National Health and Nutrition Examination Survey

2003-2004 Data Documentation, Codebook, and Frequencies

Human Papillomavirus (HPV) DNA - Vaginal Swab: Roche Linear Array (L37SWR C)

Data File: L37SWR_C.xpt

First Published: November 2010

Last Revised: NA

Component Description

Human papillomavirus (HPV) infection is one of the most common sexually transmitted infections in the United States. Cervical infection with certain types of HPV is a major risk factor for cervical cancer in women. The "high-risk" types of HPV (e.g., HPV 16, 18) are associated with cervical cancer and the "low-risk" types (e.g., HPV 6, 11) with genital warts. No national surveillance system exists to measure the full burden of HPV infection, and no reliable national population estimate of HPV exists. NHANES offers a unique opportunity to assess the prevalence of HPV infection in the general population.

Reducing the prevalence of HPV infection is a Healthy People 2010 objective: "Reducing the number of new HPV cases can help minimize the overall number of cases of high risk subtypes associated with cervical cancer in females..." Detection and typing of HPV DNA in vaginal swabs (in conjunction with testing of NHANES sera for HPV antibody) will allow evaluation of trends in prevalence of type-specific HPV infection by age, sexual behavior, and race/ethnicity. Two HPV vaccines (Gardasil and Cervarix) are licensed and recommended for use in girls and women. Routine vaccination is recommended for girls 11 or 12 years of age, and catch-up vaccination through 26 years. One vaccine (Gardasil) is licensed and available for boys and men. As vaccine becomes more widely used, the national prevalence of HPV infection will be critical for planning vaccination strategies in the United States.

Results of the Digene hc2 HPV DNA Test and HPV typing based on the Roche prototype line blot assay have been previously released. The current data release adds HPV typing results based on the Roche research use only Linear Array (LA) HPV Genotyping kit. The LA typing assay is based upon the same assay principles as the prototype, but includes proprietary refinements to improve sensitivity and reproducibility.

Eligible Sample

Examined female participants aged 14-59 years were eligible. This public data file includes data for examined participants aged 18-59 years. Please see Analytic Notes about the release of data for adolescents aged 14-17 years.

Description of Laboratory Methodology

Roche Linear Array Assay

This assay uses the Research Use Only (RUO) Roche Linear Array HPV Genotyping test that is based on HPV L1 consensus polymerase chain reaction (PCR) with biotinylated PGMY09/11 primer sets. It also includes biotinylated β -globin primers as an internal control for sample amplification. The primer mix amplifies essentially all HPV types found in the genital tract along with the human β -globin gene. After amplification the samples are typed by hybridization to the typing strips followed by colorimetric detection. The strip is a linear array of probes specific for 37 HPV types (6, 11, 16, 18, 26, 31, 33, 35, 39, 40, 42, 45, 51, 52, 53, 54, 55, 56, 58, 59, 61, 62, 64, 66, 67, 68, 69, 70, 71, 72, 73, 81, 82, 83, 84, IS39, and 89)

and for the positive β -globin control as well. Types are read by comparing the reaction pattern to the typing template. Samples that are negative for HPV and the β -globin control indicate lack of a suitable sample and are considered inadequate for interpretation.

Laboratory Method Files

HPV Vaginal Swab Linear Array Laboratory Procedure Manual (November 2010)

Laboratory Quality Assurance and Monitoring

Vaginal swab samples were processed, stored and shipped to the Chronic Viral Diseases Branch, Division of High-Consequence Pathogens and Pathology, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA for analysis.

Detailed instructions on specimen collection and processing are discussed in the NHANES Laboratory Procedures Manual (LPM). Swabs were stored at room temperature until they were shipped to the National Center for Emerging and Zoonotic Infectious Diseases for testing.

Detailed QA/QC instructions are discussed in the NHANES LPM.

Mobile Examination Centers (MECs)

Laboratory team performance is monitored using several techniques. NCHS and contract consultants use a structured competency assessment evaluation during visits to evaluate both the quality of the laboratory work and the quality-control procedures. Each laboratory staff member is observed for equipment operation, specimen collection and preparation; testing procedures and constructive feedback are given to each staff member. Formal retraining sessions are conducted annually to ensure that required skill levels were maintained.

Analytical Laboratories

NHANES uses several methods to monitor the quality of the analyses performed by the contract laboratories. In the MEC, these methods include performing blind split samples collected on "dry run" sessions. In addition, contract laboratories randomly perform repeat testing on 2% of all specimens.

Progress reports containing any problems encountered during shipping or receipt of specimens, summary statistics for each control pool, QC graphs, instrument calibration, reagents, and any special considerations are submitted to NCHS quarterly. The reports are reviewed for trends or shifts in the data. The laboratories are required to explain any identified areas of concern.

Data Processing and Editing

The data were reviewed. Incomplete data or improbable values were sent to the performing laboratory for confirmation.

Analytic Notes

Refer to the 2003-2004 Laboratory Data Overview for general information on NHANES laboratory data.

Sample Weights

MEC exam sample weights should be used for analyses.

Demographic and Other Related Variables

The analysis of NHANES laboratory data must be conducted using the appropriate survey design and demographic variables. The NHANES 2003-2004 Demographics File contains demographic data, health indicators, and other related information collected during household interviews as well as the sample design variables. The recommended procedure for variance estimation requires use of stratum and PSU variables (SDMVSTRA and SDMVPSU, respectively) in the demographic data file.

This laboratory data file can be linked to the other NHANES data files using the unique survey participant identifier (i.e., SEQN).

The Questionnaire data files contain socio-economic data, health indicators, and other related information collected during household interviews. Certain sensitive data on participants under 18 years of age (e.g., HPV typing results, sexual behavior variables) are not included in the public use files. These data may be requested as described in the NHANES guidelines.

The public release data file includes HPV vaginal swab data for participants aged 18-59. HPV vaginal swab data for youth aged 14-17 years are available through the NCHS Research Data Center (RDC).

HPV DNA detection and typing results from two assays are provided: the Roche prototype line blot assay (previously released, Data set name: I37SWA_C) and the Roche research use only Linear Array (LA) HPV Genotyping kit (Data set name: I37SWR_C). The Roche prototype reagents were discontinued when the LA assay was released and will not be available for further use in future NHANES cycles. While based on identical principles, the LA was refined for commercialization as a research use only kit. The two assays were comparable, although LA was found to be more sensitive and detected more types per sample (3, 4, 5). To assure comparability of results in the ongoing NHANES sampling, residual extracts from 2003-2004 were retested with LA.

• We recommend all analysis of HPV DNA PCR be conducted using the Roche LA results (Data set name: L37SWR_C) in order to provide the most accurate longitudinal information on HPV detection and typing by PCR.

Note: The two data sets can also be distinguished by the variable names. The data for the Roche prototype line blot assay has a fourth letter of the variable name, H. The Roche LA assay has the fourth letter of the variable name, R.

HPV PCR Assay

HPV Summary Variable

The HPV PCR Summary variable (LBDRPCR) indicates if at least one type is positive (LBDRPCR=1), the sample is negative (LBDRPCR=2), the sample is inadequate (LBDRPCR=3), or the sample is missing (LBDRPCR=.).

If beta-globin is not present, both LBDRHP and LBDRLP are negative in the sample and no HPV type is detected, the sample is coded as "Inadequate".

If any of the types on the strips (LBDR06-LBDRPI) are positive, the sample is coded as positive. If all of the types on the strip are coded as negative, and beta-globin is detected (either LBDRHP or LBDRLP is positive) the sample is coded as negative.

Variables LBDRHP through LBDRPI are from the RUO Roche Linear Array HPV typing assay, however LBDR52 also includes information from a type-specific assay for HPV 52. The Linear Array typing strip includes an XR probe that hybridizes with HPV 52 as well as HPV types 33, 35 and 58. Samples positive for the XR probe and 33, 35 or 58 requires specific testing to confirm the presence of HPV 52.

Detection Limits

If data is qualitative, the use of lower limits of detection (LLODs) is not applicable.

Please refer to the NHANES Analytic Guidelines and the on-line NHANES Tutorial for further details on the use of sample weights and other analytic issues.

References

- Castle PE, Gravitt PE, Solomon D, et al. Comparison of linear array and line blot assay for detection of human papillomavirus and diagnosis of cervical precancer and cancer in the atypical squamous cell of undetermined significance and low-grade squamous intraepithelial lesion triage study. J Clin Microbiol. 2008; 46: 109-117.
- Coutlee F, Rouleau D, Petignat P, et al. Enhanced detection and typing of human papillomavirus (HPV) DNA in anogenital samples with PGMY primers and the linear array HPV genotyping test. J Clin Microbiol. 2006; 44: 1998-2006.

• Gravitt PE, Peyton CL, Alessi TQ, Wheeler CM, Coutlee F, Hildesheim A, Schiffman MH, Scott DR, Apple RJ. Improved Amplification of Genital Human Papillomaviruses. J Clin Microbiol 2000; 38: 357-361

- Steinau M, Swan DC, Unger ER. Type-specific reproducibility of the Roche Linear Array HPV genotyping test. J Clin Virol 42: 412-414, 2008
- Unger ER, Steinau M, Lin JM, Patel SS, Swan DC. Impact of HPV assay on observed population prevalence. Diagn Mol Pathol (in press)

Codebook and Frequencies

SEQN - Respondent sequence number

Variable Name: SEQN

SAS Label: Respondent sequence number

English Text: Respondent sequence number.

LBDRPCR - Roche HPV linear array summary result

Variable Name: LBDRPCR

SAS Label: Roche HPV linear array summary result

English Text: Roche HPV linear array (LA) summary result

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	781	781	
2	Negative	777	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDRHP - Roche LA high positive globin control

Variable Name: LBDRHP

SAS Label: Roche LA high positive globin control

English Text: Roche LA high positive globin control

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	1552	1552	
2	Negative	35	1587	
	Missing	272	1859	

LBDRLP - Roche LA low positive globin control

Variable Name: LBDRLP

SAS Label: Roche LA low positive globin control

English Text: Roche LA low positive globin control

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	1540	1540	
2	Negative	47	1587	
	Missing	272	1859	

LBDR06 - HPV type 6

Variable Name: LBDR06

SAS Label: HPV type 6

English Text: HPV type 6

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	68	68	
2	Negative	1490	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR11 - HPV type 11

Variable Name: LBDR11

SAS Label: HPV type 11

English Text: HPV type 11

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	8	8	
2	Negative	1550	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR16 - HPV type 16

Variable Name: LBDR16

SAS Label: HPV type 16

English Text: HPV type 16

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	71	71	
2	Negative	1487	1558	
3	Inadequate	29	1587	
	Missing	272	1859	_

LBDR18 - HPV type 18

Variable Name: LBDR18

SAS Label: HPV type 18

English Text: HPV type 18

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	38	38	
2	Negative	1520	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR26 - HPV type 26

Variable Name: LBDR26

SAS Label: HPV type 26

English Text: HPV type 26

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	4	4	
2	Negative	1554	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR31 - HPV type 31

Variable Name: LBDR31

SAS Label: HPV type 31
English Text: HPV type 31

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	32	32	
2	Negative	1526	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR33 - HPV type 33

Variable Name: LBDR33

SAS Label: HPV type 33

English Text: HPV type 33

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	32	32	
2	Negative	1526	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR35 - HPV type 35

Variable Name: LBDR35

SAS Label: HPV type 35

English Text: HPV type 35

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	27	27	
2	Negative	1531	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR39 - HPV type 39

Variable Name: LBDR39

SAS Label: HPV type 39

English Text: HPV type 39

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	40	40	
2	Negative	1518	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR40 - HPV type 40

Variable Name: LBDR40

SAS Label: HPV type 40

English Text: HPV type 40

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	24	24	
2	Negative	1534	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR42 - HPV type 42

Variable Name: LBDR42

SAS Label: HPV type 42

English Text: HPV type 42

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	42	42	
2	Negative	1516	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR45 - HPV type 45

Variable Name: LBDR45

SAS Label: HPV type 45

English Text: HPV type 45

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	44	44	
2	Negative	1514	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR51 - HPV type 51

Variable Name: LBDR51

SAS Label: HPV type 51

English Text: HPV type 51

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	101	101	
2	Negative	1457	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR52 - HPV type 52

Variable Name: LBDR52

SAS Label: HPV type 52

English Text: HPV type 51

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	61	61	
2	Negative	1497	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR53 - HPV type 53

Variable Name: LBDR53

SAS Label: HPV type 53

English Text: HPV type 53

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	105	105	
2	Negative	1453	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR54 - HPV type 54

Variable Name: LBDR54

SAS Label: HPV type 54

English Text: HPV type 54

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	70	70	
2	Negative	1488	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR55 - HPV type 55

Variable Name: LBDR55

SAS Label: HPV type 55

English Text: HPV type 55

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	45	45	
2	Negative	1513	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR56 - HPV type 56

Variable Name: LBDR56

SAS Label: HPV type 56

English Text: HPV type 56

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	41	41	
2	Negative	1517	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR58 - HPV type 58

Variable Name: LBDR58

SAS Label: HPV type 58

English Text: HPV type 58

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	30	30	
2	Negative	1528	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR59 - HPV type 59

Variable Name: LBDR59

SAS Label: HPV type 59

English Text: HPV type 59

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	62	62	
2	Negative	1496	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR61 - HPV type 61

Variable Name: LBDR61

SAS Label: HPV type 61

English Text: HPV type 61

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	85	85	
2	Negative	1473	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR62 - HPV type 62

Variable Name: LBDR62

SAS Label: HPV type 62

English Text: HPV type 62

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	113	113	
2	Negative	1445	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR64 - HPV type 64

Variable Name: LBDR64

SAS Label: HPV type 64

English Text: HPV type 64

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	1	1	
2	Negative	1557	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR66 - HPV type 66

Variable Name: LBDR66

SAS Label: HPV type 66

English Text: HPV type 66

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	69	69	
2	Negative	1489	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR67 - HPV type 67

Variable Name: LBDR67

SAS Label: HPV type 67

English Text: HPV type 67

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	16	16	
2	Negative	1542	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR68 - HPV type 68

Variable Name: LBDR68

SAS Label: HPV type 68

English Text: HPV type 68

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	29	29	
2	Negative	1529	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR69 - HPV type 69

Variable Name: LBDR69

SAS Label: HPV type 69

English Text: HPV type 69

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	7	7	
2	Negative	1551	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR70 - HPV type 70

Variable Name: LBDR70

SAS Label: HPV type 70

English Text: HPV type 70

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	47	47	
2	Negative	1511	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR71 - HPV type 71

Variable Name: LBDR71

SAS Label: HPV type 71

English Text: HPV type 71

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	20	20	
2	Negative	1538	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR72 - HPV type 72

Variable Name: LBDR72

SAS Label: HPV type 72

English Text: HPV type 72

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	26	26	
2	Negative	1532	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR73 - HPV type 73

Variable Name: LBDR73

SAS Label: HPV type 73

English Text: HPV type 73

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	30	30	
2	Negative	1528	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR81 - HPV type 81

Variable Name: LBDR81

SAS Label: HPV type 81

English Text: HPV type 81

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	54	54	
2	Negative	1504	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR82 - HPV type 82

Variable Name: LBDR82

SAS Label: HPV type 82

English Text: HPV type 82

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	11	11	
2	Negative	1547	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR83 - HPV type 83

Variable Name: LBDR83

SAS Label: HPV type 83

English Text: HPV type 83

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	85	85	
2	Negative	1473	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR84 - HPV type 84

Variable Name: LBDR84

SAS Label: HPV type 84

English Text: HPV type 84

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	104	104	
2	Negative	1454	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDR89 - HPV type 89

Variable Name: LBDR89

SAS Label: HPV type 89

English Text: HPV type 89

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	92	92	
2	Negative	1466	1558	
3	Inadequate	29	1587	
	Missing	272	1859	

LBDRPI - HPV type IS39

Variable Name: LBDRPI

SAS Label: HPV type IS39

English Text: HPV type IS39

Code or Value	Value Description	Count	Cumulative	Skip to Item
1	Positive	0	0	
2	Negative	784	784	
3	Inadequate	29	813	
	Missing	1046	1859	