Health Dis. Res. 1(2), 310-313, October 2026

Health and Disease Research

https://doi.org/10.00000/HDR2025.00003
https://integrityresjournals.org/journal/JASVM

Original Research

Patterns of hypertension awareness, treatment, and control among adults in a simulated urban community survey#

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#DEMONSTRATION MANUSCRIPT — ALL STUDY DATA ARE SIMULATED

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Article Info:

Received 8 July 2026
Accepted 26 August 2026
Available online 3 September 2026

Keywords:
hypertension; awareness; treatment; blood pressure; primary care; simulated data

Citation:
Michael, J., Mathew, R., Richard, E., & Eze, D. (2025). Patterns of hypertension awareness, treatment, and control among adults in a simulated urban community survey. *Health and Disease Research*,*10*(3), 310-324

ABSTRACT

Hypertension is a major modifiable risk factor for cardiovascular disease, yet awareness and control can remain uneven across communities. This demonstration study describes simulated data from 240 adults to illustrate how a community survey might assess awareness, treatment, and blood-pressure control. In the synthetic dataset, 38.3% of participants met the study definition for hypertension; 63.0% of those participants reported prior awareness, 48.9% reported current treatment, and 27.2% were controlled at assessment. Older age and lower reported access to routine care were associated with lower control in exploratory comparisons. Because the dataset is entirely simulated, the results are not estimates for any real population. The paper demonstrates a transparent reporting structure for cross-sectional hypertension research and highlights the value of standardised measurement, accessible primary care, and follow-up.

1. Introduction

Hypertension is an important contributor to stroke, ischemic heart disease, kidney disease, and premature mortality. Its clinical burden is amplified when elevated blood pressure is not detected or adequately treated. Population-level progress depends on reliable measurement, affordable long-term care, adherence support, and continuity between screening and treatment. The World Health Organization (WHO, 2023) identifies hypertension as a major global health challenge, while international guidelines emphasize accurate measurement and risk-informed management (Whelton *et al*., 2018). Community surveys can help identify gaps across the hypertension care cascade: prevalence, awareness, treatment, and control. These indicators are not interchangeable. A community may have substantial screening coverage but limited treatment continuity, or reasonable treatment uptake but poor control because of therapeutic inertia, medication costs, or barriers to follow-up. Cross-sectional studies cannot establish causal pathways, but they can guide service planning when sampling and measurement are carefully described.\n\nThis demonstration paper uses a fully synthetic dataset to show how a study of hypertension care could be reported. It asks: what proportions of simulated adults with hypertension are aware, treated, and controlled, and how do these outcomes vary by age and routine-care access?

2. Materials and Methods

A cross-sectional community survey design was specified for demonstration. The synthetic dataset represented 240 adults aged 18 years or older and was generated solely for teaching and journal-layout purposes; no participants were recruited and no real measurements were collected. Variables included age group, sex, access to routine care, self-reported prior diagnosis, current antihypertensive

Table 1. Characteristics of the synthetic survey population.

Characteristic	All records (n=240)	Hypertension subgroup (n=92)
Age 18–39 years	82 (34.2%)	18 (19.6%)
Age 40–59 years	104 (43.3%)	43 (46.7%)
Age ≥60 years	54 (22.5%)	31 (33.7%)
Women	126 (52.5%)	49 (53.3%)
Routine care access reported	151 (62.9%)	61 (66.3%)

Table 2. Illustrative hypertension care cascade.

Care-cascade indicator	n	% of hypertension subgroup
Classified as hypertensive	92	100.0
Aware of prior diagnosis	58	63.0
Currently receiving treatment	45	48.9
Controlled at assessment	25	27.2

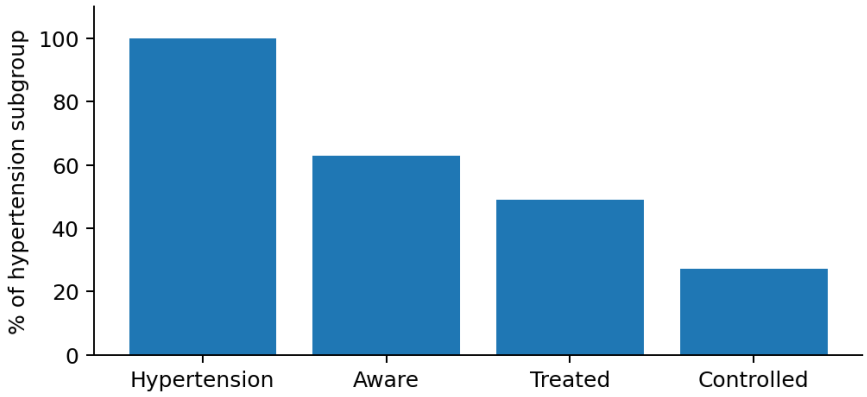


Figure 1. Illustrative results- synthetic data (Note: All plotted values are synthetic and for demonstration only).

treatment, and a hypothetical mean of two seated blood-pressure readings. For this example, hypertension was defined as systolic pressure ≥140 mmHg, diastolic pressure ≥90 mmHg, or reported current treatment, consistent with commonly used epidemiological thresholds (Whelton *et al*., 2018). Control was defined as systolic pressure <140 mmHg and diastolic pressure <90 mmHg among participants classified as having hypertension. Descriptive statistics were calculated as counts and percentages. Group differences are presented as illustrative unadjusted comparisons; no causal interpretation is intended. The synthetic data were not designed to reproduce a specific city or country. Because the study involved no human participants or identifiable information, it did not require ethics review; any real-world implementation would require approval from an appropriate ethics committee, informed consent, a sampling plan, and a prespecified analysis protocol.

3. Results

Of the 240 synthetic records, 92 (38.3%) met the study definition for hypertension. Among these 92 records, 58 (63.0%) were classified as aware, 45 (48.9%) as receiving treatment, and 25 (27.2%) as controlled. Control was more common in the younger hypertension subgroup than in the oldest subgroup, while participants reporting routine access to care showed a higher illustrative treatment proportion. These differences should be interpreted only as patterns embedded in a teaching dataset, not as empirical evidence.\n\nThe care cascade suggests that awareness alone does not ensure treatment or control. The largest absolute drop in this example occurred between awareness and treatment, followed by a further reduction from treatment to control. In a real survey, these gaps would justify investigating medicine availability, continuity of care, side effects, health literacy, and whether treatment intensification follows repeated high readings.

4. Discussion

This synthetic example illustrates why hypertension surveillance should report the full care cascade rather than prevalence alone. The proportion classified as aware was higher than the proportion treated, and the controlled fraction was smaller still. Similar gaps are a recurring

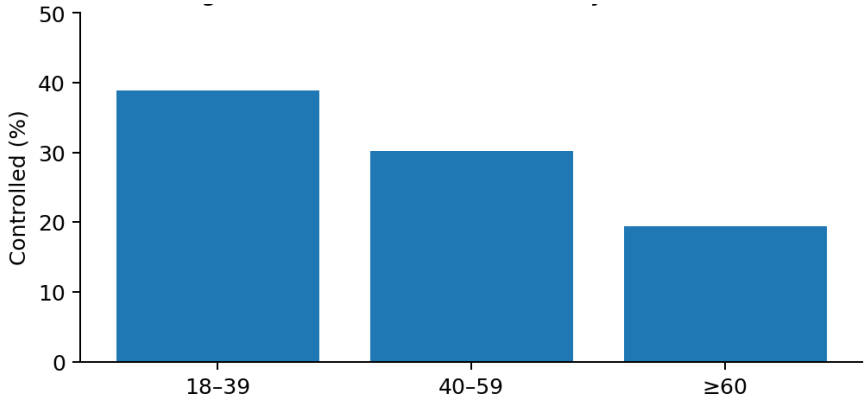


Figure 2. Illustrative results- synthetic data (Note: All plotted values are synthetic and for demonstration only).

concern in global hypertension control efforts, although the exact figures vary substantially by setting and methods (Mills *et al*., 2020; WHO, 2023). A real study would need to account for sampling weights, non-response, repeated measurements, and potential misclassification.Primary-care systems can improve detection and long-term control through standardized measurement, protocol-based treatment, reliable medication supply, recall systems, and team-based care. Evidence supports multicomponent approaches rather than relying on screening campaigns in isolation (WHO, 2021). Community health workers and digital reminders may support follow-up when they are designed around local needs and privacy safeguards. The principal limitation is fundamental: all data in this paper are simulated. The sample size, proportions, and subgroup patterns cannot be generalised. The cross-sectional design described also cannot establish whether access to care caused improved control. Future real-world research should use a representative sampling strategy, validated measurement devices, repeated readings, and multivariable analyses specified before examining outcomes.

5. Conclusion

The article demonstrates a reporting framework for describing hypertension awareness, treatment, and control. In any real implementation, a care-cascade approach could help locate service gaps, but the numerical results here are synthetic and should not be cited as population findings.

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