



Original Article

Persistent Hypertension Awareness Gap and Temporal Trends in Indonesia: A 16-Year Analysis of National Health Surveys

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ARTICLE INFO	ABSTRACT
<i>Article history:</i> Received: April 14, 2026 Accepted: August 18, 2026 Published Online: August 24, 2026 <i>Corresponding Author:</i> Sonia Ayu Islami, Wawa Husada General Hospital, Malang, Indonesia, dr.soniaayuislami@gmail.com	Background: Hypertension is a key modifiable risk factor for cardiovascular and chronic kidney diseases. In Indonesia, surveys show a high prevalence based on measurements, but healthcare detection remains limited. Objective: To analyze trends in measured hypertension, physician-diagnosed hypertension and the diagnostic gap in Indonesia over a 16-year period. Methods: This secondary analysis used nationally representative surveys (Riskesdas 2007, 2013, 2018, and SKI 2023). Adults ≥ 18 years were included. Measured hypertension was defined as systolic ≥ 140 mmHg and/or diastolic ≥ 90 mmHg. Diagnosed hypertension was based on self-reported physician diagnosis or antihypertensive use. The diagnostic gap was the difference between measured and diagnosed prevalence. Results: Measured hypertension remained high (25.8%–34.1%), while diagnosed cases were low (7.2%–9.4%). The diagnostic gap persisted: 24.5 percentage points (2007), decreased to 16.4 (2013), then increased to 25.7 (2018) and remained high at 22.2 (2023). Overall, only a minority of individuals were aware of their condition. This gap was consistent across sociodemographic groups and regions. Conclusion: The hypertension diagnostic gap in Indonesia remains substantial and has tended to widen. Detection efforts have not kept pace with disease burden, highlighting the need to strengthen early screening and diagnosis to reduce cardiovascular and kidney disease risk. Keywords: hypertension; diagnostic gap; underdiagnosis; Indonesia; national health survey; chronic kidney disease.

Introduction

Chronic Hypertension is one of the leading modifiable risk factors for cardiovascular disease, stroke, chronic kidney disease, and premature death worldwide. The World Health Organization (WHO) identifies hypertension as a major cause of global morbidity and mortality and estimates that only a minority of adults with hypertension have their blood pressure adequately controlled. WHO has also emphasized that improving detection, treatment, and control of hypertension at the primary care level is essential to reducing avoidable

cardiovascular events and deaths (World Health Organization).¹

The burden of hypertension is especially challenging in low- and middle-income countries, where health systems often face limitations in screening coverage, continuity of care, treatment adherence, and risk-factor control. Because hypertension is frequently asymptomatic, many individuals remain unaware of their condition until complications occur. This makes case detection through routine blood pressure measurement a critical component of prevention strategies.¹

Cite this as:

Islami SA, Nugroho D. Persistent Hypertension Awareness Gap and Temporal Trends in Indonesia: A 16-Year Analysis of National Health Surveys. InaKidney. 2026;3(2):236-242. doi:10.32867/inakidney.v3i2.246



In Indonesia, the burden of hypertension has been documented repeatedly through nationally representative health surveys. Across survey waves, prevalence based on blood pressure measurement has consistently been substantially higher than prevalence based on physician diagnosis. In 2007, national hypertension prevalence was 31.7% by measurement and 7.2% by diagnosis.² By 2013, these estimates were 25.8% and 9.4%, respectively.³ In 2018, measured prevalence rose to 34.11% while diagnosed prevalence was 8.36%.⁴ In 2023, measured prevalence remained high at 30.8%, whereas diagnosed prevalence was only 8.6%.⁵

This discrepancy between measured and diagnosed hypertension represents a diagnostic gap, reflecting the difference between the underlying burden of disease and the proportion recognized by the healthcare system. Such a gap is clinically important because delayed diagnosis may postpone lifestyle intervention, pharmacologic treatment, and long-term risk reduction. From a kidney health perspective, this is especially relevant because blood pressure control is a key strategy for reducing cardiovascular risk and slowing progression of chronic kidney disease.⁶

Although Indonesian national survey reports provide yearly estimates of hypertension prevalence, the long-term pattern of the diagnostic gap itself has not been sufficiently framed as a health-system performance issue. Examining this gap over time may provide a more policy-relevant perspective than prevalence alone, because it helps identify whether increasing disease burden has been matched by improvements in detection.

Therefore, this study aimed to analyze the 16-year trend in measured hypertension, physician-diagnosed hypertension, and the resulting diagnostic gap in Indonesia using national health survey data from 2007 to 2023. In addition, this study explored variation in the diagnostic gap across provinces and sociodemographic groups to identify populations at greater risk of remaining undiagnosed.

Methods

Study Design

This study was a secondary analysis of nationally representative cross-sectional surveys conducted in Indonesia over a 16-year period, including the Basic Health Research (Riskesdas) surveys in 2007, 2013, and 2018, and the Indonesian Health Survey (Survei Kesehatan Indonesia, SKI) in 2023.

Data Sources

All data were obtained from publicly available national survey reports published by the Ministry of Health of Indonesia. These surveys used multistage cluster sampling to represent the Indonesian population at national and provincial levels.

Study Population

The analysis included individuals aged ≥ 18 years who had available data on blood pressure measurement and/or hypertension diagnosis. For consistency across survey years, only adult population estimates (≥ 18 years) were used for trend comparison.

Definition of Variables

Table 1. Operational Definitions of Study Variables

Variable	Operational Definition
Measured Hypertension	Defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg based on survey measurements, in accordance with JNC VII criteria. Blood pressure was measured at least twice using a digital sphygmomanometer, and the average of measurements was used for analysis.
Diagnosed Hypertension	Defined as self-reported history of hypertension diagnosed by a healthcare professional or current use of antihypertensive medication.
Diagnostic Gap	Defined as the absolute difference between measured hypertension prevalence and diagnosed hypertension prevalence at the population level.
Undiagnosed Hypertension	Defined as individuals with measured hypertension who had not been previously diagnosed by a healthcare professional.

Study Variables

Sociodemographic variables included age group, sex, education level, occupation, place of residence (urban versus rural), and socioeconomic status as measured by wealth quintiles. These variables were extracted and analyzed as reported in each national survey, ensuring consistency with the original data classification.

Statistical Analysis

Descriptive analyses were performed to evaluate trends in hypertension prevalence across survey years. Measured hypertension prevalence, diagnosed hypertension prevalence, and the diagnostic gap were calculated for each survey period. The diagnostic gap was defined as the difference between measured and diagnosed hypertension and was expressed both as an absolute difference in percentage points and as a relative proportion of diagnosed cases among total hypertension cases.

Temporal trends were assessed descriptively across survey waves to identify patterns over time. Where data were available, subgroup analyses were conducted based on sociodemographic characteristics to explore variations in hypertension prevalence and diagnostic gaps among different population groups. All analyses were based on aggregated national estimates as reported in official survey publications.

Results

Trends in Hypertension Prevalence and Diagnosis

Across the four national survey waves, the prevalence of hypertension based on blood pressure measurement remained consistently high, whereas the prevalence based on physician diagnosis remained substantially lower.

In 2007, the prevalence of hypertension based on measurement was 31.7%, while only 7.2% of individuals reported a prior diagnosis. By 2013, measured prevalence was 25.8% and diagnosed prevalence increased slightly to 9.4%. In 2018, measured prevalence rose sharply to 34.11%, whereas diagnosed prevalence remained low at 8.36%. In 2023, measured prevalence remained elevated at 30.8%, with diagnosed prevalence at 8.6%.

Diagnostic Gap Across Survey Years

The diagnostic gap between measured and diagnosed hypertension persisted throughout the study period and showed a tendency to widen over time.

In 2007, the gap was 24.5 percentage points. This decreased to 16.4 percentage points

in 2013, followed by a marked increase to 25.7 percentage points in 2018. In 2023, the gap remained substantial at 22.2 percentage points.

When expressed as proportions, only approximately one-quarter to one-third of individuals with hypertension were aware of their condition across survey years.

Table 2. National Trends in Measured and Diagnosed Hypertension in Indonesia (2007–2023)

Year	Measured Hypertension (%)	Diagnosed Hypertension (%)	Diagnostic Gap (%)
2007	31.7	7.2	24.5
2013	25.8	9.4	16.4
2018	34.11	8.36	25.75
2023	30.8	8.6	22.2

Variation by Sociodemographic Characteristics

Across all survey years, measured hypertension prevalence increased with age, with the highest prevalence observed in older age groups. Similarly, diagnosed hypertension was more common among older individuals; however, the relative diagnostic gap persisted across all age categories.

Women consistently had higher rates of diagnosed hypertension compared to men, although measured hypertension remained high in both groups.

Individuals with lower levels of education exhibited higher prevalence of measured hypertension, while diagnosis rates did not increase proportionally, indicating a larger diagnostic gap in lower socioeconomic groups.

Urban populations tended to have slightly higher diagnosed hypertension compared to rural populations, although measured prevalence remained comparable, suggesting disparities in access to detection services.

Provincial Variation

Substantial variation in hypertension prevalence and diagnosis was observed across provinces. Provinces with higher measured prevalence did not consistently demonstrate higher diagnosis rates, further indicating uneven detection capacity across regions.

Overall, these findings highlight a persistent and substantial diagnostic gap in hypertension across Indonesia, with evidence of widening disparities over time and across population subgroups.

Discussion

This study demonstrates a persistent and substantial diagnostic gap in hypertension in Indonesia over a 16-year period, with the gap exceeding 20 percentage points in recent years. Although the prevalence of hypertension based on blood pressure measurement remained high, the proportion of individuals diagnosed by healthcare providers has not improved proportionally. This indicates that increases in disease burden have not been accompanied by adequate improvements in population-level detection.

Principal Findings

The most notable finding is the widening diagnostic gap, particularly between 2013 and 2018, when measured hypertension increased markedly while diagnosed cases remained relatively unchanged. Even in 2023, despite slight improvements, the gap remained large. These findings suggest that a substantial proportion of individuals with hypertension continue to be unaware of their condition, highlighting a persistent limitation in early detection strategies.

Comparison with Global Evidence

The findings of this study are consistent with global evidence indicating that underdiagnosis of hypertension remains a major challenge, particularly in low- and middle-income countries (LMICs). The World Health Organization (WHO) reports that globally, nearly half of individuals with hypertension are unaware of their condition.¹ Similarly, large-scale analyses from the NCD Risk Factor Collaboration have shown that although hypertension prevalence has increased over time, improvements in awareness and treatment have been uneven, particularly in LMIC settings.⁷

Compared to high-income countries, where systematic screening and primary care integration have improved hypertension detection rates, many LMICs continue to experience substantial gaps between disease prevalence and diagnosis. The persistence of a large diagnostic gap in Indonesia suggests that the country faces similar structural challenges in translating epidemiological burden into effective detection and management.

Health System and Behavioral Explanations

Several mechanisms may explain the persistent diagnostic gap observed in this study. First, hypertension is largely asymptomatic, which reduces perceived need for medical evaluation. Individuals may not seek care until complications occur, thereby limiting opportunities for early diagnosis.

Second, screening coverage may remain insufficient. Although Indonesia has implemented national programs targeting non-communicable diseases, routine blood pressure measurement may not yet be consistently integrated into all levels of primary healthcare or community-based services. Opportunistic screening, which has been effective in other settings, may still be underutilized.

Third, disparities in healthcare access and utilization likely contribute to unequal detection. The larger diagnostic gap observed among individuals with lower socioeconomic status and education levels suggests the influence

of structural barriers, including limited access to healthcare facilities, lower health literacy, and reduced health-seeking behavior. Previous studies have highlighted that social determinants of health play a critical role in shaping access to diagnosis and treatment for chronic conditions.⁷

Fourth, health system factors such as workforce capacity, continuity of care, and follow-up mechanisms may also limit effective diagnosis. Fragmentation in care delivery and insufficient integration between preventive and curative services may reduce the likelihood that individuals with elevated blood pressure are formally diagnosed and managed.

Clinical and Nephrology Implications

From a clinical perspective, the high proportion of undiagnosed hypertension has important implications. Prolonged exposure to elevated blood pressure without treatment increases the risk of cardiovascular events, stroke, and target organ damage. Early diagnosis is essential to initiate lifestyle modification and pharmacological therapy to reduce these risks.

In the context of nephrology, undiagnosed hypertension represents a critical risk factor for the development and progression of chronic kidney disease (CKD). Hypertension is both a cause and a consequence of kidney disease, and uncontrolled blood pressure accelerates the decline in renal function. Clinical guidelines emphasize that early detection and effective blood pressure control are key strategies for slowing CKD progression and reducing the need for renal replacement therapy.⁶ Therefore, failure to detect hypertension at an early stage may contribute to the increasing burden of advanced kidney disease in Indonesia.

Public Health and Policy Implications

The findings of this study have important implications for public health policy. Strengthening hypertension detection requires a multi-level approach. First, expanding routine blood pressure screening in primary care, workplaces, and community settings is essential. Integrating opportunistic screening into all

patient encounters may help identify undiagnosed cases.

Second, improving public awareness of hypertension as a “silent disease” is critical. Educational campaigns targeting high-risk populations may encourage earlier health-seeking behavior and increase participation in screening programs.

Third, addressing disparities in access to healthcare is necessary to reduce inequities in detection. Targeted interventions for populations with lower socioeconomic status, including community outreach and mobile health services, may help bridge this gap.

Fourth, strengthening primary healthcare systems is essential to ensure continuity of care, follow-up, and appropriate management after diagnosis. Integration of hypertension screening into broader non-communicable disease control programs may improve efficiency and impact.

This study has several strengths, including the use of nationally representative data across multiple time points, allowing for a comprehensive assessment of long-term trends. The use of standardized definitions across surveys enhances comparability.

Conclusion

The diagnostic gap in hypertension in Indonesia remains substantial and reflects ongoing challenges in early detection. Despite a high and increasing burden of hypertension, detection strategies have not improved proportionally. Addressing this gap through strengthened screening, improved access to care, and increased public awareness is essential to reduce the burden of cardiovascular and kidney disease.

Limitations of the Study

However, several limitations should be acknowledged. First, the analysis was based on aggregated data, limiting the ability to perform

individual-level statistical analysis. Second, variations in survey methodology across years may affect comparability. Third, self-reported diagnosis may be subject to recall bias, potentially underestimating or overestimating true diagnosis rates.

Declarations

Ethics approval and consent to participate

This study used publicly available secondary data from national surveys. No individual-level identifiable information was accessed; therefore, ethical approval was not required.

Competing interests

There are no conflicts of interest in writing this article.

Funding source

Not applicable.

Acknowledgments

None.

Author's Contribution

Idea/concept: SAI. Design: SAI. Control/supervision: DN. Data collection/processing: SAI, DN. Analysis/interpretation: SAI, DN. Literature review: SAI. Writing the article: SAI. Critical review: -. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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