

**NHANES 2001-2002 Data Release
May 2004
MEC Examination**

**Ankle-Brachial Blood Pressure Index (ABPI) Section of the Lower Extremity
Disease Examination (LEXAB_B)**

Survey Years Included in this File: 2001-2002

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_B data file, codebook, and documentation for information on the Peripheral Neuropathy.

Eligible Sample and Component-Specific Exclusions:

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 Component-Specific Analytic Notes section of this documentation for further details on the LEDSCCT2 variable). Due to participant confidentiality and data disclosure concerns, this file does not identify persons with a bilateral amputation. However, information on right or left amputations of the feet and toes is recorded on the LEXPN_B data file, in variables LEALAMP and LEARAMP.

Examination Protocol:

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 9cm, 12cm, 15cm, and 18cm bladder widths. 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.

Table. Arm circumference and acceptable cuff size

| 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 (LEXPB_B)).

Refer to Lower Extremity Disease Procedures Manual (2) for further details.

Quality Control during Data Collection:

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.

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. Since 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 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) for data release and the remaining were left as “other”.

LEDARMCF and LEDANKCF– Brachial cuff size used and Ankle cuff size used

These variables record the blood pressure cuff size used to obtain a systolic blood pressure measurement at the brachial and posterior tibial sites. To make these variables comparable with the 1999-2000 LED ABPI variables (LEDARMCF and LEDANKCF) and to aid in merging the 1999-2000 and 20001-2002 files, the values for the 2001-2002 variables were recoded to 1 (9 cm), 3 (12 cm), 4 (15 cm), 5 (18 cm), and 8 (could not obtain).

Component-Specific Analytic Notes and File Variables:

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 mm Hg and 10 mm Hg. There were cases where the difference was greater than 10 mm Hg.

Persons aged 40-59 may have up to 2 recorded blood pressure readings at each site where as persons aged 60 and older may only have 1 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 provided in the data release file to allow analysts to have some information on missing data and possible reasons for non-response.

NCHS Research Data Center:

No data from this component are in the Research Data Center.

Reference:

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.
2. National Center for Health Statistics. Lower Extremity Disease Procedures Manual. January 2002. <http://www.cdc.gov/nchs/data/nhanes/le.pdf>