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Home blood pressure monitoring among adults—American Heart Association Cardiovascular Health Consumer Survey, 2012

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Abstract

Home blood pressure monitoring (HBPM) among hypertensive adults was assessed using the 2012 American Heart Association Cardiovascular Health Consumer Survey. The prevalence of hypertension was 25.5% and 53.8% of those reported HBPM. Approximately 63% of hypertensive adults 65 years and older reported HBPM followed by 51% and 34.6% (35–64 and 18–34 years, respectively; *P*=.001). Those who had seen a healthcare professional within a year reported HBPM compared with those who had not (54.8% vs 32.8%, *P*=.047). Those who believed that lowering blood pressure can reduce risk of heart attack and stroke had a higher percentage of HBPM compared with those who did not (55.5% vs 33.1%, *P*=.01). Age and the belief that lowering blood pressure could reduce cardiovascular disease risk were significant factors associated with HBPM. Half of the adult hypertensive patients reported HBPM and its use was greater among those who reported a positive attitude toward lowering blood pressure to reduce cardiovascular disease risk.

1 | INTRODUCTION

Hypertension (HTN) is a major risk factor for heart disease and stroke,[1–3] the first and fifth leading causes of death in the United States, respectively.[4] While a highly treatable condition, half of patients with HTN do not have it under control, leading to increased risk of cardiovascular events.[5,6] Uncontrolled HTN has varied by age, race/ethnicity, poverty- to-income ratio, education, usual source of care, and health insurance coverage.[6] Lifestyle modification is the initial treatment for HTN, but if blood pressure (BP) goals are not reached, or if BP is highly elevated, then antihypertensive medication therapy is

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CONFLICT OF INTEREST

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recommended.[1–3] Achieving HTN control can help prevent or mitigate serious sequelae, and evidence- based clinical and public health interventions are available to improve individual and population-level control.

Home BP monitoring (HBPM) has been utilized for regular monitoring of BP at home to improve HTN control or regulate antihypertensive medications.[7] HBPM is also known as self- measured BP.[8] Recently, the U.S. Preventive Services Task Force recommended that ambulatory BP measurement or HBPM may be used to confirm a diagnosis of HTN after initial screening.[9] HBPM, when conducted correctly and under healthcare provider (HCP) recommendation,[8] is a strategy for detecting white- coat (or masked) HTN is and better than office BP at predicting cardiovascular disease (CVD) prognosis and end- stage renal disease.[7–14] New technologies are making portable BP monitoring devices more affordable and user- friendly. These devices allow for a greater number of patients to conveniently monitor their own BP measurements at home. They also make it easier for them to report to their HCPs for HTN management.[8–15]

Improving HTN control is a national priority, highlighted by its central focus in national programs, such as the American Heart Association's Check. Change. *Control.*—Blood Pressure Program (heart. org/checkchangecontrol), *Healthy People 2020* (www.healthypeople.gov/), and Million Hearts.[16] Multifaceted approaches for the patient to track their BP at home or at no cost in many pharmacies, healthcare facilities, and fire stations could help improve control rates. HBPM use has been increasing in recent years, yet it continues to be an underutilized resource.[17] Previous data using population-based surveys showed that fewer than half of hypertensive adults were HBPM users in 2005, yet there was a significant relative increase (14.2%) in regular HBPM use between 2005 and 2008.[17] There was also an association between regular HBPM use and the perception among hypertensive adults that HBPM use helped control BP.[16] Even with a growing body of clinical evidence supporting HBPM use, limited data exist on its use and perceived benefit at a population level. To fill in this gap, we analyzed data from the American Heart Association Cardiovascular Health Consumer Survey (CHCS) to examine the association between HBPM and the belief that controlling BP can reduce risk of heart attack and stroke among hypertensive adults.

2 | METHODS

2.1 | Survey design

CHCS is a Web- based survey administered by IPSOS Marketing, a public opinion survey firm. The sample was acquired using several steps. A list of 16 463 IPSOS Internet panelists was generated for each electronic invitation. With the intention of creating a nationally representative sample of adults 18 years and older using age, sex, geographic region, household size and income, and race/ethnicity categories, 10 899 panelists were electronically invited to participate in CHCS. A supplemental invitation was extended to African Americans and Hispanics to create an oversampling in these groups. There are multiple sources (eg, social media, email lists, banner ads, Web test ads, search engine marketing) used for recruitment to avoid sampling bias. Respondents join the panel to take online surveys through IPSOS' "double-opt-in" process; those wishing to join the IPSOS

panel first complete the online recruitment survey and accept the terms and conditions of membership. All personal information remains confidential within IPSOS. All panelists receive appropriate incentives for their time taken to participate in surveys. The Centers for Disease Control and Prevention (CDC) suggested potential questions to include and the American Heart Association licensed the results (responses to the questions) from IPSOS. Licensed data provided did not contain individual identifiers, making it exempt from institutional review board approval.

A total of 1078 adults completed the electronic CHCS survey during June 15 to July 18, 2012, and 1031 in a second wave of data collection from December 15 to 18, 2012, yielding a response rate of 19.4%. No information was available for nonresponders; thus, the intent of having a nationally representative sample of adults was not confirmed. The data were weighted based on age, sex, race/ethnicity, education, and household income to match the US Census adult population of 2012. The survey was designed to collect data about heart health beliefs, attitudes, social norms, and behaviors regarding important health concerns. Among these concerns were monitoring one's BP, actions taken to modify lifestyle, and taking medications to control BP. All data were self- reported. According to the PEW Research Center, as of 2012, 83% of US adults used the Internet. Those without a computer or tablet connection to the Internet were not able to participate. The IPSOS survey company maintains volunteer panelists with email addresses, which allows for some to participate using computers at their work, library, or colleges. A sampling bias of those who could not volunteer would be under 17% of US adults.

2.2 | Study measurements

2.2.1 | High BP—Respondents were asked, "Which of the following do you currently experience? Please select it even if it is controlled or managed by medication." They were classified as hypertensive if they selected "high blood pressure."

2.2.2 | Positive attitude toward action to control BP—Another question examined attitudes about lowering BP to reduce the risk of having a heart attack or stroke. The question was, "Which of the following activities do you believe can prevent or reduce the risk of having a heart attack or stroke (select all that apply)." Respondents could choose from the following responses: (1) take your antihypertensive medicine as directed; (2) stop smoking; (3) reduce the amount of fat in your diet; (4) reduce the amount of salt/sodium in your diet; (5) increase your physical activity/exercise; (6) lower your BP; (7) reduce your blood cholesterol levels; (8) lose weight; (9) other; and (10) nothing can prevent or reduce the risk of having a heart attack or stroke. If they selected "yes" to question 1 or 8, then they were categorized as having a positive attitude toward directly lowering BP as an action to reduce risk of heart attack or stroke. Although "yes" to questions 2, 3, 4, 5, and 8 reflect positive attitudes to actions that can be taken to lower one's BP and would reduce the risk of heart attack and stroke, our study is focusing on the direct actions to lowering BP.

2.2.3 | Home BP monitoring—The categories for locations of where regular BP monitoring was performed were based on responses to the question: "Where, if at all, do you regularly monitor your blood pressure outside of the doctor's office?" The responses were

grouped into five locations: (1) home, if the participant selected “using self- monitor at home” or “at home by visiting nurse or community health worker”; (2) “work”; (3) “grocery store”; (4) “pharmacy”; or (5) “other,” if the participant selected dentist, fire station, church or religious center, community or senior center, or other not listed. Respondents were classified as not regularly monitoring their BP if they selected the response, “I don’t regularly monitor my blood pressure.”

Of the hypertensive participants who responded to whether they regularly monitored their BP, 25.1% selected that they do not monitor and 74.9% selected that they regularly monitored their BP. Of those who regularly monitored their BP, 71.8% were at home, 11.9% at a pharmacy, 9.1% at a grocery store, 4.0% at work, and 3.2% in other locations. The focus of our report will be on the hypertensive adults who selected home as their location for regularly monitoring their BP, or HBPM.

2.3 | Statistical analysis

Weighted frequency analyses provided information on the prevalence of self- reported high BP and HBPM use by selected characteristics. Descriptive characteristics used in the analyses included sex; age (18–34, 35–64, and ≥65 years); race/ethnicity (non- Hispanic white, non- Hispanic black, Hispanic, and other); household income (<$25K, $25K–$49.9K, $50K–$74.9K, $75K–99.9K, and x$100K); education (≤high school graduate, some college, and college graduate or more); employment status (employed, not employed, retired); smoking habits; HCP visit in the 12 months preceding survey; and positive attitudes towards lowering BP to reduce the risk of heart attack or stroke and CVD comorbidities (hyperlipidemia, diabetes, heart condition, and obesity). The χ^2 test was performed to test differences, and multiple logistic regression analyses were conducted to examine the associations between the outcomes of HBPM use and selected characteristics, independently. Adjusted odds ratios and 95% confidence intervals (95% CIs) were obtained after controlling for age, sex, race/ethnicity, employment status, HCP visit within the past year, receipt of HCP advice to take lifestyle modification actions to reduce BP or risk for CVD, and positive attitude towards lowering BP to reduce the risk of heart attack or stroke. A *P* value at the level of .05 was considered to be significant and all statistical analyses were performed using SAS version 9.2 (SAS Institute, Cary, NC).

3 | RESULTS

The weighted prevalence of self- reported HTN was 25.5% (Table 1). Among 559 self-reported hypertensives, 437 (81.5%) were taking antihypertensive medications. There were 303 hypertensives who used HBPM, and of those, 260 (85.5%) were taking antihypertensive medications (data not shown). The prevalence of HTN and hypertensives reporting HBPM use was significantly different by age, sex, race/ethnicity, education, employment status, HCP advice to take action, HCP visit within the past year, positive attitude towards taking action to lower BP, and presence of CVD comorbidities. Hypertensives 65 years and older reported more HBPM use (62.9%) followed by those aged 35 to 64 years (51.0%) and those aged 18 to 34 years (34.6%) (*P*=.001) (Table 1). Retired hypertensives had significantly higher HBPM use compared with those employed or not employed (61.6% vs 47.1% and

52.6%, respectively; P=.02). Hypertensives who saw an HCP within the past year reported significantly higher HBPM than those who had not seen an HCP within the past year (54.8% vs 32.8%, respectively; P=.047). In addition, the hypertensives with positive attitudes toward taking action to lower BP used HBPM more than those who did not (55.5% vs 33.1%, P=.01). The majority of patients with HTN (95.5%) had seen an HCP within the past year.

The results from multiple logistic regression analysis showed that age and positive attitude towards lowering BP were associated with HBPM use after adjusting for selected descriptive factors (Table 2). Hypertensives 65 years and older were 2.46 (95% CI, 1.08–5.59) times more likely to report HBPM than those aged 18 to 34 years (Table 2). The hypertensives who believed that lowering BP reduces CVD risk were 2.44 (95% CI, 1.15–5.19) times more likely to report HBPM use than those who did not.

4 | DISCUSSION

Our results show that half of all self- reported hypertensive survey participants reported HBPM use. In addition, there were significant associations between HBPM use and age, employment status, HCP visit within the past year, and positive attitudes toward taking actions to lower BP. Specifically, younger adults (18–34 years), those who were employed, those who had not seen an HCP within the past year, and those who did not have positive attitudes towards taking actions to lower BP were less likely to report HBPM use, compared with their counterparts. These findings are consistent with prior reports that demonstrated associations between HBPM and various sociodemo-graphic characteristics.[7,8,13–15,17] Further, the results from the multivariate logistic regression model suggested that age and positive attitudes toward taking actions to lower BP were independently associated with HBPM after controlling for the other factors.

Our results suggest that a positive attitude toward taking actions to lower BP is a strong independent predictor associated with HBPM use. Strategies to incorporate the use of HBPM in HTN management protocols[7,8,15,17] should take positive attitudes and knowledge of benefits of HTN control into consideration. For example, increasing patient knowledge of the serious negative consequences of uncontrolled HTN, such as congestive heart failure, stroke, and chronic kidney disease, may increase patient engagement and participation in their care. One National Institutes of Health education program, “Mind Your Risks” (https://mindyourrisks.nih.gov/) focuses on keeping BP under control to reduce the risk for heart attack and stroke. New studies have shown that uncontrolled HTN during midlife is linked to dementia later in life.[18,19] Increasing understanding of the disease condition, including how it occurs and how actions lead to improvement, can be supported by educational programs. Such programs should be aligned with HTN management protocols within health systems.

HBPM use is a beneficial tool for helping achieve BP control and could be utilized with home health strategies and telemedicine protocols.[7–15,20–25] In our study, the majority of hypertensives (77%) reported that they were advised by their HCP to lower their BP; however, only 52.7% of hypertensives using HBPM reported receiving advice from their HCP to lower their BP. Barriers to effective care are influenced by systems and individuals, and examples include: time limitations, patient noncompliance, lack of effective and

culturally appropriate teaching materials, lack of training in or effective use of counseling, lack of knowledge about benefits of HBPM for improved BP, reimbursement concerns, and low motivation or access to motivational tools from HCP.[8,26] The significant association between a recent HCP visit and HBPM use was only observed in univariate analyses, and was accounted for in multiple regression analyses, likely due to the high number of participants with a recent HCP visit. Further research is needed to better define the barriers that prevent HCPs from successfully motivating hypertensives to monitor their BP outside of the clinic setting.[26]

Our study also suggests the need for HCPs to engage their patients and encourage them to check their BP at home. Patient education about the importance of how lowering one's BP can lower their CVD risk is crucial, especially since hypertensive adults who have such beliefs were twice as likely to report HBPM. One cross- sectional study of 1088 hypertensive adults seen by HCPs within the North Carolina Family Medicine Research Network during 2004–2005 showed that the factor most strongly associated with HBPM use was related to their HCP's recommendation to do so.[27] HCPs should also utilize evidenced-based community- clinical linkages to support HBPM, including the use of community health workers and team- based care as tools to improve HTN control.[8,16,17,20–26,28–32] The CDC, several national and state- based partners, and multiple organizations are collaborating to decrease uncontrolled HTN to prevent heart disease, kidney disease, peripheral vascular disease, and stroke.[2,3,7–10] For example, the Million Hearts initiative aims to prevent CVD events by improving access to care, improving the quality of care, focusing clinical attention on the prevention of heart attack and stroke, and increasing adoption of self- monitoring BP to improve clinical management of HTN.[16] Any recommended HBPM use should be accompanied by advice on using a monitor that has been clinically validated for accuracy.[33] A comprehensive list can be found online (http://www.dableducational.org/).

5 | STUDY LIMITATIONS

Our study has several limitations. First, CHCS is an online survey that may limit participation among low- income households, as they are less likely to have easy access to Internet and email service. However, the CHCS is based on a weighted national sample by age, sex, education, and household income, which correlates well with US census data in 2012. In addition, the supplemental invitation to expand representation of non- Hispanic blacks and Hispanics may have led to the skewed income distribution among these two groups. The overrepresentation of high- income minorities (Hispanics and non- Hispanic blacks) and low cell sizes of HBPM users among some minority groups might explain why there were no differences between the race/ethnicity groups for HBPM.[17] Second, the survey was only available in English, which might affect generalizability to ethnic and minority groups. Third, this study was cross- sectional and did not allow for inference of causality. For example, determining whether receipt of advice from an HCP in the past year leads hypertensive adults to take actions to lower their BP. Fourth, the low response may result with inaccuracy of HTN prevalence because of nonresponse bias. However, the fielding company did not assess nonresponse differences by demographic variables. Last, self-reported data are subject to recall and social desirability biases.[34] The data might not provide

complete or accurate results on HTN status, comorbidities, positive attitudes towards taking actions to lower BP, or actual receipt of advice from an HCP.

6 | CONCLUSIONS

Our study showed that about half of the hypertensive respondents used HBPM. We found that older age and positive attitude toward taking actions to lower BP were independent factors associated with increased HBPM use among hypertensive adults. Since HBPM can help with improved HTN control, HCPs should utilize best practices to promote HBPM use across diverse hypertensive adults.

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REFERENCES

1. Egan BM, Zhao Y, Axon RN. US trends in prevalence, awareness, treatment, and control of hypertension, 1988–2008. JAMA. 2010;303:2043–2050. [PubMed: 20501926]
2. Chobanian AV, Bakris GL, Black HR, et al. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003;42: 1206–1252. [PubMed: 14656957]
3. Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics—2015 update. A report from the American Heart Association. Circulation. 2015;131:e1–e295. [PubMed: 25561477]
4. Murphy SL, Kochanek MA, Xu J, Arias E. Mortality in the United States, 2014. NCHS Data Brief. 2015;229:1–8.
5. Yoon SS, Fryar CD, Carroll MD. Hypertension prevalence and control among adults: United States, 2011–2014. NCHS Data Brief. 2015;220:1–8.
6. Valderrama AL, Gillespie C, Coleman S, George MG, Hong Y. Vital signs: awareness and treatment of uncontrolled hypertension among adults—United States, 2003–2010. MMWR Morb Mortal Wkly Rep. 2012;61:703–709. [PubMed: 22951452]
7. Agarwal R, Bills JE, Hecht TJ, et al. Role of home blood pressure monitoring in overcoming therapeutic inertia and improving hyper-tension control: a systematic review and meta- analysis. Hypertension. 2011;57:29–38. [PubMed: 21115879]
8. Uhlig K, Balk EM, Patel K. Self-measured blood pressure monitoring: comparative effectiveness. Agency for Healthcare Research and Quality 1 2012 http://www.ncbi.nlm.nih.gov/books/NBK84604/pdf/Bookshelf_NBK84604.pdf. Accessed on June 30, 2016.
9. Centers for Disease Control and Prevention. Self-measured blood pressure monitoring: action steps for clinicians. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2014 http://millionhearts.hhs.gov/docs/mh_smbp.pdf. Accessed June 30, 2016.
10. Siu AL; U.S. Preventive Services Task Force. Screening for high blood pressure in adults: U.S. preventive services task force recommendation statement. Ann Intern Med. 2015;163:778–786. [PubMed: 26458123]
11. Kerry S, Markus H, Khong T, et al. Community based trial of home blood pressure monitoring with nurse- led telephone support in patients with stroke or transient ischaemic attack recently discharged from hospital. Trials. 2008;9:15. [PubMed: 18353175]
12. Mancia G, Parati G. Home blood pressure monitoring: a tool for better hypertension control. Hypertension. 2011;57:21–23. [PubMed: 21115877]

13. Staessen JA, Asmar R, De Buyzere M, et al. Task force II: blood pressure measurement and cardiovascular outcome. Blood Press Monit. 2001;6:355–370. [PubMed: 12055415]
14. Staessen JA, Den Hond E, Celis H, et al. Antihypertensive treatment based on blood pressure measurement at home or in the physician's office: a randomized controlled trial. JAMA. 2004;291:955–964. [PubMed: 14982911]
15. Godwin M, Lamm M, Birtwhistle R, et al. A primary care pragmatic cluster randomized trial of the use of home blood pressure monitoring on blood pressure levels in hypertensive patients with above target blood pressure. Fam Pract. 2010;27:135–142. [PubMed: 20032170]
16. Frieden TR. The "Million Hearts" initiative–preventing heart attacks and strokes. N Engl J Med. 2011;365:e27. [PubMed: 21913835]
17. Ayala C, Tong X, Keenan NL. Regular use of home blood pressure monitor by hypertensives adults —HealthStyles, 2005 and 2008. J Clin Hypertens (Greenwich). 2012;14:172–177. [PubMed: 22372777]
18. Muller M, Sigurdsson S, Kjartansson O, et al. Joint effect of mid- and late- life blood pressure on the brain: the AGES-Reykjavik study. Neurology. 2014;82:2187–2195. [PubMed: 24898928]
19. Launer LJ, Hughes T, Binbing Y, et al. Lowering midlife levels of systolic blood pressure as a public health strategy to reduce late-life dementia: perspective from the Honolulu Heart Program/ Honolulu Asia Aging Study. Hypertens. 2010;55:1352–1359.
20. Bosworth HB, Olsen MK, McCant F, et al. Hypertension Intervention Nurse Telemedicine Study (HINTS): testing a multifactorial tailored behavioral/educational and a medication management intervention for blood pressure control. Am Heart J. 2007;153:918–924. [PubMed: 17540191]
21. Dolor RJ, Yancy WS, Jr, Owen WF, et al. Hypertension Improvement Project (HIP): study protocol and implementation challenges. Trials. 2009;10:13. [PubMed: 19245692]
22. Green BB, Cook AJ, Ralston JD, et al. Effectiveness of home blood pressure monitoring, Web communication, and pharmacist care on hypertension control: a randomized controlled trial. JAMA. 2008;299:2857–2867. [PubMed: 18577730]
23. Madsen LB, Kirkegaard P, Pedersen EB. Blood pressure control during telemonitoring of home blood pressure. A randomized controlled trial during 6 months. Blood Press. 2008;17:78–86. [PubMed: 18568696]
24. Madsen LB, Kirkegaard P, Pedersen EB. Health- related quality of life (SF-36) during telemonitoring of home blood pressure in hypertensive patients: a randomized, controlled study. Blood Press. 2008;17:227–232. [PubMed: 18815937]
25. McManus RJ, Mant J, Bray EP, et al. Telemonitoring and self- management in the control of hypertension (TASMINH2): a randomized controlled trial. Lancet. 2010;376:163–172. [PubMed: 20619448]
26. Kushner RF. Barriers to providing nutrition counseling by physicians: a survey of primary care practitioners. Prev Med. 1995;24: 546–552. [PubMed: 8610076]
27. Viera AJ, Cohen LW, Mitchell CM, Sloane PD. Use of home blood pressure monitoring by hypertensive patients in primary care: survey of a practice- based research network cohort. J Clin Hypertens (Greenwich). 2008;10:280–286. [PubMed: 18401225]
28. Pickering TG, Miller NH, Ogedegbe G, et al. Call to action on use and reimbursement for home blood pressure monitoring: Executive Summary. A joint scientific statement from the American Heart Association, American Society of Hypertension, and Preventive Cardiovascular Nurses Association. J Clin Hypertens (Greenwich). 2008;10:467–476. [PubMed: 18550937]
29. Brownstein JN, Chowdhury FM, Norris SL, et al. Effectiveness of community health workers in the care of people with hypertension. Am J Prev Med. 2007;32:435–447. [PubMed: 17478270]
30. Balcazar HG, de Heer H, Rosenthal L, et al. A promotores de salud intervention to reduce cardiovascular disease risk in a high-risk Hispanic border population, 2005–2008. Prev Chronic Dis. 2010;7:A28. [PubMed: 20158973]
31. Prioa KK, Thota AB, Njie GJ. Team- based care and improved blood pressure control: a community guide systematic review. Am J Prev Med. 2014;47:86–99. [PubMed: 24933494]
32. Community Preventive Services Task Force. Team-based care to improve blood pressure control. Recommendation of the community preventive services task force. Am J Prev Med. 2014;47:100–102. [PubMed: 24933493]

33. Wan Y, Heneghan C, Stevens R, et al. Determining which automatic digital blood pressure device performs adequately: a systematic review. J Hum Hypertens. 2010;24:431–438. [PubMed: 20376077]

34. Nunes V, Neilson J, O'Flynn N, et al. Clinical Guidelines and Evidence Review for Medicines Adherence: involving patients in decisions about prescribed medicines and supporting adherence. London, England: National Collaborating Centre for Primary Care and Royal College of General Practitioners; 2009.

TABLE 1

Weighted Percentage[a] of High Blood Pressure and Home Blood Pressure Monitoring[b] Among Hypertensive Patients by Selected Characteristics—American Heart Association Cardiovascular Consumer Health Survey, 2012

		Self-Reported High Blood Pressure		Home Blood Pressure Monitor Use	
Characteristics	**Total, No. (%)[a]**	**No. (%)[a]**	***P* Value[b]**	**No. (%)[a]**	***P* Value[b]**
Overall	2109	559 (25.5)		303 (53.8)	
Age, y					
18–34	599 (30.3)	50 (7.6)		18 (34.6)	
35–64	1021 (50.6)	273 (27.6)		135 (51.0)	
≥65	489 (19.1)	236 (48.0)	<.0001	150 (62.9)	.001
Sex					
Men	1118 (49.0)	339 (28.2)		175 (51.8)	
Women	991 (51.0)	220 (22.9)	.011	128 (56.2)	.36
Race/ethnicity					
Non-Hispanic whites	1429 (69.3)	399 (26.1)		219 (55.1)	
Non-Hispanic blacks	263 (11.8)	91 (36.0)		51 (51.6)	
Hispanic	299 (13.0)	56 (18.6)		26 (48.5)	
Non-Hispanic others	118 (5.9)	13 (12.2)	<.0001	7 (51.4)	.83
Income, $					
Under 25k	436 (22.0)	108 (25.6)		52 (43.8)	
≥25k and <50k	549 (28.0)	165 (29.3)		86 (53.8)	
≥50kand <75k	427 (17.0)	119 (25.5)		66 (54.8)	
≥75kand <100k	292 (12.0)	69 (21.5)		38 (56.7)	
≥100k	405 (21.0)	98 (22.5)	.13	61 (63.0)	.15
Education level					
≤High school graduate	331 (15.9)	107 (32.8)		61 (57.7)	
Some college	540 (25.8)	152 (27.7)		82 (53.3)	
College graduate or more	1225 (58.3)	298 (22.6)	.0024	159 (52.6)	.72
Employment					
Employed	1198 (59.1)	234 (19.1)		109 (47.1)	
Retired	502 (22.0)	248 (48.9)		155 (61.6)	

Characteristics	Total, No. (%)[a]	Self-Reported High Blood Pressure		Home Blood Pressure Monitor Use	
		No. (%)[a]	*P* Value[b]	No. (%)[a]	*P* Value[b]
Not employed	393 (18.9)	74 (18.4)	<.0001	38 (52.6)	.02
Smoking					
Yes	289 (14.3)	77 (25.9)		35 (47.6)	
No	1820 (85.7)	482 (25.4)	.85	268 (54.8)	.28
Saw healthcare professional in the past 12 mo					
Yes	1799 (85.2)	532 (28.5)		294 (54.8)	
No	310 (14.8)	27 (7.8)	<.0001	9 (32.8)	.047
In the past 12 mo, a doctor or healthcare professional told you to lower your blood pressure					
Yes	267 (12.8)	214 (77.7)		115 (52.7)	
No	1842 (87.2)	345 (17.8)	<.0001	188 (54.5)	.72
Believe that lowering blood pressure can reduce cardiovascular risk[c]					
Yes	1747 (82.9)	516 (28.3)		288 (55.5)	
No	362 (17.1)	43 (11.5)	<.0001	15 (33.1)	.01
Eight actions related to positive attitudes that can prevent or reduce the risk of having a heart attack or stroke					
Take the prescribed medication as directed					
Yes	1410 (67.4)	457 (30.8)		260 (56.4)	
No	699 (32.6)	102 (14.5)	<.0001	43 (42.2)	.02
Stop smoking					
Yes	1618 (77.1)	424 (25.1)		245 (57.9)	
No	491 (22.9)	135 (26.7)	.50	58 (40.8)	.002
Reduce the amount of fat in diet					
Yes	1665 (79.3)	456 (26.5)		266 (58.0)	
No	444 (20.7)	103 (21.5)	.036	37 (33.9)	<.0001
Reduce the amount of salt/sodium in diet					
Yes	1609 (76.4)	455 (27.0)		264 (57.9)	
No	500 (23.6)	104 (20.5)	.004	39 (36.2)	.0003
Increase physical activity/exercise					
Yes	1800 (85.2)	493 (26.3)		281 (57.1)	
No	309 (14.8)	66 (20.6)	.037	22 (29.2)	.0001
Lower blood pressure					

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Characteristics	Total, No. (%)[a]	Self-Reported High Blood Pressure		Home Blood Pressure Monitor Use	
		No. (%)[a]	*P* Value[b]	No. (%)[a]	*P* Value[b]
Yes	1666 (79.2)	494 (28.6)		277 (55.8)	
No	443 (20.8)	65 (13.6)	<.0001	26 (37.8)	.013
Reduce blood cholesterol levels					
Yes	1646 (78.4)	458 (26.7)		267 (58.4)	
No	463 (21.6)	101 (20.9)	.012	36 (32.2)	<.0001
Lose weight					
Yes	1763 (83.8)	484 (26.3)		270 (55.1)	
No	346 (16.2)	75 (21.1)	.049	33 (45.3)	.15
Comorbidities					
Hyperlipidemia					
Yes	511 (23.8)	301 (58.6)		170 (55.9)	
No	1598 (76.2)	258 (15.1)	<.0001	133 (51.2)	.31
Diabetes					
Yes	224 (10.1)	140 (63.7)		83 (56.6)	
No	1885 (89.9)	419 (21.1)	<.0001	220 (52.8)	.47
Obesity					
Yes	851 (39.6)	321 (38.2)		171 (53.4)	
No	1258 (60.4)	238 (17.1)	<.0001	132 (54.3)	.86
Heart condition					
Yes	210 (9.3)	117 (55.7)		70 (58.5)	
No	1899 (90.7)	442 (22.3)	<.0001	233 (52.6)	.29
Number of above health conditions (comorbidities)					
None	932 (45.7)	98 (9.2)		50 (50.1)	
1 condition	732 (33.8)	181 (24.2)		98 (53.8)	
2 conditions	301 (13.8)	168 (56.8)		87 (53.5)	
3 or more conditions	144 (6.7)	112 (78.1)	<.0001	68 (57.2)	.83

[a]Prevalence estimates are weighted for age, sex, race, and household income to represent the US 2000 Census population.

[b]*P* value from χ^2 statistic.

[c]Positive attitudes to lowering blood pressure for reducing risk of having a heart attack or stroke consisted of nine actions.

TABLE 2

Home Blood Pressure Monitoring Among Adults With High Blood Pressure—American Heart Association Cardiovascular Health Survey, 2012

Characteristics	Adjusted Odds Ratio (95% Confidence Interval)
Age, y	
18–34	Reference
35–64	1.95 (0.95–4.00)
65	2.46 (1.08–5.59)
Sex	
Men	Reference
Women	1.15 (0.78–1.71)
Race/ethnicity	
Non-Hispanic whites	Reference
Non-Hispanic blacks	0.92 (0.53–1.58)
Hispanic	1.07 (0.52–2.21)
Non-Hispanic others	1.49 (0.44–5.05)
Non-Hispanic whites	
Employment	
Employed	Reference
Retired	1.41 (0.83–2.38)
Not employed	1.20 (0.65–2.21)
Saw healthcare professional in the past 12 mo	
Yes	2.00 (0.81–4.99)
No	Reference
Believe that lowering blood pressure can reduce cardiovascular risk	
Yes	2.44 (1.15–5.19)
No	Reference