



Add Health

The National Longitudinal Study of Adolescent to Adult Health

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Cardiovascular Measures User Guide



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This document summarizes the rationale, equipment, measurement, protocol and data cleaning procedures for each of the cardiovascular measures collected at the Wave VI home exam. It also documents how constructed variables were derived from the cardiovascular measures collected in the field. Whenever possible, data collection and methods in Wave VI mirrored those of Wave V to ensure comparability of data between waves. This document is one in a set of Wave VI user guides. User guides are also available to describe protocols for the following biological measures in Wave VI:

- Anthropometrics
- Baroreflex Sensitivity & Hemodynamic Recovery
- Biomarker Weights
- Glucose Homeostasis
- Hepatic Injury
- Home Exam – Medication Use
- Home Exam Questionnaire and QC Metrics
- Infection
- Inflammation and Immune Function
- Lipids
- Neurodegeneration
- Renal Function

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1. Introduction

The cardiovascular measures collected at Add Health Wave V were also collected at the Wave VI home exam in the following order:

- Arm Circumference (cm)
- Systolic blood pressure (SBP, mm Hg)
- Diastolic blood pressure (DBP, mm Hg)
- Pulse rate (PR, beats/min)

In addition, the Add Health Wave VI cardiovascular data set includes eight constructed measures based on information collected at the home exam:

- Average systolic blood pressure
- Average diastolic blood pressure
- Average pulse rate
- Pulse pressure (mm Hg)
- Mean arterial pressure (mm Hg)
- Blood pressure classification based on JNC7
- Blood pressure classification based on AHA/ACC
- Antihypertensive medication use
- Joint classification of average blood pressures, history of health care provider-diagnosed high blood pressure, and antihypertensive medication use

2. General Overview of Data Collection

2.1. Biomarker Consent & Scheduled Home Exam

During the Wave VI Survey, participants were asked if they would agree to participate in the Wave VI home exam administered by a field examiner (FE), which included taking measurements and collecting a blood sample. If the participant agreed, examiners from the Add Health data collection partner (Section 2.2) scheduled a date and time for the home exam. Depending on participant and/or FE availability, the time between the Wave VI Survey completion and the home exam ranged from days to years (see the time interval variable H6TIMESE in the *bdemo6* data set and codebook).

2.2. Home Exam

All data were collected during home exams performed by ExamOne, a subsidiary of Quest Diagnostics®. All FEs were trained and certified using a custom program specific to the Add Health protocol. FEs used a 7" Samsung Galaxy Tab A7 Lite tablet to record and transmit data. An Add Health data collection application (Open Data Kit or ODK) installed on the tablet guided the FEs through the home exam protocol. In addition, FEs received a series of job aids, both on paper and on the tablet, to serve as quick

reference guides when completing the protocol. Each tablet also contained an in-depth Add Health training manual that could be accessed at any time.

Once the home exam was initiated, a few preliminary questions were asked of participants, and then cardiovascular measures were collected. Participants were free to skip any portion of the data collection or terminate the visit at any time. Particular care was taken to provide participants with written documentation of mean blood pressures and current guideline-based recommendations for follow-up.

3. Arm Circumference (cm) [H6ARMCIR]

3.1 Rationale

Arm circumference was measured to guide selection of an appropriately sized blood pressure cuff for the cardiovascular measures.

3.2 Equipment

FEs used a SECA 201 metric-increment circumference soft tape measure (Seca Corp., North America East; Hanover, MD) to measure arm circumference (**Figure 1**).

Specifications:

- 200 cm maximum range
- 1 mm graduations
- 2-sided cm scaling
- 90 x 25 x 65 mm
- 50 g
- Fiberglass tape
- Plastic case
- Automatic roll-up
- End-peg positioned



Figure 1. SECA 201 Tape

3.3 Measurement and Protocol

Trained and certified FEs measured right arm circumference and blood pressure unless one or more of the following contraindications were present:

- open sores, wounds, gauze dressings or rashes;
- casts, splints or shunts;
- intravenous (IV) catheters or other attached medical devices;
- swelling, withering or paralysis; or

- arm on same side as prior mastectomy.

If there were contraindications to the measurement of right arm circumference or blood pressure, FEs measured left arm circumference. If there were contraindications to measurement on both arms, arm circumference and blood pressure were not measured.

To measure arm circumference accurately, FEs asked participants to remove bulky outer garments (e.g., sweaters or jackets) and, if applicable, push up their shirt sleeves to expose the upper arm. FEs also instructed participants to relax their shoulders and allow their arm to be measured while hanging loosely at their side. FEs wrapped the SECA tape around the participant's upper arm, midway between the shoulder and elbow. Arm circumference was measured to the nearest 0.5 cm and entered into the tablet which determined the appropriate cuff size for blood pressure measurement. The cuff used was based on the following tables (**Figure 2**):

Arm Circumference	BP taken	Cuff Size
< 21.9 cm	Yes	Medium
22.0-31.9 cm	Yes	Medium
32.0-52.0 cm	Yes	Extra Large
> 52.0 cm	No	N/A

Figure 2. Cuff Size and Blood Pressure Measurement

3.4 Data Cleaning

Arm circumferences entered in inches were converted to centimeters. The skip logic and distribution of the entered arm circumferences were checked for outliers and inconsistencies. Outlying measured arm circumferences were identified using an extreme studentized deviate (ESD) multiple outlier detection procedure.¹ The ESD procedure identified outlying measured arm circumferences as well as outlying differences between 1) measured arm circumference at Wave VI and 2) measured arm circumference at Wave V. All outliers identified as described above were investigated for inconsistencies within Wave VI and across Waves V–VI. Clearly implausible or inconsistent Wave VI arm circumferences were recoded to “invalid data” (H6ARMCIR=-9999). After recoding, measured arm circumferences were compared to the 2021-2023 National Health and Nutrition Examination Survey (NHANES) age-, sex-, and race-specific 5th and 95th percentiles of arm circumference.² Approximately 20.4% of the measured arm circumferences were < the 5th percentile and 2.1% were > the 95th percentile.

4. Cardiovascular Measures

4.1 Rationale

Blood pressure and pulse rate were measured because of their established relationship with cardiovascular disease morbidity and mortality.

4.2 Equipment

FEs used a factory calibrated, Microlife BP3GQ1-3P oscillometric blood pressure monitor (MicroLife USA, Inc.; Dunedin, FL) recommended for clinical and home use by the British Hypertension Society (**Figure 3**) and a medium or extra large cuff to measure blood pressure and pulse rate.

Specifications:

- Weight: 346 g (with batteries)
- Size: 82 (W) x 136 (L) x 58 (H) mm
- Storage Temperature: -20°C - 50°C (-4°F -131°F)
- Humidity: 15%-90% relative humidity maximum
- Operation Temperature: 10°C-40°C (50°F-104°F)
- Display: Liquid crystal display (LCD)
- Measuring Method: Oscillometric
- Pressure Sensor: Capacitive
- Measuring Range: 60-255 mm Hg (SBP), 40-200 mm Hg (DBP); 40 to 200 beats/min (PR)
- Cuff Pressure Display Range: 0-299 mm Hg
- Measuring Resolution: 1 mm Hg
- Accuracy: ± 3 mm Hg (SBP & DBP); ± 5 % (PR)
- Power Source: [1] 4 AA batteries, 1.5V [2] AC Adapter 6V DC 600 mA (4.5-6 V DC)
- Medium Cuff (MSC, for arm circumferences: 22 - 32 cm)
- Extra Large Cuff (XLSC, for arm circumferences: 32 - 52 cm)



Figure 3. Microlife Blood Pressure Monitor

4.3 Measurement

Trained and certified FEs measured resting, seated systolic and diastolic blood pressure (mm Hg) and pulse rate (beats/minute). Three serial measurements were collected separated by at least 30-second intervals. Readings from the display on the BP monitor were keyed into the tablet ODK. Variable names are as listed in **Figure 4**.

Measure	Variable	Measure	Variable	Measure	Variable
SBP #1	H6BPSYS1	DBP #1	H6BPDIA1	PR #1	H6BPPULSE1
SBP #2	H6BPSYS2	DBP #2	H6BPDIA2	PR #2	H6BPPULSE2
SBP #3	H6BPSYS3	DBP #3	H6BPDIA3	PR #3	H6BPPULSE3

Figure 4. Variable Names of Direct Measures

4.4 Protocol

FEs used the Microlife blood pressure monitor supplied by Add Health unless unable to do so. When an alternate monitor was used (n = 15 [0.3%] of 6,073 exams), the reason was recorded in the tablet.

Participants who left their seat for any reason during the five minutes before blood pressure measurement were resealed. All participants rested with both feet on the floor and legs uncrossed for five minutes before and during blood pressure measurement. FEs positioned the Microlife monitor display so that it was outside the view of participants.

FEs collected three measurements of blood pressure and pulse rate separated by at least 30 second intervals. During each interval, participants raised their elbow to the level of the shoulder and held the forearm upward at a 90-degree angle for five seconds after which the tablet presented a 20 second countdown ending in a visual cue and audible chime to prompt the next measurement. Immediately following each of the three measurements, FEs keyed the systolic and diastolic blood pressures and pulse rate into the tablet ODK.

In the event of a measurement error, FEs keyed the error message code from the Microlife display into the tablet ODK. The tablet returned the appropriate, i.e. manufacturer-recommended solution to the FE, who then implemented it and repeated the measurement. In the uncommon event of a recurring measurement error, it also was keyed into the tablet ODK, the remaining measurements were skipped, the FE stopped using the monitor and contacted the field supervisor. All malfunctioning monitors and cuffs were immediately withdrawn from fieldwork and replaced.

Using average blood pressure measures as well as self-reported pregnancy status, smoking status, and history of health care provider-diagnosed cardiovascular risk factors, the tablet ODK provided current

guideline-based recommendations for (1) follow-up with a health care provider,³ (2) skipping the blood draw, and / or (3) halting the visit as illustrated in **Figure 5** below. When mean SBP and DBP did not fall within the same follow-up category, the earlier follow-up was recommended. When mean SBP and DBP warranted follow up within one day, the tablet ODK prompted FEs to immediately terminate the home exam and stay with participants for up to 30 minutes while they called a health care provider, friend or relative to discuss the results (n = 42 [0.7%] of 6,073 participants).

SBP* (mm Hg)		DBP† (mm Hg)	Risk Factors‡	Follow-up	Blood Draw?	Halt Visit?
<120	AND	<80	NA	1 year	Yes	No
120-129	AND	<80	NA	3-6 months	Yes	No
130-139	OR	80-89	Negative	3-6 months	Yes	No
130-139	OR	80-89	Positive	1 month	Yes	No
140-180	OR	90-120	NA	1 month	Yes	No
>180	OR	>120	NA	1 day	No	Yes

Follow-up based on the Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults from the American Heart Association/American College of Cardiology Task Force.² * Average of SBP #2 & #3 (mm Hg) [Variable: H6SBP]. †Average of DBP #2 & #3 (mm Hg) [Variable: H6DBP]. ‡ Self-reported pregnancy – known or not known [Variable: H6BQ01 = 1 or -9998] or currently smoke [Variable: H6BQ06 = 1] or history of health care provider-diagnosed high blood pressure [Variable: H6CQ47A = 1], diabetes [Variable: H6CQ47B = 1], heart disease [Variable: H6CQ47C = 1], chronic kidney disease [Variable: H6CQ47D = 1], stroke [Variable: H6CQ47E = 1] or high cholesterol or triglycerides [Variable: H6CQ47F = 1]. NA = not applicable.

Figure 5. Recommendations for Follow-up, Blood Draw, and Visit

FEs transferred the follow-up recommendation to a “Cardiovascular Health Sheet” and gave it to participants after the home exam. The sheet included the date of the home exam, mean systolic and diastolic blood pressures warranting the follow-up recommendation, information about risk factors for heart disease, and contact information for the American Heart Association.

4.5 Data cleaning

Blood pressure and pulse rate were double keyed, automatically compared, and range checked at the time of entry into the tablet ODK to prevent keystroke errors. They also were plotted over time, statistically summarized, and reviewed weekly throughout Wave VI to monitor missing data, outliers, digit preference, and short-term reliability. Moreover, repeated measures were compared for consistency.

5. Constructed Measures

For the following constructed variables that are based on the blood pressure and pulse rate collected three times during the visit, the final calculations were made using measures 2 and 3 whenever possible. When either measure 2 or 3 was missing, the other single measure was used in the calculation. In cases when both measures 2 and 3 were missing, measure 1 was used in the calculation. The variable H6BPFLG indicates which measures were used in the construction of each of these calculated variables. **Figure 6** lists the possible values for the H6BPFLG variable.

H6BPFLG	Measures Used
1	2 nd & 3 rd
2	3 rd only
3	2 nd only
4	1 st only
5	No measures

Figure 6. Measures Used for Blood Pressure and Pulse Rate

5.1 Average systolic blood pressure (mm Hg) [H6SBP]

Average systolic blood pressure was constructed as the mean of systolic blood pressures 2 and 3. When either measure 2 or 3 was missing, the systolic blood pressure for the other single measure was used. In cases when both measures 2 and 3 were missing, systolic blood pressure 1 was used.

5.2 Average diastolic blood pressure (mm Hg) [H6DBP]

Average diastolic blood pressure was constructed as the mean of diastolic blood pressures 2 and 3. When either measure 2 or 3 was missing, the diastolic blood pressure for the other single measure was used. In cases when both measures 2 and 3 were missing, diastolic blood pressure 1 was used.

5.3 Average pulse rate (beats/min) [H6PR]

Average pulse rate was constructed as the mean of pulse rates 2 and 3. When either measure 2 or 3 was missing, the pulse rate for the other single measure was used. In cases when both measures 2 and 3 were missing, pulse rate 1 was used.

5.4 Pulse pressure (mm Hg) [H6PP]

Pulse pressure was constructed as the average of the difference between systolic and diastolic blood pressures using measures 2 and 3. When either measure 2 or 3 was missing, the difference between systolic and diastolic blood pressure for the other single measure was used. In cases when both

measures 2 and 3 were missing, the difference between the systolic and diastolic blood pressure 1 was used. The formula is:

$$((\text{SBP2} - \text{DBP2}) + (\text{SBP3} - \text{DBP3}))/2$$

5.5 Mean arterial pressure (mm Hg) [H6MAP]

Mean arterial pressure was conventionally approximated as the weighted sum of systolic and diastolic blood pressure measures 2 and 3, where the weights for SBP (1/3) and DBP (2/3) reflect the typical contributions of ventricular systole and diastole to the duration of the cardiac cycle. When either measure 2 or 3 was missing, the other single measure was used. In cases when both measures 2 and 3 were missing, the first measure was used. The formula is:

$$(((\text{SBP2} + (2 * \text{DBP2}))/3) + ((\text{SBP3} + (2 * \text{DBP3}))/3))/2$$

5.6 Blood pressure classification based on JNC7 [H6BPCLS4]

For historical continuity, classification of average blood pressures was based on guidelines from the Seventh Report of the Joint National Committee on Prevention Detection, Evaluation, and Treatment of High Blood Pressure (JNC7).⁴

JNC7 Category	H6SBP (mm Hg)		H6DBP (mm Hg)	H6BPCLS4
Normal	< 120	AND	< 80	1
Pre-hypertension	120-139	OR	80-89	2
Hypertension Stage 1	140-159	OR	90-99	3
Hypertension Stage 2	≥ 160	OR	≥ 100	4

Figure 6. JNC7 Classification of Blood Pressure

5.7 Blood pressure classification based on AHA/ACC [H6BPCLS5]

Classification of average blood pressures also was based on the more current Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults from the American Heart Association/American College of Cardiology Task Force (AHA/ACC).^{3,5}

AHA/ACC Category	H6SBP (mm Hg)		H6DBP (mm Hg)	H6BPCLS5
Normal	<120	AND	<80	1
Elevated	120-129	AND	<80	2
Hypertension Stage 1	130-139	OR	80-89	3
Hypertension Stage 2	140-180	OR	90-120	4
Hypertension Crisis	>180	OR	>120	5

Figure 7. AHA/ACC Classification of Blood Pressure

5.8 Antihypertensive medication use [H6EAHT]

Use of a prescription medication in the past 4 weeks in one or more of the therapeutic classes defined elsewhere,⁶ but also listed below (**Figure 8**) was assigned a value of 1. Non-use of a prescription medication in the past four weeks in one of the therapeutic classes listed below was assigned a value of 0.

Class	Label	Variable
040-042-***	Angiotensin converting enzyme (ACE) inhibitors	H6EAHT
040-043-***	Anti-adrenergic agents (peripherally acting)	
040-044-***	Anti-adrenergic agents (centrally acting)	
040-046-386 040-047-***	Beta-adrenergic blocking agents	
040-046-388 040-048-***	Calcium channel blocking agents	
040-049-156	Thiazide diuretics	
040-053-***	Vasodilators	
040-055-***	Antihypertensive Combinations	
040-056-***	Angiotensin II inhibitors	
040-342-***	Renin inhibitors	
040-482-***	Angiotensin receptor blockers and neprilysin inhibitors	

Figure 8. Antihypertensive Medication Use

Therapeutically classified use of prescription medication in particular classes may confound biomarker-based estimates of disease prevalence or risk. For example, use of antihypertensive medications may confound blood pressure-based estimates of hypertension prevalence or cardiovascular disease risk. However, the (1,0) classifications should be used cautiously in the investigation or control of potential confounding, because selection biases often threaten the study of non-randomized medication

exposures.^{7,8}

5.9 Joint Classification of Hypertension Based on JNC7 [H6HTENJC]

For historical continuity, participants were flagged as having evidence of hypertension when they met **at least one** of the following criteria in **Figure 9**:

Criterion (≥ 1 of the following must be true)	Variable & Value
JNC7 Hypertension Stage 1 or 2	H6BPCLS4 = 3 or 4
Self-reported history of diagnosed high blood pressure	H6CQ47A = 1
Antihypertensive medication use in the past 4 weeks	H6EAHT= 1

Figure 9. Criteria Used to Identify Hypertension Using JNC7 Classifications

The criteria are analogous to those adopted at Waves IV-V,^{9,10} in that they *rely only on contemporaneous information collected at the home exam and the JNC7 classification*.

5.10 Joint Classification of Hypertension Based on AHA/ACC [H6HTENJC2]

Participants were flagged as having evidence of hypertension when they met **at least one** of the following criteria in **Figure 10**:

Criterion (≥ 1 of the following must be true)	Variable & Value
AHA/ACC Hypertension Stage 1, Stage 2, or Crisis	H6BPCLS5 = 3, 4 or 5
Self-reported history of diagnosed high blood pressure	H6CQ47A = 1
Antihypertensive medication use in the past 4 weeks	H6EAHT= 1

Figure 10. Criteria Used to Identify Hypertension Using AHA/ACC Classifications

The criteria *rely only on contemporaneous information collected at the home exam and the AHA/ACC classification, which also could be applied retrospectively to Waves IV and V*.

6. Quality Control

6.1. Equipment Evaluation and Accuracy

To ensure it was in working order, all field equipment was evaluated before study start-up in 2020.

6.2. Digit Preference

FE-specific digit preference was monitored throughout fieldwork using a Pearson χ^2 test of the null hypothesis that all possible digits (0, 1, 2, ..., 9) were observed with equal frequency and a digit preference score (DPS).¹¹ As at Add Health Wave V, there was little evidence of penultimate digit preference in FE recording of measured arm circumference (DPS: 1.3) or terminal digit preferences in recording of blood pressures or pulse rates (DPS range: 2.2–3.5). There was, however, some evidence of whole- and half-unit rounding of terminal digits for arm circumferences despite FE training aimed at eliminating it (DPS: 51.8).¹²

6.3. Reliability

Within a race/ethnicity- and sex-stratified random sample of 143 Add Health participants among whom cardiovascular measures were collected twice, on average 13.0 (95% confidence interval: 11.9–14.1) days apart, typically by the same FE and at approximately the same time of day, the reliability of arm circumference, blood pressures and pulse rates was estimated as an intra-class correlation coefficient (ICC, 95% confidence interval) (**Figure 10**). The estimates (range: 0.63–0.90) reflected those stemming from Add Health Waves IV-V and suggested that home exam cardiovascular measures are comparably reliable at Add Health Wave VI.¹²

Measure	N	ICC	95% CI
Arm (cm)	143	0.90	(0.87,0.93)
SBP #1	143	0.74	(0.66,0.81)
SBP #2	143	0.72	(0.64,0.80)
SBP #3	143	0.73	(0.66,0.81)
Average SBP	143	0.75	(0.68,0.82)
DBP #1	143	0.68	(0.59,0.77)
DBP #2	143	0.69	(0.61,0.78)
DBP #3	143	0.70	(0.61,0.78)
Average DBP	143	0.73	(0.65,0.81)
PR #1	143	0.63	(0.53,0.73)
PR #2	143	0.68	(0.59,0.77)
PR #3	143	0.69	(0.60,0.78)
Average PR	143	0.71	(0.62,0.79)

Figure 10. Reliability of Cardiovascular Measures

7. The Cardiovascular Data File (bcardio6.sas7bdat)

7.1. Structure

The structure of the disseminated cardiovascular data file is flat. This means that it is a participant-level data file, wherein each participant has one and only one record. The participant identifier (AID) will appear in the data file only once.

7.2. Contents

The cardiovascular data file includes the variables below, which are described in the corresponding codebook documentation that also contains frequencies.

<u>Variable Name</u>	<u>Variable Description</u>
AID	Participant Identifier
H6ARM	CQ07: Which arm is measured (1=R, 2=L)
H6ARMCIR	Measured arm circumference (cm)
H6ARMINS	Arm measure converted from inches to cm
H6CUFFIT	Arm circumference fits blood pressure cuff
H6BPSYS1	BPSYS1: Systolic blood pressure #1 (mm Hg)
H6BPDIA1	BPDIA1: Diastolic blood pressure #1 (mm Hg)
H6BPPULSE1	BPPULSE1: Pulse rate #1 (/min)
H6BPSYS2	BPSYS2: Systolic blood pressure #2 (mm Hg)
H6BPDIA2	BPDIA2: Diastolic blood pressure #2 (mm Hg)
H6BPPULSE2	BPPULSE2: Pulse rate #2 (/min)
H6BPSYS3	BPSYS3: Systolic blood pressure #3 (mm Hg)
H6BPDIA3	BPDIA3: Diastolic blood pressure #3 (mm Hg)
H6BPPULSE3	BPPULSE3: Pulse rate #3 (/min)
H6ALTBP	Alternate blood pressure unit used
H6BQ01	BQ01: Self-reported pregnancy
H6BQ06	BQ06: Do you smoke any tobacco products
H6CQ47A	CQ47a: Ever diagnosed with high blood pressure or hypertension
H6CQ47B	CQ47b: Ever diagnosed with high blood sugar or diabetes
H6CQ47C	CQ47c: Ever diagnosed with heart attack or heart surgery for clogged coronary arteries
H6CQ47D	CQ47d: Ever diagnosed with kidney disease or failure
H6CQ47E	CQ47e: Ever diagnosed with stroke, mini-stroke or surgery for clogged neck arteries
H6CQ47F	CQ47f: Ever diagnosed with high cholesterol, triglycerides or lipids
H6BPFLG	Number of BP/PR measures used for single measure
H6SBP	Average systolic blood pressure (mm Hg)
H6DBP	Average diastolic blood pressure (mm Hg)
H6PR	Average pulse rate (/min)
H6PP	Pulse pressure (mm Hg)
H6MAP	Mean arterial pressure (mm Hg)
H6BPCLS4	Blood pressure classification based on JNC7
H6BPCLS5	Blood pressure classification based on AHA/ACC
H6EAHT	Antihypertensive medication use in past 4 weeks

H6HTENJC
H6HTENJC2

Joint classification of hypertension based on JNC7
Joint classification of hypertension based on AHA/ACC

8. References

1. Rosner, B. Percentage Points for a Generalized ESD Many-Outlier Procedure. *Technometrics* 1983;25(2),165-172.
2. Centers for Disease Control and Prevention (CDC). National Center for Health Statistics (NCHS). National Health and Nutrition Examination Survey Data. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2021-2023. www.cdc.gov/nchs/nhanes.
3. Whelton PK, Carey RM, Aronow WS, Casey DE Jr, Collins KJ, Dennison Himmelfarb C, DePalma SM, Gidding S, Jamerson KA, Jones DW, MacLaughlin EJ, Muntner P, Ovbigele B, Smith SC Jr, Spencer CC, Stafford RS, Taler SJ, Thomas RJ, Williams KA Sr, Williamson JD, Wright JT Jr.; 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol* 2018;71(19):2199-2269.
4. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, Jones DW, Materson BJ, Oparil S, Wright JT Jr, Roccella EJ; Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National Heart, Lung, and 16 Blood Institute; National High Blood Pressure Education Program Coordinating Committee. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Hypertension* 2003;42(6):1206-1252.
5. Jones DW, Ferdinand KC, Taler SJ, Johnson HM, Shimbo D, Abdalla M, Altieri MM, Bansal N, Bello NA, Bress AP, Carter J, Cohen JB, Collins KJ, Commodore-Mensah Y, Davis LL, Egan B, Khan SS, Lloyd-Jones DM, Melnyk BM, Mistry EA, Ogunniyi MO, Schott SL, Smith SC Jr, Talbot AW, Vongpatanasin W, Watson KE, Whelton PK, Williamson JD. 2025 AHA/ACC/AANP/AAPA/ABC/ACCP/ACPM/AGS/AMA/ASPC/NMA/PCNA/SGIM Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Hypertension* 2025;82(10):e212-e316.
6. Angel RA, Grago J, Qu L, Carrier KS, Hummer RA, Whitsel EA. Add Health Wave VI Documentation: *Medication Use – Biomarker Home Exam*, 2025; Available from: <https://doi.org/10.17615/qkqz-ye89>
7. Sender R, Stürmer T. Core concepts in pharmacoepidemiology: confounding by indication and the role of active comparators. *Pharmacoepidemiol Drug Saf* 2022;31(3):261-269.
8. Ray WA. Evaluating medication effects outside of clinical trials: new-user designs. *Am J Epidemiol* 2003;158(9):915-920.

9. Nguyen QC, Tabor JW, Entzel PP, Lau Y, Suchindran C, Hussey JM, Halpern CT, Harris KM, Whitsel EA. Discordance in national estimates of hypertension among young adults. *Epidemiology* 2011;22(4):532-541.
10. Whitsel EA, Nguyen QC, Suchindran CM, Hussey JM, Killea-Jones LA, Tabor JW, Fitzgerald CS, Hallquist SP, Halpern CT, Harris KM. Value added: quality, quantity and diversity of national blood pressure data on young adults. *Epidemiology* 2011;22(4):544-545.
11. National Heart, Lung and Blood Institute, Atherosclerosis Risk in Communities Study. Chapel Hill, North Carolina: Collaborative Studies Coordinating Center; 1989. Manual 12: Quality assurance and quality control, section 5.2. Monitoring for digit preference.
https://www5.csc.unc.edu/aric9/sites/default/files/public/visitdocuments/v1/Quality_Assurance_and_Quality_Control.1_12.pdf.
12. Hussey JM, Nguyen QC, Whitsel EA, Richardson LJ, Halpern CT, Gordon-Larsen P, Tabor JW, Entzel PP, Harris KM. The Reliability of In-home Measures of Height and Weight in Large Cohort Studies: Evidence from Add Health. *Demogr Res* 2015;32:1081-1098.