	57	5.5
	No	371	93.0	605	95.4	976	94.5
History of coronary artery disease	Yes	19	4.8	23	3.6	42	4.1
	No	380	95.2	611	96.4	991	95.9
History of stroke	Yes	2	0.5	3	0.5	5	0.5
	No	397	99.5	631	99.5	1028	99.5
History of heart failure	Yes	4	1.0	9	1.4	13	1.3
	No	395	99.0	625	98.6	1020	98.7
History of kidney failure	Yes	4	1.0	2	0.3	6	0.6
	No	395	99.0	632	99.7	1027	99.4
History of irregular heartbeat	Yes	10	2.5	19	3.0	29	2.8
	No	389	97.5	615	97.0	1004	97.2
Average systolic blood pressure		125.93 ± 17.07		115.74 ± 16.15		119.67 ± 17.23	
Average diastolic blood pressure		79.39 ± 11.74		73.35 ± 10.01		75.69 ± 11.10	
Average heart beat		76.79 ± 11.83		78.50 ± 11.18		77.84 ± 11.46	
Total		399	38.63	634	61.37	1033	100.00

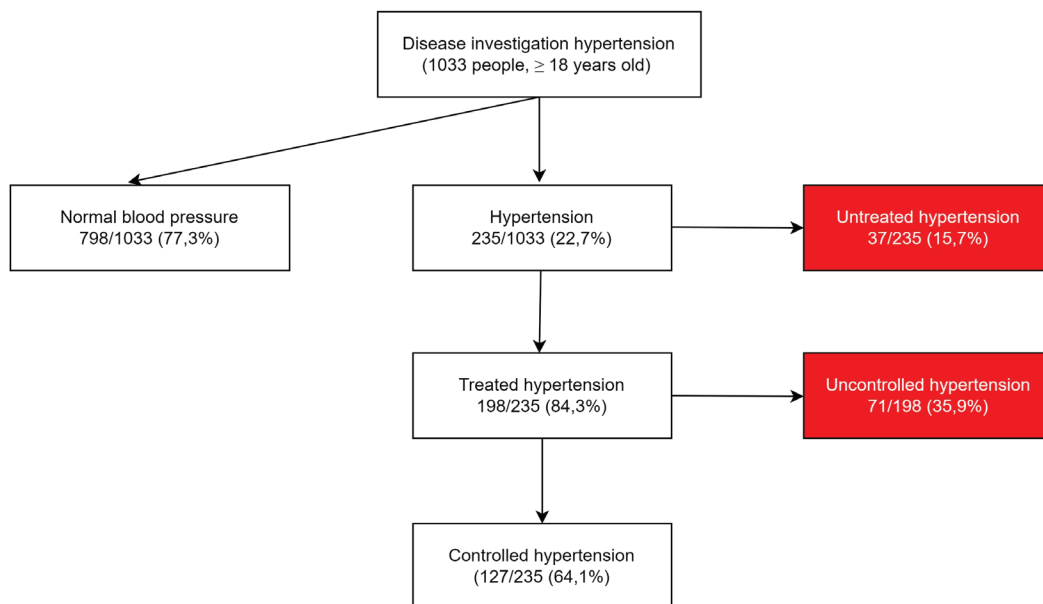
The program “May Measurement Month” 2023 in Thua Thien Hue province had 1033 participants for screening. More women than men participated in screening with an average age of 47.58 years. The mean body mass index was 22.05 kg/m<sup>2</sup>. Among the survey participants, 198 (19.8%) were being treated for hypertension, 57 (5.5%) had a history of diabetes, 42 (4.1%) had a history of coronary artery disease, 5 (0.5%) had a history of stroke, 13 (1.3%) had a history of heart failure, 6 (0.6%) had a history of kidney failure, 29 (2.8%) had a history of irregular heartbeat, and 286 (27.7%) were or had been tobacco users.

**Table 2.** Multivariable logistic regression model between associated factors and hypertension.

Associated factors		B	Odd Ratio (OR)	95% Confidence interval (CI)	Statistical significance p
Age		0.055	1.057	1.044 - 1.069	0.0001
Sex	Male	-0.371	0.69	0.52 - 0.90	0.006
	Female		1	1	
Overweight/Obesity	Yes	0.668	1.95	1.48 - 2.56	0.0001
	No		1	1	
Smoking	Yes	0.560	1.75	1.20 - 2.57	0.04
	No		1	1	
Alcohol consumption	Yes	0.270	1.31	0.86 - 1.98	0.203
	No		1	1	
History of diabetes	Yes	0.943	2.566	1.404 - 4.963	0.002
	No		1	1	
History of coronary artery disease	Yes	0.264	1.303	0.608 - 2.791	0.496
	No		1	1	

History of heart failure	Yes	0.513	1.671	0.446 - 6.256	0.446
	No		1	1	
History of irregular heart-beat	Yes	0.841	2.320	1.007 - 5.342	0.048
	No		1	1	
History of kidney failure	Yes	1.398	4.048	0.685 - 23.932	0.123
	No		1	1	

Based on model above, identified risk factors associated with hypertension included age (OR 1.057; 95% CI (1.044 - 1.069)), sex (OR 0.69; 95% CI (0.52 - 0.90)), overweight/obesity (OR 1.95; 95% CI (1.48 - 2.56)), smoking (OR 1.75; 95% CI (1.20 - 2.57)), history of diabetes (OR 2.566; 95% CI (1.404 - 4.493)), and history of irregular heartbeat (OR 2.320; 95% CI (1.007 - 5.342)).



**Flowchart 1.** Rates of Hypertension, Awareness, and Blood Pressure Control

Of the total 1033 participants in the program “May Measurement Month” 2023 screening, 235 (22.7%) had hypertension. Among those with hypertension, 84.3% were taking antihypertensive medication, of which 64.1% were controlled. Comparing this study with previous studies, we see that the rate of hypertension is lower than in the program “May Measurement Month” 2019 in Hue city (23.9) and much lower than the program “May Measurement Month” 2022 in Thua Thien Hue province (40.7%), the program “May Measurement Month” 2019 in Vietnam (33.8%) and the program “May Measurement Month” 2021 in the world (35.2%).

**Table 3.** Drug use status and blood pressure control rate.

Number of antihypertensive drugs used	N	%	Blood pressure control rate (%)
1	174	87.9	63.2
2	23	11.6	69.6
3	1	0.5	100.0
Total	198	100.0	

Among the 198 individuals previously diagnosed with hypertension who used antihypertensive medication for treatment, the majority used a single type of medication (87.9%). The blood pressure control rate in this group was 63.2%. The blood pressure control rate was higher in the groups using multiple medications for treatment, with 69.6% in the group using two medications and 100% in the group using three medications.

#### 4. DISCUSSION

The program “May Measurement Month” 2023 was conducted with 1033 participants in Thua Thien Hue province, of which 38.6% were male and 61.4% were female. The average age of the participants was 47.58 years old with 235 (22.7%) diagnosed with hypertension. Of these, 37 people were untreated, accounting for 15.7% of the total number of people with hypertension, with an average systolic blood pressure of  $119.67 \pm 17.23$  mmHg, an average diastolic blood pressure of  $75.69 \pm 11.10$  mmHg, and an average heart rate of  $77.84 \pm 11.46$  beats/minute. Through analysis, we drew the following conclusions: The proportion of subjects with hypertension at the time of the study was 22.7%, of which 15.7% were not treated. This result is lower than that of a similar study in Hue City by Minh Huynh Van, Nam Le Van, and colleagues conducted in 2019, in which 23.9% of subjects with hypertension and 30.7% of subjects were not treated [7], and much lower than the study in Thua Thien Hue province by Minh Huynh Van, Tri Ngo Manh, and colleagues conducted in 2022, in which 40.7% of subjects with hypertension and 15.1% were not treated [13]; which is also lower than the rates in Vietnam in 2019 (33.8%) and the program “May Measurement Month” 2021 (25.2%) [6]. The majority of subjects with hypertension used one type of medication (87.9%), and the blood pressure control rate was 63.2%. The group of subjects using two types of medication accounted for 11.6%, and the blood pressure control rate was higher at 69.6%. This value is higher than that reported by Minh Huynh Van, Nam Le Van, and colleagues (2019), who found that 82.1% were being treated with one type of medication, and the blood pressure control rate was 55.9%; the group of subjects using two types of medication was 14.2%, achieving 60% blood pressure control [7]; and also higher than that reported by Minh Huynh Van, Tri Ngo Manh, and colleagues (2022), in which 75.3% were being treated with one drug and the blood pressure control rate was 52.69%, the group of subjects using two drugs was 7.9% achieving 59.09% blood pressure control [13]. The majority of hypertensive patients are being treated with one type of medication; however, the blood pressure control rate in this group of subjects in general, and hypertensive patients in particular, is not high (35.9%). This shows that there is a need for close coordination between doctors and patients when combining multiple drugs to achieve treatment goals, which has been included in the recommendations for the diagnosis and treatment

of hypertension in both International Society of Hypertension 2022 and Vietnam National Heart Association 2022 [8, 14]. The difference in the results of the above studies comes from the difference in sample size; our study was conducted with 1033 participants, while the program “May Measurement Month” 2019 in Hue city included 6000 participants, the program “May Measurement Month” 2022 in Thua Thien-Hue province included 2674 participants and the program “May Measurement Month” 2021 in the world included 642000 participants.

The model in Table 2 shows that some associated factors related to hypertension were age, sex, smoking (27.7%), history of diabetes (5.5%), and history of irregular heartbeat (2.8%), in which history of diabetes (OR 2.566; 95% CI (1.404 - 4.693%)) was the factor that affected the highest control rate. In the associated factors, age and sex are unchangeable factors, the older the age, the greater the risk of disease, blood pressure in men is higher than in women with an average systolic blood pressure of  $125.93 \pm 17.07$  mmHg in men compared to  $115.74 \pm 16.15$  mmHg in women, the average diastolic blood pressure is  $79.39 \pm 11.74$  mmHg in men compared to  $73.35 \pm 10.01$  mmHg in women. This shows that the risk of hypertension and complications depends largely on the patients’s lifestyle changes, cessation of tobacco and alcohol use, and proper physical activity. Along with that is the consultation to change behavior from the medical staff to raise people’s awareness in preventing and reducing the risk of hypertension and complications. Patients living with their families are easily affected by the habits of their relatives, such as smoking, alcohol use, and diet; therefore, it is necessary to consult with the patient’s family members to change their behavior to improve the effectiveness of treatment.

Regarding limitations, the number of participants in the program “May Measurement Month” 2023 is more limited than in other studies, specifically 1033 people in Thua Thien Hue province compared to the program “May Measurement Month” 2022 in Thua Thien Hue province with 2674 people, the program “May Measurement Month” 2019 in Hue city with 6000 people and the program “May Measurement Month” 2021 in the world with 642000 people, and our study does not represent any other country or population. The research method we applied was cross-sectional research, meaning that each subject was only contacted to collect information once, without follow-up, so our research results only reflect the situation at one point in time. In addition,

cross-sectional studies have not evaluated the effectiveness of lifestyle changes; therefore, follow-up plans after screening are required for a clearer assessment. The effects of white coat hypertension were not evaluated in this study.

This motivates us to continue to conduct other studies in 2024 on a larger scale to evaluate the local hypertension situation and provide appropriate treatment and prevention management methods. We propose some plans for better treatment management: counseling patients about the consequences of hypertension, scheduling regular monthly follow-up visits, counseling on lifestyle changes for patients and their families, providing blood pressure monitors, and instructing patients to self-monitor their blood pressure at home.

## 5. CONCLUSION

In a survey of 1033 adults aged  $\geq 18$  years in Thua Thien Hue province, the prevalence of diagnosed hypertension was 22.7%. Of these, 15.7% did not receive any treatment. Among the patients receiving treatment, 35.9% had uncontrolled blood pressure with medication.

The associated factors for hypertension included age, sex, overweight/obesity, smoking, history of diabetes, and history of irregular heartbeat.

Among hypertensive patients receiving treatment, the majority (87.9%) used one medication. The blood pressure control rate in this group was 63.2%. The target blood pressure control rate was higher in subjects who received combination therapy, with 69.6% in the group using two medications.

It is necessary to change to a healthy lifestyle, limit risk factors and coordinate between healthcare workers, patients and families in the management and treatment of hypertension.

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