

## **Mobile Exam Center Components Descriptions**

The following pages describes the exam components as offered in the Mobile Examination Center. Participants under one year of age or over 59 years who are unable or unwilling to come to the MEC for an examination will be eligible to receive a home examination consisting of a core set of measurements normally done in the MEC. The home examination will include the following: a subset of body measurements, a subset of the physical function exam, an abbreviated MEC interview, blood pressure measurements, visual acuity test, assessments for peripheral neuropathy, venipuncture for selected biochemical measurements, and a TB skin test. The home examination protocol will begin in the second half of 1999.

## **Audiometry**

### **Public Health Objectives:**

Hearing loss severe enough to interfere with speech is experienced by approximately 8 percent of U.S. adults and 1 percent of children. Hearing loss at this level has consequences for quality of life, development in children, and other problems. Occupational surveys list noise as the first or second most prevalent work hazard worldwide. More than 8 million U.S. workers are exposed to average eight hour noise levels exceeding 85 dBA, and of this number 500,000 are estimated by the Occupational Safety and Health Administration (OSHA) to be exposed to 100 dBA or greater. The principal health consequence of excessive noise exposure is permanent hearing loss, and the economic consequences of hearing loss are great. Workers compensation is estimated by the Alliance of American Insurers to average \$80-\$100 million each year, with the number of claims increasing each year.

The hearing examination will achieve the following objectives: 1) to obtain normative data on the hearing status of the adult US population; and 2) to evaluate certain covariates that may be related to hearing loss, such as occupational exposure.

### **Staff:**

Medical technician

### **Protocol:**

#### **Methods:**

The hearing component for NHANES will test a half-sample of adults ages 20-69 using pure tone audiometry and tympanometry. Pure tone audiometry thresholds will be obtained in both ears at 500, 1000, 2000, 3000, 4000, 6000, and 8000 hz. To detect middle ear disease, tympanometry will be conducted to provide an estimate of tympanic membrane compliance. The otoscopic exam will examine the outer ear to identify abnormalities which may require alternate audiometric procedures or influence the results obtained.

#### **Time Allotment:**

- 16 minutes

#### **Health Measures:**

- Evaluation of hearing sensitivity
- Evaluation of the physiological function of the middle ear
- Physical examination of the outer ear

#### **Eligibility:**

- Participants age 20-69

#### **Exclusion Criteria:**

- No precluding conditions for otoscopy, immittance, or audiometry

#### **Justification for using vulnerable populations:**

- There is no reason to exclude mentally impaired or handicapped individuals because there is no contraindication if they can understand exam instructions.

#### **Risks:**

- There are no known risks with the hearing examination.

### **Report of findings:**

- MEC  
Level 1: None  
Level 2: MEC physician evaluates all participants with the following findings and refers as appropriate:
  - Otoscopy - impacted cerumen, drainage, blood in ear canal, foreign body in ear canal
  - Tympanometry- Measures of pressure, compliance and volume consistent with blocked ear canal, fluid, or perforated eardrum
- Level 3: Classification of hearing ability based on pure-tone audiometry

Text as is appears in MEC report:

The softest sounds you are able to hear are called hearing thresholds. Your thresholds at different frequencies (pitches) are reported in the table below. The lower pitched sounds are towards the left of the table and the higher pitched sounds are toward the right. Values of 25 dB or less are considered normal hearing.

Hearing Levels by Ear and Frequency (Air Conduction)

|           | Frequency (Hz) |      |      |      |      |      |      |
|-----------|----------------|------|------|------|------|------|------|
|           | 500            | 1000 | 2000 | 3000 | 4000 | 6000 | 8000 |
| Right Ear | 999            | 999  | 999  | 999  | 999  | 999  | 999  |
| Left Ear  | 999            | 999  | 999  | 999  | 999  | 999  | 999  |

Thresholds reported in dB HL

- Provide interpretation of hearing test for right ear and left ear (**see Attachment 32**) .
- Provide recommendation if any threshold in either ear exceeds 25 dB HL as follows:

The audiometry test can identify a hearing problem but can not determine the cause of hearing loss. We recommend that you see a doctor regarding your hearing loss if you have not already done so.

## **Balance and Vestibular Testing**

### **Public Health Objectives:**

Balance disorders, disequilibrium and dizziness from vestibular disturbance constitute a major public health problem. Primary disorders of balance and dizziness are often hidden by their acute and serious consequences, such as falls; motor vehicle accidents; and on the job injuries. Subtle dysfunction of the vestibular system may underlie difficulties in learning, writing, and reading, and affects an individual's ability to perform the most routine activities. These problems may not only interfere with most activities of everyday life but may prevent employment and limit personal independence. Tremendous health care resources are committed to the medical, surgical, and physical rehabilitative therapy of patients with balance disorders.

Disequilibrium may be responsible and is certainly related to many of the fractures caused by falling, including 200,000 hip fractures, that occur annually in Americans over the age of 65. Data from the National Institute on Aging indicate that combined medical and surgical costs for care of individuals with hip fractures exceed \$8 billion per year. Accurate prevalence data on vestibular function is critical to improve the diagnosis and treatment of balance disorders.

The specific objectives of this component are: 1) to obtain accurate prevalence data on disorders of balance and vestibular function; 2) to examine the relationship between balance disorders and other covariates, such as certain medical conditions and health status; and 3) to characterize normal and disordered balance and spatial orientation.

### **Staff:**

Health technician trained in modified Romberg test

### **Protocol:**

#### **Methods:**

The balance function component of NHANES will be performed on a half-sample of adults ages 40-69 using the standard Romberg test as a measure of postural sway. This test is performed on normal and compliant support surfaces in a corner of a room in the MEC with a chair placed behind the participant. The subject is instructed to maintain standing balance without shoes for 15 seconds under each of four conditions that reduce or eliminate input from the sensory avenues of vision and/or proprioception: normal support surface with eyes open; normal support surface with eyes closed; compliant support surface with eyes open; and, compliant support surface with eyes closed. This test is a pass/fail examination, with failure defined as having occurred if the subject begins to fall within 15 seconds. Increased sway without indication of falling is not considered abnormal. The medical technician stands immediately to the side of the participant prepared to stabilize the participant by use of the safety belt.

#### **Time Allotment:**

6 to 7 minutes

#### **Health Measures:**

Identification of balance disordered individuals

#### **Eligibility:**

One-half of participants aged 40-69 who do not meet exclusion criteria

#### **Exclusion Criteria:**

Participants who are unable to stand

#### **Justification for using vulnerable populations:**

There is no reason to exclude mentally impaired or handicapped individuals because there is no contraindication if they can understand exam instructions.

#### **Risks:**

Minimal risk of falling

#### **Report of findings:**

None

## **Body Composition - Bioelectrical Impedance Analysis (BIA)**

### **Public Health Objectives:**

Evaluation of body composition will: 1) provide nationally representative data on body composition (lean and fat tissue), overall and for age, gender, and racial/ethnic groups; 2) provide estimates of the prevalence of obesity, as distinct from overweight; 3) provide data to study the association between body composition and other health conditions and risk factors, such as cardiovascular disease, diabetes, hypertension, and activity and dietary patterns; and 4) provide nationally representative data from a simple measurement (BIA) to develop equations to estimate body composition as measured by a more expensive and complicated measurement (dual-energy x-ray absorptiometry). BIA was successfully introduced into NHANES III (1988-94).

### **Staff:**

Health technician (MEC).

### **Protocol:**

#### **Methods:**

The sample person lies on his/her back and electrodes are placed on the wrists and ankles. A low-level alternating current (< 1 mA) is delivered and impedance through the body fluids is measured using the BIA equipment.

#### **Time Allotment:**

3 minutes.

#### **Health Measures:**

Resistance, reactance, impedance (all in ohms), and phase angle (degrees) are determined at 50 distinct frequencies between 5KHz and 1MHz. Prediction equations can use these values to estimate extra- and intra-cellular water content, and by further estimation, lean tissue and adipose tissue. However, these outcomes will not be calculated because of lack of consensus on the appropriate equations.

#### **Eligibility:**

Sample persons aged 8- 49 years who do not meet any of the exclusion criteria.

#### **Exclusion Criteria:**

- Any amputations other than fingers or toes
- Artificial joint or any orthopedic hardware
- Pacemaker or automatic defibrillator
- History of radiographic contrast material (barium) use in past 72 hours
- Coronary stents or metal suture material.

#### **Justification for using vulnerable populations:**

- Minors are included in the body composition assessment to develop simple measures of body composition for this age group.
- Mentally impaired individuals will not be excluded from body composition because there is no contraindication.

#### **Risks:**

- Minimal risk.
- There is no shock and the current is not perceptible. The BIA procedure is safe because of the following three factors: 1) no adverse event has been reported in the course of thousands of individuals undergoing measurement, 2) the test frequencies (5KHz - 1MHz) are unlikely to stimulate electrically excitable tissues, such as nerves or cardiac muscle, and 3) the relatively small test current is less than the threshold of perception.
- Although there has been no risk or contraindication reported, experts in the field recommend that measurements *not* be performed on people with implanted defibrillators, pacemakers, stents, metal suture material in the heart or great vessels, metal pins, or artificial joints.

#### **Report of findings:**

Because there is no consensus on appropriate prediction equations for all populations, no outcomes that are meaningful to participants will be obtained. Therefore, no findings will be reported to the participant.

## **Body Composition - Dual-energy X-ray Absorptiometry (DXA)**

### **Public Health Objectives:**

Evaluation of body composition will: 1) provide nationally representative data on body composition (bone, lean, and fat tissue), overall and for age, gender, and racial/ethnic groups; 2) provide estimates of the prevalence of obesity, as distinct from overweight; 3) provide estimates of low bone density/osteoporosis; 4) provide data to study the association between body composition and other health conditions and risk factors, such as cardiovascular disease, diabetes, hypertension, and activity and dietary patterns; and 5) provide nationally representative data from a sophisticated instrument (DXA) to allow development of equations to estimate lean and fat composition from a simple measurement (BIA).

Information on bone, lean, and fat content is obtained by DXA. The importance of lean and fat tissue in relation to obesity and chronic disease has been addressed in the section on BIA. Therefore, this section focuses on the bone measure aspect of DXA.

It has been estimated that the annual cost of osteoporosis is about \$10 billion. The magnitude of this problem is likely to increase dramatically over the next few decades as the population ages. The risk of hip fractures (the most costly fractures in terms of morbidity, mortality and health care costs) begins to increase exponentially after age 65.

Important pieces of data are not currently available about the changes in bone mass in the population, especially in minority populations. There are no data on total body bone measures from a nationally representative sample. Measures of total body bone mineral content or density will allow researchers to gain insights into age, sex, and racial/ethnic differences in the skeleton relative to other measures of body composition such as total muscle and fat mass, as well as behavioral factors such as diet and activity.

NHANES is the only nationally representative survey that can shed light on when peak bone mass is attained and the degree of total body bone loss with age. Childhood and adolescence are the periods to target for intervention strategies in osteoporosis. Measurement in younger individuals will provide insight into early racial/ethnic differences in the rate of bone accretion. This information is vital to all aspects of treatment and prevention of this disease and is particularly critical to government funding of related research, medical screening, treatment, and reimbursement programs.

### **Staff:**

Health Technician (MEC)

### **Protocol:**

#### **Methods:**

Dual-energy X-ray absorptiometry delivers a small amount of radiation through a scanning arm while the participant lies in the supine position.

#### **Time Allotment:**

Scan time is 3 minutes; 10 minutes are allowed for the procedure.

#### **Health Measures:**

Values are obtained for the total body and for each arm, each leg, the trunk and head. Bone measures may also be obtained for pelvis, left and right ribs, thoracic and lumbar spine.

- Total body tissue (gm)
- Bone mineral content (gm)
- Bone area (cm<sup>2</sup>)
- Bone mineral density (gm/cm<sup>2</sup>)
- Fat content (gm)
- Lean mass (gm)
- Lean mass plus bone mineral content (gm)
- Percent fat (%)

#### **Eligibility:**

Male sample persons aged 8 years and older and female sample persons aged 18 years and older who do not meet any of the exclusion criteria.

#### **Exclusion Criteria:**

- Any amputations other than fingers or toes
- Pregnancy

- Artificial joint or any orthopedic hardware
- Pacemaker or automatic defibrillator
- History of radiographic contrast material (barium) use in past 72 hours
- Coronary stents or metal suture material.

**Risks:**

Minimal risk. The total radiation dose is extremely low, 0.01 to 0.04 mrem, which is within the range of background radiation and considerably less than conventional X-rays. A chest X-ray, for example, delivers a radiation dose of 40 mrem.

**Justification for using vulnerable populations:**

- Males under 18 are included in the DXA assessment to obtain information on critical periods for bone accretion.
- Pregnant women will be excluded from DXA because of the radiation exposure, however minimal.
- Mentally impaired individuals will not be excluded from body composition because there is no contraindication.

**Report of findings:**

- MEC None

- NCHS

Level 1: None

Level 2: DXA grader will fax any abnormal pathology to DHES physician (e.g., abnormal densities, fracture). Physician will call participant and send report when appropriate.

Level 3: Total bone mineral density (BMD) and interpretation using the T-score from analyzed whole body scan, and % total body fat. Males will be analyzed as if they were females because the reference group includes only females.

Text as it appears in final report:

The whole body DXA scan provides two pieces of health information; the first is your percent body fat and the second is your bone density.

The body composition analysis showed that your total body fat is \_\_\_\_%

The percentage of body fat varies considerably among normal people. *<If age < 17 print statement A; else print statement B>*

*Statement A.* For boys between the ages of 6 and 16, percent body fat normally ranges from about 5% to 26%. (note: norms for girls tbd)

*Statement B.* For adults, the percentages reach up to 30% for men and 35% for women in middle age.

*IF SP is ≥ 20 years of age:*

The bone density measurement can help identify persons who may be at greater risk for fracture because they have weaker bones. In general, a lower bone density means that the bone is weaker. However, not all men or women with low bone density will have fractures.

The results from your whole body scan show that your bone density is \_\_\_\_\_g/cm<sup>2</sup>, and your T-score is \_\_\_\_\_. Compared with young adults, your bone density is *<insert statement>*.

*If examinees T-score is ≥ -1.0 insert **normal***

**Statement choices** *If examinees T-score is less than -1.0 but greater than -2.5 insert **low***

*If examinees T-score is ≤ -2.5 **very low***

*<If T-score is ≤ -2.5 print the following:>* Most people develop low bone density over many years and you should not be alarmed. We do recommend that you discuss these results with your doctor in the near future. Your doctor may wish to do another bone density test of your spine or hip, since fractures due to osteoporosis often occur at these sites.

*<If T-score is > -2.5 print the following:>* The whole body scan is used for research only. This type of scan gives information on the bone density of your skeleton. The fragility of your spine or hip are best evaluated by DXA scans of those specific areas.

*Else if SP is < 20 years of age:*

This is the first time that bone density in young people is being measured in a national survey. We are using this information to learn about bone formation in your age group. We will not be able to give you results about your bone density until we know what typical bone density is in your age group. Your participation is helping us determine this.

## **Body Measurements - Anthropometry**

### **Public Health Objectives:**

Evaluation of body measurements (anthropometry) will: 1) provide nationally representative data on selected body measures, overall and for age, gender, and racial/ethnic groups; 2) provide estimates of the prevalence of overweight; 3) provide data to study the association between body measures and body composition, other health conditions and risk factors, such as cardiovascular disease, diabetes, hypertension, and activity and dietary patterns; and 4) monitor growth and development in children.

Overweight and obesity are important nutrition-related public health problems. The recent increase in overweight prevalence among all sex, age, and racial-ethnic groups has been called an epidemic. NHANES is unique in collecting nationally representative measured data on body measures and composition. Body measures data from NHANES are used to provide representative reference data, set health objectives, and monitor trends. Anthropometry data have been collected with comparable methods since the first National Health Examination Survey (1960-62).

### **Staff:**

Health technician (MEC): (second person needed for young children)

### **Protocol:**

#### **Methods:**

- Weight: the participant will stand on a digital scale that is connected to the ISIS system.
- Stature and recumbent length: measured with an electronic stadiometer that is connected to the ISIS system.
- Other lengths and circumferences: measured with a metal tape.
- Skinfolde: measured with a skinfold caliper.

#### **Time Allotment:**

Range 4-5 minutes.

**Health Measures:**

|                            | Birth+ | 2mo+                       | 2yr+ | 4yr+ | 8yr+ |
|----------------------------|--------|----------------------------|------|------|------|
| Head Circumference         | ✓      | ✓<br>(through<br>6 months) |      |      |      |
| Weight                     | ✓      | ✓                          | ✓    | ✓    | ✓    |
| Upper Leg Length           |        |                            |      |      | ✓    |
| Maximal calf circumference |        |                            |      |      | ✓    |
| Recumbent Length           | ✓      | ✓                          | ✓    |      |      |
| Standing Height            |        |                            | ✓    | ✓    | ✓    |
| Upper arm length           |        | ✓                          | ✓    | ✓    | ✓    |
| Arm Circumference          |        | ✓                          | ✓    | ✓    | ✓    |
| Waist Circumference        |        |                            | ✓    | ✓    | ✓    |
| Thigh Circumference        |        |                            |      |      | ✓    |
| Triceps Skinfold           |        | ✓                          | ✓    | ✓    | ✓    |
| Subscapular Skinfold       |        | ✓                          | ✓    | ✓    | ✓    |

**Eligibility:**

All sample persons. See Health Measures table for age-eligibility.

**Exclusion Criteria:**

None

**Justification for using vulnerable populations:**

- Minors are included in this component because they are an important target population group. Body composition findings are linked to other household interview and health component data and are used to track changes that occur in health over time.
- There is no reason to exclude mentally impaired or handicapped individuals because there is no contraindication if they can understand exam instructions.

**Risks:**

None

**Report of findings:**

MEC :

Level 1: None  
 Level 2: None  
 Level 3: Height and weight

For non-pregnant persons 20 years and over, text in MEC report is as follows:

**For a person of your height, your weight is \_\_\_\_\_**

Body mass index

< 19.00  
 25.00  
 19.00-24.99

Statement

**below the range of a healthy weight, and you may be underweight.**  
**above the range of a healthy weight, and you may be overweight.**  
**within the range of a healthy weight.**

## Cardiovascular Fitness

### Public Health Objectives:

Low levels of physical activity and physical fitness are surely the most important public health problem on which we have such limited data. Reports on population attributable risk place inactivity in the same general category as tobacco use and unhealthful diet as problems, yet the amount of data from nationally representative samples on smoking and diet is several orders of magnitude greater than the data on physical activity, and there are no data on physical fitness on a nationally representative population of U.S. adults.

Evaluation of cardiovascular fitness will: 1) provide nationally representative data on cardiovascular fitness; 2) estimate the prevalence of persons at risk due to poor physical fitness; and 3) provide data to study the association between cardiovascular fitness and other health conditions and risk factors, such as obesity, cardiovascular disease, diabetes, hypertension, and activity and dietary patterns.

### Staff:

Health technician (MEC) and physician

### Protocol:

#### Methods:

The protocol is a submaximal exercise test. The exam consists of a 2 minute warm up, two 3 minute exercise periods, and a 3 minute recovery period. The grade and speed of the treadmill during exercise are determined by: 1) the participant's physical activity readiness determined by responses to the household interview, 2) age, and 3) BMI. During the first stage of the exercise period, the participant should attain approximately 55-65% of age-predicted maximal heart rate (APMHR). During the second stage, the participant should attain approximately 70-80% APMHR.

#### Time Allotment:

22 minutes

#### Health Measures:

Pre-test heart rate and blood pressures will be captured and stored by ISIS. Additionally, at the end of warm-up, each exercise stage, and each minute of recovery, the ISIS will capture:

- Heart rate (bpm)
- Systolic blood pressure (mm Hg)
- Diastolic blood pressure (mm Hg)
- Treadmill speed and grade (mph, %)

From the exercise heart rate and treadmill settings, maximal work capacity will be predicted. Predicted maximal work capacity is the measure of fitness obtained.

#### Eligibility:

Sample persons aged 12-49 years who do not meet any of the exclusion criteria

#### Exclusion Criteria:

All persons not excluded by household questionnaire will be evaluated by the MEC physician for eligibility for the CV fitness component. Physician will follow the protocol for medical exclusion based on responses to safety exclusion questions, pulse and blood pressure.

Exclusions based on household interview and/or other components:

- Any amputations of legs and feet other than toes
- Self reported weight > 350 pounds, exclude
- Pacemaker or automatic defibrillator
- Pregnancy greater than 12 weeks

Exclusions based on household interview

Medical Conditions and Health Status (COQ) (if 1, 7, or 9 exclude)

- COQ.160b Congestive heart failure
- COQ.160c Coronary heart disease
- COQ.160d Angina pectoris
- COQ.160e Myocardial infarction
- COQ.160f Stroke
- COQ.160 Emphysema

Physical Functioning - (PFQ) - (if 3, 4, 7, or 9, exclude)

- PFQ.060b Difficulty walking for a quarter mile (2-3 blocks)
- PFQ.060c Difficulty walking up 10 steps without resting
- PFQ.060h Walking from one room to another on the same level

- PFQ060I Standing up from an armless straight chair  
(if 1,7, or 9, exclude)
- PFQ.090 Use of a device such as a cane or wheelchair  
(if 2,5,6,7,8,10,12,16, 97, 99 exclude)
- PFQ.067 2=Back or Neck Problem  
5=Depression/Anxiety/Emotional Problem  
6=Developmental Problems (Cerebral Palsy)  
7=Diabetes  
10=Heart Problem  
12=Lung/Breathing Problem  
16=Stroke Problem  
Diabetes (DIQ) (if 1,7, or 9, exclude)
- DIQ.080 Retinopathy  
Cardiovascular (CAQ)- (if 1, 7, or 9)
- CAQ.030 Stop when walking at own pace on the level
- CAQ.040 SOB after walking 100 yards or few minutes on the level
- CAQ.050 PND
- CAQ.060 PND relieved by sitting on side of bed
- CAQ.070 Orthopnea  
Respiratory Health (RSQ) - (if 55 {code for 12 or more attacks}, 77, or 99 exclude)
- RSQ.080 Wheezing in past 12 months (if 1,7,or 9, exclude)
- RSQ.110 Wheezing that limits speech (last 12 months)
- Vision (VSQ) -
- VSQ.020 Blind (if 1,7, or 9, exclude)
- VSQ.030 Very poor eyesight (if 1,7, or 9, exclude)
- DSQ.240 medications will be available in SP History in Physician's Exam. Physician will check this list and exclude based on medication on the Exclusion list below. (See questions 9-14 below)

Cardiovascular Safety and Exclusion Questions (Asked in Physician's Exam):

(If Yes or Don't Know, exclude unless otherwise indicated)

1. Have you been hospitalized in the past 3 months? (See exclusion list below)
2. (12-19 years only) Has a doctor ever said you should not participate in sports or other activities because of a health condition?
3. Has a doctor ever said you have a heart condition and that you should only do physical activity recommended by a doctor?
4. (20-49 years only) Do you feel pain in your chest when you do physical activity?
5. (20-49 years only) In the past month, have you had chest pain when you were not doing physical activity? (Probe: Have you seen a medical doctor about your chest pain? Did the doctor tell you that the chest pain was related to your heart?)
6. Do you lose your balance because of dizziness? (Probe: Is this an isolated incident or does it occur on a regular basis?)
7. Do you ever lose consciousness? (Probes: Did this occur as a result of illness or was it unexplained? Is this an isolated incident or does it occur on a regular basis?)
8. Do you have a bone or joint problem that could be made worse by walking? (Probe: Do you think you can do the test without injuring yourself?)
9. Are you currently taking any prescription medications? (yes go to 10, no go to 15)
10. Are you currently taking any prescription medications for your blood pressure? (yes go to 11, no go to 14)
11. What is the name of this medication? \_\_\_\_\_  
(If medication is on list, exclude. If not on list, go to 12.)
12. Are you taking any other medication for your blood pressure? (Yes, go to 13/ No go to 14./Don't Know, exclude.)
13. What is the name of this medication? \_\_\_\_\_  
(If medication is on list, exclude. If not on list, go to 14.)
14. Are you currently taking prescription medications for the following conditions:  
· heart condition Yes/No/Don't Know (If Yes or Don't Know, exclude)

- prescription eye drops for glaucoma (If Yes or Don't Know, exclude)
15. Do you know of any other reason why you should not do a treadmill test?

Question 1: List of reasons for exclusion based on hospitalization from ACSM Guidelines, 5th edition, page 42.

- A recent significant change in the resting ECG suggesting infarction or other acute cardiac event.
- Recent complicated myocardial infarction
- Unstable angina
- Uncontrolled ventricular arrhythmia
- Uncontrolled atrial arrhythmia that compromises cardiac function
- Third degree AV heart block
- Acute congestive heart failure
- Severe aortic stenosis
- Suspected or known dissecting aneurysm
- Active or suspected myocarditis or pericarditis
- Thrombophlebitis or intracardiac thrombi
- Recent systemic or pulmonary embolus
- Acute infections
- Significant emotional distress (psychosis)
- Moderate valvular heart disease
- Known electrolyte abnormalities
- Fixed rate pacemaker
- Frequent or complex ventricular ectopy
- Ventricular aneurysm
- Uncontrolled metabolic disease (diabetes, thyrotoxicosis, myxedema, etc)
- Chronic infections disease (mononucleosis, hepatitis, AIDS)
- Neuromuscular, musculoskeletal, or rheumatoid disorders that are exacerbated by exercise
- Complicated pregnancy (N.B. this is an exception to the ASCM guidelines - the guidelines also include advanced pregnancy)

Questions 9-14: Exclusion Medication List

#### **Antianginal Agents**

Calcium Channel-Blockers  
Bepidil (Vascor)  
Diltiazem (Cardizem)  
Verapamil (Calan, Isoptin)

#### **Anti Arrhythmics**

Amiodarone (Cordarone)  
Bretylium (Bretylol)  
Disopyramide (Norpace)  
Encainide (Enkaid)  
Ethmozine (Moricizine)  
Flecainide (Tambocor)  
Lidocaine (Xylocaine, Xylocard)  
Mexiletine (Mexitil)  
Procainamide (Pronestyl, Procan SR)  
Propafenone  
Sotalol (Betapace)  
Tocainide (Tonocard)  
Quinidine (Quinidex, Quinaglute)

#### **Beta Blockers**

Acebutolol (Sectral)

Atenolol (Tenormin)  
Betaxolol (Kerlone)  
Bisoprolol (Zebeta)  
Cartelol (Cartrol)  
Labetalol (Normodyne)  
Metoprolol tartrate (Lopressor)  
Nadolol (Corgard)  
Pindolol (Visken)  
Propranolol (Inderal)  
Timolol (Blocardren)

### **Eye Drops**

Betoptic Eyedrops  
Timoptic Eyedrops

### **Nitrates and Nitroglycerin**

Isosorbide dinitrate (Isordil, Diltrate)  
Nitroglycerin (Nitrostat, Nitrolingual spray)  
Nitroglycerin ointment (Nitrol ointment)  
Nitroglycerin patches (Transderm Nitro, Nitro-Dur II, Nitrodisc)  
Isosorbide mononitrate (Ismo, Monoket)  
Pentaerythritol tetranitrate (Cardilate)

### **Digitalis**

Digoxin (Lanoxin)

**Physician exam exclusions:** If participants resting pulse rate is > 100 bpm or systolic blood pressure > 180 mm Hg.

### **Criteria for stopping during the fitness protocol:**

- Onset of angina or angina-like symptoms
- Significant drop (20mmHg) in SBP or a failure of the SBP to rise with an increase in exercise intensity
- Excessive rise in BP: SBP >260 mmHg or DBP >115 mmHg
- Signs of poor perfusion: lightheadedness, confusion, ataxia, pallor, cyanosis, nausea, or cold and clammy skin
- Failure of heart rate to increase with increased exercise intensity
- Subject requests to stop
- Physical or verbal manifestations of severe fatigue
- Unusual or severe shortness of breath
- Leg pains or cramps
- Failure of the testing equipment
- Severe headache
- Visual disturbances
- %HRmax >90% and SP appears/feels exhausted
- Unable to complete test without holding on to the handrail

### **Justification for using vulnerable populations:**

- Minors are included in the cardiovascular fitness assessment to obtain information on fitness among adolescents.
- Pregnant women will be excluded from fitness testing because physiologic changes with pregnancy affect heart rate, and therefore the interpretation of the data. The exclusion also considers safety.
- Mentally impaired individuals will be excluded from the treadmill test.

### **Risks:**

- There is much experience across the country to suggest that submaximal testing in a healthy population poses minimal health risk. Persons with any conditions that may increase risk of adverse outcome on the treadmill will be excluded. Risk associated with this test in a screened population include fatigue, muscle soreness, exercise-induced asthma, and chest tightness.

- The Cooper Institute for Aerobic Research and Stanford University have conducted tens of thousands of submaximal tests similar to what is proposed in NHANES. These tests were conducted in community survey centers and work-site health promotion programs. They were done after screening and determination of eligibility by a nurse or exercise technician with no physician supervision, other than supervising training and monitoring for quality control. There have been no complications from these tests. No one even missed 30 minutes of work due to delay caused by some incident related to the exercise test. This accumulated experience also points to the low risk associated with submaximal exercise testing in an apparently healthy population. There is also no problem associated with conducting the exercise test after venipuncture. That is the procedure followed in most exercise laboratories including the Cooper Clinic and Stanford surveys since exercise changes hemoconcentration and provides inaccurate readings for lipids etc.

**Report of findings:**

MEC:

Level 1: MEC Physician notified if participant has acute chest pain, acute respiratory distress or signs of hemodynamic instability. If the participant is deemed medically unstable, emergency medical procedures will be instituted.

Level 2: If the MEC Physician determines that a condition discovered during fitness testing requires follow-up by a community physician, a referral will be made.

Level 3: Grade, speed, test duration, and general fitness classification relative to same sex and age group based on estimated maximum work capacity (V02 max).

Text in MEC report is as follows:

Your fitness test was done on a treadmill. The test consisted of a warm-up, two exercise periods (stage 1 and stage 2), and a recovery period. The table below shows your test results.

| Stage    | Required Time | Your Time | Your Heart Rate |
|----------|---------------|-----------|-----------------|
| Warmup   | 2 min         |           |                 |
| Stage 1  | 3 min         |           |                 |
| Stage 2  | 3 min         |           |                 |
| Recovery | 2 – 3 min(s)  |           |                 |

During this exercise your maximum incline on the treadmill was \_\_%, and your maximum speed was \_\_mph. Compared with other people of your age and sex, your cardiovascular fitness level is \_\_\_\_\_. (Superior, excellent, good, fair, poor, very poor).

## **Dermatology Exam (Excluded from protocol for NHANES 1999)**

### **Public Health Objectives:**

Overall, it is estimated that one in three Americans has a skin condition serious enough to require medical attention. However, there are major gaps in knowledge about the frequency, impact, etiology and prevention of most skin diseases. These data will be used to assess the frequency and impact of skin disease in the U.S.

This component will focus on two specific skin conditions: melanocytic nevi and eczematous dermatitis. With regard to melanocytic nevi, the major goals will be to measure the prevalence of atypical moles and dysplastic nevi, which are risk factors for malignant melanoma. With regard to eczematous dermatitis, the major goal will be to determine the prevalence and severity of hand dermatitis.

### **Staff:**

Health technician

### **Protocol:**

#### **Methods:**

- The exam consists of nine pictures of the body: four of the back, two of the hands, two of the back of the legs and one of the upper inner arm (to get untanned skin color).
- A digital camera with a direct computer link will be used to take the images. The images will be stored as computer files, not printed as pictures.
- Image files will be transmitted to dermatologists who will review these images on a computer monitor to see if there are any clinically relevant skin conditions.

#### **Time Allotment:**

8-9 minutes

#### **Health Measures:**

- Four pictures of the back
- Two pictures of the hands
- Two pictures of the back of the lower legs
- One picture of the upper inner arm

#### **Eligibility:**

Sample persons aged 12-59 years who do not meet any of the exclusion criteria.

#### **Exclusion Criteria:**

A person using a wheelchair would not receive the photos of the back or back of the legs. He/she would be eligible for the other photos. There are no safety exclusions for this component.

#### **Justification for using vulnerable populations:**

- Minors are included in the dermatology exam because prevalence estimates are desired for the entire U.S. population. Children under six are excluded because in many cases it would be too difficult to explain the instructions to this age group. Infants and toddlers are excluded because the exam requires an individual to be of standing age and also requires that an individual be able to stand still without assistance.
- Mentally impaired individuals will not be excluded from the dermatology exam because there is no contraindication; however the person's guardian will receive the report of findings and facilitate any referral if necessary.

#### **Risks:**

None. There is a concern that some sample persons may feel embarrassed

#### **Special precautions:**

A chaperone will be made available should the SP request one.

**Report of findings:**

- MEC                      None
  
- NCHS  
Level 1: Moles or lesions suspicious of melanoma or other malignancies. Report faxed directly from NIH dermatologist to DHES medical officer. Officer will call SP with findings in addition to sending report.  
Level 2: Presence of eczematous dermatitis or other clinically relevant skin condition will be reported by letter to sample person.  
Level 3: None

## Lower Extremity Disease

### Public Health Objective:

Lower extremity disease is disabling and costly among the elderly and persons with diabetes. The major manifestations of lower extremity disease are peripheral vascular disease and peripheral neuropathy. Late-stage complications are chronic ulcers, gangrene, and amputation. Lower extremity disease is associated with increased susceptibility to falls. Few population-based studies have been conducted and no national examination data exist on lower extremity disease and its risk factors. The Health Resources and Services Administration has launched a major initiative called the Lower Extremity Amputation Prevention Program, and would benefit from population-based data to help monitor this effort.

Information on the prevalence of lower extremity disease, especially in its early stages, and associated risk factors will be used to help develop early intervention and prevention programs for the disabling consequences of this condition. Specifically, the lower extremity disease examination will provide population data to: 1) determine a national estimate of lower extremity disease prevalence (diagnosed and undiagnosed), including those at high risk for the late complications of the disease (i.e., ulceration and amputation); 2) identify the risk factors of lower extremity disease; 3) permit a national cohort to be established for follow-up studies of this condition; and 4) provide critical information to clinicians and public health officials for the development of preventive care and community-based interventions.

### Staff:

Health technician (MEC)

### Protocol:

#### Methods:

- Peripheral vascular disease is assessed by the ratio between systolic blood pressure in the lower legs to that in the arm. Systolic pressure will be measured in one arm (brachial vessel, right arm if accessible) and both ankles (posterior tibial vessels). Each pressure will be measured twice in SP's age 40-59, while each will be measured only once for SP's 60 and above to reduce the time for this component in that age group.
- The feet will be examined for the presence of amputations, lesions, and bunions.
- Peripheral neuropathy is assessed by ability to feel slight pressure applied with a standard monofilament to the bottom of the foot at 3 sites. If an incorrect answer is given at any site, the test will be repeated at that site up to a total of three times.

### Time Allotment:

15-18 minutes depending on age of examinee

### Health Measures:

Peripheral vascular disease - systolic blood pressures (mm Hg):

- Brachial
- Right Posterior Tibial
- Left Posterior Tibial

Calculated means and ratios

Foot abnormalities - presence or absence of:

- Amputations (entire foot, partial foot, great toe, other toes)
- Lesions or bandages
- Bunions

Peripheral neuropathy - correct response, incorrect response, or inability to detect monofilament pressure on each foot at:

- Metatarsal Head 1
- Metatarsal Head 5
- Halux

### Eligibility:

Sample persons aged 40 years and older who do not meet any of the exclusion criteria.

### Exclusion Criteria:

- Bilateral above the knee or below the knee amputations
- Rash or open wound on both arms that would interfere with accurate measurement or would cause discomfort to the participant, exclude from the peripheral vascular disease measures.
- Venous stasis ulceration or other pathology that precludes placing a blood pressure cuff around the right OR left ankle (e.g., open wounds, small gauze/adhesive dressings, casts, puffiness) -

measurements will not be made on the affected ankle. If both ankles are affected, person is excluded from peripheral vascular disease component.

**Justification for using vulnerable populations:**

- Minors are not included in the lower extremity disease assessment because of extremely low prevalence of abnormalities at younger ages.
- Pregnant women will be included because the effect of any hemodynamic changes will affect both brachial and lower vessels equivalently. However, a woman in later pregnancy may not be able to lay on her back comfortably for the test and would be excluded for this reason.
- Mentally impaired individuals will not be excluded from the exam because there is no contraindication.

**Risks:**

None

**Report of findings**

MEC

Peripheral vascular disease - Ankle/arm pressure ratios

|          |            |
|----------|------------|
| Level 1: | None       |
| Level 2: | <0.5       |
| Level 3: | 0.5- < 0.9 |

Text in MEC report is as follows:

The circulation in your legs was examined by comparing the blood pressure in your arm with the blood pressure in your ankles. The result is reported below as an index, which is called the ankle brachial pressure index. Typically the index is around 1.

Right ankle brachial pressure index \_\_\_\_\_

Left ankle brachial pressure index \_\_\_\_\_

Part A. The blood pressure in <your right ankle, **both your ankles**> showed you have \_\_\_\_\_ blood flow to <your right leg, **both legs**> Part B., and the blood pressure in your left ankle, showed you have \_\_\_\_\_ blood flow to your left leg.

*Programming specifications:*

| <u>ABPI</u> | <u>Statement</u>          |
|-------------|---------------------------|
| >0.9        | <b>normal</b>             |
| 0.5-0.9     | <b>decreased</b>          |
| <0.5        | <b>severely decreased</b> |

*Programming check - if both right and left have the same statement (normal, decreased, severely decreased) print the bolded version of part A and do not print part B.*

Peripheral neuropathy

|          |  |
|----------|--|
| Level 1: | None   |
| Level 2: | One or more insensate sites (inability to determine response or an incorrect response for one or more of the three sites on each foot in at least two of three repetitions of the test will be a cause for referral) |
| Level 3: | None   |

Text in MEC report is as follows:

This sensory examination tested your ability to feel a filament pressed on the bottoms of your feet. We tested three places on each foot. Part A. The examination showed that you have \_\_\_\_\_ sensation in <your right foot, **both feet**>, Part B. and \_\_\_\_\_ sensation in your left foot.

*If one or more of the three areas (metatarsal head 1, 5, or halux) is/are incorrect, then print **decreased**. Else print **normal***

Either of the following define a correct response for a site:

- First response is correct
- First response is incorrect (or unable to determine), but second and third responses are correct

The following defines an incorrect response for a site:

- First response is incorrect (or unable to determine) and second or third responses are incorrect (or unable to determine)

*Programming check - if both right and left have the same statement (normal, decreased) print the bolded version of part A. and do not print part B.*

Observation of abnormalities

- |          |  |
|----------|--|
| Level 1: | Gangrene or acute vascular occlusion requiring immediate treatment         |
| Level 2: | Purulent or draining wounds, other gangrene, cellulitis or other infection |
| Level 3: | None   |

## **Muscular Strength**

### **Public Health Objectives:**

Evaluation of muscular strength and physical functions will: 1) provide nationally representative data on muscular strength and physical functioning in older adults; 2) provide data to study the association between muscular strength and lower extremities physical functions, activities of daily living, body composition, sedentary habit; other health conditions and risk factors, such as obesity, cardiovascular disease, diabetes, and hypertension.

### **Staff:**

Health technicians

### **Protocol:**

#### **Methods:**

Muscle strength: Lower body strength will be assessed by a determination of isokinetic strength of the knee extensor (quadriceps) and flexor (hamstring). Only a concentric maneuver will be done.

Physical functions: The evaluation item will be a twenty foot walk performed at the usual walking speed.

### **Time Allotment:**

12 minutes

### **Health Measures:**

Muscle strength

- Torque (newton-meter (Nm))
- Angle
- Velocity (deg/sec)

Physical functions

- Time (seconds)

### **Eligibility:**

Examinees ages 50 years and over

### **Exclusion Criteria:**

- Chest or abdominal surgery in the past three weeks
- Myocardial infarction within the past six weeks
- History of aneurysm/stroke
- Severe right knee pains due to arthritis, injury, or other condition
- Right knee or hip replacement
- Severe neck or back pain

### **Justification for using vulnerable populations:**

Mentally impaired individuals will be included if they can understand the instructions.

### **Risks:**

Minimal risk. There is a possibility of some muscle soreness after the procedure. No other injuries or risks are anticipated. The only reported cases of adverse outcome associated with muscular strength testing were cases of knee injury reported in the longitudinal study of aging (NIA) related to eccentric maneuver which will not be done in NHANES.

### **Special precautions:**

None

### **Report of Findings:**

There are no normative data for strength test. The data from Baltimore Longitudinal Study of Aging were obtained at 30 and 180 degrees/sec and the current protocol is for 60 degrees/sec. Because strength values are inversely related to speed of movement, these normative data would not be appropriate for NHANES. Therefore, no findings will be reported to the participant.

## Oral health

### Public Health Objectives:

NHANES is critical for monitoring oral health status, risk factors for disease, and access to preventive and treatment services. This component will address public health significance in areas of surveillance, prevention, treatment, health promotion/disease prevention, health policy, evaluation of Federal health programs, standardization of new methods and health and nutrition status of minorities and underserved populations.

Oral health data from NHANES will be used for:

- Assessing the prevalence of major oral health diseases and conditions including caries, periodontal disease, trauma, dry mouth, oral pain, and fluorosis effectiveness of fluoride based on the recommendations from a PHS report on the risks and benefits of fluoride and a recent NIDR sponsored conference
- Prevalence of mutations in cells from oral cavity
- Assessing prevention and treatment efforts
- Evaluating specific public health programs/new policies and initiatives
- Targeting minority/underserved populations for monitoring of health status
- Evaluating Healthy People 2000 and 2010 objectives related to oral health
- Assessing prevalence of antibodies and other indicators of oral health status in saliva

### Staff:

Dentist

### Protocol:

#### Methods:

- The exam consists largely of visual inspection of surfaces, gums, and soft tissues. Examinations for coronal and root caries are conducted with dental explorer and mirror. The exams for gingival bleeding, periodontal pockets and gum recession are done with a periodontal probe. For the saliva collection, the participant engages in stimulated salivation into a container for a two minute period.

#### Time Allotment:

Depending on age, 4-11 minutes.

#### Health Measures and Eligibility:

The following oral health subcomponents for the examination component and the age groups of interest in parentheses are:

- Dental sealant assessment (2 to 34 years of age)
- Tooth count (2 years and older)
- Coronal caries (2 years and older)
- Orofacial traumatic injuries (6 to 29 years of age)
- Dental fluorosis assessment -- full mouth (6 to 49 years of age)
- Orofacial and other pain assessment (6 to 69 years of age)
- Gingival bleeding (12 to 49 years of age)
- Periodontal pockets, recession, loss of attachment (18 years and older)
- Root caries (18 years and older)
- Saliva flow rate (40 years and older)

#### Exclusion Criteria:

Asked of sample persons 12+ only, positive responses to the following screening questions exclude persons from the periodontal or root caries examination:

- Has a doctor or dentist ever told you that you must take antibiotics (e.g. penicillin) before you get a dental check up or care?
- Do you have a heart problem (specifically congenital heart murmurs, heart valve problems, congenital heart disease, or bacterial endocarditis)?
- Do you have rheumatic fever?
- Kidney disease requiring renal dialysis?
- Hemophilia?
- Pacemaker or artificial material in your heart veins or arteries?
- A hip bone or joint replacement?

**Justification for using vulnerable populations:**

- Minors are included in this component because they are an important target population group. Oral health findings are linked to other household interview and health component data and are used to track changes that occur in health over time.
- There is no reason to exclude mentally impaired or handicapped individuals because there is no contraindication.

**Risks:**

Minimal risks. These include possible discomfort, bleeding, and potential dislodging of already loose restorative material. There will be no exposure to radiation (no x-rays), hazardous material (no use of mercury) and no use of anesthetic agents.

**Special precautions:**

If the respondent reports a latex allergy, the dentist will wear vinyl gloves.

**Report of Findings:**

MEC:

- Level 1: Oral lesions requiring emergent attention -(e.g., abscess, oral cancer). Dentist will generate a referral letter for participant to take to oral health care provider.
- Level 2: Oral pathology requiring follow-up (e.g., severe periodontal disease or caries).Dentist will generate a referral letter for participant to take to oral health care provider.
- Level 3: Dentist will indicate participant should see dentist at his/her earliest convenience.
- Level 4: Dentist will refer participant to continue with routine dental visits.

*Text as it appears in MEC report:*

The dental examination of the National Health and Nutrition Examination Survey is not, and is not intended to be, a substitute for the examination usually given to persons seeking care from their own dentists.

Neither a dental history nor x-rays are taken, and therefore the findings are solely the result of what can be seen at the time of the examination.

The examining dentist recommends that you Statement A <part B> because of the following conditions: Statement B

**Statement A**

1. see a dentist immediately
2. see your dentist within the next 2 weeks
3. see your dentist at the earliest convenience
4. continue your regular routine care

**Statement B**

1. decayed teeth
2. gum problems/disease
3. oral hygiene
4. clinical impression of a soft tissue condition
5. some other findings (See referral letter) **Attachment 33**
6. no significant findings

## Physician's Exam

### Public Health Objectives:

High blood pressure is a marker for the chronic condition hypertension, which is a major risk factor for premature cardiovascular, cerebrovascular, renovascular and other vascular diseases. Standardized blood pressure measurements will be used to monitor prevalence of hypertension.

### Staff:

Licensed physician

### Protocol:

#### Methods:

- Pulse: the examining physician will determine a 30 second resting pulse rate.
- Blood pressure: three systolic/diastolic BP measurements will be taken following a strict protocol.
- Cardiovascular exclusion screening questions will be asked by physician (see Cardiovascular Fitness)
- Pre-test counseling for STD/HIV testing. Physician will discuss the STD/HIV testing and assure the confidentiality of information collected. Physician will explain to the participants how they are to get their test results and will ask them to provide a password which will be used at the time of reporting results. Physician will answer any questions the participants may have about the STD or HIV testing. Attachment 34 is a brochure with information about STDs to be used by the physician.

#### Time Allotment:

Depends on age of sample person. Range 2-13 minutes.

#### Health Measures:

Blood pressure

- Pulse (bpm)
- Systolic blood pressure (mmHg)
- Diastolic blood pressure (mmHg)

#### Eligibility:

Sample persons who do not meet the exclusion criteria

|                                   |                    |
|-----------------------------------|--------------------|
| Pulse:                            | 2 months and older |
| Blood pressure:                   | 8 years and older  |
| Cardiovascular fitness screening: | 12-49 years        |
| STD/HIV counseling:               | 14-49 years of age |

#### Exclusion Criteria:

- Blood pressure - presence of the following on both arms: rashes, gauze dressings, casts, edema, paralysis, tubes, open sores or wounds, withered arms, a-v shunts, or if blood has been drawn from arm within last week.
- Blood pressure cuff too small to fit on arm

#### Justification for using vulnerable populations:

- Minors are included in the pulse and blood pressure assessment because of the relevance and impact of high blood pressure in this age group.
- Mentally impaired individuals will not be excluded from the physician's exam because there is no contraindication; however the person's guardian will receive the report of findings and facilitate any referral if necessary.

#### Risks:

Minimal risk. Transient discomfort during blood pressure measurement.

#### Special precautions:

None.

#### Report of findings:

- MEC  
Pulse and Blood Pressure - Adult  
Level 1: Systolic BP  $\geq$  210 and/or diastolic BP  $\geq$  120; Pulse  $>$  140 bpm  
Level 2:  $140 <$  Systolic BP  $<$  210 and/or  $90 \leq$  diastolic BP  $<$  120  
Level 3: Systolic  $<$  140 and diastolic  $<$  90.

Text in MEC report is as follows:

|              |         | Optimal | Normal | Acceptable |
|--------------|---------|---------|--------|------------|
| Systolic bp  | <value> | < 120   | < 130  | <140       |
| Diastolic bp | <value> | < 80    | < 85   | < 90       |

Resting pulse rate (all ages) <value>

Your blood pressure today is *insert statement from table below*

| <i>Systolic</i> | <i>Diastolic</i> | <i>Statement</i>                               |
|-----------------|------------------|--|
| < 130           | < 85             | within the normal range                        |
| 130-139         | 85-90            | normal but at the high end of the normal range |
| 140-159         | 90-99            | mildly high                                    |
| 160-179         | 100-109          | moderately high                                |
| 180-209         | 110-119          | very high                                      |
| >210            | >120             | severely high                                  |

From the Sixth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure

Children's BP levels reported as normal, high normal, high, and very high based on criteria established by the following manuscript: National High Blood Pressure Education Program Working Group on Hypertension Control in Children and Adolescents. Update on the 1987 Task Force Report on High Blood Pressure in Children and Adolescents: A Working Group Report from the National High Blood Pressure Education Program. Pediatrics. 1996;11:649-658.

- NCHS

STD/HIV - Toll free phone line for participant to call for results

Level 1: None

Level 2: Positive results for chlamydia, gonorrhea, Herpes type 2 or HIV. Participants will be counseled by health educator and referred for care. List of STD/HIV treatment sites will be obtained in advance for each stand and be made available for participants

Level 3: Negative results for chlamydia, gonorrhea, Herpes type 2 and HIV.

## Vision

### Public Health Objectives:

Eye diseases cause suffering, disability and loss of productivity for millions of people in the United States. In economic terms, eye disease and blindness are estimated to cost the U.S. in excess of \$22 billion each year. No high-quality, up-to-date information exists on the prevalence of visual impairment and the major causes of visual impairment in the general population. These data are needed in planning health services, in monitoring changes in disease prevalence, in research program planning, in developing and testing hypotheses about eye disease etiology.

Data collected over 20 years ago in the NHANES I (self-reported history questions and full vision examination with dilation) continue to be the only source of national prevalence data on eye disease and visual acuity impairment and there are no data on visual field impairment. Changes in disease definitions, population demographics, diagnostic capabilities, and treatments for eye diseases make it important to obtain new national data about eye disease. The absence of such data has forced researchers to use blindness registry data that are almost 25 years old. These studies select mostly white populations or non-nationally representative populations.

The ophthalmic data from NHANES will be used to: 1) measure the prevalence of visual acuity impairment in the U.S. population (visual acuity worse than 20/40), by cause; 2) measure the distribution of refractive error in the U.S. population; 3) evaluate screening strategies for visual impairment and eye disease; and 4) evaluate functional impairment related to vision.

### Staff:

Health technician (MEC)

### Protocol:

#### Methods:

##### Best corrective vision

Visual acuity is measured with an autorefractor. The examinee puts his/her chin on the chin rest and focuses on a chart with numbers and letters in the autorefractor screen. Examinee is then asked to sequentially read the largest to smallest possible line on a built-in chart in the autorefractor. The technician isolates the smallest line read by the examinee with 1 error. With the examinee's eye focused on the line, the autorefractor quickly takes three repeated measurements, which is also known as objective refraction. These three auto-retinoscopy measurements, their average, and other measurements from the objective refraction are saved in a database. If required, these readings are further fine tuned to obtain best visual acuity based on objective refraction readings. Data from completed examinations are transferred to the ISIS and saved in a database.

##### Current Prescription

The Lensmeter reads the current prescription of the eyeglass. This data is transferred to the autorefractor and later saved in the ISIS database to compare the current correction with the best corrective vision obtained from the auto-refractor.

##### Near visual acuity

For the near visual acuity, older examinees are asked to read five lines of numbers and letters written on the near acuity card at the comfortable distance and this distance is measured and saved in the ISIS database.

### Time Allotment:

Depends on age and vision of sample person. Range 7-8 minutes.

### Health Measures:

The ophthalmic data from NHANES will be used to: 1) measure the prevalence of visual acuity impairment in the U.S. population (visual acuity worse than 20/40), by cause; 2) measure the distribution of refractive error in the U.S. population; 3) evaluate screening strategies for visual impairment and eye disease; and 4) evaluate functional impairment related to vision.

### Eligibility:

All sample persons aged 12+ years will have the refraction exam for the best corrective vision. Visual acuity assessment using the near card will be performed only on persons 50 years and over.

### Exclusion Criteria:

Any evidence of injury (eye patch or bandage) or severe infection (i.e., purulent discharge with redness in eye) in both eyes.

**Justification for using vulnerable populations:**

- In recent years, myopia has been rapidly increasing in the U.S., especially among young adults and impaired vision is a major cause of motor vehicle accidents among older persons.
- Minors are included in this component because they are an important target population group. Visual acuity will be linked to other household interview and health component data and are used to monitor trends for impairment.
- Mentally impaired individuals will be tested if they can follow instructions.

**Risks:**

None. No mydriatic or anesthetic agents will be used

**Report of Findings:**

- MEC:  
Level 1: None  
Level 2: None  
Level 3: Visual acuity with recommendation

Text in MEC report is as follows:

We have done a quick check of your vision today. Our exam is not as precise as an eye exam done by an eye doctor. These values may differ from a vision exam you may have by an ophthalmologist, optometrist or optician

*For vision 20/25 or better in both eyes with their current correction (either no correction, distance glasses and/or contact lenses):*

Your distance vision is 20/\_\_\_ in your right eye and 20/\_\_\_ in your left eye with \_\_\_\_\_. This is a good level of vision. You should continue your usual schedule of periodic examinations by your eye doctor.

*For vision worse than 20/25 in either eye with their current correction (either no correction, distance glasses and/or contact lenses) :*

Your distance vision is 20/\_\_\_ in your right eye and 20/\_\_\_ in your left eye with \_\_\_\_\_. This level of vision is not as good as most people's. If you were not already aware of this, you should see an eye doctor to see if he/she can improve your vision. Your eye doctor can also provide you with a full eye examination.