Methods Description for Measure E5

Measure

E5. Percentage of children ages 6 and under regularly exposed to environmental tobacco smoke in the home.

Summary

Data for this measure are from two surveys. For 1994 and 1998, exposure in the home was measured by data from the National Health Interview Survey (NHIS), administered by the Centers for Disease Control and Prevention's National Center for Health Statistics. For 2003, data are from U.S. EPA Indoor Environments Division, National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke. That telephone survey was designed to assess knowledge regarding general and personal environmental asthma triggers; the extent to which individuals with asthma take measures to reduce exposure to indoor environmental asthma triggers; and the barriers to implementation, for adults with asthma or parents of children with asthma, which prevent improvement of the indoor environment. In addition, data were collected to provide information about children (under the age of 18), particularly those age 6 and under, exposed to environmental tobacco smoke in the home. For both surveys, the measure indicates the percentage of children 6 years and under who are exposed regularly (4 or more days per week) to environmental tobacco smoke in the home.

Overview of Data Files

The following files are needed to calculate this measure..

National Health Interview Survey (NHIS):

For the National Health Interview Survey, all the files together with the survey documentation and SAS programs for reading in the data are available at the NHIS website: www.cdc.gov/nchs/nhis.htm

- NHIS 1994: Person file personsx.asc, Year 2000 Objectives Supplement file year2000.asc. The personsx.asc file is an ASCII file containing interview data for all persons. The year2000.asc file is an ASCII file that contains supplementary interview data including household smoking variables. The two files were sorted and merged using the following identifier variables: QUARTER, PSU number random recode (PSUMNUMR), week census code (WEEKCEN), segment number (SEGNUM), household number (HHNUM), type of family (FAMNUM). The other variables needed for these analyses are age (AGE), survey weight (WTFA), whether or not someone smokes inside the home (SMOKEHOM), and the number of days per week that residents smoke in the home (NDSMOKHM).

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- NHIS 1998: Person file personsx.dat, Adult Prevention file prevadlt.dat. The personsx.dat file is an ASCII file containing interview data for all persons. The prevadlt.dat file is an ASCII file that contains supplementary interview data for adults including household smoking variables. The two files were sorted and merged using the following identifier variables: household (HHX) and family (FMX). The other variables needed for these analyses are age (AGE_P), survey weight (WTFA), whether or not someone smokes inside the home (SMANY), and the number of days per week with smoking in the home (SMDAYS).

National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke (NSEMA-CEE):

- The information for this measure was obtained from the survey report.[1] The variables used for the data analyses are age, person screener weight, whether or not someone smokes inside the home, and the number of days per week with smoking in the home.

Metadata for Measure E5

Measure Name	Percentage of children ages 6 and under regularly exposed to environmental tobacco smoke in the home.
Measure Number:	E5
Data Set Names:	1. National Health Interview Survey (NHIS). NHIS 1994: personsx.asc, year2000.asc. NHIS 1998: personsx.dat, prevadlt.dat. 2. National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke (NSEMA-CEE).
Who provides the Data set:	NHIS: Centers for Disease Control and Prevention, National Center for Health Statistics. EPA: Office of Radiation and Indoor Air, Indoor Environments Division
Source location of the Data set:	NHIS: www.cdc.gov/nchs/nhis.htm EPA: [not available online]
Years reported for this measure:	1994, 1998, 2003
Data Collection Frequency:	NHIS: annually. NSEMA-CEE: one-time survey
Brief Data Set Description:	The National Health Interview Survey (NHIS) is

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[1] **National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke, Methodology and Analysis Report, EPA 2004**

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| | conducted by the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention. The survey is designed to assess the health status of the non-institutionalized civilian population with interviews, using a complex multi-stage, stratified, clustered sampling design. Interviewers obtain information on health history and demographic characteristics, including age, household income, and race and ethnicity by self-reporting or as reported by an informant.

EPA's National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke was conducted in 2003 to assess knowledge regarding general and personal environmental asthma triggers; the extent to which individuals with asthma take measures to reduce exposure to indoor environmental asthma triggers; and the barriers to implementation, for adults with asthma or parents of children with asthma, which prevent improvement of the indoor environment. In addition, data were collected to provide information about children (under the age of 18), particularly those age 6 and under, exposed to environmental tobacco smoke in the home. |
|---|---|
| Variables Used to Calculate This Indicator: | NHIS 1994: QUARTER, PSU number random recode (PSUMNUMR), week census code (WEEKCEN), segment number (SEGNUM), household number (HHNUM), type of family (FAMNUM), age (AGE), survey weight (WTFA), whether or not someone smokes inside the home (SMOKEHOM), and the number of days per week that residents smoke in the home (NDSMOKHM). NHIS 1998: household (HHX), family (FMX), age (AGE_P), survey weight (WTFA), whether or not someone smokes inside the home (SMANY), and the number of days per week with smoking in the home (SMDAYS). NSEMA-CEE 2003: Age, Person Screener Weight, Whether or not someone smokes inside the home, and Number of days per week with smoking in the home. |
| Comments: | The NHIS survey design over-samples certain demographic groups including Hispanics (since 1995) and Blacks (since 1985). The NSEMA-CEE 2003 survey design oversampled households with multiple telephone lines, and low-income adults with asthma. Therefore, in both cases, the survey weights must be used to adjust for the over-sampling, as well as for non-coverage and non-response. |

National Health Interview Survey (NHIS)

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Since 1957, the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention, has conducted the National Health Interview Survey (NHIS), a series of annual US national surveys of the health status of the non-institutionalized civilian population.

Results are calculated from responses to the following survey questions:

In NHIS 1994:

- SMOKEHOM: "Does anyone who lives here smoke cigarettes, cigars, or pipes anywhere inside this home?"
- NDSMOKHOM: "On the average, about how many days per week do people who live here smoke anywhere inside this home?"

In NHIS 1998:

- SMANY: "Does anyone smoke cigarettes, cigars, or pipes anywhere inside this home?"
- SMDAYS: "On the average, about how many days per week is there smoking anywhere inside this home?"

The NHIS uses a complex multi-stage, stratified, clustered sampling design. Certain demographic groups have been deliberately over-sampled. In 1994, Blacks were over-sampled. In 1998, Blacks and Hispanics were over-sampled. The publicly released data includes survey weights to adjust for the over-sampling, non-response, and non-coverage. The statistical analyses used the survey weights (WTFA) to re-adjust the responses to represent the total national population for each year.

National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke (NSEMA-CEE)

In 2003, the U.S. Environmental Protection Agency's Office of Radiation and Indoor Air (ORIA) commissioned a commercial contractor, Abt Associates Incorporated, to conduct a survey on asthma and environmental tobacco smoke (ETS) issues. The survey was designed to assess knowledge regarding general and personal environmental asthma triggers; the extent to which individuals with asthma take measures to reduce exposure to indoor environmental asthma triggers; and the barriers to implementation, for adults with asthma or parents of children with asthma, which prevent improvement of the indoor environment. In addition, data were collected to provide information about children (under the age of 18), particularly those age 6 and under, exposed to environmental tobacco smoke in the home.

All interviews were conducted by telephone using a random digit dialing sampling methodology. A total of 14,685 households in the 50 states and Washington DC were contacted; of these, 2,504 interviews were conducted in households with children age 6 and under. To determine the exposure of children to ETS, a series of questions were

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administered in homes with children to determine whether residents and/or visitors smoked in the home, and if so, how often.

The NSEMA-CEE used a complex stratified sampling design. As a telephone survey, households with multiple telephone lines were oversampled. Also, the survey included an oversample of low-income adults with asthma. The data includes survey weights to adjust for the over-sampling, non-response, and non-coverage. The statistical analyses used the survey weights to re-adjust the responses to represent the total national population for 2003.

Calculation of Measure

Measure E5 is the percentage of children ages 6 or under regularly exposed to environmental tobacco smoke inside the home. "Regularly" is interpreted as an average of four or more days per week. For the NHIS data, the following calculations were applied to the publicly released data. For the NSEMA-CEE, measure E5 was obtained directly from the survey report[2], based on the same calculation approach.

For 1994, the NHIS question SMOKEHOM asked if anyone who lives in the residence smokes anywhere inside the home and the NHIS question NDSMOKHM asked for the average number of days per week residents smoke in the home. The responses are missing for responders not included in the Year 2000 Objectives Supplement file. Define the ETS question as "Do residents smoke in the home an average of four or more days per week?" Then ETS has the values:

- ETS = Missing if SMOKEHOM is missing (not in Year 2000 Objectives subsample)
- ETS = "Yes" if SMOKEHOM is not missing and NDSMOKHM = 4, 5, 6, or 7 (4-7 days smoking per week)
- ETS = "No" if SMOKEHOM is not missing and NDSMOKHM = 0, 1, 2, 3 (0-3 days smoking per week), 8 ("not ascertained") or 9 ("refused" or "don't know")

For 1998, the NHIS question SMANY asked if anyone smokes anywhere inside the home and the NHIS question SMDAYS asked for the average number of days per week there is smoking anywhere inside the home. The responses are missing for responders not included in the Adult Prevention file. Define the ETS question as "Does anyone smoke in the home an average of four or more days per week?" Then ETS has the values:

- ETS = Missing if SMANY is missing (not in Adult Prevention subsample)
- ETS = "Yes" if SMANY is not missing and SMDAYS = 4, 5, 6, or 7 (4-7 days smoking per week)

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[2] **National Survey on Environmental Management of Asthma and Children's Exposure to Environmental Tobacco Smoke, Methodology and Analysis Report, EPA 2004.**

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- ETS = "No" if SMANY is not missing and SMDAYS = 0, 1, 2, 3 (0-3 days smoking per week), 97 ("refused"), 98 ("not ascertained"), 99 ("don't know")

To simply demonstrate the calculations, we will use the NHIS 1998 responses to the ETS question. We have rounded all the numbers to make the calculations easier:

We begin with all the non-missing responses to the ETS question in the NHIS 1998 survey for children ages 0-6. Assume for the sake of simplicity that Yes or No responses were available for every sampled child. Each sampled child has an associated survey weight that estimates the annual number of children represented by that sampled child. For example, the first response for a child aged 6 or under was Yes with a survey weight of 4,000, and so represents 4,000 children ages 6 or under. A second child aged 6 or under had a No response with a survey weight of 2,000, and so represents 2,000 children ages 6 or under. The third child aged 6 or under had a No response with a survey weight of 1,000, and so represents 1,000 children ages 6 or under. The total of the survey weights for the sampled children equals 28 million, the total US population of children ages 6 or under in 1998.

To calculate the proportion of children exposed to environmental tobacco smoke, we can use the survey weights to expand the data to the total 1998 US population of 28 million children ages 0 to 6. We have 4,000 Yes responses from the first child, 2,000 No responses from the second child, 1,000 No responses from the third child, and so on. Of these 28 million responses, a total of 5.6 million responses are Yes and the remaining 22.4 million are No. Thus 5.6 million of the 28 million children were exposed to environmental tobacco smoke more than 4 days per week, giving a percentage of 20 % (5.6/28).

In reality, the calculations need to take into account that Yes or No responses were not reported for every respondent, and to use exact rather than rounded numbers. There were non-missing ETS responses for 8,991 of the 11,062 sampled children ages 0 to 6. The survey weights for all 11,062 sampled children add up to 27.8 million, the total 1998 US population of children ages 0 to 6. The survey weights for the 8,991 sampled children with non-missing responses add up to 22.7 million. Thus the available data represent 22.7 million children, which is 82 % of the 1998 US population of children ages 0 to 6. The survey weights for the Yes responses add up to 4.6 million, which is 20 % of the population with responses (4.6 million/22.7 million = 20 %). Thus we divide the sum of the weights for participants with Yes responses by the sum of the weights for participants with non-missing responses. These calculations assume that the sampled children with non-missing responses are representative of the children with missing responses.

Equations

The following equations give the mathematical calculations. Let $w(i)$ denote the survey weight for the i'th surveyed child of ages 0-6. Exclude any surveyed children that had a response other than Yes or No. For the ETS question, let the response indicator $c(i) = 1$

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if the i'th surveyed child had a Yes response and let $c(i) = 0$ if the i'th surveyed child had a No response.

1. Sum all the survey weights to get the total weight W:

$$W = \Sigma\ w(i).$$

2. Sum all the survey weights multiplied by the response indicators to get the total weight D for children with a Yes response:

$$D = \Sigma\ w(i) \times c(i).$$

3. Divide D by W to get the percentage of children regularly exposed to environmental tobacco smoke:

$$\text{Percentage} = (D\ /\ W)\ \times 100\ \%.$$

Questions and Comments

Questions regarding these methods, and suggestions to improve the description of the methods, are welcome. Please use the "Contact Us" link at the bottom of any page in the America's Children and the Environment website.

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