

# National Health and Nutrition Examination Survey 2003-2004

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## Documentation, Codebook, and Frequencies

MEC Laboratory Component:  
Measles, Rubella, and Varicella

Survey Years:  
2003 to 2004

SAS Export File:  
L19\_C.XPT



January 2006

# NHANES 2003–2004 Data Documentation

## Laboratory Assessment: Lab 19 – Measles, Rubella, and Varicella

Years of Coverage: 2003–2004

First Published: January 2006

Last Revised: April 2006

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### Component Description

#### Measles

Measles is a highly infectious disease that was targeted for elimination in the United States by the year 1996. The elimination strategy called for vaccination of all susceptible persons at age 12–15 months and at 4–11 years. NHANES will assess age-specific population immunity, taking into account vaccinees who never develop antibodies, persons who may lose immunity over time, and persons who are immune from natural disease. The U.S. measles elimination goal for 1996 came at a time when measles elimination was being considered as an achievable goal worldwide by the World Health Organization. If success can be demonstrated in the U.S. as well as other countries in the hemisphere, worldwide efforts to eliminate measles will be encouraged. The benefit from a study of the seroprevalence of measles will be to document age-specific immunity that is found following measles elimination efforts and to help judge the levels of immunity that are needed to eliminate measles.

#### Rubella

Congenital rubella syndrome (CRS) is the term used to describe the serious birth defects that occur among infants born to women infected with rubella while pregnant. A single rubella vaccination, usually given as measles-mumps-rubella (MMR) vaccine, is thought to confer lifelong immunity. Widespread use of the vaccine has resulted in near elimination of CRS in the United States. In recent years, an increasing proportion of rubella cases have been reported among adults, and outbreaks have occurred among persons of Hispanic ethnicity.

Population-based rubella seroprevalence studies will provide valuable information about specific groups that lack rubella immunity and therefore could be targeted for immunization. Therefore, serologic testing of NHANES participants will be conducted to document the level of immunity to rubella by race and ethnicity and allow comparison data from NHANES III.

#### Varicella

In 1995, a vaccine for the prevention of varicella (chicken pox) was licensed for use in persons 1 year of age and older. Wide use of the

vaccine may change the epidemiology of the disease with a shift in incidence to older persons who are at higher risk than are younger persons for more severe disease and complications.

Older persons may have severe complications such as encephalitis and/or death if they develop varicella. Additionally, pregnant women can pass on varicella if they develop it in the last weeks of gestation, with severe life-threatening consequences to the newborn. NHANES provides a unique opportunity to assess changes in the seroprevalence of immunity to varicella after introduction of the vaccine. Demographic data on immune and susceptible persons will help target vaccination programs toward groups at risk for disease.

**Eligible Sample**

Participants aged 6–49 years were tested.

**Description of Laboratory Methodology**

The staff of the Immunoserology Unit of the California State Department of Health Services (CSDHS), Viral and Rickettsial Disease Laboratory (VRDL) developed these EIA tests. The procedures described below are the standardized protocols of the VRDL's in-house EIA tests for serodiagnosis of viral infections and are currently routinely used for the following viruses: adeno, cytomegalo, herpes simplex, influenza A and B, measles, mumps, rubella, parvo-B19, respiratory syncytial, St. Louis encephalitis, varicella-zoster, and Western encephalitis. The individual steps in the test are the same for all these viruses, except that production and purification of viral and control antigens used in the assay are different for individual viruses. These assays are approved and routinely monitored by CLIA staff.

In the indirect EIA, a suitable antigen material (i.e., solubilized varicella-zoster virus) is coated on the wells of a 96-well microtiter plate, which is subsequently incubated with a diluted test specimen. If the specimen contains antibody to the antigen, the antibody will form complexes with the antigen on the coated plate.

After washing unreacted serum components from the plate, an antibody-enzyme conjugate is added to the wells and incubated. The conjugate consists of antihuman IgG covalently coupled to the enzyme alkaline phosphatase. The conjugate will react with the antigen-antibody complex on the surface of the well resulting in a sandwich of well-antigen-antibody-antibody-enzyme. If the test specimen does not

contain IgG antibody to the antigen, the conjugate will not bind to the well surface and will be removed by washing. The presence of enzyme in the complex is determined by adding an enzyme substrate (indicator system) to the well and incubating while a color reaction occurs. The enzyme substrate reaction will result in a yellow-colored product, which is measured in a spectrophotometer adjusted to a wavelength of 405 nanometers with a side band adjusted to 630 nanometers.

There were no changes to the equipment, lab methods, or lab site from the previous 2 years.

A detailed description of the laboratory method used can be found on the NHANES website.

### **Laboratory Quality Control and Monitoring**

The NHANES quality assurance and quality control (QA/QC) protocols meet the 1988 Clinical Laboratory Improvement Act mandates. Detailed QA/QC instructions are discussed in the NHANES Laboratory/Medical Technologists Procedures Manual (LPM). Read the LABDOC file for detailed QA/QC protocols.

A detailed description of the quality assurance and quality control procedures can be found on the NHANES website.

### **Data Processing and Editing**

Blood specimens were processed, stored and shipped to Viral and Rickettsial Disease Laboratory, California State Department of Health Services, Berkeley, California for analysis. Detailed specimen collection and processing instructions are discussed in the NHANES LPM. Read the LABDOC file for detailed data processing and editing protocols. The analytical methods are described in the **Description of the Laboratory Methodology** section.

The LBDRUIU variable was derived in this data file. Rubella antibody data are reported as an optical density index that is converted to International Units. See the **Analytic Notes** section for the formula used for its derivation.

This file contains no top coding, fill values, or minimal detectable limits.

Detailed instructions on specimen collection and processing can be found on the NHANES website.

### **Analytic**

The analysis of NHANES 2003–2004 laboratory data must be

## Notes

conducted with the key survey design and basic demographic variables. The NHANES 2003–2004 Household Questionnaire Data Files contain demographic data, health indicators, and other related information collected during household interviews. They also contain all survey design variables and sample weights for these age groups. The phlebotomy file includes auxiliary information such as the conditions precluding venipuncture. The household questionnaire and phlebotomy files may be linked to the laboratory data file using the unique survey participant identifier SEQN.

### **LBDRUIU - Rubella International Units**

Rubella antibody data are reported as an optical density index that is converted to International Units using the following formula:

$$\text{LBDRUIU (Rubella\_Units)} = [(65.93928 \times \text{Rubella\_Index}) \times (0.177)] + 1.28060$$

The Rubella index is calculated by subtracting the absorbance of the control well from the absorbance of the antigen well (AG – NS) and dividing the difference by the cut-off value. The cut-off value is calculated as the mean AG – NS value of duplicate 10 IU standards. The equation used is: O.D. index = (AG – NS)/Cut-off value.

International Units are calculated based on a standard curve using a regression analysis of duplicate AG – NS values of 10, 40, and 100 IU standards and their squares.

### **Interpretation of Results**

1. An O.D. Index of > 1.0 indicates the presence of antibody.
2. An O.D. Index of <1.0 indicates that antibody was not detected.
3. An International Unit value of 10 or greater is considered significant for rubella.

## References

N/A

## Locator Fields

**Title:** Measles, Rubella, and Varicella

**Contact Number:** 1-866-441-NCHS

**Years of Content:** 2003–2004

**First Published:** January 2006

**Revised:** April 2006

**Access Constraints:** None

**Use Constraints:** None

**Geographic Coverage:** National

**Subject:** Measles, Rubella, and Varicella

**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)**

**Measles, Rubella, and Varicella (L19\_C)  
Person Level Data**

April 2006



<b>SEQN</b>	<b>Target</b>
<b>Hard Edits</b>	B(6 Yrs. to 49 Yrs.)
	<b>SAS Label</b>
	Respondent sequence number
<b>English Text:</b> Respondent sequence number.	
<b>English Instructions:</b>	

<b>LBXME</b>	<b>Target</b>			
	B(6 Yrs. to 49 Yrs.)			
<b>Hard Edits</b>	<b>SAS Label</b>			
	Measles			
<b>English Text:</b> Measles				
<b>English Instructions:</b>				
<b>Code or Value</b>	<b>Description</b>	<b>Count</b>	<b>Cumulative</b>	<b>Skip to Item</b>
0 to 29.58	Range of Values	5138	5138	
.	Missing	517	5655	

<b>LBDRUIU</b>	<b>Target</b>			
	B(6 Yrs. to 49 Yrs.)			
<b>Hard Edits</b>	<b>SAS Label</b>			
	Rubella international units			
<b>English Text:</b> Rubella units				
<b>English Instructions:</b>				
<b>Code or Value</b>	<b>Description</b>	<b>Count</b>	<b>Cumulative</b>	<b>Skip to Item</b>
1 to 320	Range of Values	5138	5138	
.	Missing	517	5655	

<b>LBXVAR</b>	<b>Target</b>			
	B(6 Yrs. to 49 Yrs.)			
<b>Hard Edits</b>	<b>SAS Label</b>			
	Varicella			
<b>English Text:</b> Varicella				
<b>English Instructions:</b>				
<b>Code or Value</b>	<b>Description</b>	<b>Count</b>	<b>Cumulative</b>	<b>Skip to Item</b>
0 to 29.65	Range of Values	5138	5138	
.	Missing	517	5655	