

Popular home blood pressure monitoring cuff devices may not fit some US adults

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At-home blood-pressure monitor cuffs may improperly fit many adults in the U.S., according to preliminary research presented at the American Heart Association's [Hypertension Scientific Sessions 2024](#) and

simultaneously published in the journal *Hypertension*. The meeting is held in Chicago, September 5–8, 2024.

Researchers investigated the cuff size available with home blood pressure monitors. They estimate that for as many as 18 million U.S. adults—nearly 7% of the [adult population](#)—the cuffs are too small or too large and may not provide accurate blood pressure measurements. A separate [recent clinical trial](#) found that a cuff that is one size too small or one size too large can over- or under-estimate blood pressure readings.

"Most popular blood pressure devices we tested had the same cuff size coverage—to fit arms with a circumference from 8.7 to 16.5 inches (22 centimeters to 42 centimeters). We estimate that these one-size cuffs would not properly fit approximately 18 million U.S. adults potentially providing inaccurate blood pressure measures," said senior study author Kunihiro Matsushita, M.D., Ph.D., FAHA, a professor in the department of epidemiology in the division of cardiology at Johns Hopkins University in Baltimore.

According to the [American Heart Association's 2024 Statistical Update](#), nearly half of U.S. adults have been diagnosed with [high blood pressure](#). Uncontrolled high blood pressure can lead to heart attack, stroke, heart failure and other complications.

The [2017 ACC/AHA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults](#) classifies high blood pressure as having top or bottom blood pressure measures greater than or equal to 130/80 mm Hg.

The Association recommends all people with high blood pressure monitor their blood pressure at home with a home blood pressure monitor between office visits to help their health care professional know if treatments are working. Upper arm cuff devices are preferred over

wrist devices, according to an American Heart Association/American Medical Association [2020 joint report](#).

For this study, researchers reviewed 10 of the most popular blood-pressure monitoring devices sold through a large online retailer. Nine of the 10 devices offered a cuff-size range of 22- to 42-centimeters (8.7 inches to 16.5 inches) in circumference. Although several manufacturers offer additional cuff sizes at an extra cost, the researchers focused on the cuffs that come standard with the blood pressure devices because most consumers are likely to use those default cuffs.

After comparing the circumference of the devices against data from the U.S. National Health and Nutrition Examination Survey (NHANES) from 2015–2020 and extrapolating that representative data on to U.S. Census data, the researchers concluded:

- 6.7% of U.S. adults (17.3 million adults based on the 2023 U.S. Census) could not use these devices because their arm circumferences were less than 8.7 inches (22 centimeters) or greater than 16.5 inches (42 centimeters).
- The proportion of adults whose arms would not fit in these devices was highest among Black adults (11.8%), compared to white adults (6.6%), Hispanic adults (5.2%) and Asian adults (1.8%).

"This disparity in sizing is particularly concerning given the already high and increasing prevalence of high blood pressure among Black adults. To increase equity, manufacturers should prioritize the development and affordable sale of blood pressure measuring devices that accommodate arm circumferences greater than 42 centimeters, and health care professionals should measure patients' arm circumferences to help them select an appropriate cuff size when purchasing a home blood pressure device," Matsushita said.

"Addressing the size disparity in [device](#) design is crucial for quality and equitable high blood pressure diagnosis and management."

Study details, background or design:

- The researchers reviewed data from the National Health and Nutrition Examination Survey (NHANES 2015–2020) database for 13,826 adults who were 18 years or older and not pregnant. This database was also the source used to quantify how many people would be ineligible to use retail devices due to arm circumference.
- Participants' average age was 47 years-old; 51% self-identified as women and 49% as men.
- Participants were considered to have high blood pressure if they had blood pressure readings of 130/80 mm Hg or higher, a self-reported physician diagnosis of high blood pressure, or if they were taking blood pressure medication.
- Researchers searched a large online retailer's automatic blood pressure category in January 2024 to identify the most widely used devices by referencing their ranking, number of purchases and number of ratings in the previous month.
- Please note: The data in this news release are updated and therefore do not match the data in the abstract but do match the data in the simultaneous publication. The update has been confirmed by the researchers.

The study's limitations included its restriction to a single large online retailer and only 10 devices. The researchers had planned to review 16 devices. However, six devices were unavailable for purchase.

"This study is interesting, important and provides very practical information. Use of an incorrect arm cuff size is one of the more important sources of systematic (predictable) error during blood pressure

measurement," said Paul K. Whelton, M.B., M.D., M.Sc., FAHA.

"This research found that the number of U.S. adults expected to have an arm size larger than routinely covered by the cuff size provided by the manufacturer (16.5 million) was much larger than the number expected to have an arm size smaller than that routinely covered by the manufacturer (0.8 million).

"Thus, the use of a routinely sized cuff is far more likely to result in overestimation of hypertension rather than underestimation of hypertension. The best solution is to have cuffs of different sizes available, so a cuff that is of correct size for the patient can be chosen."

Whelton is the Show Chwan Chair in Global Public Health in the department of epidemiology at Tulane University's School of Public Health and Tropical Medicine in New Orleans and president of the World Hypertension League, as well as chair of the American Heart Association's 2017 [Hypertension Practice Guidelines](#) and a member of the writing committee for the Association's 2021 Scientific Statement on [Management of Stage 1 Hypertension in Adults](#).

"In addition to selection of the correct cuff size, other sources of systematic (predictable) error should be excluded by preparing the patient, choosing an appropriate BP measurement site and using clinically validated BP measurement devices," Whelton said.

More information: Moderated Poster Presentation MP23 in Session MPS04 Social Determinant of Health and Blood Pressure is Friday, September 6, 2024, at 10:10 am CT.

Provided by American Heart Association

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