

# National Health and Nutrition Examination Survey

## August 2021-August 2023 Data Documentation, Codebook, and Frequencies

### Blood Pressure - Oscillometric Measurements (BPXO\_L)

**Data File:** BPXO\_L.xpt

**First Published:** September 2024

**Last Revised:** NA

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### Component Description

This section provides data for three consecutive blood pressure (BP) and pulse measurements using an oscillometric device.

### Eligible Sample

Participants aged 8 years and older were eligible. Participants with any of the following on both arms were excluded from the exam: rashes, gauze dressings, casts, edema, paralysis, tubes, open sores or wounds, withered arms, and A-V shunts. Also, women who have had an axillary nodal biopsy or resection, or a unilateral radical mastectomy, do not have their blood pressure measured in the affected arm.

### Protocol and Procedure

All BP measurements are taken in the mobile examination center (MEC). Prior to obtaining BP measurements, upper arm circumference is measured, which is done to guide selection of cuff size.

After resting quietly in a seated position for 5 minutes, three consecutive BP measurements (systolic and diastolic) were taken 60 seconds apart using a digital upper-arm electronic blood pressure measurement device, Omron HEM-907XL. This device has been previously validated by both the Association for the Advancement of Medical Instrumentation (AAMI) and the International Protocol of the European Society of Hypertension for taking BP measurements in populations aged 13 years and older (White et. al., 2002; Ombani et. al., 2007; Ostchega et. al., 2010).

BP measurements were taken in the right arm unless specific conditions prohibited the use of the right arm, or if participants reported any reason that the BP measurements should not be taken in the right arm.

Details on the protocol for obtaining upper arm circumference and BP are described in the NHANES [August 2021–August 2023](#) procedure manuals.

### Quality Assurance & Quality Control

The BP examiners were certified for BP measurement through a training program and followed a strict standardized BP protocol. In addition, examiners were observed to assure that BP

readings were obtained following the standardized protocol. Health technician performance was also monitored using data reviews.

## Data Processing and Editing

The following are some specifications used in capturing the BP data:

- Systolic BP cannot be greater than 300 mmHg;
- Systolic blood pressure must be greater than diastolic BP;
- If there is no systolic BP, there can be no diastolic BP. However, there can be a systolic measurement without a diastolic measurement.

## Analytic Notes

After the 2017-2018 survey cycle, NHANES stopped collection of auscultatory BP measurements using a mercury sphygmomanometer. During the 2017-2018 survey cycle, blood pressure was collected using both auscultatory (with a mercury sphygmomanometer) and oscillometric (with the Omron HEM-907XL) methods. Additional details and results from the study, comparing auscultatory and oscillometric BP measurements, are available in an NCHS Vital and Health Statistics Series 2 Report at [NCHS website](#) (Ostchega et. al., 2021).

Exam sample weights should be used for analyses. Please refer to the [NHANES Analytic Guidelines](#) and the on-line [NHANES Tutorial](#) for further details on the use of sample weights and other analytic issues.

## References

- Ombani S, Riva I, Giglio A, Caldara G, Groppelli A, Parati G. Validation of the Omron M5-I, R5-I and HEM-907 automated blood pressure monitors in elderly individuals according to the international protocol of the European Society of Hypertension. *Blood Press Monit* 12(4):233-42. 2007.
- Ostchega Y, Nwankwo T, Chiappa M, Wolz M, Gruber J, Nguyen DT. Comparing blood pressure values obtained by two different protocols: National Health and Nutrition Examination Survey, 2017-2018. National Center for Health Statistics. *Vital Health Stat* 2(187). 2021.
- Ostchega Y, Nwankwo T, Sorlie PD, Wolz M, Zipf G. Assessing the validity of the Omron HEM-907XL oscillometric blood pressure measurement device in a national survey environment. *J Clin Hypertens (Greenwich)* 12(1):22-8. 2010
- White WB, Anwar YA. Evaluation of the overall efficacy of the Omron office digital blood pressure HEM-10. El Assaad MA, Topouchian JA, Darné BM, Asmar RG. Validation of the Omron HEM-907 device for blood pressure measurement. *Blood Press Monit* 7(4):237-41. 2002.

## Codebook and Frequencies

### SEQN - Respondent sequence number

**Variable Name:** SEQN  
**SAS Label:** Respondent sequence number  
**English Text:** Respondent sequence number.  
**Target:** Both males and females 8 YEARS - 150 YEARS

## BPAOARM - Arm selected - oscillometric

**Variable Name:** BPAOARM  
**SAS Label:** Arm selected - oscillometric  
**English Text:** Arm selected - oscillometric  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
L	Left	51	51	
R	Right	7603	7654	
< blank >	Missing	147	7801	

## BPAOCSZ - Coded cuff size - oscillometric

**Variable Name:** BPAOCSZ

**SAS Label:** Coded cuff size - oscillometric

**English Text:** Mid arm circumference (cm) cuffing parameters - oscillometric

**Target:** Both males and females 8 YEARS - 150 YEARS

<b>Code or Value</b>	<b>Value Description</b>	<b>Count</b>	<b>Cumulative</b>	<b>Skip to Item</b>
2	17-21.9 (bladder size = 9.20 x 16.68 cm)	330	330	
3	22-31.9 (bladder size = 12.49 x 23.52 cm)	3404	3734	
4	32-41.9 (bladder size = 14.98 x 31.19 cm)	3442	7176	
5	42-50 (bladder size = 17.98 x 37.89 cm)	435	7611	
.	Missing	190	7801	

## BPXOSY1 - Systolic - 1st oscillometric reading

**Variable Name:** BPXOSY1  
**SAS Label:** Systolic - 1st oscillometric reading  
**English Text:** Systolic - 1st oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
61 to 232	Range of Values	7517	7517	
.	Missing	284	7801	

## BPXODI1 - Diastolic - 1st oscillometric reading

**Variable Name:** BPXODI1  
**SAS Label:** Diastolic - 1st oscillometric reading  
**English Text:** Diastolic - 1st oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
33 to 142	Range of Values	7517	7517	
.	Missing	284	7801	

## BPXOSY2 - Systolic - 2nd oscillometric reading

**Variable Name:** BPXOSY2  
**SAS Label:** Systolic - 2nd oscillometric reading  
**English Text:** Systolic - 2nd oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
59 to 233	Range of Values	7505	7505	
.	Missing	296	7801	

## BPXODI2 - Diastolic - 2nd oscillometric reading

**Variable Name:** BPXODI2  
**SAS Label:** Diastolic - 2nd oscillometric reading  
**English Text:** Diastolic - 2nd oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
32 to 139	Range of Values	7505	7505	
.	Missing	296	7801	

## BPXOSY3 - Systolic - 3rd oscillometric reading

**Variable Name:** BPXOSY3  
**SAS Label:** Systolic - 3rd oscillometric reading  
**English Text:** Systolic - 3rd oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
50 to 232	Range of Values	7480	7480	
.	Missing	321	7801	

## BPXODI3 - Diastolic - 3rd oscillometric reading

**Variable Name:** BPXODI3  
**SAS Label:** Diastolic - 3rd oscillometric reading  
**English Text:** Diastolic - 3rd oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
24 to 136	Range of Values	7480	7480	
.	Missing	321	7801	

## BPXOPLS1 - Pulse - 1st oscillometric reading

**Variable Name:** BPXOPLS1

**SAS Label:** Pulse - 1st oscillometric reading

**English Text:** Pulse - 1st oscillometric reading

**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
35 to 158	Range of Values	7517	7517	
.	Missing	284	7801	

## BPXOPLS2 - Pulse - 2nd oscillometric reading

**Variable Name:** BPXOPLS2  
**SAS Label:** Pulse - 2nd oscillometric reading  
**English Text:** Pulse - 2nd oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
32 to 141	Range of Values	7505	7505	
.	Missing	296	7801	

## BPXOPLS3 - Pulse - 3rd oscillometric reading

**Variable Name:** BPXOPLS3  
**SAS Label:** Pulse - 3rd oscillometric reading  
**English Text:** Pulse - 3rd oscillometric reading  
**Target:** Both males and females 8 YEARS - 150 YEARS

Code or Value	Value Description	Count	Cumulative	Skip to Item
31 to 154	Range of Values	7480	7480	
.	Missing	321	7801	

