

**National Health and Nutrition
Examination Survey 2003-2004**

**Documentation, Codebook,
and Frequencies**

**MEC Exam Component: Lower
Extremity Disease – Ankle
Brachial Blood Pressure Index
Examination Data**

**Survey Years:
2003 to 2004**

**SAS Export File:
LEXAB_C.XPT**



December 2005

NHANES 2003–2004 Data Documentation

Exam Component: Ankle-Brachial Blood Pressure Index (ABPI) Section of the Lower Extremity Disease Examination (LEXAB_C)

Years of Coverage: 2003–2004

First Published: December 2005

Last Revised: N/A

Component Description

The Lower Extremity Disease examination data will be used to determine the prevalence of lower extremity disease in the U.S. population (diagnosed and undiagnosed), including those at high risk for the late complications of the disease (i.e., ulceration and amputation). The major manifestations of lower extremity disease are peripheral vascular disease and peripheral neuropathy. The Ankle Brachial Blood Pressure Index section of the Lower Extremity Disease component collects data on peripheral vascular disease and the Peripheral Neuropathy section of the Lower Extremity Disease component collects data on peripheral neuropathy. The following documentation provides information on the ABPI section. Please refer to the LEXPN_C data file, codebook, and documentation for information on the Peripheral Neuropathy.

Eligible Sample

Participants 40 years of age and older are asked to participate in the ABPI Section of the Lower Extremity Disease examination.

Persons are excluded from the exam if they have a bilateral amputation or weigh over 400 pounds (due to equipment limitations). Additionally, some persons who were eligible for the exam (40 years of age and older) might not have received the exam due to the following multiple reasons: 1) casts, ulcers, dressings, or other conditions of the participant interfered with testing; 2) participant could not understand the test instructions; 3) participant became ill and the test could not be performed; 4) there was an equipment failure; 5) participant refused; 6) participant came late or left early from the MEC and the LED exam could not be performed; or 7) some other reason. As a result, these eligible persons will have missing data for the ABPI variables. The variable LEDSCCT2 may be used to identify reasons for missing data (refer to Analytic Notes section of this documentation for further details on the LEDSCCT2 variable). Because of participant confidentiality and data disclosure concerns, this file does not identify persons with a bilateral amputation. However, persons reporting right or left amputations of the feet and toes can be identified on the LEXPN_C data file, in variables LEALAMP and LEARAMP.

Protocol and Procedure

The ABPI exam was performed by trained health technicians in a specially equipped room in the mobile examination center (MEC). Participants lie supine on the exam table during the exam. Systolic pressure is measured on the right arm (brachial artery) and both ankles (posterior tibial arteries). If the participant has a rash or open wound on the right arm, dialysis shunt, right-sided radical mastectomy or any other condition that would interfere with accurate measurement or would cause discomfort to the participant, the left arm is used for the brachial pressure measurement. Systolic blood pressure is measured twice at each site for participants aged 40–59 years and once at each site for participants aged 60 years and older. If a health technician is unable to obtain a reading at a site, they may attempt another reading at the same site after a brief resting period. If the technician was unable to obtain even one ankle reading, they were asked to record whether they felt a posterior tibial pulse. If the technician recorded “yes”, they were asked if the participant’s posterior tibial systolic blood pressure was greater than 255 mm Hg.

Health technicians measured brachial and tibial systolic blood pressures using blood pressure cuffs with bladder widths of 9 cm, 12 cm, 15 cm, and 18 cm. The appropriate cuff to be used on a participant was determined by the circumference of the participant’s bare upper arm at the midpoint. While the participant was standing upright, the health technician would measure the participant’s arm circumference and then refer to the table below [adapted from Human Blood Pressure Determination by Sphygmomanometry by the American Heart Association (1)] to determine the acceptable cuff size for a given arm circumference. The same size cuff was used on the arm and both ankles with one exception. If the adult thigh cuff was used on the arm, the large adult cuff would be used on the participant’s ankles. Also, if the technician was unable to make the adult thigh cuff fit properly on the participant’s arm, the large adult cuff could be used instead. The information regarding the cuff exchange is recorded in variable LEQ020.

Cuff Size	Bladder Width (cm)	Bladder Length (cm)	Arm Circumference (cm)
Child/small adult	9	17	17–21.9
Adult	12	22	22–29.9
Large adult	15	32	30–37.9
Adult thigh	18	35	38–47.9

After the appropriate cuff size was selected, the cuffs were placed on the participant’s arm and each ankle. Before the blood pressure was measured at each site, the peripheral neuropathy testing of the LED

exam was performed to provide a brief resting period for stabilization of the participant's blood pressure prior to measurement. (Note: the peripheral neuropathy protocol is described in a separate file (LEXPN_C).

For the procedures relevant to this component, please go to the Lower Extremity Disease Procedures Manual on the NHANES website.

Quality Assurance & Quality Control

Health technicians were regularly monitored by MEC supervisory staff and evaluated by experienced trainers and NCHS staff two to four times per year in the field. Retraining sessions were conducted with the technicians periodically and annually to reinforce the proper protocols and technique. Data were also routinely examined by outside staff.

Inspection, calibration, and maintenance of the equipment and supplies were performed on a regular basis. The NHANES Lower Extremity Disease Procedures Manual details the equipment quality control procedures.

For details on the QA/QC process for this component, please refer to the Procedure Manuals on the NHANES website.

Data Processing and Editing

During the data editing process, extreme values were examined. When there was insufficient information to conclude that values were invalid, they were retained in the data set. A few systolic blood pressure values below 40 mm Hg were considered implausible and set to missing. No other editing of the systolic blood pressure values was performed.

The ankle-brachial blood pressure index (ABPI) was automatically calculated by the computer system and verified by NCHS before data release. The right ABPI was obtained by dividing the mean systolic blood pressure in the right ankle by the mean blood pressure in the arm. The left ABPI was obtained by dividing the mean systolic blood pressure in the left ankle by the mean blood pressure in the arm. The mean blood pressure value for the arm and ankles are computed based on the first and second reading at each site. Because the second reading for all persons 60+ is missing, the mean values are in fact the first recorded blood pressure reading at a site. This may also be true for 40–59 year old persons who have a missing value for the first or second blood pressure reading.

Variable-Specific Editing:

LEDSCCT2 – ABPI Section Comment Variable

This variable is a quality control variable that NCHS used to monitor the LED component and the reasons technicians provided for why an exam was not done or was incomplete. Technicians were provided a defined list of reasons but could also select “other, specify” and provide the reason for a not-done or incomplete exam in a separate text field. Several of these “other” reasons were re-coded to one of the specific reasons (1–104), and the remaining were left as “other”.

Analytic Notes

Analysts should examine the data distribution and consider whether or not it is appropriate to include or exclude extreme values in a given analysis. Analysts should note that the absolute difference between the first and second systolic blood pressure reading (when available) was mostly between 0–10 mm Hg. There were cases where the difference was greater than 10 mm Hg.

Persons aged 40–59 may have up to two recorded blood pressure readings at each site, whereas persons aged 60 and older would only have one recorded reading at each site. Therefore, analysts should note that for participants aged 60 and older, all second measurements will be missing at each site. Other missing blood pressure values (either the first or second for those 40–59 or the first reading for those 60+) may have been due to one of many reasons, as described above, such as participant refusal, equipment failure, or technical error.

LEDSCCT2 – ABPI Section Comment Variable

This variable is a quality control variable that allowed NCHS to monitor the component and the reasons technicians provided for why an exam was not done or incomplete. The data were not collected for analytic reasons but for quality control purposes. This variable is only provided in the data release file to allow analysts to have some information on missing data and possible reasons for non-response.

Please refer to the Analytic Guidelines for further details on the use of sample weights and other analytic issues at

http://www.cdc.gov/nchs/about/major/nhanes/nhanes2003-2004/analytical_guidelines.htm

No data from this component currently exist in the Research Data Center.

References

1. Perloff D, Grim C, Flack J, Frohlich ED, Hill M, McDonald M,

Morgenstern BZ. Special Report: Human Blood Pressure Determination by Sphygmomanometry. Circulation. 1993; 88(5);2460–2470.

Locator Record

Title: Ankle-Brachial Blood Pressure Index (LEXAB_C)

Contact Number: 1-866-441-NCHS

Years of Content: 2003–2004

First Published: December 2005

Revised: N/A

Access Constraints: None

Use Constraints: None

Geographic Coverage: National

Subject: Lower Extremity Disease

Record Source: NHANES 2003–2004

Survey Methodology: NHANES 2003–2004 is a stratified multistage probability sample of the civilian non-institutionalized population of the U.S.

Medium: NHANES Web site; SAS transport files

**National Health and Nutrition Examination Survey
Codebook for Data Production (2003-2004)**

**MEC Examination
Ankle Brachial Blood Pressure Index (ABPI) Section of the Lower
Extremity Disease Examination (LEXAB_C)
Person Level Data**

December 2005



SEQN	Target
	B(40 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Respondent sequence number
English Text: Respondent sequence number	
English Instructions:	

LEDESCCT2		Target		
		B(40 Yrs. to 150 Yrs.)		
Hard Edits		SAS Label		
		ABPI Section Comment		
English Text: ABPI section comment				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0	None	2082	2082	
1	Safety exclusion	7	2089	
2	SP refusal	139	2228	
3	No time	45	2273	
4	Physical limitation	100	2373	
5	Communication problem	4	2377	
6	Equipment failure	16	2393	
7	SP ill/emergency	10	2403	
14	Interrupted	2	2405	
22	Pain or discomfort	7	2412	
23	Poor cuff fit	8	2420	
56	Came late/left early	69	2489	
58	Unable to obtain all bps	565	3054	
72	Error (technician/software/supply)	1	3055	
84	SP with child	12	3067	
101	Bandage, stocking, or other obstruction	4	3071	
104	Swollen legs/ankle edema	2	3073	
999	Other, specify	13	3086	
.	Missing	0	3086	

LEAARM	Target
	B(40 Yrs. to 150 Yrs.)
Hard Edits	SAS Label
	Arm tested

English Text: Arm tested

English Instructions: DEFAULT IS RIGHT.

Code or Value	Description	Count	Cumulative	Skip to Item
1	Right	2744	2744	
2	Left	34	2778	
8	Could not obtain	5	2783	
.	Missing	303	3086	

LEAARMC	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Arm comment			
English Text: Arm comment				
English Instructions: REASON FOR NOT USING RIGHT ARM.				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Lesion, bandage	18	18	
2	Rash	0	18	
3	Amputation	0	18	
4	Other	21	39	
.	Missing	3047	3086	

LEDARMCF	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Brachial cuff size used			
English Text: Brachial cuff size used for BP measurement				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	9 cm	6	6	
3	12 cm	757	763	
4	15 cm	1878	2641	
5	18 cm	104	2745	
8	Could not obtain	8	2753	
.	Missing	333	3086	

LEQ020	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Large adult used, poor thigh cuff fit			
English Text: Large adult cuff selected due to poor thigh cuff fit?				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Yes	244	244	
2	No	1634	1878	
.	Missing	1208	3086	

LEAANKL	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Ankle(s) tested			
English Text: Ankle(s) tested				
English Instructions: DEFAULT IS BOTH.				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Right	8	8	
2	Left	6	14	
3	Both	2760	2774	
8	Could not obtain	4	2778	
.	Missing	308	3086	

LEAANKLC	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Ankle comment			
English Text: Ankle comment				
English Instructions: REASON FOR NOT USING BOTH ANKLES.				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Edema, lesions, bandages	11	11	
2	Rash	0	11	
3	Amputation	6	17	
4	Other	1	18	
.	Missing	3068	3086	

LEDANKCF	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Ankle cuff size used			
English Text: Ankle cuff size used for BP measurement				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	9 cm	6	6	
3	12 cm	773	779	
4	15 cm	1966	2745	
5	18 cm	0	2745	
8	Could not obtain	5	2750	
.	Missing	336	3086	

LEXBRP1	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Brachial SBP 1 (mm Hg)			
English Text: Brachial systolic blood pressure 1 (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
57 to 250	Range of Values	2642	2642	
.	Missing	444	3086	

LEXBRP2	Target			
	B(40 Yrs. to 59 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Brachial SBP 2 (mm Hg)			
English Text: Brachial systolic blood pressure 2 (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
55 to 217	Range of Values	1066	1066	
.	Missing	2020	3086	

LEXBRPM	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Mean Brachial SBP (mm Hg)			
English Text: Mean brachial systolic blood pressure (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
56 to 250	Range of Values	2658	2658	
.	Missing	428	3086	

LEXLPTS1	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Left Posterior Tibial SBP 1 (mm Hg)			
English Text: Left posterior tibial systolic blood pressure 1 (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
52 to 248	Range of Values	2348	2348	
.	Missing	738	3086	

LEXLPTS2	Target			
	B(40 Yrs. to 59 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Left Posterior Tibial SBP 2 (mm Hg)			
English Text: Left posterior tibial systolic blood pressure 2 (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
65 to 230	Range of Values	964	964	
.	Missing	2122	3086	

LEXLPTSM	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Left Mean Posterior Tibial SBP (mm Hg)			
English Text: Left mean posterior tibial systolic blood pressure (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
52 to 248	Range of Values	2370	2370	
.	Missing	716	3086	

LEXLABPI	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Left ABPI			
English Text: Left ABPI				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.33 to 2.16	Range of Values	2346	2346	
.	Missing	740	3086	

LEXRPTS1	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Right Posterior Tibial SBP 1 (mm Hg)			
English Text: Right posterior tibial systolic blood pressure 1 (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
61 to 248	Range of Values	2347	2347	
.	Missing	739	3086	

LEXRPTS2	Target			
	B(40 Yrs. to 59 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Right Posterior Tibial SBP 2 (mm Hg)			
English Text: Right posterior tibial systolic blood pressure 2 (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
76 to 232	Range of Values	973	973	
.	Missing	2113	3086	

LEXRPTSM	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
0.0000 to 300.0000	Right Mean Posterior Tibial SBP (mm Hg)			
English Text: Right mean posterior tibial systolic blood pressure (in millimeters of mercury)				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
61 to 248	Range of Values	2364	2364	
.	Missing	722	3086	

LEXRABPI	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Right ABPI			
English Text: Right ABPI				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
0.36 to 2.07	Range of Values	2339	2339	
.	Missing	747	3086	

LEALPTPD	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Left PT pulse detected?			
English Text: Left posterior tibial pulse detected?				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Yes	275	275	
2	No	54	329	
8	Could not obtain	0	329	
.	Missing	2757	3086	

LEARPTPD	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Right PT pulse detected?			
English Text: Right posterior tibial pulse detected?				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Yes	277	277	
2	No	53	330	
8	Could not obtain	0	330	
.	Missing	2756	3086	

LEALAPNC	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Left ankle SBP > 255 mm Hg?			
English Text: Left ankle systolic blood pressure > 255 mm Hg?				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Yes	43	43	
2	No	231	274	
8	Could not obtain	0	274	
.	Missing	2812	3086	

LEARAPNC	Target			
	B(40 Yrs. to 150 Yrs.)			
Hard Edits	SAS Label			
	Right ankle SBP > 255 mm Hg?			
English Text: Right ankle systolic blood pressure > 255 mm Hg?				
English Instructions:				
Code or Value	Description	Count	Cumulative	Skip to Item
1	Yes	45	45	
2	No	231	276	
8	Could not obtain	0	276	
.	Missing	2810	3086	