

Potential Impact of the 2017 ACC/AHA Hypertension Guideline Compared With the 2024 Thai Guideline: A Population-Based Analysis Using NHSO/UCS Data

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Abstract

Background: Hypertension is a major public health challenge in Thailand. The 2017 American College of Cardiology/American Heart Association (ACC/AHA) guideline lowered the diagnostic threshold for hypertension compared with the 2024 Thai guideline, which may affect prevalence estimates and treatment requirements

Objective: To compare the prevalence of newly diagnosed hypertension and the number of individuals eligible for antihypertensive therapy under the 2017 ACC/AHA and the 2024 Thai guidelines.

Methods: A descriptive analytic study was conducted using the 2022 Thai National Health Security Office data. This study included 1 406 008 adults aged 18-100 years without prior hypertension. Blood pressure levels and comorbidities were analyzed to estimate hypertension prevalence and treatment eligibility based on both guidelines.

Results: Hypertension prevalence was 44.5% (95% CI, 44.4-44.5) by the 2017 ACC/AHA definition compared with 19.9% (95% CI, 19.9-20.0) by the 2024 Thai definition. Extrapolated to the Thai population, this equates to 23.6 million vs 10.6 million adults, respectively, a difference of 13.0 million cases. However, the number of individuals recommended for antihypertensive medication was nearly identical: 10.6 million (ACC/AHA) vs 10.6 million (Thai).

Conclusions: Adoption of the 2017 ACC/AHA guideline would substantially increase the number of Thai adults classified as hypertensive without proportionally increasing the number of those requiring pharmacological treatment. Broader diagnostic criteria may improve early detection and awareness but they must be balanced against healthcare capacity and resource implications.

Keywords: Hypertension, 2017 ACC/AHA guideline, 2024 Thai hypertension guideline, Prevalence, Antihypertensive therapy

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Introduction

Hypertension is a leading cause of cardiovascular morbidity and mortality worldwide and remains a major public health concern in Thailand.¹⁻³ In 2015, cardiovascular diseases (CVDs) accounted for 18 922 deaths nationwide (28.9 deaths per 100 000 population), whereas stroke caused 27 884 deaths (42.6 deaths per 100 000 population).⁴ These figures underscore the heavy burden of hypertension-related complications and highlight the urgent need for improved detection and management strategies.

The prevalence of hypertension among Thai adults has steadily increased, rising from 17.0% in 1992 to 25.4% in 2020, equivalent to nearly 14 million individuals.⁵⁻⁷ Prevalence is disproportionately higher in older adults, with women more affected after age 60.

Because more than half of hypertensive individuals are asymptomatic, hypertension has been termed the “silent threat”. Improving hypertension control could significantly reduce mortality rates from cardiovascular and cerebrovascular diseases, thereby alleviating one of the most preventable contributors to premature death in the Thai population.

In 2017, the American College of Cardiology/American Heart Association (ACC/AHA) lowered the diagnostic threshold for hypertension from $\geq 140/90$ mmHg to $\geq 130/80$ mmHg for the general population,^{8,9} based on evidence from large clinical trials such as the Systolic Blood Pressure Intervention Trial (SPRINT) and the Strategy of Blood Pressure Intervention in the Elderly Hypertensive Patients (STEP), as well as meta-analyses, which demonstrated that earlier intervention could reduce cardiovascular risk.¹⁰⁻¹⁸ This change increased the prevalence of hypertension in the US from 31.9% to 45.6%.¹⁸ However, the proportion of individuals requiring antihypertensive therapy rose only slightly, as many were recommended to undergo lifestyle modification alone.

By contrast, the 2024 Thai guideline retains $\geq 140/90$ mmHg as the diagnostic threshold for the general population, while defining hypertension at blood pressure of 130-139/80-89 mmHg in individuals with hypertension-mediated organ damage (HMOD), established CVD, diabetes mellitus (DM), or those at high cardiovascular risk.¹⁹ Previous studies evaluating the impact of a 130/80 mmHg diagnostic threshold have demonstrated a substantial increase in hypertension prevalence, while the increase in antihypertensive treatment eligibility is much smaller because most individuals with blood pressure 130-139/80-89 mmHg are initially recommended lifestyle modification.^{13, 15, 18} Therefore, the potential impact of adopting the 2017 ACC/AHA guideline in Thailand warrants evaluation in the Thai population. This study was designed to compare the prevalence of newly diagnosed hypertension and treatment eligibility under the 2 guidelines using data from the Thai National Health Security Office (NHSO).

Methods

Study Design and Data Source

This descriptive analytic study used secondary data from the 2022 Universal Coverage Scheme (UCS) national database, managed by the NHSO. The study was approved by the Human Research Ethics Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand.

Study Population

A total of 3.9 million adults aged 18-100 years across 13 health regions were randomly sampled. After exclusions for missing or duplicate data and prior hypertension diagnosis, 1 406 008 individuals remained for analysis (Figure 1). Variables included age, sex, systolic blood pressure (SBP), diastolic blood pressure (DBP), and comorbidities (DM, CVD, and chronic kidney disease [CKD]).

Definitions

Hypertension and treatment recommendations were classified according to the 2017 ACC/AHA and the 2024 Thai hypertension guidelines.

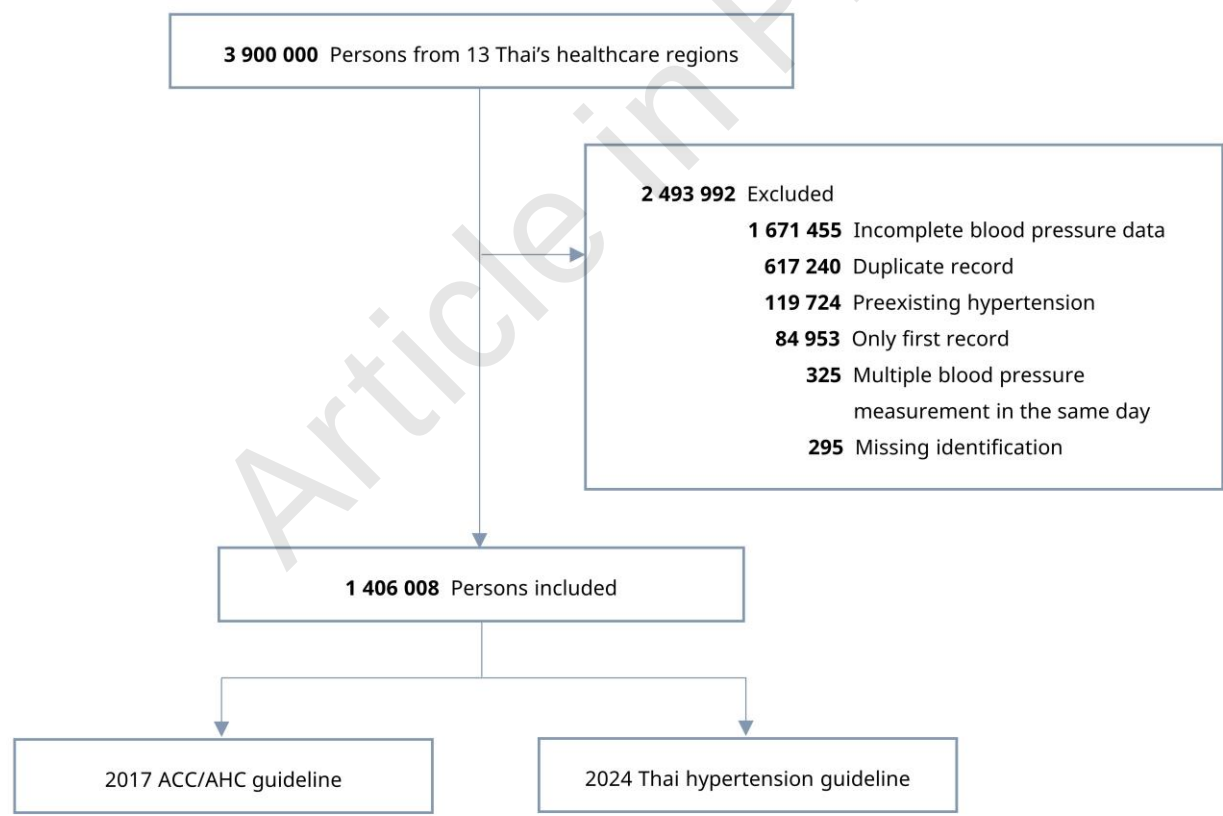
According to the 2017 ACC/AHA guideline, hypertension was defined as SBP/DBP $\geq 130/80$ mmHg. Antihypertensive medication was recommended for individuals with SBP/DBP $\geq 140/90$ mmHg or SBP/DBP $\geq 130/80$ mmHg in the presence of DM, CKD, established CVD, or elevated cardiovascular risk.

According to the 2024 Thai guideline, hypertension was defined as BP $\geq 140/90$ mmHg in the general population, or blood pressure of 130-139/80-89 mmHg in individuals with HMOD, established CVD, DM, or high cardiovascular risk. Because information on HMOD and formal cardiovascular risk assessment was unavailable in the NHSO database, the lower diagnostic threshold under the 2024 Thai guideline was operationalized using only DM and CVD. CKD was not used as a surrogate marker for HMOD or high cardiovascular risk in this analysis (Table 1).

Statistical Analysis

Continuous variables were assessed for normality before analysis and, as all were approximately normally distributed, are presented as means (SDs). Categorical variables are presented as frequencies and percentages. Hypertension prevalence and treatment eligibility were estimated as proportions with 95% CIs calculated using the Wilson score method. Because the study population was derived from a simple random sample of the NHSO database, survey weighting was not applied. Population-level estimates were extrapolated using official 2022 Thai adult population statistics from the Ministry of Interior. All analyses were performed using Stata, version 14.2 (StataCorp LLC).

Figure 1. Study Flow



Abbreviation: ACC/AHA, American College of Cardiology/American Heart Association.

Table 1. Blood Pressure Levels Used to Define Hypertension, Recommend Antihypertensive Medication According to the 2017 ACC/AHA Guideline and the 2024 Thai Guidelines on the Treatment of Hypertension

Clinical Scenario	Guideline SBP/DBP Level, mmHg	
	2017 ACC/AHA	2024 Thai
Definition of hypertension		
In the general population	≥ 130/80	≥ 140/90
HMOD, high cardiovascular risk*, CVD, or DM	≥ 130/80	≥ 130/80
Recommendation for antihypertensive medication		
In the general population	≥ 140/90	≥ 140/90
History of stroke	≥ 130/80	≥ 140/90
CKD	≥ 130/80	≥ 140/90
History of CVD event** and DM	≥ 130/80	≥ 130/80

Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association; CKD, chronic kidney disease; CVD, cardiovascular disease; DBP, diastolic blood pressure; DM, diabetes mellitus; HMOD: hypertension-mediated organ damage; SBP, systolic blood pressure.

* Data on HMOD and formal cardiovascular risk assessment were unavailable in the Thai National Health Security Office (NHSO) database and were therefore not included in the analysis. CKD was not used as a surrogate marker for HMOD or high cardiovascular risk in this analysis.

** CVD was defined as a documented history of coronary artery disease or ischemic stroke based on NHSO records.

Results

Baseline Characteristics

Among 1 406 008 participants, the mean (SD) age was 52.0 (16.9) years; 58.2% were female. Mean (SD) of SBP and DBP values were 123.3 (16.2) and 74.9 (9.2) mmHg, respectively. DM was present in 6.0% of participants and CVD in 0.24% (Table 2).

Blood Pressure Categories

In this study, 55.6% of adults had blood pressure < 130/80 mmHg, 39.8% were in the elevated range (130-139/80-89 mmHg), and 4.6% met the hypertensive threshold (≥ 140/90 mmHg) (Table 3). Individuals with higher blood pressure levels were older, more often male, and had a higher prevalence of diabetes and CVD compared with those in lower blood pressure categories.

Hypertension Prevalence

Hypertension prevalence was significantly higher under the 2017 ACC/AHA guideline (44.5%; 95% CI, 44.4-44.5) compared with the 2024 Thai guideline (19.9%; 95% CI, 19.9-20.0). The difference of 24.5% points was consistent across all age groups (Table 4 and Figure 2). This difference was also consistent across age, sex, and comorbidity subgroups.

Treatment Eligibility

Despite these diagnostic differences, the proportion of adults recommended for antihypertensive therapy was nearly identical: 20.0% (95% CI, 19.9-20.1) under the 2017 ACC/AHA guideline vs 19.9% (95% CI, 19.9-20.0) under the 2024 Thai guideline (Table 5 and Figure 2).

Population Impact

Extrapolated to the 2022 Thai adult population, the 2017 ACC/AHA guideline would classify 23.6 million adults as hypertensive, compared with 10.6 million under the 2024 Thai guideline. However, treatment recommendations affected 10.61 million and 10.57 million adults, respectively — a difference of only 36 024 individuals (Table 6 and Figure 3).

Table 2. Characteristics of Thai Participants Based on the 2022 NHSO Data

Characteristic	Value
Age, mean (SD), y	52.0 (16.9)
Female, No. (%)	802 009 (58.2)
SBP, mean (SD), mmHg	123.3 (16.2)
DBP, mean (SD), mmHg	74.9 (9.2)
DM, No. (%)	84 982 (6.0)
History of CVD, No. (%)	3428 (0.24)

Abbreviations: CVD, cardiovascular disease; DBP, diastolic blood pressure; DM, diabetes mellitus; NHSO, National Health Security Office; SBP, systolic blood pressure.

Table 3. Characteristics of Thai Adults (Ages ≥ 18-100 Years) by Blood Pressure Level Based on the 2022 Thai NHSO Data

Characteristic	Blood Pressure Level		
	SBP < 130 mmHg and DBP < 80 mmHg	SBP 130-139 mmHg or DBP 80-89 mmHg	SBP ≥ 140 mmHg or DBP ≥ 90 mmHg
Thai population, No. (%)	781 106 (55.6)	560 172 (39.8)	64 730 (4.6)
Age, mean (SD), y	50.0 (17.2)	54.6 (16.5)	52.8 (14.3)
Female, No. (%)	459 672 (60.1)	311 766 (56.8)	30 571 (48.1)
SBP, mean (SD), mmHg	113.5 (8.7)	133.2 (13.5)	155.3 (12.6)
DBP, mean (SD), mmHg	69.7 (5.6)	79.7 (7.4)	95.5 (5.1)
DM, No. (%)	31 164 (4.0)	49 488 (8.8)	4330 (6.7)
History of CVD, No. (%)	1018 (0.1)	1913 (0.3)	497 (0.8)

Abbreviations: CVD, cardiovascular disease; DBP, diastolic blood pressure; DM, diabetes mellitus; NHSO, National Health Security Office; SBP, systolic blood pressure.

Table 4. Prevalence (95% CI) of Hypertension According to the Definitions From the 2017 ACC/AHA Guideline and the 2024 Thai Guidelines on the Treatment of Hypertension Based on the 2022 Thai NHSO Data

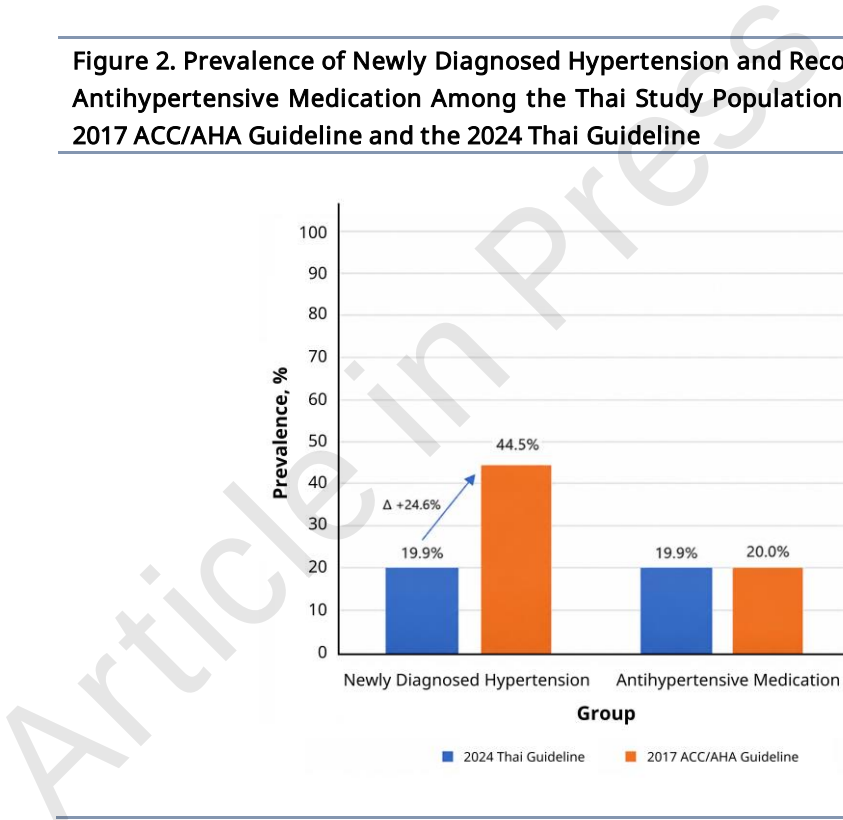
Characteristic	Prevalence (95% CI)		
	2017 ACC/AHA Guideline	2024 Thai Hypertension Guideline	Difference (2017 ACC/AHA Guideline but Not 2024 Thai Hypertension Guideline)
Overall	44.5 (44.4-44.5)	19.9 (19.9-20.0)	24.5 (24.4-24.6)
Age, y			
18-40	37.1 (37.0-37.3)	11.7 (11.6-11.8)	25.4 (25.3-25.6)
41-60	47.0 (46.9-47.2)	21.9 (21.7-22.0)	25.2 (25.0-25.3)
61-80	53.5 (53.3-53.6)	28.9 (28.8-29.1)	24.6 (24.4-24.7)
81-100	51.8 (51.3-52.2)	27.6 (27.2-28.0)	24.2 (23.8-24.6)
Female	42.7 (42.6-42.8)	19.1 (19.1-19.2)	23.5 (23.5-23.6)

Table 4. Prevalence (95% CI) of Hypertension According to the Definition From 2017 ACC/AHA Guideline and the 2024 Thai Guidelines on the Treatment of Hypertension Based on the 2022 Thai NHSO Data (Continued)

Characteristic	Prevalence (95% CI)		
	2017 ACC/AHA Guideline	2024 Thai Hypertension Guideline	Difference (2017 ACC/AHA Guideline but Not 2024 Thai Hypertension Guideline)
DM			
Yes	63.3 (63.0-63.6)	63.3 (63.0-63.7)	NA
No	43.2 (43.1-43.3)	17.1 (17.1-17.2)	26.1 (26.0-26.2)
History of CVD			
Yes	70.3 (68.7-71.8)	42.4 (40.8-44.1)	27.9 (26.4-29.4)
No	44.4 (44.3-44.5)	19.9 (19.8-19.9)	24.5 (24.4-24.6)

Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association; CVD, cardiovascular disease; DM, diabetes mellitus; NA, not applicable; NHSO, National Health Security Office.

Figure 2. Prevalence of Newly Diagnosed Hypertension and Recommendations for Antihypertensive Medication Among the Thai Study Population According to the 2017 ACC/AHA Guideline and the 2024 Thai Guideline



Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association.

Table 5. Prevalence (95% CI) of Thai Adults Meeting the Criteria for Recommended Antihypertensive Medication According to the 2017 ACC/AHA Guideline and the 2024 Thai Guidelines for the Treatment of Hypertension Based on 2022 Thai NHSO Data

Characteristic	Prevalence (95% CI)		
	Recommended Antihypertension Medication		Difference (2017 ACC/AHA Guideline but Not 2024 Thai Hypertension Guideline)
	2017 ACC/AHA Guideline	2024 Thai Hypertension Guideline	
Overall	20.0 (19.9-20.1)	19.9 (19.9-20.0)	0.07 (0.06-0.07)
Age, y			
18-40	11.7 (11.6-11.8)	11.7 (11.6-11.8)	0.01 (0.00-0.02)
41-60	21.9 (21.8-22.0)	21.9 (21.7-22.0)	0.07 (0.06-0.08)
61-80	29.0 (28.9-29.2)	28.9 (28.8-29.1)	0.12 (0.11-0.13)
81-100	27.7 (27.3-28.1)	27.6 (27.2-28.0)	0.15 (0.11-0.19)
Female	19.2 (19.1-19.3)	19.1 (19.0-19.2)	0.05 (0.04-0.06)
DM			
Yes	63.3 (63.0-63.6)	63.3 (63.0-63.6)	NA
No	17.2 (17.1-17.3)	17.1 (17.1-17.2)	0.07 (0.06-0.08)
History of CVD			
Yes	70.3 (68.7-71.8)	42.4 (40.8-44.1)	27.86 (26.30-26.36)
No	19.9 (19.8-19.9)	19.9 (19.8-19.9)	NA

Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association; CVD, cardiovascular disease; DM, diabetes mellitus; NA, not applicable; NHSO, National Health Security Office.

Table 6. Number of Thai Adults (Ages ≥ 18-100 Years) Meeting the Definition for Hypertension and Eligibility for Treatment With Antihypertensive Medication According to the 2017 ACC/AHA Guideline and the 2024 Thai Guidelines for the Treatment of Hypertension Based on the 2022 Thai Population Data From the Department of Provincial Administration, Ministry of Interior, Thailand

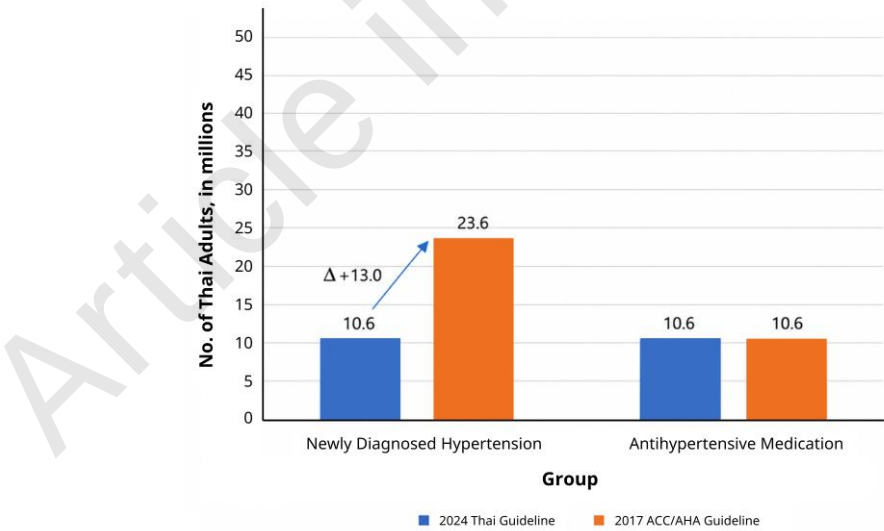
Characteristic	No. of Participants					
	2017 ACC/AHA Guideline		2024 Thai Hypertension Guideline		Difference (2017 ACC/AHA vs 2024 Thai Hypertension Guideline)	
	Hypertension	Recommended Antihypertensive Medication	Hypertension	Recommended Antihypertensive Medication	Hypertension	Recommended Antihypertensive Medication
Overall	23 572 376	10 610 440	10 574 416	10 574 416	12 997 960	36 024
Age, y						
18-40	7 843 158	2 473 236	2 470 422	2 470 422	5 372 736	2814
41-60	9 465 774	4 414 060	4 399 352	4 399 352	5 066 422	14 709
61-80	5 456 590	2 962 258	2 949 918	2 949 918	2 506 672	12 340
81-100	821 689	440 076	437 760	437 760	383 930	2317
Female	11 728 539	5 272 373	5 258 566	5 258 566	6 469 973	13 807

Table 6. Number of Thai Adults (Ages ≥ 18-100 Years) Meeting the Definition for Hypertension and Eligibility for Treatment With Antihypertensive Medication According to the 2017 ACC/AHA Guideline and the 2024 Thai Guidelines for the Treatment of Hypertension Based on the 2022 Thai Population Data From the Department of Provincial Administration, Ministry of Interior, Thailand (Continued)

Characteristic	No. of Participants					
	2017 ACC/AHA Guideline		2024 Thai Hypertension Guideline		Difference (2017 ACC/AHA vs 2024 Thai Hypertension Guideline)	
	Hypertension	Recommended	Hypertension	Recommended	Hypertension	Recommended
		Antihypertensive Medication		Antihypertensive Medication		Antihypertensive Medication
DM						
Yes	2 030 107	2 030 107	2 030 107	2 030 107	NA	NA
No	21 542 269	8 580 332	8 544 308	8 544 308	12 997 960	36 024
History of CVD						
Yes	90 909	90 909	54 885	54 885	36 024	36 024
No	23 481 467	10 519 530	10 519 530	10 519 530	12 961 936	NA

Abbreviations: ACC/AHA, American College of Cardiology/American Heart Association; CVD, cardiovascular disease; DM, diabetes mellitus; NA, not applicable; NHSO, National Health Security Office.

Figure 3. Numbers of Newly Diagnosed Cases of Hypertension and Recommendations for Antihypertensive Medication Among the 2022 Thai Population (Ages ≥ 18-100 Years) According to the 2017 ACC/AHA Guideline and the 2024 Thai Guideline



Abbreviation: ACC/AHA, American College of Cardiology/American Heart Association.

Discussion

This study showed that adopting the 2017 ACC/AHA guideline in Thailand would substantially increase hypertension prevalence estimates, resulting in a substantially higher number of individuals classified as hypertensive. However, the treatment burden would remain largely unchanged.

The findings mirror international observations. In the US, China, and Taiwan, implementation of the 2017 ACC/AHA threshold substantially increased hypertension prevalence but resulted in only a modest increase in the number of individuals eligible for antihypertensive therapy.^{8, 9, 13, 16, 20} This is largely because individuals with blood pressure 130-139/80-89 mmHg are often initially managed with lifestyle modification rather than pharmacologic therapy.

Another consideration is the potential for overestimation of hypertension prevalence when classification is based solely on office blood pressure measurements. White-coat hypertension may contribute to false-positive hypertension diagnoses, particularly among individuals with mildly elevated blood pressure. Because the present study relied on office blood pressure measurements recorded in the NHSO database and lacked data from home blood pressure monitoring (HBPM) or ambulatory blood pressure monitoring (ABPM), some individuals classified as hypertensive may not have sustained hypertension.

The potential impact of adopting the 2017 ACC/AHA guideline extends beyond antihypertensive medication use. A lower diagnostic threshold may improve awareness of elevated blood pressure, promote earlier lifestyle modification, and facilitate cardiovascular risk assessment among individuals who would not have been classified as hypertensive under previous criteria. Conversely, the substantial increase in the number of individuals classified as having hypertension may increase healthcare utilization and follow-up requirements. Previous studies from the US, China, and Taiwan have similarly demonstrated marked increases in hypertension prevalence following implementation of the 2017 ACC/AHA guideline, while the increase in treatment eligibility was comparatively modest.^{13, 16, 20}

These findings suggest that adoption of the 2017 ACC/AHA guideline would substantially increase the number of individuals classified as having hypertension, while resulting in only a modest increase in treatment eligibility. The implications of implementing a lower diagnostic threshold in Thailand warrant further evaluation. Future studies should assess long-term clinical outcomes, cost-effectiveness, and healthcare system implications in the Thai population.

Limitations

This study has several limitations. First, it used retrospective, secondary NHSO data, which may not capture recent trends or variations in blood pressure measurement practices. Second, blood pressure values were based on measurements obtained during a single visit and from routine office-based assessments, potentially leading to misclassification. Detailed information regarding blood pressure measurement procedures, including the number of measurements, the use of averaged values, and measurement protocols, was unavailable in the NHSO database. Data from out-of-office blood pressure monitoring, including HBPM and ABPM, were unavailable; therefore, white-coat hypertension and masked hypertension could not be excluded. Third, lifestyle and behavioral data, treatment adherence, and clinical outcomes were unavailable. Finally, although the sample was large and derived from the NHSO/UCS database, it did not include all healthcare schemes in Thailand. Therefore, extrapolation of prevalence estimates to the entire Thai population should be interpreted with caution.

Conclusions

Application of the 2017 ACC/AHA hypertension guideline to the NHSO/UCS population resulted in substantially higher estimated hypertension prevalence compared with the 2024

Thai guideline, while producing only a modest increase in treatment eligibility. These findings highlight the considerable impact that different diagnostic thresholds may have on hypertension classification in Thailand and provide important population-level evidence to inform future discussions regarding hypertension screening and diagnosis.

Additional Information

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Ethics Approval: The study was approved by the Human Research Ethics Committee, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Thailand (MURA2024/150 on 27 February 2024).

Clinical Trial Consideration: This study does not report on a clinical trial.

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Conflict of Interest: The authors declare no conflict of interest.

Author Contributions:

Conceptualization: All authors

Formal Analysis: All authors

Investigation: Supassara Luangjaru

Methodology: All authors

Visualization: Supassara Luangjaru

Writing – Original Draft: Supassara Luangjaru

Writing – Review & Editing: All authors

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