## Environmental Exposures Measures for PhenX Toolkit

*Chair of this Working Group was Dr. Lynn Goldman of Johns Hopkins University. Co-leads of the Expert Review Panel that updated this domain were Dr. Barbara Entwisle of the University of North Carolina at Chapel Hill and Dr. Myles Cockburn of the University of Southern California.*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description of Measurement Protocol</th>
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<tbody>
<tr>
<td>1</td>
<td><strong>Air Contaminants in the Home Environment</strong> Questions about interior home/apartment improvements—such as professional cleaning, major renovations, new carpeting, and painting—in the last year. Short-term exposure questions are also asked about personal activities in and around the home in the last 48 hours.</td>
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<td>2</td>
<td><strong>Characteristics of Current Residence</strong> Questions asked about the type of home, age, time lived in the residence, garage, pets in the home, and water damage.</td>
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<td>3</td>
<td><strong>Current Environmental Tobacco Smoke Exposure</strong> Questions include smoking at the respondent's home and at work. If smoking occurs at the home, a house- hold roster is utilized to document which person smokes and the number of cigarettes smoked per day. If smoking occurs at work, the respondent is asked the number of hours per day the smoke is present.</td>
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<td>4</td>
<td><strong>Day Care/Preschool Attendance</strong> Respondent's mother is asked if the child attended day care or preschool. If the child attended either, the parent is asked the dates attended and the number of hours per week. If the child attended either, the parent is asked the dates attended and the number of hours per week.</td>
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<td>5</td>
<td><strong>Dust Collection - Vacuum Bag</strong> Respondents are mailed instructions and a sealable plastic bag to collect dust from their vacuum cleaner. The respondent mails the contents to the laboratory. The laboratory sieves, weighs, and analyzes the sample for environmental contaminants.</td>
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<td>6</td>
<td><strong>Exposure at Work and in Daily Life</strong> Respondent completes a table of questions about exposures at work or during daily life. If respondent answers “yes” to any of the exposures, the number of years exposed to the substance is also requested.</td>
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<td>7</td>
<td><strong>Exposures from Hobbies</strong> Questions about specific hobbies the respondent participated in for 6 months or longer. If the respondent has participated in one or more of the hobbies, he or she is asked additional questions about when the hobby started, how long it lasted, the overall time period, and the number of hours per week or month.</td>
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<td>8</td>
<td><strong>History of Being Breast Fed</strong> Child: The respondent is asked whether or not his or her mother breast-fed him or her. Adult: The respondent is asked whether or not the child was breast-fed.</td>
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<td>9</td>
<td><strong>Home and Workplace Exposures to Floor and Wall Materials</strong> The respondent answers questions about the interior surfaces in his or her residence and workplace.</td>
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<td>10</td>
<td><strong>Occupation/Occupational History</strong> This protocol includes several questions about the respondent's current job, including the job title, industry, activities, when the job was started, hours spent working each week, and normal hours of the day worked. Occupation and industry entries are coded using the Standardized Occupational Classification System (SOC) and the North American Industry Classification System (NAICS) codes from the U.S. Census Bureau. The respondent is asked a number of questions about his longest-held job, including name of occupation, industry, types of activities performed, and length of time worked. As an alternative, the respondent is asked specific details about every job he or she has had for 6 months or longer since he or she was 16 years old.</td>
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<td>11</td>
<td><strong>Personal Care Products</strong> The Study of Use of Products and Exposure-Related Behavior (SUPERB) questionnaire includes a comprehensive list of personal care product questions used to capture the type of product and frequency of use.</td>
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<tr>
<td>12</td>
<td><strong>Residential History</strong> This protocol captures information about every residence the respondent has lived in for 3 months or longer. It includes questions concerning topics such as the dates lived, exact address and/or landmarks near the residence, whether the residence was located on or near a farm, the type of water supply, whether the residence was near fields or orchards, and whether it was located in the center or margin of town. After the interview has been completed, the researcher should determine the geocoordinates of each residence.</td>
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<tr>
<td>13</td>
<td><strong>Ultraviolet Light Exposure</strong> The interviewer asks the respondent several questions about sunburn, use of tanning booths and sunlamps, and time spent outdoors in the midday sun.</td>
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<td>14</td>
<td><strong>Water Source</strong> The respondent is asked a series of questions about the home’s source of drinking water, such as if the water comes from a community’s supply or a private well, the depth of the well, if the well is cased, and whether water filtration/treatment devices are used.</td>
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What is the PhenX Toolkit?

The PhenX Toolkit is an online catalog of recommended, standard measures and is available for use at no cost at https://www.phenxtoolkit.org.

The purpose of the PhenX Toolkit is to:

- Provide recommended, standard measures of phenotypes and exposures for use in biomedical research
- Facilitate acceptance and use of standard PhenX measures
- Promote collaboration and facilitate cross-study analyses

Researchers visit the Toolkit to:

- Select and incorporate standard measures into ongoing studies
- Consider PhenX measures when planning new studies
- Review and select high-quality, recommended, standard measures in order to expand a study beyond the primary research focus
- Review and select PhenX measures that relate to researchers’ primary research focus

PhenX Toolkit features:

- The Smart Query Tool provides two search options: a Smart Search based on keywords (and synonyms) and a Text Search that searches all text
- Browse options: Domains, Measures, Collections, Supplemental Information, and hierarchical tree view
- Link your study to find other researchers using the same measures and to explore opportunities for cross-study analysis
- Standards included: cancer Data Standards Registry and Repository (caDSR) Common Data Elements (CDEs); Logical Observation Identifiers Names and Codes (LOINC)
- Registered Users have access to additional features and functionality (e.g., saving more than one "My Toolkit")
- Quick Start and Tutorial resources help new users become familiar with the Toolkit
- Data Dictionaries compatible with submission to the database of Genotypes and Phenotypes (dbGaP) and Custom Data Collection Worksheets can be downloaded
- REDCap Instrument Zip files for PhenX protocols can be uploaded directly to REDCap

For each PhenX measure, the following information is provided:

- Brief description of the measure
- Rationale for selecting the measure for inclusion in the Toolkit
- Detailed protocol(s) for collecting the measure
- Information about the personnel, training, and equipment needed to collect the measure
- Any special requirements
- Related measures
- References

PhenX Research Domains

- Alcohol, Tobacco and Other Substances
- Anthropometrics
- Cancer
- Cardiovascular
- Demographics
- Diabetes
- Environmental Exposures
- Gastrointestinal
- Infectious Diseases and Immunity
- Neurology
- Nutrition and Dietary Supplements
- Obesity
- Ocular
- Oral Health
- Physical Activity and Physical Fitness
- Pregnancy
- Psychiatric
- Psychosocial
- Rare Genetic Conditions
- Reproductive Health
- Respiratory
- Skin, Bone, Muscle and Joint
- Social Environments
- Speech and Hearing

PhenX supplements:

Several National Institutes of Health (NIH) institutes and programs have contributed supplemental funding to add depth to the Toolkit in specific areas of research.

PhenX Measures for Sickle Cell Disease Research funded by the National Heart, Lung, and Blood Institute (NHLBII).

PhenX Measures for Tobacco Regulatory Research were supported by NIH and the Food and Drug Administration’s Center for Tobacco Products (CTP).

PhenX Measures for Mental Health Research funded by the National Institute of Mental Health (NIMH).

PhenX Measures for Substance Abuse and Addiction Research funded by the National Institute on Drug Abuse (NIDA).

1 Funding for the Social Environments domain provided by the Office of Behavioral and Social Sciences Research (OBSSR).