



Early Life Exposures

Assessment Tool

Itemized Rationale Summary for the Early Life Exposures Assessment Tool (ELEAT):

An instrument for autism studies

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X Module (Demographic Information) -

Itemized Rationale Summary of

the Early Life Exposures Assessment Tool for Autism Studies

X1 - Today's date

X2 - Birth month/year of child of interest

X3 - Relationship to child of interest

X4 - Sex of child of interest

X5 - Specification of child's developmental disorder (as diagnosed by a health professional)

X6 - Parent speculation into cause of child's developmental condition

X7 - Impact of environment on child development

X8 - Maternal birth year/month

X9 - Ethnicity of interview subject

X10 - Race of interview subject

X11 - Maternal Birthplace

X12 - Maternal grandmother birthplace

X13 - Maternal grandfather birthplace

X14 - Highest level of schooling received by mother

X15 - Birth year/month of child's father

X16 - Ethnicity of father of child

X17 - Race of child's father

X18 - Place of birth, for father of child

X19 - Place of birth for father's mother

X20 - Place of birth for father's father

X21 - Father's level of education

X22 - Number of individuals living in child's household

X23 - Estimated total family income

X24 - House owned or rented

X1 - Date of Questionnaire

Module: X

Question Number: 1

Tier: 1

Question:

1 – What is today's date?

[Responses: Month; day, year]

Potential Exposures:

N/A

Validity: N/A

Rationale:

N/A

Other Surveys using the question or a version of it:

N/A

Journal Resources:

N/A

X2 - Birth month/year of child of interest

Module: X

Question Number: 2

Tier: 1

Question:

2 – During what month and year was the child of interest born?

[Responses: _____ Month; _____ Year]

Potential Exposures:

Exposures that vary by season or year (sunlight (vitamin D), vegetables, pesticide spraying, pollution, influenza, asthma, products with formulation changes, etc). Also for examining temporal exposures and their association to instances of ASD.

Validity: Face

Rationale:

Used to capture the timing of the child's birth (or conception) which can be categorized according to seasons or years before and after exposure or other changes. Can be used to assess timing of exposures relative to birth and the length of recall (with difference to time of interview). The month and year a child was born should be easy to recall accurately. Date of birth was not asked to avoid identifying information.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure 101300 (Reproductive History Protocol), Question #4

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

X3 - Relationship to Child

Module: X

Question Number: 3

Tier: 1

Question:

3 – What is your relationship with the child of interest?

[Responses: Biological Mother [your egg/genetic material]; Adoptive Mother; Stepmother; Other Guardian (specify)]

Potential Exposures:

Genetic relationship to child.

Validity: Face.

Rationale:

To determine respondent's genetic and social relationship to child of interest.

Other Surveys using the question or a version of it:

N/A

Journal Resources:

N/A

X4 - Sex of child of interest

Module: X

Question Number: 4

Tier: 1

Question:

4 – Is your child male or female?

[Responses: Male; Female; Declined; Don't Know]

Potential Exposures:

Biological sex of the child

Validity: Face

Rationale:

Most neurodevelopmental conditions have sex predispositions and exposures can have sex-specific effects. This is a standard demographic question that should be easily recalled accurately.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure 101300 (Reproductive History Protocol), Question #8

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

X5 - Specification of child's developmental disorder (as diagnosed by a health professional)

Module: X

Question Number: 5

Tier: 1

Question:

5 – Has the child of interest been diagnosed by a health professional with any of the following developmental conditions? [Mark all that apply]

[Responses: Autism / Autism Spectrum Disorder; Pervasive Developmental Disorder Not Otherwise Specified (PDD NOS); Asperger's Disorder; Social Communication Disorder; Rett Syndrome; Childhood Disintegrative Disorder; Intellectual Disability / Mental Retardation; Speech or Language Disorder; Reading Disorder of Dyslexia; Attention Deficit Hyperactivity Disorder (ADHD); Epilepsy; Developmental Delay; Other [specify] _____; No, my child appears to be developing typically [Skip to question 7 in next section]]

Potential Exposures:

Conditions selected from commonly occurring or co-occurring conditions associated with neurodevelopment.

Validity: Face

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

X6 - Parent speculation into cause of child's developmental condition

Module: X

Question Number: 6

Tier: 1

Question:

6 – What do you think caused your child's condition?

[Responses: _____; Declined; Don't Know]

Potential Exposures:

Any potential exposures the mothers experienced and believe would be relevant to their child's developmental outcome.

Validity: Face

Rationale:

Parents might identify risk factors for conditions in their child which would otherwise not be brought to attention and taken into account.

No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

X7 - Impact of environmental exposures on the early development of children

Module: X

Question Number:7

Tier: 1

Question:

7 – How much of an impact do you think environmental exposures have on the early development of children?

[Responses: Large impact; Moderate impact; small impact; no impact; declined; don't know]

Potential Exposures:

Initial attitude about environmental impact

Validity: Face

Rationale:

To determine impact of attitude about questionnaire responses and vice versa when paired with question I5

Description of Supporting Papers:

N/A

Other Surveys using the question or a version of it:

N/A

Journal Resources:

N/A

X8 - Birth month/year of interview subject (biological mother of proband)

Module: X

Question Number: 8

Tier: 1

Question:

8 – During what month and year were you born?

[Responses: Month _____; Year _____]

Potential Exposures:

Maternal age at time of index child's birth/conception. Proxy for general health, DNA quality, oocyte (egg) quality, and intrauterine environment.

Validity: Face + Criterion

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Oocyte quality – (Navot et al., 1991)

A study examining the cause of age-related decline in female fertility found that when older women used donated oocytes from younger women their rate of pregnancies, and deliveries were higher (56.0% and 30.0%, respectively) than when their own eggs were used (3.3% and 0, respectively). When considering that in vitro fertilization uses multiple oocytes per cycle, the number of pregnancies per embryo transferred was 2/60 (3.3%) for self-oocytes and 33/225 (14.7%) for donated oocytes.

Description of Supporting Papers:

Oocyte quality – (Navot et al., 1991)

An experimental study in which 35 infertile women aged 40 years or older

Other Surveys using the question or a version of it:

PhenX: Measure 010100 (Demographics - Current Age Protocol), Question #1

U.S. Census: American Community Survey (2015)- Question #4

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

Navot D, Bergh PA, Williams MA, et al. Poor oocyte quality rather than implantation failure as a cause of age-related decline in female fertility. *Lancet*. 1991; 337: 1375-1377

US Census: American Community Survey (2015): Available from:

<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

X9 - Ethnicity of interview subject

Module: X

Question Number: 9, 9a

Tier: 1

Question:

9 – Is your ethnicity Hispanic or Latino?

[Responses: Yes; No Declined; Don't Know]

9a – Of which Hispanic or Latino group do you consider yourself a member? [Please select one or more of these categories]

[Responses: Puerto Rican; Dominican (Republic); Mexican/Mexicano; Mexican American; Chicano; Cuban; Cuban American; Central or South American; Other Latin American; Other Hispanic; Declined; Don't Know]

Potential Exposures:

Maternal ethnicity – genetic predisposition, cultural factors, dietary differences

Validity: Face

Rationale:

This is a standard demographic question.

Self-report - (Tang et al., 2005)

A study found that self-identified race/ethnicity corresponded nearly perfectly with genetic race/ethnicity clusters such that only 0.14% of subjects showed genetic cluster membership different from their self-identified race/ethnicity

Cultural Factors - (Zayas and Solari, 1994)

A review article reported that hispanic parents differ from parents of other ethnic groups in their child rearing values and the interpersonal behavior they want their children to display at home and school.

Diet - (Guendelman and Abrams, 1995)

First-generation Mexican-American women had a higher average intake of protein; vitamins A, C, and folic acid; and calcium, than second-generation Mexican-American or White non-Hispanic women.

Description of Supporting Papers:

Self-report - (Tang et al., 2005)

A study of 3,636 subjects, originally enrolled as members of sibships or nuclear families from 15 recruitment sites, were asked about their race/ethnicity. Their genetic material was then examined to determine which of five racial clusters they belonged to (non-Hispanic white, black non-Hispanic, Hispanic, Chinese, and Japanese).

Cultural Factors - (Zayas and Solari, 1994)

Review article examining the influence of context and culture on child rearing in both minority and nonminority families and research on infant–mother attachment and parental beliefs about young children's behavior.

Diet - (Guendelman and Abrams, 1995)

Data on the intake of eight nutrients were obtained from 1,373 women from the 1982-1984 Hispanic Health and Nutrition Examination Survey (HHANES) (n= 475 first-generation Mexican-American, n=898 second-generation Mexican-American women) and from 2,326 non-Hispanic white women from the NHANES II study. In both of these studies, a 24-hour recall was given .

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2 (Maternal): Question #4

National Health and Nutrition Examination Survey (NHANES 2005-06). Demographics Information - DMQ. Questions DMQ.241.

PhenX: Measure 010500 (Demographics - Ethnicity Protocol), Question #1

U.S. Census: American Community Survey (2015)- Question #5

Journal References:

Mersha TB, Abebe T. Self-reported race/ethnicity in the age of genomic research: its potential impact on understanding health disparities. *Hum Genomics*. 2015; 9:1

Guendelman S and Abrams B. Dietary intake among Mexican-American women: generational differences and a comparison with white non-Hispanic women. *American Journal of Public Health* January. 1995; 85(1): 20-25.

<http://ajph.aphapublications.org/doi/abs/10.2105/AJPH.85.1.20>

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

National Health and Nutrition Examination Survey (NHANES 2005-06). Available from:
http://www.cdc.gov/nchs/data/nhanes/nhanes_05_06/sp_dmq_d.pdf

Tang H, Quertermous T, Rodriguez B, et al. Genetic Structure, Self-Identified Race/Ethnicity, and Confounding in Case-Control Association Studies. *Am J Hum Genetics*. 2005; 76(2): 268–275.

US Census: American Community Survey (2015): Available from:

<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

Zayas LH and Solari F. Early childhood socialization in Hispanic families: Context, culture, and practice implications. *Professional Psychology: Research and Practice*. 1994; 25(3), 200-206.

X10 - Race of interview subject (biological mother of the proband)

Module: X

Question Number: 10

Tier: 1

Question:

10 – What race do you consider yourself? [Please select 1 or more of these categories]
[Responses: *White (or European or Middle Eastern descent); Black, African American; American Indian; Alaska Native; Asian; Asian Indian; Chinese; Filipino; Japanese; Korean; Vietnamese; Thai; Cambodian; Other Asian; Native Hawaiian or other Pacific Islander; Native Hawaiian; Guamanian, Chamorro; Samoan; Other Pacific Islander; Other (specify); Declined; Don't Know*]

Potential Exposures:

Maternal race – genetic susceptibility to exposures/outcomes, cultural factors

Validity: Face + Criterion

Rationale:

This is a standard demographics question.

Self-report - (Tang et al., 2005)

A study found that self-identified race/ethnicity corresponded nearly perfectly with genetic race/ethnicity clusters such that only 0.14% of subjects showed genetic cluster membership different from their self-identified race/ethnicity.

Self-report - (Mersha & Abebe, 2015)

A review article reported that comparisons between estimates of genetic ancestry and self-reported race in African, African American, and European American populations from the 1000 Genomes Project datasets showed mean (+/- SD) agreement of 0.99 (+/- 0.01), 0.89 (+/- 0.15), and 0.98 (+/- 0.02), respectively.

Cultural Factors - (Zayas and Solari, 1994)

A review article reported that hispanic parents differ from parents of other ethnic groups in their child rearing values and the interpersonal behavior they want their children to display at home and school.

Description of Supporting Papers:

Self-report - (Tang et al., 2005)

A study of 3,636 subjects, originally enrolled as members of sibships or nuclear families from 15 recruitment sites, were asked about their race/ethnicity. Their genetic material was then examined to determine which of five racial clusters they belonged to (non-hispanic white, black non-Hispanic, Hispanic, Chinese, and Japanese)

Self-report - (Mersha & Abebe, 2015)

Review article comparing self-reported race and genetic ancestry from the 1000 Genomes Project datasets

Cultural Factors - (Zayas and Solari, 1994)

Review article examining the influence of context and culture on child rearing in both minority and nonminority families and research on infant–mother attachment and parental beliefs about young children's behavior.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2: Question #6

PhenX: Measure 010500 (Demographics - Ethnicity Protocol), Question #1

U.S. Census: American Community Survey (2015)- Question #6

Journal References:

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Mersha TB, Abebe T. Self-reported race/ethnicity in the age of genomic research: its potential impact on understanding health disparities. *Hum Genomics*. 2015; 9:1

Tang H, Quertermous T, Rodriguez B, et al. Genetic Structure, Self-Identified Race/Ethnicity, and Confounding in Case-Control Association Studies. *Am J Hum Genetics*. 2005; 76(2): 268–275.

US Census: American Community Survey (2015): Available from:
<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

X11 - Birthplace of interview subject

Module: X

Question Number: 11

Tier: 1

Question:

11 – Where were you born?

[Responses: In the United States; specific the name of the U.S. state: _____; Outside the United States; specify U.S. Territory (e.g. Puerto Rico; U.S. Virgin Islands; Guam) or name of other country; Declined; Don't Know]

Potential Exposures:

Maternal birthplace (as a proxy for birth-place related exposures and immigrant status)

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2 (Maternal): Question #1

PhenX: Measure 010200 (Birthplace Protocol), Question #1

Journal References:

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

X12 - Birthplace of maternal grandmother

Module: X

Question Number: 12

Tier: 1

Question:

12 – Where was your mother born?

[Responses: In the United States; specify the Name of the U.S. State: _____; Outside the United States, specify U.S. Territory (e.g., Puerto Rico, U.S. Virgin Islands, Guam) or name of other country; Declined; Don't Know]

Potential Exposures:

Maternal grandmother birthplace/immigrant status.

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure 010300 (Birthplace of Parents Protocol), Question #1

Journal References:

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

X13 - Birthplace of maternal grandfather

Module: X

Question Number: 13

Tier: 1

Question:

13 – Where was your father born?

[Responses: In the United States; specify the Name of the U.S. State: _____; Outside the United States, specify U.S. Territory (e.g., Puerto Rico, U.S. Virgin Islands, Guam) or name of other country; Declined; Don't Know]

Potential Exposures:

Maternal grandfather birth place/immigrant status

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure 010300 (Birthplace of Parents Protocol), Question #2

Journal References:

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

X14 - Highest level of schooling received by interview subject

Module: X

Question Number: 14

Tier: 1

Question:

14 – What is the highest grade of level of school you have completed or the highest degree you have received?

[Responses: Never Attended/Kindergarten Only; 1st Grade; 2nd Grade; 3rd Grade; 4th Grade; 5th Grade; 6th Grade; 7th Grade; 8th Grade; 9th Grade; 10th Grade; 11th Grade; 12th Grade; High School Graduate; GED or Equivalent; Some College, No Degree; Associate Degree: Occupational, Technical, or Vocational Program; Associate Degree: Academic program; Bachelor's Degree (e.g., BA, AB, BS, BBA); Master's Degree (e.g., MA, MS, MEng, MEd, MBA); Professional School Degree (e.g., MD, DDS, DVM, JD); Doctoral Degree (e.g., PhD, EdD); Declined; Don't Know]

Potential Exposures:

Maternal education (can be combined with paternal education for maximum parental education). Proxy for socioeconomic status; may influence reliability of reporting.

Validity: Face

Rationale:

This is a standard sociodemographic question. No studies were found on the validity of the recall or self-report of this question.

SES - (Ahluwalia et al., 2013)

The reliability kappa coefficient, sensitivity percent, and specificity percent for women who have attained a below high school level education are as follows: WIC during pregnancy (0.61, 91.8, 67.4), delivery payment by Medicaid (0.35, 82.7, 52.2), breastfeeding initiation (0.68, 90.1, 77.5). The reliability kappa coefficient, sensitivity percent, and specificity percent for women who have attained a high school level education are as follows: WIC during pregnancy (0.74, 92.0, 81.0), delivery payment by Medicaid (0.56, 83.0, 73.1), breastfeeding initiation (0.70, 91.9, 77.0). The reliability kappa coefficient, sensitivity percent, and specificity percent for women who have achieved above a high school level education are as follows: WIC during pregnancy (0.82, 88.0, 95.4), delivery payment by Medicaid (0.70, 81.1, 92.3), breastfeeding initiation (0.72, 96.0, 74.7).

Description of Supporting Papers:

(Ahluwalia et al., 2013)

A CDC study in 2012 assessed the validity and reliability between the Pregnancy Risk Assessment Monitoring System (PRAMS) and the U.S. Certificate of Live Birth (2003). The PRAMS survey used self-reported data from a sample population of 15,646 women from 12 states. Their self-reported results were compared for agreement with the 2003 Certificate of Live Birth. The PRAMS survey was administered 2-6 months after

delivery. Another issue of focus was the effect certain maternal characteristics and birth outcomes had on reliability and validity. The indicators of interest were breastfeeding initiation, prenatal WIC services, and Medicaid paying for the pregnancy.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study: 1st Trimester Questionnaire, Part 2 (Maternal): Question #7

National Health and Nutrition Examination Survey (NHANES 2013). Demographics Information - DMQ. Questions DMQ.141.

PhenX: Measure 011000 (Current Educational Attainment Protocol), Question #1

Journal References:

Ahluwalia IB, Helms K, Morrow B. Assessing the validity and reliability of three indicators self-reported on the pregnancy risk assessment monitoring system survey. *Public Health Reports*. 2013; 128(6), 527-36.

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

National Health and Nutrition Examination Survey (NHANES 2013). Available from: http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/DMQ_H.pdf

X15 - Birth year/month of child's father

Module: X

Question Number: 15

Tier: 1

Question:

15 – During what year and month was the child's father born?

[Responses: _____ Year, _____ Month, Declined, Don't Know]

Potential Exposures:

Paternal age – proxy for sperm/DNA quality

Validity: Face

Rationale:

This is a standard demographic question.

Self-report (Lerchen and Samet, 1986)

A study examining the validity of questionnaire responses of a spouse found that 92% of wives correctly reported the their husband's year of birth.

Description of Supporting Papers:

Self-report (Lerchen and Samet, 1986)

A study examining the validity of questionnaire responses of a spouse interviewed 177 male lung cancer cases between 1980 and 1983. Subjects for the present study had died before March 1984, and were survived by their spouses. The surviving spouses were approached to participate, of which 80 participated and answered a shortened version of the questionnaire that the deceased husband had answered.

Other surveys which use the question or a version of it:

U.S. Census: American Community Survey (2015), Question #4

Journal References:

Lerchen ML, Samet JM. An assessment of the validity of questionnaire responses provided by a surviving spouse. *Am J Epidemiol.* 1986; 123 (3): 481-9

US Census: American Community Survey (2015): Available from:

<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

X16 - Ethnicity of father of child

Module: X

Question Number: 16, 16a

Tier: 1

Question:

16 – Is the father’s ethnicity Hispanic or Latino?

[Responses: Yes; No; Declined; Don’t Know]

16a – Of which Hispanic or Latino group does the father consider himself a member?

(Please select 1 or more of these categories)

[Responses: Puerto Rican; Dominican (Republic); Mexican/Mexicano; Mexican American; Chicano; Cuban; Cuban American; Central or South American; Other Latin American; Other Hispanic; Declined; Don’t Know]

Potential Exposures:

Paternal ethnicity; paternal ethnicity can serve as a proxy for ethnicity-associated variables such as cultural practices.

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question, though, this is likely to be less valid among lower SES subjects, since they are less likely to be married.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2 (Paternal): Question #11, #12

National Health and Nutrition Examination Survey (NHANES 2005-06). Demographics Information - DMQ. Questions DMQ.241.

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

National Health and Nutrition Examination Survey (NHANES 2005-06). Available from: http://www.cdc.gov/nchs/data/nhanes/nhanes_05_06/sp_dmq_d.pdf

X17 - Race of child's father

Module: X

Question Number: 17

Tier: 1

Question:

17 – What race does the father consider himself? (Please select 1 or more of these categories.)

[Responses: White (or European or Middle Eastern descent); Black, African American; American Indian; Alaska Native; Asian; Asian Indian; Chinese; Filipino; Japanese; Korean; Vietnamese; Thai; Cambodian; Other Asian; Native Hawaiian or other Pacific Islander; Native Hawaiian; Guamanian, Chamorro; Samoan; Other Pacific Islander; Other (specify) _____; Declined; Don't Know]

Potential Exposures:

Paternal race; paternal race can serve as a proxy for race-associated exposures, such as genetic background and population-specific sensitivities.

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

See those for maternal race.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2 (Paternal): Question #13

U.S. Census: American Community Survey (2015)- Question #6

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

US Census: American Community Survey (2015): Available from:

<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

X18 - Place of birth, for biological father of child

Module: X

Question Number: 18

Tier: 1

Question:

18 – Where was the father born?

[Responses: In the United States (Specify the name of the U.S. State: _____); Outside the United States (Specify U.S. Territory: Puerto Rico, U.S. Virgin Islands, Guam) or name of other country: _____); Declined; Don't Know]

Potential Exposures:

Paternal birthplace (as a proxy for birth-place related exposures and immigrant status)

Validity: Face

Rationale:

This is a standard demographic question.

Self-report (Lerchen and Samet, 1986)

A study examining the validity of questionnaire responses of a spouse found that 98% of wives correctly reported the birth state of their deceased husbands.

Description of Supporting Papers:

Self-report (Lerchen and Samet, 1986)

A study examining the validity of questionnaire responses of a spouse interviewed 177 male lung cancer cases between 1980 and 1983. Subjects for the present study had died before March 1984, and were survived by their spouses. The surviving spouses were approached to participate, of which 80 participated and answered a shortened version of the questionnaire that the deceased husband had answered.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-1st Trimester Questionnaire, Part 2 (Paternal): Question #8

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Lerchen ML, Samet JM. An assessment of the validity of questionnaire responses provided by a surviving spouse. *Am J Epidemiol.* 1986; 123 (3): 481-9

X19 - Place of birth for paternal grandmother

Module: X

Question Number: 19

Tier: 1

Question:

19 – Where was the father’s mother born?

[Responses: In the United States (Specify the name of the U.S. State: _____); Outside the United States (Specify U.S. Territory: Puerto Rico, U.S. Virgin Islands, Guam) or name of other country: _____); Declined; Don’t Know]

Potential Exposures:

Paternal grandmother’s birthplace (as a proxy for birth-place related exposures and immigrant status)

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

X20 - Place of birth for paternal grandfather

Module: X

Question Number: 20

Tier: 1

Question:

20 – Where was the father’s father born?

[Responses: In the United States (Specify the name of the U.S. State: _____); Outside the United States (Specify U.S. Territory: Puerto Rico, U.S. Virgin Islands, Guam) or name of other country: _____); Declined; Don’t Know]

Potential Exposures:

Paternal grandfather birthplace (as a proxy for birth-place related exposures and immigrant status)

Validity: Face

Rationale:

This is a standard demographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

X21 - Father's level of education

Module: X

Question Number: 21

Tier: 1

Question:

21 – What is the highest grade or level of school the father completed or the highest degree the father has received?

[Responses: Never Attended/Kindergarten Only; 1st Grade; 2nd Grade; 3rd Grade; 4th Grade; 5th Grade; 6th Grade; 7th Grade; 8th Grade; 9th Grade; 10th Grade; 11th Grade; 12th Grade; High School Graduate; GED or Equivalent; Some College, No Degree; Associate Degree: Occupational, Technical, or Vocational Program; Associate Degree: Academic program; Bachelor's Degree (e.g., BA, AB, BS, BBA); Master's Degree (e.g., MA, MS, MEng, MEd, MBA); Professional School Degree (e.g., MD, DDS, DVM, JD); Doctoral Degree (e.g., PhD, EdD); Declined; Don't Know]

Potential Exposures:

Paternal education (can be combined with maternal education for maximum parental education); proxy for socioeconomic status; may influence reliability of reporting

Validity: Face

Rationale:

This is a standard demographic question.

Self-report (Lerchen and Samet, 1986)

A study examining the validity of questionnaire responses of a spouse found that only 38 percent of the wives reported the same total years of education as had their husbands, while eight per cent did not know this information. For the 31 men who reported less than 12 years of education, 78 per cent of the wives correctly reported this information. All of the wives giving incorrect information said their husbands were high school graduates. However, for the men who said they had completed high school, 69 per cent of the wives' responses were correct, with the errors equally distributed between under- and over-reporting of education. For the 24 men with education beyond high school, 17 of the wives reported this information correctly and seven said their husbands had only completed high school.

Description of Supporting Papers:

Self-report (Lerchen and Samet, 1986)

A study examining the validity of questionnaire responses of a spouse interviewed 177 male lung cancer cases between 1980 and 1983. Subjects for the present study had died before March 1984, and were survived by their spouses. The surviving spouses were approached to participate, of which 80 participated and answered a shortened version of the questionnaire that the deceased husband had answered.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2 (Paternal): Question #14

PhenX: Measure 011000 (Current Educational Attainment Protocol), Question #1

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Lerchen ML, Samet JM. An assessment of the validity of questionnaire responses provided by a surviving spouse. *Am J Epidemiol*. 1986; 123 (3): 481-9

X22 - Number of individuals living in child's household

Module: X

Question Number: 22

Tier: 1

Question:

22 – How many individuals are living in the household where the child lives? (Including the child of interest, where he/she spends most of his/her time)

[Responses: _____ Adults (18 years old or older); _____ Children]

Potential Exposures:

Number of individuals living in child's household. Proxy for socioeconomic status and risk for infectious diseases.

Validity: Face

Rationale:

This is a standard sociodemographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2: Question #30, #31, #32

U.S. Census: American Community Survey (2015)

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

House T and Keeling MJ. Household structure and infectious disease transmission. *Epidemiol Infect.* 2009; 137(5): 654–661.

US Census: American Community Survey (2015): Available from:

<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

X23 - Estimated total family income

Module: X

Question Number: 23, 23a

Tier: 1

Question:

23 – What is your best estimate of the total annual income of all family members from all sources, before taxes, in the year prior to the child’s birth?

[Responses: \$ _____, Declined, Don’t Know]

23a – Would you say the total income was:

[Responses: Less than \$25,000 per year; \$25,000 - \$49,999 per year; \$50,000 - \$99,999 per year; \$100,000 - \$149,999 per year; \$150,000 or more per year; Declined, Don’t Know]

Potential Exposures:

Family economic status; Family economic status level can be associated with several factors, including environmental exposures, stress, lifestyle, nutrition, and access to health care.

Validity: Face

Rationale:

This is a standard demographic question.

Self-report - (Moore et al., 2000)

A review article found that wage and salary income response bias estimates from a wide variety of studies were generally small and without consistent sign, and indicators of unreliability (random error) were quite low

Description of Supporting Papers:

Self-report - (Moore et al., 2000)

Review article examining the quality of survey measures of income, with a particular focus on survey programs of the U.S. government.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2: Question #48

U.S. Census: American Community Survey (2015)- Question #48

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Moore JC, Stinson LL, Welniak EJ. Income measurement error in surveys: A review. *J Off Stat.* 2000. 16(4): 331-361.

US Census: American Community Survey (2015): Available from:

<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

X24 - House owned or rented

Module: X

Question Number: 24

Tier: 1

Question:

24 – Was the child’s home at the time of his/her birth owned or rented?

[Responses: Owned by you or someone in the household with a mortgage or loan; Owned by you or someone in the household free and clear (without a mortgage or loan); Privately rented for cash rent; Occupied without payment of cash rent; Other (specify: _____); Declined; Don’t Know]

Potential Exposures:

Socioeconomic status, Home security/stability

Validity: Face

Rationale:

This is a standard sociodemographic question. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
1st Trimester Questionnaire, Part 2: Question #16

National Health Interview Survey (NHIS) Family Questionnaire (2007). FIN.250_00.000
through FIN.275_00.000

U.S. Census: American Community Survey (2015)- Question #17

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

National Health Interview Survey (NHIS) Family Questionnaire (2007): Available from:
http://www.cdc.gov/nchs/nhis/quest_data_related_1997_forward.htm

US Census: American Community Survey (2015): Available from:
<http://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf>

B Module (Breastfeeding and Child Diet) -
Itemized Rationale Summary of
the Early Life Exposures Assessment Tool for Autism Studies

B1 - Child breastfed

B2 - Pumped Breast Milk

B3 - Age of Breastfeeding cessation

B4 - Infant Formula

B5 - Type of feeding bottle

B6 - Age of introduction of non-breast milk/infant formula foods to infant diet

B7 - Organic food in first year

B1 - Child breastfed

Module: B

Question Number: 1

Tier:

Question:

1 – Was your child ever breastfed?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Nutrients (fatty acids), maternal medications, persistent organic pollutants (POPs), pesticides, heavy metals, perchlorate, perfluorinated chemicals, other contaminants that accumulate in and are passed through breast milk, antibodies/immune factors. Psychosocial benefits. Reduction in infant infections.

Validity: Face + Criterion

Rationale:

Breast milk is the optimal source of nutrition for infants. Its components are easy to digest and include antibodies that can protect infants from bacterial and viral infections and growth factors that may prevent chronic diseases later in life. Breastfeeding can be examined as an exposure itself, or as a means of delivering exposures as defined above under “Potential Exposures.” Several studies have evaluated the validity/reliability of self-reported breastfeeding of their children, and most have shown highly reliable/valid results.

Recall - (Ahluwalia et al., 2013)

In a recent study of 15,646 women, the concordance percent, reliability kappa coefficient, sensitivity percent, and specificity percent for agreement in self-reporting of breastfeeding initiation were: 89.9, 0.72, 94.3, 76.0.

Recall - (Teinboon et al., 1994)

Maternal recall of breastfeeding (ever vs. never) is valid with agreement=85%, sensitivity=82%, specificity=93%.

Recall - (van Zyl et al., 2016)

After 10 years, 93% of mothers accurately reported that they had breastfed (ever/never) (kappa = 0.79, 95% CI = 0.63–0.90). The specificity of recall was 100%, while the sensitivity of breastfeeding recall was 91%.

Fatty Acids - (Gibson & Kneebone, 1981)

A meta-analysis including 65 studies of 2474 women found that the mean (\pm SD) concentration of DHA in breast milk (by weight) is $0.32 \pm .22\%$ and that of AA is $0.47 \pm 0.13\%$. The highest DHA concentrations were primarily in coastal populations and were associated with marine food consumption.

Medication - (Spencer et al., 2001)

Non-ionized and non-protein-bound medications transfer into breast milk primarily by passive diffusion.

POPs - (Jensen, 1982)

A review article examining chemicals found in breast milk found that DDT has been detected in most human milk investigations.

POPs – (Kalantzi et al., 2004)

A study from the UK found PBDE in breast milk samples at levels ranging from 0.3 to 69 ng/g (geometric mean = 6.6 ng/g) and PCB at levels ranging from 26 to 530 ng/g (geometric mean = 150 ng/g)

Heavy Metals - (Sonawane, 1995)

A review article found that concentrations of lead in the breast milk of women from industrialized countries are around 5 to 20 ppb. In heavily polluted areas these levels may be up to 20 times higher. Cadmium and mercury is also found in breast milk, but at lower levels than lead.

Perchlorate - (Kirk et al., 2005)

A study examining the concentration of perchlorate in both dairy and human breast milk found that perchlorate was present in nearly all milk samples and that breast milk had concentrations nearly five times that of dairy milk (mean = 2.0 vs 10.5 µg/L and maximum = 11 vs 92 µg/L, respectively).

Perfluorinated Chemicals- (Tao et al., 2008)

There were significantly higher levels of perfluorooctanoic acid (PFOA) in milk of first-time nursing mothers than those who had previously nursed before ($p \leq 0.05$). The average concentration of perfluorooctane sulfonic acid (PFOS) in human milk (n=43) from Massachusetts (MA) was 131 pg/mL, with a range of <32-617 pg/mL. The average concentration of PFOA in human milk (n=40) from MA was 43.8 pg/mL, with a range of <30.1-161 pg/mL. The average concentration of PFOA in human milk (n=40) from MA was 43.8 pg/mL, with a range of <30.1-161 pg/mL. The average concentration of perfluorohexane sulfonate (PFHxS) in human milk (n=23) from MA was 14.5 pg/mL, with a range of <12.0-63.8 pg/mL. The average concentration of perfluorononanoic acid (PFNA) in human milk (n=29) from MA was 7.26 pg/mL, with a range of <5.20-18.4 pg/mL.

Antibodies and Infection - (Ven de Perre, 2003)

A review article reported that secretory IgA immunoglobulins are secreted in breast milk, and while they do not enter circulation, they do help protect against enteric infections and act as a first line of defense in mucosal areas.

Psychosocial - (Oddy et al., 2010)

A cohort study found that breastfeeding for less than 6 months was an independent predictor of mental health problems through childhood and into adolescence compared to breastfeeding for 6 months or longer.

Description of Supporting Papers:

Recall - (Ahluwalia et al., 2013)

A CDC study in 2012 assessed the validity and reliability of certain factors, including breastfeeding initiation, between the Pregnancy Risk Assessment Monitoring System (PRAMS) and the U.S. Certificate of Live Birth (2003). The PRAMS survey used self-reported data from a sample population of 15,646 women from 12 states. Their self-reported results were compared for agreement with the 2003 Certificate of Live Birth. The PRAMS survey was administered 2-6 months after delivery. Across all ethnicities, education levels, marital statuses, and birth outcomes, the indicators demonstrated moderate to excellent validity.

Recall - (Teinboon et al., 1994)

Maternal interviews recalled information about infant feeding practice 14-15 years earlier in 144 Australian mother-child pairs, and were compared with that recorded in the Infant Welfare Center.

Recall - (van Zyl et al., 2016)

Cohort study of 969 families from the Isle of Wight starting in 2001/2002 investigating factors associated with maternal dietary intake, feeding and weaning practices in relation to the development of food hypersensitivity in the infant. Mothers were administered a dietary validated maternal food frequency questionnaire at 36 weeks of gestation. Information was obtained at 3, 6, 9, and 12 months regarding feeding practices and reported symptoms of atopy, using a standardized questionnaire. In 2012, parents were asked to complete a feeding questionnaire consisting of 18 of the same questions that were asked in 2001/2002.

Fatty Acids - (Brenna et al., 2007)

A descriptive meta-analysis that consisted of 65 studies of human breast milk (n=2474 women). 41 of 106 possible studies were excluded because they did not employ modern analysis methods capable of making accurate estimates of fatty acid (FA) profiles and criteria related to the completeness of reporting.

Medication - (Spencer et al., 2001)

Review article detailing drugs that are excreted through breast milk.

POPs - (Jensen, 1982)

Review of chemical contaminants found in breast milk.

POPs - (Kalantzi et al., 2004)

Cross sectional study examining the concentrations of 15 PBDE congeners, 15 polychlorinated biphenyl (PCB) congeners, and other selected chlorinated compounds in

breast milk from 27 women residing in London and 27 women residing in Lancaster, England.

Heavy Metals - (Sonawane, 1995)

Review article detailing the problem of contamination of human milk with environmental and occupational chemicals, excluding drugs.

Perchlorate - (Kirk et al., 2005)

Cross-sectional study examining iodine and perchlorate concentrations in 36 human milk samples from 18 states and 47 dairy milk samples from 11 states.

Perfluorinated Chemicals- (Tao et al., 2008)

A study sought to determine human milk levels of PFCs of a sample of 45 nursing mothers in Massachusetts, U.S.A.. The PFCs were identified and quantified by high-performance liquid chromatography coupled with electrospray triple-quadrupole mass spectrometry. PFC concentration comparisons between first-time nursing mothers and previous nursing mothers (within the past 4 years) was computed using the Mann-Whitney U test.

Antibodies and Infection - (Ven de Perre, 2003)

Review article evaluating the excretion of antibodies into human breast milk and the role of these antibodies on infant infections.

Psychosocial - (Oddy et al., 2010)

A cohort study from Western Australia consisting of 2900 pregnant women that were followed for 14 years. The researchers assessed the mental health status of the children using the Child Behavior Checklist (CBCL) at 2, 6, 8, 10, and 14 years;

Other surveys which use the question or a version of it:

PhenX: Measure #050101 (Breastfeeding Protocol) Question: 1

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey (NHANES) 2005–2006. Diet Behavior and Nutrition Questionnaire—DBQ. Questions DBQ010 (question 1)

Journal References:

Al-Farsi YM, Al-Sharbati MM, Waly MI, et al. Effect of suboptimal breastfeeding on occurrence of autism: a case-control study. *Nutrition*. 2012; 28(7-8):e27-32.

Brenna JT, Varamini B, Jensen RG, et al. Docosahexaenoic and arachidonic acid concentrations in human breast milk worldwide. *Am J Clin Nutr*. 2007; 85(6):1457-64.

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Jensen AA. Chemical contaminants in human milk. *Residue Rev*. 1982; 89:1-128

Kalantzi OI, Martin FL, Thomas GO, et al. Different Levels of Polybrominated Diphenyl Ethers (PBDEs) and Chlorinated Compounds in Breast Milk from Two U.K. Regions. *Environ Health Perspect.* 2004; 112(10):1085–1091.

Kirk AB, Martinelango PK, Tian K, et al. Perchlorate and iodide in dairy and breast milk. *Environ Sci Technol.* 2005; 39(7):2011-7.

National Health and Nutrition Examination Survey (NHANES 2005-06). Available from: https://wwwn.cdc.gov/nchs/data/nhanes/2005-2006/questionnaires/sp_dbq_d.pdf

Oddy WH, Kendall GE, Li J, et al. The Long-Term Effects of Breastfeeding on Child and Adolescent Mental Health: A Pregnancy Cohort Study Followed for 14 Years. *J Pediatr.* 2010; 156(4):568-74

Schultz ST, Klonoff-Cohen HS, Wingard DL, et al. Breastfeeding, infant formula supplementation, and Autistic Disorder: the results of a parent survey. *Int Breastfeed J.* 2006; 1(16):1-7.

Sonawane BR. Chemical contaminants in human milk: an overview. *Environ Health Perspect.* 1995; 103(Suppl 6):197–205.

Spencer JP, Gonzalez LS 3rd, Barnhart DJ. Medications in the breast-feeding mother. *Am Fam Physician.* 2001; 64(1):119-26.

Tao L, Kannan K, Wong CM, Arcaro KF, Butenhoff JL. Perfluorinated compounds in human milk from Massachusetts, USA. *Environmental science & technology*, 2008; 42(8), 3096-3101.

Van de Perre P. Transfer of antibody via mother's milk. *Vaccine.* 2003; 21(24):3374-3376

van Zyl Z, Maslin K, Dean T, et al. The accuracy of dietary recall of infant feeding and food allergen data. *J Hum Nutr Diet.* 2016; 29:777–785

B2 - Pumped Breast Milk

Module: B

Question Number: 2, 2a, 2b

Tier: 1

Question:

2 – Did your child ever receive pumped breast milk from a bottle?

[Responses: Yes; No; Declined; Don't Know]

2a – How often was the breast milk fed to your child from a bottle during your child's first 3 months?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

2b – How often was the breast milk fed to your child from a bottle when your child was 4-6 months old?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Same exposures as for question B1; BPA or similar exposures from plastic bottles or liners; reduction in psychosocial / attachment.

Validity: Face + Criterion

Rationale:

No studies were found on the validity of the recall or self-report of this question.

See Question B1 for rationale on exposures covered in that question.

BPA - (Rhie et al., 2014)

A study examining the association between BPA exposure and bottle/breastfeeding found that bottle-fed babies had a statistically significantly higher BPA level than those of breast-fed infants (96.58 ± 102.36 vs 45.53 ± 34.05 pg/mL, respectively; $p=0.014$).

Description of Supporting Papers:

BPA - (Rhie et al., 2014)

A study conducted using patients from the outpatient clinic of the Korea University Ansan Hospital Department of Pediatrics investigated the association between BPA exposure and bottle/breastfeeding. All subjects were between 37-41 weeks old, had no history of hospitalization and had a birth weight between 2,500 and 4,000 grams. There were 30 infants each in the breastfed and bottle-fed groups. The infants in the breastfed group had no history of being bottle-fed, and the bottle-fed group had been regularly bottle-fed for the previous three months of life. Serum BPA levels were assayed via ELISA, then independent t-test and Pearson correlation coefficient were calculated to analyze the data.

Other surveys which use the question or a version of it:

N/A

Journal References:

Rhie YJ, Nam HK, Oh YJ, et al. Influence of Bottle-Feeding on Serum Bisphenol A Levels in Infants. *J Korean Med Sci.* 2014; 29(2): 261–264.

B3 - Age of Breastfeeding cessation

Module: B

Question Number: 3

Tier: 1

Question:

3 – How old was your child when he/she completely stopped breastfeeding or receiving breast milk?

[Responses: _____ days OR _____ weeks OR _____ months OR _____ years;
Did Not Breastfeed or feed child breast milk; Still Breastfeeding / Feeding Breast Milk;
Declined, Don't Know]

Potential Exposures:

Exposures noted in B1 and B2 proportional to duration of breastfeeding / receiving breast milk.

Validity: Face

Rationale:

Recall – (Li et al., 2005)

A review article by Li et al (2005) found that of the studies examining the validity of recalled duration of breastfeeding, there was generally a high correlation between recall and the validation standard ($r=0.77$ and 0.94). The percent agreement between the recall and the recorded duration tended to be much higher when the period of recall was shorter (<6 months; 80% recalled within 1 month and 95% within 2 months) than when the period of recall was longer (14-15 years; 37% recalled within 1 month and 59% within 2 months).

Description of Supporting Papers:

Recall – (Li et al., 2005)

A review article examining the validity and reliability of maternal recall of breastfeeding practices. The 11 studies included had a sample size of 10 or more and published in English between 1966 and 2003. Five of these studies examined the validity of recalled duration of breastfeeding by comparing recall to a validated standard, while four studies compared the original and repeated interviews. [11]

Other surveys which use the question or a version of it:

PhenX: Measure #050101 (Breastfeeding Protocol) Question: 3

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey (NHANES) 2005–2006. Diet Behavior and Nutrition Questionnaire—DBQ. Question DBQ030 (question 3)

Journal References:

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Li R, Scanlon KS, Serdula MK. The Validity and Reliability of Maternal Recall of Breastfeeding Practice. *Nutr Rev.* 2005; 63(4): 103-110

National Health and Nutrition Examination Survey (NHANES 2005-06). Available from: https://wwwn.cdc.gov/nchs/data/nhanes/2005-2006/questionnaires/sp_dbq_d.pdf

B4 - Infant Formula

Module: B

Question Number: 4, 4a, 4b, 4c, 4d, 4e, 4f

Tier:

Question:

4 – Did you ever feed your child infant formula?

[Responses: Yes; No; Declined: Don't Know]

4a – If yes, how old was your child when you started feeding him/her formula?

[Responses: _____ days OR _____ weeks OR _____ months OR _____ years; Declined; Don't Know]

4b – How long did you feed your child formula?

[Responses: _____ days OR _____ weeks OR _____ months OR _____ years; Declined; Don't Know]

4c – Formulas can come with different protein bases, e.g., milk, soy, or other. What type(s) of formula did you use? *[Mark all that apply]*

[Responses: Cow's-milk based (most common); Soy-based (often for infants with lactose intolerance, colic); Other (describe): _____; Declined; Don't Know]

4d – Was the formula fortified with DHA or ARA?

[Responses: Yes; No; Declined: Don't Know]

4e – Was there a period during the time you fed your child formula that you also regularly breastfed?

[Responses: Yes; No; Declined: Don't Know]

4f – If yes, during the time you fed both formula and breast milk, did you feed:

[Responses: Mostly breastmilk; mostly formula; Half breast milk and half formula; Declined; Don't Know]

Potential Exposures:

Zinc, DHA/ARA (infant formulas started to be fortified with DHA/ARA in 2002), perchlorate, phytoestrogens (isoflavones), loss of psychosocial / attachment benefits of breastfeeding, higher infection risk through infancy.

Validity: Face + Criterion

Rationale:

Recall – (van Zyl et al., 2016)

A cohort study in the United Kingdom found that after 10 years, 84% of mothers were able to accurately recall if their child had had a bottle of formula milk while in the hospital and 94% of mothers were able to accurately recall that their child had received formula milk at some stage, irrespective of when and how much (Sensitivity=62.5%,

specificity=95.7%). This study also found substantial agreement in the reported age at which mothers introduced formula milk ($r = 0.63$, $p < 0.05$). When asked to recall the brand/type of formula given to their children, only 13.6% of those that had given their children formula answered the question. Of those, 59% recalled the exact brand name and 41% recalled the exact variant of the brand of formula given.

Recall – (Li et al., 2005)

A review article found that of the studies examining the validity of recalled age at introduction of formula was fairly low. Agreement after 6 month was between 37 and 58%, while agreement after 1 year was only 23%.

Zinc - (Johnson et al., 1978)

Zinc is an essential nutrient and is typically exclusively received from milk or formula during the first three months postpartum. Human breast milk has a higher zinc bioavailability than bovine milk and soy-based infant formula. The mean values for zinc bioavailability in decreasing order were as follows: human breast milk = 59.2%; processed cow's milk = 43.7 to 50.9%; unprocessed (raw) cow's milk = 42%; reconstituted dry milk = 41.2%; soy-based infant formula (Isomil) = 39.5%; milk-based formula (Similac) = 37.4%; and soy-based formula (Nursoy) = 26.8%.

Perchlorate - (Her et al., 2010)

Perchlorate levels were assessed by ion chromatography tandem mass spectrometry, from 37 samples of 12 brands of bovine milk, and 12 samples of 4 brands of infant formula. The resulting perchlorate concentration in raw dairy milk ranged from 1.99–6.41 lg L1 ($n = 37$, mean concentration = 4.59 ± 0.17 lg L1). The perchlorate concentration in milk-based infant formula ranged between 1.49–33.3 lg kg1 ($n = 26$, mean concentration = 7.83 ± 0.22 lg kg1).

Phytoestrogens - (Setchell et al., 1998)

A study examining the concentration of isoflavones in soy-based formulas prepared for infant feeding found that the total isoflavone concentrations ranged from 32 to 47 mg/L, whereas isoflavone concentrations in human breast milk are only 5.6 ± 4.4 µg/L (mean \pm SD).

Psychosocial - (Oddy et al., 2010)

A cohort study found that breastfeeding for less than 6 months was an independent predictor of mental health problems through childhood and into adolescence compared to breastfeeding for 6 months or longer.

Infection – (Victoria et al., 1987)

A case-control study from Brazil found that compared to infants that were exclusively breastfed, those also given formula or cow's milk had 4.2 times (95% CI: 1.7 - 10.1) the risk of death from diarrhea, while those not receiving any breast-milk had a risk 14.2 times that of those that were exclusively breastfed (95% CI: 5.9 - 34.1). Similarly, the risk of death due to respiratory infections in breastfed infants who also received a milk supplement were 1.6 times (95% CI 0.7 - 3.6) that of exclusively breast-fed infants. Those fed only on formula or cow's milk had a 3.6 times (95% CI 1.7 - 7.5) higher risk.

Description of Supporting Papers:

Recall - (van Zyl et al., 2016)

Cohort study of 969 families from the Isle of Wight starting in 2001/2002 investigating factors associated with maternal dietary intake, feeding and weaning practices in relation to the development of food hypersensitivity in the infant. Mothers were administered a dietary validated maternal food frequency questionnaire at 36 weeks of gestation. Information was obtained at 3, 6, 9, and 12 months regarding feeding practices and reported symptoms of atopy, using a standardized questionnaire. In 2012, parents were asked to complete a feeding questionnaire consisting of 18 of the same questions that were asked in 2001/2002.

Recall – (Li et al., 2005)

A review article examining the validity and reliability of maternal recall of breastfeeding practices. The 11 studies included had a sample size of 10 or more and published in English between 1966 and 2003. Five of these studies examined the validity of recalled duration of breastfeeding by comparing recall to a validated standard, while four studies compared the original and repeated interviews.

Zinc - (Johnson et al., 1978)

A study conducted at the University of North Dakota, Grand Forks, examined the bioavailability of various types of milk and infant formula in Sprague-Dawley rats. The rats had been fasted for 18 hours, then within 2 hours were fed 20 mL of either human breast milk, processed bovine milk, raw bovine milk, reconstituted dry milk, and various soy-based infant formulas. The rats were then sacrificed and serum and fecal levels of zinc were measured. Human breast milk was found to have the highest bioavailability of the liquids sampled.

Perchlorate - (Her et al., 2010)

A study was conducted to determine average perchlorate levels in bovine milk and milk-based formula across South Korea. The study found that perchlorate levels in milk are directly related to perchlorate levels in food. Perchlorate levels were directly quantified by ion chromatography tandem mass spectrometry, and all samples were above the lowest observable quantity (LOQ).

Phytoestrogens - (Setchell et al., 1998)

A study examined the isoflavone compositions of nine commercially available soy-based formulas using HPLC.

Psychosocial - (Oddy et al., 2010)

A cohort study from Western Australia consisting of 2900 pregnant women that were followed for 14 years. The researchers assessed the mental health status of the children using the Child Behavior Checklist (CBCL) at 2, 6, 8, 10, and 14 years;

Infection – (Victoria et al., 1987)

A population-based case-control study of infant mortality in two urban areas of southern Brazil. Information on deaths among singleton infant residents in the study areas, aged at least 8 days, whose birth weight was at least 1500 g and who had not been in the hospital for more than 15 days prior to their death, was obtained weekly from all hospitals, coroner services, health authorities and registries in the study areas between Dec 24, 1984 and Dec 23, 1985. When an infectious disease was noted as the underlying or associated cause of death, a physician visited the home of the infant to obtain information on feeding habits and signs and symptoms preceding the death. The closest two infants aged 7 to 364 days were selected as the controls for each case, and a detailed feeding history was obtained for them.

Other surveys which use the question or a version of it:

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study

CHARGE (Childhood Autism Risks from Genetics and the Environment) Study

Journal References:

Chen AC, Donovan SM. Genistein at a concentration present in soy infant formula inhibits Caco-2BBe cell proliferation by causing G2/M cell cycle arrest. *The Journal of nutrition*. 2004; 134(6): 1303-1308.

Her N, Kim J, Yoon Y. Perchlorate in dairy milk and milk-based powdered infant formula in South Korea. *Chemosphere*. 2010. 81(6): 732-737.

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Johnson PE, Evans GW. Relative zinc availability in human breast milk, infant formulas, and cow's milk. *Am J Clin Nutr*. 1978; 31(3): 416-421.

Li R, Scanlon KS, Serdula MK. The Validity and Reliability of Maternal Recall of Breastfeeding Practice. *Nutr Rev*. 2005; 63(4): 103-110

Oddy WH, Kendall GE, Li J, et al. The Long-Term Effects of Breastfeeding on Child and Adolescent Mental Health: A Pregnancy Cohort Study Followed for 14 Years. *J Pediatr*. 2010; 156(4):568-74

Setchell KD, Zimmer-Nechemias L, Cai J, et al. Isoflavone content of infant formulas and the metabolic fate of these phytoestrogens in early life. *Am J Clin Nutr*. 1998; 68(6): 1453S-1461S.

van Zyl Z, Maslin K, Dean T, et al. The accuracy of dietary recall of infant feeding and food allergen data. *J Hum Nutr Diet*. 2016; 29: 777–785

Victoria CG, Vaughan JP, Lombardi C, et al. Evidence for protection by breast-feeding against infant deaths from infectious diseases in Brazil. *Lancet*. 1987; 2(8554): 319-22.

B5 - Type of feeding bottle

Module: B

Question Number: 5

Tier: 1

Question:

5 – If you fed your child with a bottle (formula, breast milk, or other liquids), which type of bottle did you use most often?

[Responses: Clear hard plastic (no inserts/liners); Clear hard plastic (with inserts/liners); Opaque plastic (not clear); Glass; Never used a bottle; Declined; Don't Know]

Was it BPA-free? [such as Born-Free®]

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

BPA

Validity: Face + Criterion

Rationale:

BPA is an endocrine disruptor found in many plastics and has been associated with numerous developmental disorders. Replacements for BPA are also of interest.

There are no studies found examining the validity of the recall or self-report of this question.

(Maragou et al., 2008)

Under real use conditions, infantile exposure to BPA from daily feeding from a polycarbonate bottle ranged from 0.2-2.2 µg/kg body weight/day. The TDI is 50 µg/kg body weight/day.

BPA - (Rhie et al., 2014)

A study examining the association between BPA exposure and bottle/breastfeeding found that bottle-fed babies had a statistically significantly higher BPA level than those of breast-fed infants (96.58 ± 102.36 vs 45.53 ± 34.05 pg/mL, respectively; $p=0.014$).

Description of Supporting Papers:

BPA - (Maragou et al., 2008)

A study investigated the migration of BPA from polycarbonate baby bottles to liquids inside the bottle under real use conditions. Analysis of the materials was conducted via FT-IR, then the presence of BPA was assessed via HPLC-MS. There were three use scenarios: cleaning the bottle via dishwasher/migration conditions of 70°C over 120 minutes, brushing the bottle with detergent and hand-washing/70°C over 120 minutes, brushing the bottle with detergent and hand-washing/filling with boiling water and left at

ambient temperature for 45 minutes. The study found that BPA migration decreases with continued wash cycles.

BPA - (Rhie et al., 2014)

A study conducted using patients from the outpatient clinic of the Korea University Ansan Hospital Department of Pediatrics investigated the association between BPA exposure and bottle/breastfeeding. All subjects were between 37-41 weeks old, had no history of hospitalization and had a birth weight between 2,500 and 4,000 grams. There were 30 infants each in the breastfed and bottle-fed groups. The infants in the breastfed group had no history of being bottle-fed, and the bottle-fed group had been regularly bottle-fed for the previous three months of life. Serum BPA levels were assayed via ELISA, then independent t-test and Pearson correlation coefficient were calculated to analyze the data.

Other surveys which use the question or a version of it:

N/A

Journal References:

Maragou NC, Makri A, Lampi EN, et al. Migration of bisphenol A from polycarbonate baby bottles under real use conditions. *Food Addit Contam.* 2008; 25(3): 373-383.

Rhie YJ, Nam HK, Oh YJ, et al. Influence of Bottle-Feeding on Serum Bisphenol A Levels in Infants. *J Korean Med Sci.* 2014; 29(2): 261–264.

B6 - Age of introduction of non-breast milk/infant formula foods to infant diet

Module: B

Question Number: 6

Tier: 1

Question:

6 – How old was your child when he/she started eating foods other than formula or breast milk, e.g., jarred baby food, cereal?

[Responses: _____ weeks OR _____ months; Declined; Don't Know]

Potential Exposures:

Obesity, diabetes, nutrition, immune/allergic sensitization.

Validity: Face + Criterion

Rationale:

Introduction before 6 months might reduce benefits of breastfeeding / breastmilk and increases child's risk for obesity, diabetes, asthma and allergies. Determines start of exposures from these first foods.

Recall - (van Zyl et al., 2016)

A cohort study in the United Kingdom found that after 10 years, there was weak agreement about the age at which their child was when first given solid foods ($r=0.16$), however, 76% of mothers could accurately remember when they first gave solid foods to their child within a 4-week margin.

Obesity - (Huh et al., 2011)

Introduction of solid foods to formula-fed infants before the age of four months is associated with a six-fold risk of obesity at three years (OR: 6.3, 95% CI: 2.3–16.9, $p<0.0001$) when compared to the odds of obesity at three for breastfed or formula-fed infants introduced to solid food at 4-5 months (OR: 1.0, 95% CI: 0.3–3.3).

Diabetes - (Norris et al., 2003)

A cohort study found that among infants at a high risk for type 1 diabetes mellitus (DM), after adjustment for HLA genotype, family history of type 1 DM, ethnicity, and maternal age, those given cereals (both gluten-containing and gluten-free) between 0 and 3 months of age were 4.32 times as likely to develop type 1 DM (95% CI, 2.0-9.35) compared with those who were exposed during the fourth through sixth month. Compared to the same group, those who were exposed at 7 months or older were 5.36 times as likely to develop type 1 DM (95% CI, 2.08-13.8). When restricting analyses to just those children with the HLA genotype, the adjusted HRs were 5.55 (95% CI, 1.92-16.03) and 12.53 (95% CI, 3.19-49.23) for initial cereal exposure between ages 0 to 3 months and at 7 months or older, respectively.

Allergies - (Nwaru et al., 2010)

A cohort study from Finland found that late introduction of potatoes (>4 months), oats (>5 months), rye (>7 months), wheat (>6 months), meat (>5.5 months), fish (>8.2 months), and eggs (>10.5 months) was significantly directly associated with sensitization to food allergens.

Description of Supporting Papers:

Recall - (van Zyl et al., 2016)

Cohort study of 969 families from the Isle of Wight starting in 2001/2002 investigating factors associated with maternal dietary intake, feeding and weaning practices in relation to the development of food hypersensitivity in the infant. Mothers were administered a dietary validated maternal food frequency questionnaire at 36 weeks of gestation. Information was obtained at 3, 6, 9, and 12 months regarding feeding practices and reported symptoms of atopy, using a standardized questionnaire. In 2012, parents were asked to complete a feeding questionnaire consisting of 18 of the same questions that were asked in 2001/2002.

Obesity - (Huh et al., 2011)

A prospective pre-birth cohort study of 847 mother-child pairs was studied via interview during pregnancy, six months and three years postpartum. The aim of the study was to investigate the relationship between obesity and age of introduction to solid foods. Prenatal nutrition assessments were performed, and data on infant feeding practices were collected. Skin-fold measurements of the infants were also taken at six months and three years. Weight for length measurements were also collected, along with demographic characteristics.

Diabetes - (Norris et al., 2003)

A cohort study recruited 1,183 newborns either born at St Joseph's Hospital in Denver, CO, that were identified as having an increased risk for type 1 DM by screening umbilical cord blood samples for diabetes susceptibility alleles in the HLA region, or from families with type 1 DM using The Barbara Davis Center for Childhood Diabetes in Denver, CO, other diabetes care clinics, the Colorado IDDM (insulin-dependent DM) Registry, and newspaper publicity. All children were tested at 9, 15, and 24 months of age and annually thereafter for antibodies to pancreatic islet antigens. If they were autoantibody positive, they returned for blood draws every 3 to 6 months. During telephone or face-to-face interviews at 3, 6, 9, 12, and 15 months of age, data for infant diet were collected. Mothers were asked to report the date of introduction and frequency of exposure (ie, number of servings per day) of all foods, milks, and formulas, that the infants consumed during the previous 3 months. The type and brand name of infant formulas and the types of cereal were recorded. In addition, juice, fruit, vegetables, meat, breads, other dairy products, eggs, sweets, and snack foods were recorded separately. Breastfeeding initiation and termination also were recorded.

Allergies - (Nwaru et al., 2010)

Subjects were enrolled from the Finnish Type 1 Diabetes Prediction and Prevention (DIPP) nutrition study, a prospective, birth cohort study. Analysis was conducted on 994

children with HLA-conferred susceptibility to type 1 diabetes mellitus for whom information on breastfeeding, age at the introduction of solid foods, and allergen-specific immunoglobulin E levels at 5 years was available. Each child's diet was assessed by means of age-specific dietary questionnaires at 3, 6, and 12 months of age, with a follow-up form on the age at the introduction of new foods to record the age at the introduction of new foods. Specific IgE concentrations were analyzed in samples obtained at the age of 5 years, by using an ImmunoCAP fluoroenzyme immunoassay (Phadia Diagnostics, Uppsala, Sweden) with allergic sensitization set at ≥ 0.35 kU/L. Clinical symptoms and food tolerance were not evaluated.

Other surveys which use the question or a version of it:

PhenX: Measure #050101 (Breastfeeding Protocol) Question: 2

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey (NHANES) 2005–2006. Diet Behavior and Nutrition Questionnaire—DBQ. Question DBQ020 (question 2)

Journal References:

Hamilton CM, Hendershot TP. *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

Huh SY, Rifas-Shiman SL, Taveras EM, et al. Timing of solid food introduction and risk of obesity in preschool-aged children. *Pediatrics*. 2011; 127(3): e544-e551.

National Health and Nutrition Examination Survey (NHANES 2005-06). Available from:

https://wwwn.cdc.gov/nchs/data/nhanes/2005-2006/questionnaires/sp_dbq_d.pdf

Norris JM, Barriga K, Klingen-Smith G, et al. Timing of Initial Cereal Exposure in Infancy and Risk of Islet Autoimmunity. *JAMA*. 2003; 290(13): 1713-1720.

Nwaru BI, Erkkola M, Ahonen S, et al. Age at the Introduction of Solid Foods During the First Year and Allergic Sensitization at Age 5 Years. *Pediatrics*. 2010; 125(1): 50-59

van Zyl Z, Maslin K, Dean T, et al. The accuracy of dietary recall of infant feeding and food allergen data. *J Hum Nutr Diet*. 2016; 29: 777–785

B7 - Organic food in first year

Module: B

Question Number: 7

Tier: 3

Question:

7 – Before your child's first birthday, how often did he/she eat food that was organic?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Lower risk of pesticides

Validity: Face + Criterion

Rationale:

There are no papers examining the validity of the recall or self-report of this question

Pesticides - (Lu et al.2006)

A longitudinal study of 23 elementary age children examining the concentration of urinary specific metabolites of organophosphorus (OP) pesticides found that when the children's diets were switched to only organic foods, the median urinary concentrations of the specific metabolites for malathion and chlorpyrifos decreased to non-detect levels until the reintroduction of non-organic foods.

Description of Supporting Papers:

Pesticides - (Lu et al.2006)

A longitudinal study conducted using 23 elementary age children recruited from local public elementary and Montessori schools in the suburban Seattle, Washington, area. Two urine samples per day were collected for 15 days. For the first three days, the child's diet did not change. The next five days a majority of the child's diet was substituted with organic food. After this five-day period, the child resumed their conventional diet. Each sample of urine was analyzed for metabolites of organophosphates.

Other surveys which use the question or a version of it:

N/A

Journal References:

Lu C, Toepel K, Irish R, et al. Organic Diets Significantly Lower Children's Dietary Exposure to Organophosphorus Pesticides. *Environ Health Perspect.* 2006; 114(2): 260-263

M Module (Maternal Conditions/Medical Interventions) -

Itemized Rationale Summary of the Early Life Exposures Assessment Tool for Autism Studies

[M1 - Number of pregnancies](#)

[M2 - Final outcome of each pregnancy](#)

[M3 - End date of pregnancy for child prior to child of interest](#)

[M4 - Stage at which pregnancy for child prior to child of interest ended](#)

[M5 - Trying to become pregnant](#)

[M6 - Duration of attempt at pregnancy](#)

[M7 - Baby desired at time of pregnancy](#)

[M8 - Mother's perception of timing of pregnancy](#)

[M9 - Medical provider assistance with conception/pregnancy](#)

[M10 - Issues with conception](#)

[M11 - Type of conception aid services received](#)

[M12 - Height](#)

[M13 - Weight prior to pregnancy](#)

[M14 - Weight gained during pregnancy](#)

[M15 - Stage of pregnancy at which mother learned of pregnancy](#)

[M16 - Nuchal translucency scan](#)

[M17 - Chorionic villus sampling during pregnancy](#)

[M18 - Amniocentesis during pregnancy](#)

[M19 - Vaccinations or immunizations during pregnancy](#)

[M20 - Specific vaccinations or immunizations received during pregnancy](#)

[M21 - Due date](#)

[M22 - Baby's actual birth date](#)

[M23 - Scheduled cesarean prior to labor](#)

[M24 - How labor was initiated](#)

[M25 - How birth provider started labor](#)

[M26 - Amount of time spent in labor](#)

[M27 - Pitocin administered during labor](#)

[M28 - Antibiotics to treat uterine infection during labor](#)

[M29 - Means of childbirth](#)

[M30 - Meconium passed in amniotic fluid](#)

[M31 - Birth weight of baby](#)

[M32 - Multiple births](#)

[M33 - Number of babies delivered](#)

[M34 - Specification of which baby is of interest in the study](#)

[M35 - Identical babies](#)

[M36 - Means of determining whether the babies were identical](#)

[M37 - Physical health during index period](#)
[M38 - Mental health during index period](#)
[M39 - Poor health keeping you from doing things during index period](#)
[M40 - Feeling unable to control things during index period](#)
[M41 - Feeling things going your way during index period](#)
[M42 - Allergies to the environment during pregnancy](#)
[M43 - Allergies to food during pregnancy](#)
[M44 - Allergies to medication during pregnancy](#)
[M45 - Asthma before or during pregnancy](#)
[M46 - Thyroid disorder before or during pregnancy](#)
[M47 - High blood sugar/diabetes before or during pregnancy](#)
[M48 - High blood pressure/hypertension before or during pregnancy](#)
[M49 - Dental cleanings/procedures before or during pregnancy](#)
[M50 - High blood sugar/diabetes during pregnancy](#)
[M51 - Anemia/low blood count during pregnancy](#)
[M52 - Depression during pregnancy](#)
[M53 - Vaginal bleeding during pregnancy](#)
[M54 - Severe nausea during pregnancy](#)
[M55 - Preeclampsia/toxemia during pregnancy](#)
[M56 - Early/preterm labor](#)
[M57 - Smaller than average growth of the baby](#)
[M58 - Any other serious condition during pregnancy](#)
[M59 - Cervical incompetence during pregnancy](#)
[M60 - Placenta Previa](#)
[M61 - Rh-negative Blood Type](#)
[M62 - Influenza during pregnancy](#)
[M63 - High fever during pregnancy](#)
[M64 - Bladder/Kidney/Urinary Tract Infection during pregnancy](#)
[M65 - Genital herpes during pregnancy](#)
[M66 - Bacterial vaginal infection during pregnancy](#)
[M67 - Yeast vaginal infection during pregnancy](#)
[M68 - Trich vaginal infection during pregnancy](#)
[M69 - Group B Streptococcus infection during pregnancy](#)
[M70 - Other infection during pregnancy](#)
[M71 - Prescription medicines for pain, fever, or inflammation](#)
[M72 - Non-prescription medicines for pain, fever, inflammation](#)
[M73 - Migraine medication](#)
[M74 - Muscle relaxant medication](#)
[M75 - Allergy medication](#)
[M76 - Acne medication](#)
[M77 - Sedatives and Sleep aids](#)
[M78 - Female hormone medication](#)
[M79 - Mental Health medication \(other than for depression\)](#)
[M80 - Seizure medication](#)
[M81 - Cough medication](#)
[M82 - Other medication](#)

M1 - Number of pregnancies

Module: M

Question Number: 1

Tier: 1

Question:

1 – How many times have you been pregnant? (Please count all pregnancies including those that ended in live birth, stillbirth, miscarriage, abortion or a tubal, ectopic or molar pregnancy. Include children from other relationships)

[Responses: __ (number), Declined, Don't Know]

Potential Exposures: N/A

Validity: Face

Rationale:

This is a standard question in reproductive health instruments, with a high degree of face validity.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

(National Children's Study 2010)

The first data planned for release in late 2015 cover the Initial Vanguard Study (IVS) period, which ended in September 2010. Samples and later study data will be available beginning in 2016.

(NHANES 2013)

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey (NHANES 2013). Reproductive Health - RHQ. Questions RHQ.160.

Journal References:

National Children's Study (NCS). Available from:

<http://www.nichd.nih.gov/research/NCS/Pages/default.aspx>

M2 - Final outcome of each pregnancy

Module: M

Question Number: 2, 2a

Tier:

Question:

2 – Did each pregnancy end? (Please answer this question by checking the one box in each row that describes how each pregnancy ended, starting with your first one and ending with the most recent one)

Pregnancy # 1 - 15

[Responses: *Live birth; Stillbirth; Abortion; Miscarriage; Ectopic or Tubal; Molar; Other [specify], Declined, Don't Know*]

2a – What was the pregnancy # of the child of interest?

[Responses: _____]

Potential Exposures: N/A

Validity: Face

Rationale:

This is a standard question in reproductive health instruments, with a high degree of face validity. Motivational biases in self-reporting are affected by social contexts and moderated by person characteristics such as gender. The social context of assessment is likely to influence self-report accuracy. Behaviors that are perceived as socially disapproved, including abortions, are likely to be underreported.

Description of Supporting Papers:

<http://www.guttmacher.org/pubs/journals/2822896.html>

Other surveys which use the question or a version of it:

PhenX: Measure #101300 (Reproductive History Protocol), Question #2

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

(Women's Interview Study of Health (WISH))

The WISH study is a population-based case-control study conducted by the NCI in the early 1900's, with the goal of identifying risk factors for early-onset breast cancer. Data was collected in the Surveillance, Epidemiology, and End Results (SEER) program study areas of Atlanta, Seattle, and several counties in New Jersey. Results from the study

confirmed the importance of several early life exposures and their contribution to breast cancer outcomes.

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:
<https://www.phenxtollkit.org/index.php>

Women's Interview Study of Health. Available from:
<https://seer.cancer.gov/studies/epidemiology/study15.html>

M3 - End date of pregnancy for child prior to child of interest

Module: M

Question Number: 3

Tier:

Question:

3 – What was the end date for the pregnancy that came just before the one with the child of interest?

[Responses: ____ Month, ____ Year, Declined, Don't Know]

Potential Exposures: This is used to calculate interpregnancy interval.

Validity: Face

Rationale:

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure #101300, Question #4 (Reproductive History Protocol)

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

(Women's Interview Study of Health (WISH))

The WISH study is a population-based case-control study conducted by the NCI in the early 1900's, with the goal of identifying risk factors for early-onset breast cancer. Data was collected in the Surveillance, Epidemiology, and End Results (SEER) program study areas of Atlanta, Seattle, and several counties in New Jersey. Results from the study confirmed the importance of several early life exposures and their contribution to breast cancer outcomes.

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:
<https://www.phenxtollkit.org/index.php>

Women's Interview Study of Health. Available from:
<https://seer.cancer.gov/studies/epidemiology/study15.html>

M4 - Stage at which pregnancy for child prior to child of interest ended

Module: M

Question Number: 4

Tier:

Question:

4 – How far along were you when that pregnancy ended?

[Responses: ____ Months or ____ Weeks or ____ Days; Declined; Don't Know]

Potential Exposures: This is used to calculate interpregnancy interval.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

PhenX: Measure #101300, Question #3 (Reproductive History Protocol)

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

(Women's Interview Study of Health (WISH))

The WISH study is a population-based case-control study conducted by the NCI in the early 1900's, with the goal of identifying risk factors for early-onset breast cancer. Data was collected in the Surveillance, Epidemiology, and End Results (SEER) program study areas of Atlanta, Seattle, and several counties in New Jersey. Results from the study confirmed the importance of several early life exposures and their contribution to breast cancer outcomes.

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:

<https://www.phenxtollkit.org/index.php>

Women's Interview Study of Health. Available from:

<https://seer.cancer.gov/studies/epidemiology/study15.html>

M5 - Trying to become pregnant

Module: M

Question Number: 5

Tier:

Question:

5 – When you found out you were pregnant, had you been trying to become pregnant?
[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Alcohol, tobacco, stress, medication intake, poor diet, vitamin/nutrient deficiency, pesticides, household cleaners, organic solvents, pollution (This is not an exhaustive list.)

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

(NHANES 2013)

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey (NHANES 2013). Reproductive Health - RHQ. Questions RHQ.174.

Journal References:

National Health and Nutrition Examination Survey (NHANES 2013). Available from: http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/RHQ_CAPI_H.pdf

M6 - Duration of attempt at pregnancy

Module: M

Question Number: 6

Tier:

Question:

8 – For about how many months were you trying to become pregnant?

[Responses: ____ Months; Declined; Don't Know]

Potential Exposures:

Alcohol, tobacco, stress, medication intake, poor diet, vitamin/nutrient deficiency, inflammation, pesticides, household cleaners, organic solvents, pollution (This is not an exhaustive list.)

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M7 - Baby desired at time of pregnancy

Module: M

Question Number: 7

Tier:

Question:

7 – When you became pregnant, did you yourself actually want to have a baby at some point in your future?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Stress, alcohol, tobacco, stress, medication intake, poor diet, vitamin/nutrient deficiency, inflammation, pesticides, household cleaners, organic solvents, pollution (this is not an exhaustive list.)

Validity: Face

Rationale:

Whether or not a women wanted to have a baby at some point in her future is considered a indicator of whether or not she was taking measures to safeguard her health for a future pregnancy.

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M8 - Mother's perception of timing of pregnancy

Module: M

Question Number: 8

Tier:

Question:

8 – Would you say you became pregnant too soon, at about the right time, or later than you wanted?

[Responses: Too Soon; Right Time; Later; Didn't Have a Preference; Declined; Don't Know]

Potential Exposures:

Alcohol, tobacco, stress, medication intake, poor diet, vitamin/nutrient deficiency, inflammation, pesticides, household cleaners, organic solvents, pollution (This is not an exhaustive list.)

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M9 - Medical provider assistance with conception/pregnancy

Module: M

Question Number: 9

Tier:

Question:

9 – Did you or your partner go to a medical provider to help you get pregnant with this pregnancy?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Proxy for underlying physiologic problems that caused infertility (inflammation, etc), and medical interventions (procedures and medications) that may have been used to achieve pregnancy.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M10 - Issues with conception

Module: M

Question Number: 10

Tier:

Question:

10 – Which of these problems did you or your partner have? [Mark all that apply]

[Responses: Problems with Ovulation; Polycystic Ovarian Syndrome (PCOS); Damage to the Fallopian Tubes; Endometriosis; Problems with the Uterus; Diminished Ovarian Reserve/Menopause; Unexplained Infertility; No male partner; Declined; Don't Know]

Potential Exposures:

Altered maternal physiology. Potential exposure to medical interventions to achieve pregnancy.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M11 - Type of conception aid services received

Module: M

Question Number: 11

Tier:

Question:

11 – Which of these services did you or your partner receive to help you have a baby together? [Mark all that apply]

[Responses: Advice; Drugs to improve ovulation; Surgery to correct blocked tubes; surgery to treat endometriosis; Surgery to correct uterus: Fibroid or Septum removal; In-vitro fertilization; Artificial insemination; Male Surgery: Varicocele treatment or Vasectomy reversal; Declined; Don't Know]

Potential Exposures:

Medical procedures and pharmaceuticals. Proxy for underlying maternal physiology abnormalities.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M12 - Height

Module: M

Question Number: 12

Tier: 1

Question:

12 – How tall are you without shoes?

[Responses: ____feet ____ inches or ____ cm; Declined; Don't Know]

Potential Exposures:

Maternal height. Can be used with weight to calculate body mass index (BMI), a measure of body fat based on height and weight.

Validity: Face

Rationale:

This question is standard in public health instruments.

Description of Supporting Papers:

Krakowiak 2015

Other surveys which use the question or a version of it:

PhenX: Measure #020700 (Reproductive History Protocol)

Definition: Height is the distance from the top of the participant's head to the heels of his or her feet (i.e., the vertical length).

Purpose: Height or stature is used to assess body size and bone length. Recumbent length is used to measure length of infants, and knee height may be used to estimate height when stature cannot be measured in older adults.

(NHANES 2013)

Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey (NHANES 2013). Weight History - WHQ. Question WHQ.010

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Sept. 2007. Web. 1 Nov 2015.

Available from: <https://www.phenxtollkit.org/index.php>

National Health and Nutrition Examination Survey (NHANES). Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/WHQ_H.pdf

M13 - Weight prior to pregnancy

Module: M

Question Number: 13

Tier: 1

Question:

13 – What was your weight *just before* you became pregnant?
[Responses: ____ Pounds or ____ kg; Declined; Don't Know]

Potential Exposures:

Obesity / underweight, inflammation, insulin resistance

Validity: Face

Rationale:

This is a component of BMI calculation.

Description of Supporting Papers:

(Tomeo et al. 1999)

A study conducted by the Channing Lab of Brigham & Women's Hospital (Harvard Medical School) assessed the validity and reproducibility of maternal recall about prenatal factors thirty years after the pregnancy of interest. Validity was tested by administering a questionnaire in 1993 about prenatal factors thirty years after the pregnancy of interest, and reproducibility was assessed by administering the questionnaire once more in 1995 to the same study population. The reproducibility study population consisted of 146 women, mothers of the the women in the HMS Nurse's Health Studies. The questionnaire was administered once in 1993, and again in 1995, by mail. Prenatal factors of interest included pre-pregnancy weight, pregnancy complications, preterm delivery, and birthweight. The validity study consisted of 154 women whose pregnancy medical records were included in the National Collaborative Perinatal Project (NCPP) of the National Institute of Neurological Diseases and Stroke, from 1959 to 1965. Questionnaires were administered by mail and telephone, and compared with medical records from the pregnancy of interest. The results of the study found high validity and reproducibility in self-reported recall for prenatal factors.

(Krakowiak et al. 2015)

Other surveys which use the question or a version of it:

National Health and Nutrition Examination Survey (NHANES 2013). Question WHQ.053 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/WHQ_H.pdf

Journal References:

National Health and Nutrition Examination Survey (NHANES 2013). Question WHQ.053 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/WHQ_H.pdf

Tomeo, C. A., Rich-Edwards, J. W., Michels, K. B., Berkey, C. S., Hunter, D. J., Frazier, A. L., ... & Buka, S. L. (1999). Reproducibility and validity of maternal recall of pregnancy-related events. *Epidemiology*, 10(6), 774-776.

M14 - Weight gained during pregnancy

Module: M

Question Number: 14

Tier: 1

Question:

14 – How much weight did you gain *during* your pregnancy?
[Responses: ____ Pounds or ____ kg; Declined; Don't Know]

Potential Exposures:

Obesity [add as in 14 for all here]

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M15 - Stage of pregnancy at which mother learned of pregnancy

Module: M

Question Number: 15

Tier: 1

Question:

15 – How far along were you when you learned that you were pregnant?

[Responses: ____ Months or ____ Weeks or ____ Days; Declined; Don't Know]

Potential Exposures:

Alcohol, tobacco, stress, medication intake, poor diet, vitamin/nutrient deficiency, inflammation, pesticides, household cleaners, organic solvents, pollution (This is not an exhaustive list.)

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M16 - Nuchal translucency scan

Module: M

Question Number: 16

Tier:

Question:

16 – At the end of the first trimester, did you get a nuchal translucency (NT) scan?
(This special ultrasound is performed at the end of the first trimester before 14 weeks and measures the back of the fetus' neck to screen for Down Syndrome / Trisomy 21.)
[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M17 - Chorionic villus sampling during pregnancy

Module: M

Question Number: 17

Tier: 2

Question:

17 – At any time during your pregnancy, did you have chorionic villus sampling/ CVS?
(This test is done during early pregnancy to find whether your baby has certain problems.
It involves collection of a small amount of placental tissue through either the cervix or
the abdominal wall.)

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Disruption of the placenta, with potential for alteration of nutrient and gas exchange

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M18 - Amniocentesis during pregnancy

Module: M

Question Number: 18

Tier: 2

Question:

18 – At any time during your pregnancy, did you have an amniocentesis / amnio? (This test is done during the second trimester to find whether your baby has certain problems. It involves collection of a small amount of amniotic fluid through the abdominal wall.)

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Disruption of the amniotic environment, with potential for damage to the integrity of the amniotic sac. Increased chance of intraamniotic infection and early membrane rupture.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M19 - Vaccinations or immunizations during pregnancy

Module: M

Question Number: 19

Tier: 2

Question:

19 – Did you receive any vaccinations or immunizations during your pregnancy?
[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Vaccine components. Immune stimulation, systemic inflammation, potential fever.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M20 - Specific vaccinations or immunizations received during pregnancy

Module: M

Question Number: 20

Tier: 2

Question:

20 – What vaccinations or immunizations did you receive during your pregnancy?

Which vaccinations did you receive?

[Responses: Rho (D) Immune Globulin/Rhogam; Influenza; Hepatitis A; Hepatitis B; Tetanus/Diphtheria (Td); Tetanus/Diphtheria/Pertussis (Tdap); Meningococcal; Pneumococcal; Other _____; Declined; Don't Know]

Potential Exposures:

As above in 21

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M21 - Due date

Module: M

Question Number: 21

Tier: 2

Question:

21 – What month and day were you due?

[Responses: ____ Month ____ Day; Declined; Don't Know]

Potential Exposures:

Extremes of gestational age at birth are associated with adverse development.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M22 - Baby's actual birth date

Module: M

Question Number: 22

Tier: 1

Question:

22 – What was your baby's month and day of birth?

[Responses: ____ Month ____ Day; Declined; Don't Know]

Potential Exposures:

As in 21.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M23 - Scheduled cesarean prior to labor

Module: M

Question Number: 23

Tier: 1

Question:

23 – Were you delivered by a planned or scheduled cesarean delivery before going into labor or breaking your water bag (amniotic sac)?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Malposition, anesthetic drugs; lack of labor stress and exposure to maternal vaginal flora for immune priming.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M24 - How labor was initiated

Module: M

Question Number: 24

Tier: 1

Question:

24 – How did you go into labor?

*[Responses: My birth provider did something to start my labor/induction;
Spontaneously/on my own; Declined; Don't Know]*

Potential Exposures:

Inherent problems in lack of natural labor; medications used to initiate labor; increased potential for difficult labor and cesarean birth.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M25 - How birth provider started labor

Module: M

Question Number: 25

Tier: 1

Question:

25 – How did your birth provider start your labor?

[Responses: Pill(s) to swallow; Pill(s), suppository or gel in my vagina or rectum; Something mechanical in my cervix to stretch it; Medicine in my IV; Broke my water bag/amniotic sac; Declined; Don't Know]

Potential Exposures:

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M26 - Amount of time spent in labor

Module: M

Question Number: 26

Tier: 1

Question:

26 – How many hours were you in labor? [Labor is defined as regular painful uterine contractions that results in cervical change. We are interested in the number of hours from the start of these contractions until the birth of your baby.]

[Responses: ____ Hours; Declined; Don't Know]

Potential Exposures:

Infection, mechanical trauma, placental fatigue with hypoxia

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M27 - Pitocin administered during labor

Module: M

Question Number: 27

Tier: 2

Question:

27 – Once you were in labor, were you given a medicine in your IV called Pitocin to speed up the process?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Oxytocin

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M28 - Antibiotics to treat uterine infection during labor

Module: M

Question Number: 28

Tier: 1

Question:

28 – Did you have an infection in your uterus/womb during labor for which they gave you antibiotics?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Antibiotics themselves, infection, inflammation, fever

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M29 - Means of childbirth

Module: M

Question Number: 29, 29a

Tier: 1

Question:

29 – How was your baby born?

[Responses: By vagina; By cesarean; Declined; Don't Know]

29a – Was the birth assisted?

[Responses: Yes, with the use of forceps; Yes, with the use of vacuum; Yes, with the use of both forceps and vacuum; No; Declined; Don't Know]

Potential Exposures:

[please draw from above: scheduled cesarean]

Validity: Face

Rationale:

As with scheduled...

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M30 - Meconium passed in amniotic fluid

Module: M

Question Number: 30

Tier: 2

Question:

30 – Did your baby pass meconium in the amniotic fluid before birth?
[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Sign of in-utero stress and associated with infection

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M31 - Birth weight of baby

Module: M

Question Number: 31

Tier: 1

Question:

31 – What was the birth weight of your baby?

[Responses: ____ Pounds ____ Ounces or ____ grams; Declined; Don't Know]

Potential Exposures:

Extremes of birth weight and birth weight for gestational age

Validity: Face

Rationale:

As above

Description of Supporting Papers:

A study conducted by the Channing Lab of Brigham & Women's Hospital (Harvard Medical School) assessed the validity and reproducibility of maternal recall about prenatal factors thirty years after the pregnancy of interest. Validity was tested by administering a questionnaire in 1993 about prenatal factors thirty years after the pregnancy of interest, and reproducibility was assessed by administering the questionnaire once more in 1995 to the same study population. The reproducibility study population consisted of 146 women, mothers of the women in the HMS Nurse's Health Studies. The questionnaire was administered once in 1993, and again in 1995, by mail. Prenatal factors of interest included pre-pregnancy weight, pregnancy complications, preterm delivery, and birthweight. The validity study consisted of 154 women whose pregnancy medical records were included in the National Collaborative Perinatal Project (NCP) of the National Institute of Neurological Diseases and Stroke, from 1959 to 1965. Questionnaires were administered by mail and telephone, and compared with medical records from the pregnancy of interest. The results of the study found high validity and reproducibility in self-reported recall for prenatal factors.

Other surveys which use the question or a version of it:

PhenX Toolkit: Measure #020200 (Birth Weight Protocol)

Definition: Birth weight (measured, recalled, or vital records/chart abstraction) is the weight of the infant in grams or pounds and ounces at birth. Birth weight is directly related to gestational age.

Purpose: Birth weight is associated not only with the health status of the infant/child, but has also been linked to later-life conditions such as obesity, hypertension, kidney disease, diabetes, and other chronic conditions. Birth weight is influenced by genetics, maternal health, prenatal health, pregnancy complications, environmental factors, multiple-gestation births, and other factors. Low birth (LBW) poses significant health risks.

Journal References:

Tomeo, C. A., Rich-Edwards, J. W., Michels, K. B., Berkey, C. S., Hunter, D. J., Frazier, A. L., ... & Buka, S. L. (1999). Reproducibility and validity of maternal recall of pregnancy-related events. *Epidemiology*, 10(6), 774-776.

M32 - Multiple births

Module: M

Question Number: 32

Tier: 1

Question:

32 – Was this a multiple birth?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Multiple gestations face increased perinatal adversity, including increased risk of early delivery and problems associated with sharing placental resources. Multiple gestations associated with fertility procedures and medications in some cases.

Validity: Face

Rationale:

As above

Description of Supporting Papers:

Other surveys which use the question or a version of it:

PhenX Toolkit. Reproductive History #101300, Question #8

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

Journal References:

N/A

M33 - Number of babies delivered

Module: M

Question Number: 33

Tier: 1

Question:

33 – How many babies were delivered?

[Responses: ____ Number; Declined; Don't Know]

Potential Exposures:

As above in 32

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

PhenX Toolkit. Reproductive History #101300, Question #8

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

Journal References:

N/A

M34 - Specification of which baby is of interest in the study

Module: M

Question Number: 34

Tier: 1

Question:

34 – Which baby was the one whose pregnancy you are describing in this survey?
[Responses: First; Second; Third; Other:____; Declined; Don't Know]

Potential Exposures:

Order of birth in multiple gestations assists with assessing risk for birth trauma and infection exposure.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M35 - Identical babies

Module: M

Question Number: 35

Tier: 1

Question:

35 – Were the babies identical?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Genetic similarities / variations alter risk of developmental issues.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M36 - Means of determining whether the babies were identical

Module: M

Question Number: 36

Tier: 1

Question:

36 – How did you know? (Mark all that apply)

[Responses: Doctor told me; Genetic tests; They look like each other; Declined; Don't Know]

Potential Exposures:

As above

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M37 - Physical health during index period

Module: M

Question Number: 37

Tier:

Question:

37 – How would you describe your physical health (including physical illness and injury)?

In the 3 Months Before Pregnancy

[Responses: Excellent; Very Good; Good; Fair; Poor; Declined; Don't Know]

During Pregnancy

[Responses: Excellent; Very Good; Good; Fair; Poor; Declined; Don't Know]

During your Child's First Year of Life

[Responses: Excellent; Very Good; Good; Fair; Poor; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M38 - Mental health during index period

Module: M

Question Number: 38

Tier:

Question:

38 – How would you describe your mental health (including stress, depression and problems with emotion)?

In the 3 Months Before Pregnancy

[Responses: Excellent; Very Good; Good; Fair; Poor; Declined; Don't Know]

During Pregnancy

[Responses: Excellent; Very Good; Good; Fair; Poor; Declined; Don't Know]

During your Child's First Year of Life

[Responses: Excellent; Very Good; Good; Fair; Poor; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M39 - Poor health keeping you from doing things during index period

Module: M

Question Number: 39

Tier:

Question:

39 – How often did poor physical health (including physical illness and injury)?

In the 3 Months Before Pregnancy

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

During Pregnancy

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

During your Child's First Year of Life

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M40 - Feeling unable to control things during index period

Module: M

Question Number: 40

Tier:

Question:

40 – How often did you feel that you were unable to control the important things in your life?

In the 3 Months Before Pregnancy

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

During Pregnancy

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

During your Child's First Year of Life

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M41 - Feeling things going your way during index period

Module: M

Question Number: 41

Tier:

Question:

41 – How often did you feel that things were going your way?

In the 3 Months Before Pregnancy

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

During Pregnancy

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

During your Child's First Year of Life

[Responses: Never; Almost Never; Sometimes; Fairly Often; Very Often; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M42 - Allergies to the environment during pregnancy

Module: M

Question Number: 42

Tier: 2

Question:

42 – At any time during your pregnancy with the child of interest, did you have any of the following allergies?

Allergies to the environment?

[Responses: Yes; No; Declined; Don't Know]

What is the source of the allergy? [Mark all that apply]

[Responses: Pollen; Mold spores; Dust mites; Animal dander/fur; Other: ____; Declined; Don't Know]

Did you have any reactions to this particular allergen during your pregnancy? [Mark all that apply]

[Responses: Pollen; Mold spores; Dust mites; Animal dander/fur; Other: ____; Declined; Don't Know]

Potential Exposures:

Allergies may be a marker for underlying immune differences.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M43 - Allergies to food during pregnancy

Module: M

Question Number: 43

Tier: 2

Question:

43 – At any time during your pregnancy with the child of interest, did you have any of the following allergies?

Allergies to food?

[Responses: Yes; No; Declined; Don't Know]

What is the source of the allergy? [Mark all that apply]

[Responses: Cow's milk; Soy; Eggs; Wheat; Peanuts; Tree nuts; Shellfish; Other: ____; Declined; Don't Know]

Did you have any reactions to this particular allergen during your pregnancy? [Mark all that apply]

[Responses: Cow's milk; Soy; Eggs; Wheat; Peanuts; Tree nuts; Shellfish; Other: ____; Declined; Don't Know]

Potential Exposures:

As above

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M44 - Allergies to medication during pregnancy

Module: M

Question Number: 44

Tier: 2

Question:

44 – At any time during your pregnancy with the child of interest, did you have any of the following allergies?

Allergies to medication?

[Responses: Yes; No; Declined; Don't Know]

What is the source of the allergy? [Mark all that apply]

[Responses: Penicillin; Sulfa drugs; Insulin; X-ray contrast / Iodine; Other: ____; Declined; Don't Know]

Did you have any reactions to this particular allergen during your pregnancy? [Mark all that apply]

[Responses: Penicillin; Sulfa drugs; Insulin; X-ray contrast / Iodine; Other: ____; Declined; Don't Know]

Potential Exposures:

As above.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M45 - Asthma before or during pregnancy

Module: M

Question Number: 45

Tier: 2

Question:

45 – At any time during the **three months before you became pregnant** or during your pregnancy with the child of interest were you treated for any of the following conditions?

Asthma?

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the condition? [Mark all that apply]

[Responses: In the 3 months Before Pregnancy; During pregnancy; Declined; Don't know]

Did you take / were you given any medications for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ albuterol (Proventil, Ventolin); salmeterol (Seravent); salmeterol+fluticasone (Advair); formoterol (Foradil, Performist); montelukast (Singulair); zafirlukast (Accolate); zileuton (Zyflo); fluticasone (Flovent); budesonide (Pulmacort, Symbicort); mometasone (Asmanex, Twisthaler); beclomethasone (Qvar); ciclesonide (Alvesco); triamcinolone acetonide (Azmacort)]

Did you take this medication during pregnancy?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Respiratory compromise, stress, immune dysfunction, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

National Children's Study 2015:

The Data Repository is now in development and will be available in late 2015.

Researchers will be able to apply to use the data in their own investigations. A link to the application and archive will be posted here when it is available. Please check back later this year for the link. (<https://www.nichd.nih.gov/research/NCS/Pages/researchers.aspx>)

National Health and Nutrition Examination Survey (NHANES 2013):

Question MCQ.010 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/MCQ_H.pdf

Journal References:

National Children's Study (NCS). Available from:

<http://www.nichd.nih.gov/research/NCS/Pages/default.aspx>

National Health and Nutrition Examination Survey (NHANES). Available from:

<https://www.cdc.gov/nchs/nhanes.htm>

M46 - Thyroid disorder before or during pregnancy

Module: M

Question Number: 46

Tier: 2

Question:

46 – At any time during the **three months before you became pregnant** or during your pregnancy with the child of interest were you treated for any of the following conditions?

Thyroid disorder? (Hypothyroidism, Hyperthyroidism, Graves Disease)

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the condition? [Mark all that apply]

[Responses: In the 3 months Before Pregnancy; During pregnancy; Declined; Don't know]

Did you take / were you given any medications for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ Levothyroxine (Synthroid); methimazole (Tapazole); propylthiouracil (PTU); propranolol, atenolol]

Did you take this medication during pregnancy?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Extremes of thyroid function, medication, potential for immune dysfunction

Validity:

Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

National Children's Study 2015:

The Data Repository is now in development and will be available in late 2015.

Researchers will be able to apply to use the data in their own investigations. A link to the application and archive will be posted here when it is available. Please check back later this year for the link. (<https://www.nichd.nih.gov/research/NCS/Pages/researchers.aspx>)

National Health and Nutrition Examination Survey (NHANES 2013):

Question MCQ.160m Available from:
http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/MCQ_H.pdf

Journal References:

National Children's Study (NCS). Available from:
<http://www.nichd.nih.gov/research/NCS/Pages/default.aspx>

National Health and Nutrition Examination Survey (NHANES). Available from:
<https://www.cdc.gov/nchs/nhanes.htm>

M47 - High blood sugar/diabetes before or during pregnancy

Module: M

Question Number: 47

Tier: 1

Question:

47 – At any time during the **three months before you became pregnant** or during your pregnancy with the child of interest were you treated for any of the following conditions?

High blood sugar / diabetes? (Type 2 Diabetes Mellitus, Type 1 Diabetes Mellitus) [We will ask about gestational diabetes diagnosed in this pregnancy below in question 50])
[Responses: Yes – Type 1; Yes – Type 2; No; Declined; Don't Know]

If yes, when did you have the condition? [Mark all that apply]
[Responses: In the 3 months Before Pregnancy; During pregnancy; Declined; Don't know]

Did you take / were you given any medications for this condition?
[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):
[Responses: _____ glucophage (Metformin); glimepiride (Amaryl); glyburide (DiaBeta, Micronase, Glynase); glipizide (Glucotrol); repaglinide (Prandin) nateglinide (Starlix); pioglitazone (Actos); rosiglitazone (Avandia); sitagliptin (Januvia); saxagliptin (Onglyza); linagliptin (Tradjenta); acarbose (Precose); mitlitol (Glyset); insulin (many brands and types)]

Did you take this medication during pregnancy?
[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Hyperglycemia, inflammation, insulin resistance

Validity: Face

Rationale:

Description of Supporting Papers:

(Krakowiak et al. 2015):

A study conducted by faculty of the University of California, Davis Department of Public Health investigated the relationship between reporting accuracy of metabolic conditions during the prenatal period and case status of the proband. The study population was a subset of the CHARGE study. Over 600 women were interviewed 2-5 years after delivery, mothers of preschool-aged children with and without neurodevelopmental disorders. An EEQ for diabetes and hypertension was assessed for agreement with data from medical records, which was used as a gold standard. The results found strong

agreement between medical records and self-reported answers regarding metabolic conditions during the prenatal period.

Other surveys which use the question or a version of it:

National Children's Study:

The Data Repository is now in development and will be available in late 2015.

Researchers will be able to apply to use the data in their own investigations. A link to the application and archive will be posted here when it is available. Please check back later this year for the link. (<https://www.nichd.nih.gov/research/NCS/Pages/researchers.aspx>)

PhenX Toolkit: Reproductive History #101300, Question #7c

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

National Health and Nutrition Examination Survey (NHANES 2013)

Question RHQ.162 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/RHQ_CAPI_H.pdf

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:

<https://www.phenxtollkit.org/index.php>

Krakowiak, P., Walker, C. K., Tancredi, D. J., & Hertz-Picciotto, I. (2015). Maternal Recall Versus Medical Records of Metabolic Conditions from the Prenatal Period: A Validation Study. *Maternal and child health journal*, 1-11.

National Children's Study (NCS). Available from:

<http://www.nichd.nih.gov/research/NCS/Pages/default.aspx>

National Health and Nutrition Examination Survey (NHANES). Available from:

<https://www.cdc.gov/nchs/nhanes.htm>

M48 - High blood pressure/hypertension before or during pregnancy

Module: M

Question Number: 48

Tier: 1

Question:

48 – At any time during the **three months before you became pregnant** or during your pregnancy with the child of interest were you treated for any of the following conditions?

High blood pressure / hypertension? (More than just a single episode of elevated blood pressure. Must be diagnosed outside of pregnancy. Not preeclampsia or toxemia.)

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the condition? [Mark all that apply]

[Responses: In the 3 months Before Pregnancy; During pregnancy; Declined; Don't know]

Did you take / were you given any medications for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ hydrochlorothiazide (Esidrix, Microzide); captopril (Capoten); lisinopril (Prinivil, Zestril); losartan (Cozaar); olmesartan (Benicar); valsartan (Diovan); atenolol (Tenormin); metoprolol (Lopressor); propranolol (Inderal); amlodipine (Norvasc); diltiazem (Cardizem); nifedipine (Procardia); nadolol (Corgard); penbutolol (Levitol); methyldopa (Aldomet); labetalol (Trandate); aliskiren (Tekuma)]

Did you take this medication during pregnancy?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

High blood pressure, placental insufficiency, inflammation, insulin resistance

Validity: Face

Rationale:

Description of Supporting Papers:

(Krakowiak et al. 2015):

A study conducted by faculty of the University of California, Davis Department of Public Health investigated the relationship between reporting accuracy of metabolic conditions during the prenatal period and case status of the proband. The study population was a subset of the CHARGE study. Over 600 women were interviewed 2-5 years after delivery, mothers of preschool-aged children with and without neurodevelopmental disorders. An EEQ for diabetes and hypertension was assessed for agreement with data from medical records, which was used as a gold standard. The results found strong

agreement between medical records and self-reported answers regarding metabolic conditions during the prenatal period.

Other surveys which use the question or a version of it:

National Children's Study:

The Data Repository is now in development and will be available in late 2015.

Researchers will be able to apply to use the data in their own investigations. A link to the application and archive will be posted here when it is available. Please check back later this year for the link. (<https://www.nichd.nih.gov/research/NCS/Pages/researchers.aspx>)

PhenX Toolkit. Reproductive History #101300, Question #7a

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

National Health and Nutrition Examination Survey (NHANES 2013)

Question BPQ.020 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/BPQ_H.pdf

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:

<https://www.phenxtollkit.org/index.php>

Krakowiak, P., Walker, C. K., Tancredi, D. J., & Hertz-Picciotto, I. (2015). Maternal Recall Versus Medical Records of Metabolic Conditions from the Prenatal Period: A Validation Study. *Maternal and child health journal*, 1-11.

National Children's Study (NCS). Available from:

<http://www.nichd.nih.gov/research/NCS/Pages/default.aspx>

National Health and Nutrition Examination Survey (NHANES). Available from:

<https://www.cdc.gov/nchs/nhanes.htm>

M49 – Dental cleanings/procedures before or during pregnancy

Module: M

Question Number: 49

Tier: 1

Question:

49 – At any time during the **three months before you became pregnant** or during your pregnancy with the child of interest were you treated for any of the following conditions?

Did you have dental cleanings or other dental procedures? (Cleaning, scaling, root canal; placement of filling, implant, crown, bridge, inlays, sealants; cosmetic dentistry; orthodontics)

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the condition? [Mark all that apply]

[Responses: In the 3 months Before Pregnancy; During pregnancy; Declined; Don't know]

Did you take / were you given any medications for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ novocaine or lidocaine shot; nitrous oxide; ketamine (Ketalar); midazolam (Versed)]

Did you take this medication during pregnancy?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Inflammation, radiation, medications, fillings and other dental materials

Validity:

Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M50 - High blood sugar/diabetes during pregnancy

Module: M

Question Number: 50

Tier: 2

Question:

50 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

High blood sugar / diabetes? (Gestational Diabetes)

[Responses: Yes; No; Declined; Don't Know]

Did you take / were you given any medications for this conditions?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ glucophage (Metformin); glimepiride (Amaryl); glyburide (DiaBeta, Micronase, Glynase); glipizide (Glucotrol); repaglinide (Prandin) nateglinide (Starlix); pioglitazone (Actos); rosiglitazone (Avandia); sitagliptin (Januvia); saxagliptin (Onglyza); linagliptin (Tradjenta); acarbose (Precose); mitlitol (Glyset); insulin (many brands and types)]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

Journal References:

M51 - Anemia/low blood count during pregnancy

Module: M

Question Number: 51

Tier: 2

Question:

51 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Anemia / low blood count?

[Responses: Yes; No; Declined; Don't Know]

Did you take / were you given any medications for this conditions?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ oral or IV iron supplement; prenatal vitamin; multivitamin; folic acid]

Potential Exposures:

Anemia reduces oxygenation in tissues, including the brain. The most common form of anemia in pregnancy is iron-deficiency anemia, which has been associated with neurodevelopmental impairment.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M52 - Depression during pregnancy

Module: M

Question Number: 52

Tier: 2

Question:

52 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Depression – diagnosed by a health provider
[Responses: Yes; No; Declined; Don't Know]

Did you take / were you given any medications for this conditions?
[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):
[Responses: _____ Citalopram (Celexa); escitalopram (Lexapro, Cipralex); fluoxetine (Prozac); fluvoxamine (Luvox); paroxetine (Paxil, Seroxat); sertraline (Zoloft, Lustral); desvenlafaxine (Pristiq); duloxetine (Cymbalta); levomilnacipran (Fetzima); milnacipran (Ixel, Salvella); tofenacin (Elamol, Tofacine); venlafaxine (Effexor); bupropion (Wellbutrin); amitriptyline (Elavil); imipramine (Tofranil); mirtazapine (Remeron); quetiapine fumarate (Seroquel); aripiprazole (Abilify); olanzapine (Zyprexa)]

Potential Exposures:

Depression, inflammation, tryptophan pathway abnormalities, medications

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *The British journal of psychiatry*, 150(6), 782-786.

Gibson, J., McKenzie-McHarg, K., Shakespeare, J., Price, J., & Gray, R. (2009). A systematic review of studies validating the Edinburgh Postnatal Depression Scale in antepartum and postpartum women. *Acta Psychiatrica Scandinavica*, 119(5), 350-364.

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:
<https://www.phenxtollkit.org/index.php>

Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., ... & Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Archives of general psychiatry*, 60(2), 184-189.

M53 - Vaginal bleeding during pregnancy

Module: M

Question Number: 53

Tier: 2

Question:

53 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Vaginal Bleeding?

[Responses: Yes; No; Declined; Don't Know]

Did you take / were you given any medications for this conditions?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ progesterone; terbutaline (Brethine. Bricanyl); nifedipine (Procardia)]

Potential Exposures:

Placental compromise

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M54 - Severe nausea during pregnancy

Module: M

Question Number: 54, 54a

Tier: 2

Question:

54 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Nausea and vomiting/hyperemesis?

[Responses: Yes; No; Declined; Don't Know]

Did you take / were you given any medications for this conditions?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ dolasetron (Anzemet); granisetron (Kytril, Sancuso); ondansetron (Zofran); tropisetron (Setrovel, Navoban); palonosetron (Aloxi); mirtazapine (Remeron); diphenhydramine (Benedryl); meclizine (Bonine, Antivert); perchlorperazine (Compazine); promethazine (Phenergan); hydroxyzine (Vistaril); brompheniramine (Dimetapp); metoclopramide (Reglan); pyridoxine/ doxylamine (vitamin B6/Unisom, Diclectin); domperidone (Motilium)]

54a – Were you treated in an urgent care or hospital setting for your nausea and vomiting?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Reduced calorie and nutrient intake, which reduces transfer of those substances to the fetus. Medications.

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

PhenX Toolkit. Reproductive History #101300, Question #6

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy. Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

Journal References:

N/A

M55 - Preeclampsia/toxemia during pregnancy

Module: M

Question Number: 55

Tier: 1

Question:

55 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Preeclampsia/toxemia?

[Responses: Yes; No; Declined; Don't Know]

Did you take/were you given any medication for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ labetalol (Trandate); nifedipine (Procardia); methyldopoa (Aldomet)]

Potential Exposures:

Placental insufficiency, inflammation, insulin resistance, oxidative stress

Validity: Face

Rationale:

Description of Supporting Papers:

(Krakowiak et al. 2015):

A study conducted by faculty of the University of California, Davis Department of Public Health investigated the relationship between reporting accuracy of metabolic conditions (BMI, diabetes, hypertension, preeclampsia) during the prenatal period and case status of the proband. The study population was a subset of the CHARGE study. Over 600 women were interviewed 2-5 years after delivery, mothers of preschool-aged children with and without neurodevelopmental disorders. An EEQ for diabetes and hypertension was assessed for agreement with data from medical records, which was used as a gold standard. The results found strong agreement between medical records and self-reported answers regarding metabolic conditions during the prenatal period.

(Walker et al. 2015 JAMA)

Other surveys which use the question or a version of it:

PhenX Toolkit. Reproductive History #101300, Question #7b

Definition: Question to assess both male and females' pregnancy history. Females are asked about the number of pregnancies, description of pregnancies and smoking during pregnancy. Males are asked whether they have ever fathered a pregnancy and, if so, the description of the pregnancy.

Purpose: The purpose of this measure is to assess the demonstrated fecundity and fertility of the individual. This measure can also be used for estimating certain in utero exposures if the research subject is an infant.

Journal References:

Hamilton, C.M., Hendershot, T.P.. *PhenX Toolkit*. Available from:
<https://www.phenxtollkit.org/index.php>

Krakowiak, P., Walker, C. K., Tancredi, D. J., & Hertz-Picciotto, I. (2015). Maternal Recall Versus Medical Records of Metabolic Conditions from the Prenatal Period: A Validation Study. *Maternal and child health journal*, 1-11.

M56 - Early/preterm labor

Module: M

Question Number: 56

Tier: 2

Question:

56 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Early / preterm labor?

[Responses: Yes; No; Declined; Don't Know]

Did you take/were you given any medication for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____ apresoline (Hydralazine); magnesium sulfate; nifedipine (Procardia); terbutaline (Brethine, Bricanyl); indomethacin (Indocin)]

Potential Exposures:

Prematurity, neonatal complications, stress, medications

Validity: Face

Rationale:

Description of Supporting Papers:

(Tomeo et al. 1999)

A study conducted by the Channing Lab of Brigham & Women's Hospital (Harvard Medical School) assessed the validity and reproducibility of maternal recall about prenatal factors thirty years after the pregnancy of interest. Validity was tested by administering a questionnaire in 1993 about prenatal factors thirty years after the pregnancy of interest, and reproducibility was assessed by administering the questionnaire once more in 1995 to the same study population. The reproducibility study population consisted of 146 women, mothers of the the women in the HMS Nurse's Health Studies. The questionnaire was administered once in 1993, and again in 1995, by mail. Prenatal factors of interest included pre-pregnancy weight, pregnancy complications, preterm delivery, and birthweight. The validity study consisted of 154 women whose pregnancy medical records were included in the National Collaborative Perinatal Project (NCP) of the National Institute of Neurological Diseases and Stroke, from 1959 to 1965. Questionnaires were administered by mail and telephone, and compared with medical records from the pregnancy of interest. The results of the study found high validity and reproducibility in self-reported recall for prenatal factors.

Other surveys which use the question or a version of it:

N/A

Journal References:

Tomeo, C. A., Rich-Edwards, J. W., Michels, K. B., Berkey, C. S., Hunter, D. J., Frazier, A. L., ... & Buka, S. L. (1999). Reproducibility and validity of maternal recall of pregnancy-related events. *Epidemiology*, 10(6), 774-776.

M57 - Smaller than average growth of the baby

Module: M

Question Number: 57

Tier: 2

Question:

57 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Smaller than average growth of the baby?

[Responses: Yes; No; Declined; Don't Know]

Did you take/were you given any medication for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____]

Potential Exposures:

Growth restriction, inflammation, stress

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M58 - Any other serious condition during pregnancy

Module: M

Question Number: 58

Tier: 2

Question:

58 – At any time during your pregnancy with the child of interest did you have any of the following conditions or procedures?

Any other serious conditions? (List)

[Responses: _____; Yes; No; Declined; Don't Know]

Did you take/were you given any medication for this condition?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____]

Potential Exposures:

Other physiologic states, medications

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M59 - Cervical incompetence during pregnancy

Module: M

Question Number: 59

Tier: 2

Question:

59 – During your pregnancy with the child of interest did you have any of the following conditions?

Cervical incompetence? [Women with this condition have a procedure to prevent the cervix from opening more called a cerclage]

[Responses: Yes; No; Declined; Don't Know]

Name of procedure used to treat this condition: (if you recall) (Possible names listed below):

[Responses: _____, cerclage]

Potential Exposures:

Increased risk for infection and early birth,

Validity: Face

Rationale:

Description of Supporting Papers:

(Tomeo et al. 1999)

A study conducted by the Channing Lab of Brigham & Women's Hospital (Harvard Medical School) assessed the validity and reproducibility of maternal recall about prenatal factors thirty years after the pregnancy of interest. Validity was tested by administering a questionnaire in 1993 about prenatal factors thirty years after the pregnancy of interest, and reproducibility was assessed by administering the questionnaire once more in 1995 to the same study population. The reproducibility study population consisted of 146 women, mothers of the the women in the HMS Nurse's Health Studies. The questionnaire was administered once in 1993, and again in 1995, by mail. Prenatal factors of interest included pre-pregnancy weight, pregnancy complications, preterm delivery, and birthweight. The validity study consisted of 154 women whose pregnancy medical records were included in the National Collaborative Perinatal Project (NCPP) of the National Institute of Neurological Diseases and Stroke, from 1959 to 1965. Questionnaires were administered by mail and telephone, and compared with medical records from the pregnancy of interest. The results of the study found high validity and reproducibility in self-reported recall for prenatal factors.

Other surveys which use the question or a version of it:

N/A

Journal References:

Tomeo, C. A., Rich-Edwards, J. W., Michels, K. B., Berkey, C. S., Hunter, D. J., Frazier, A. L., ... & Buka, S. L. (1999). Reproducibility and validity of maternal recall of pregnancy-related events. *Epidemiology*, 10(6), 774-776.

M60 - Placenta Previa

Module: M

Question Number: 60

Tier: 2

Question:

60 – During your pregnancy with the child of interest did you have any of the following conditions?

Previa? (When the placenta covers the cervix and requires a cesarean delivery)

[Responses: Yes; No; Declined; Don't Know]

Name of procedure used to treat this condition: (if you recall) (Possible names listed below):

[Responses: _____, cesarean delivery, c-section]

Potential Exposures:

Increased risk for maternal anemia, early birth, traumatic birth, hypoxia

Validity: Face

Rationale:

Description of Supporting Papers:

(Tomeo et al. 1999)

A study conducted by the Channing Lab of Brigham & Women's Hospital (Harvard Medical School) assessed the validity and reproducibility of maternal recall about prenatal factors thirty years after the pregnancy of interest. Validity was tested by administering a questionnaire in 1993 about prenatal factors thirty years after the pregnancy of interest, and reproducibility was assessed by administering the questionnaire once more in 1995 to the same study population. The reproducibility study population consisted of 146 women, mothers of the the women in the HMS Nurse's Health Studies. The questionnaire was administered once in 1993, and again in 1995, by mail. Prenatal factors of interest included pre-pregnancy weight, pregnancy complications, preterm delivery, and birthweight. The validity study consisted of 154 women whose pregnancy medical records were included in the National Collaborative Perinatal Project (NCP) of the National Institute of Neurological Diseases and Stroke, from 1959 to 1965. Questionnaires were administered by mail and telephone, and compared with medical records from the pregnancy of interest. The results of the study found high validity and reproducibility in self-reported recall for prenatal factors.

Other surveys which use the question or a version of it:

N/A

Journal References:

Tomeo, C. A., Rich-Edwards, J. W., Michels, K. B., Berkey, C. S., Hunter, D. J., Frazier, A. L., ... & Buka, S. L. (1999). Reproducibility and validity of maternal recall of pregnancy-related events. *Epidemiology*, 10(6), 774-776.

M61 - Rh-negative Blood Type

Module: M

Question Number: 61

Tier: 2

Question:

61 – During your pregnancy with the child of interest did you have any of the following conditions?

Was your blood type Rh-negative? (Women with this condition get a shot called Rho(D) immune globulin/RhoGam in the 3rd trimester and after delivery)

[Responses: Yes; No; Declined; Don't Know]

Name of procedure used to treat this condition: (if you recall) (Possible names listed below):

[Responses: _____, Rho-D immune globulin (RhoGAM, WinRho)]

Potential Exposures:

Immune activity by mother against fetus; Rho(D) immune globulin, immune stimulation

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M62 - Influenza during pregnancy

Module: M

Question Number: 62

Tier: 2

Question:

62 – At any time during your pregnancy with the child of interest did you have any of the following infections?

Influenza/the flu?

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, oseltamivir (Tamiflu); zanamivir (Relenza)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Viral infection, inflammation, fever, medications

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M63 - High fever during pregnancy

Module: M

Question Number: 3

Tier: 2

Question:

63 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Fever? (More than 101.3 degrees Fahrenheit/38.5 degrees Centigrade)

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, acetaminophen (Tylenol); ibuprofen (Motrin, Advil); naproxen (Aleve, Naprosen, Anaprox); aspirin)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Fever, inflammation, medications

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M64 - Bladder/Kidney/Urinary Tract Infection during pregnancy

Module: M

Question Number: 60

Tier: 2

Question:

64 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Bladder / kidney / urinary tract infection

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, nitrofurantoin (Macrobid); trimethoprim- sulfamethoxole (Bactrim, Septra); cephalexin (Keflex); ciprofloxacin (Cipro); amoxicillin/cavulanic acid (Augmentin); ceftriaxone (Rocephin)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, fever, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M65 - Genital herpes during pregnancy

Module: M

Question Number: 65, 64a

Tier: 2

Question:

65 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Genital herpes? (This refers to chronic infection and medication used to suppress an outbreak)

[Responses: Yes; No; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, aciclovir (Zovirax); valaciclovir (Valtrex); famciclovir (Famvir)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

65a – Did you have any outbreaks during your pregnancy?

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the condition? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M66 - Bacterial vaginal infection during pregnancy

Module: M

Question Number: 66

Tier: 2

Question:

66 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Bacterial vaginal infection / bacterial vaginosis / BV?

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, metronidazole (Flagyl); clindamycin (Cleocin, Clindesse)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M67 - Yeast vaginal infection during pregnancy

Module: M

Question Number: 67

Tier: 2

Question:

67 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Yeast vaginal infection?

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, fluconazole (Diflucan); butaconazole (Gynazole); clotrimazole (Gyne-Lotrimin); miconazole (Monistat); terconazole (Terzol)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M68 - Trich vaginal infection during pregnancy

Module: M

Question Number: 68

Tier: 2

Question:

68 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Trichomonas / Trich vaginal infection?

[Responses: Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, metronidazole (Flagyl); tinidazole (Tindamax)]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M69 - Group B Streptococcus infection during pregnancy

Module: M

Question Number: 69

Tier: 2

Question:

69 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Group B Streptococcus vaginal infection? (Infection tested for with a vaginal swab at 36 weeks)

[Responses: Yes; No; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M70 - Other infection during pregnancy

Module: M

Question Number: 70

Tier: 2

Question:

70 – At any time during your pregnancy with the child of interest or during breastfeeding did you have any of the following conditions?

Other infection? (Bronchitis, Pneumonia, Sinus Infection, Lice, Scabies, Cellulitis, Skin Infection)

[Responses: List: _____; Yes; No; Declined; Don't Know]

If yes, when did you have the infection? (Mark all that apply)

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Did you take/were you given any medication for this infection?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, _____]

If yes, when did you take the medication(s)? (Mark all that apply)

Medication #1

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Medication #2

[Responses: 1st trimester; 2nd trimester; 3rd trimester; Declined; Don't Know]

Potential Exposures:

Infection, inflammation, medication

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M71 - Prescription medicines for pain, fever, or inflammation

Module: M

Question Number: 71

Tier: 1

Question:

71 – Did you take any of the following medication types – in addition to the ones previously listed?

Prescription medicines for pain, fever, inflammation

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, codeine; codeine/ acetaminophen (Tylenol #3); hydrocodone/ acetaminophen (Vicodin, Lortab, Norco); hydromorphone (Dilaudid); Oxycodone (OxyContin); oxycodone/acetaminophen (Percocet); morphine (M S Contin); oxymorphone (Opana); methadone; tramadol (Ultram); naproxen (Naprosyn, Anaprox); proprionic acid (Ketaprofen); celecoxib (Celebrex); ketorolac (Toradol); neurontin (Gabapentin)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Medication and underlying condition

Validity: Face

Rationale:

Description of Supporting Papers:

(Sarangarm et al. 2012)

A 2012 study sought to determine the level of agreement between self-reported and prescription medication data in EMRs, with respect to various medication classes. The classes of interest included antidiabetic medications, opioid analgesics, antibiotics, antifungals, antivirals, gastrointestinal agents, asthma medications, antidepressants, migraine medications, thyroid medications, and antihypertension medications. The study population consisted of 404 pregnant women, 80% of which identified as Latina. All participants were included in the study at University of New Mexico Hospital and its five satellite clinics. Self-reported data about medication use was compared against the

participant's EMR. Only prescription medications were included in the final analysis. The study found a high degree of agreement for antidiabetic, thyroid, asthma medication and antidepressants. All other categories displayed poor to moderate agreement.

Other surveys which use the question or a version of it:

N/A

Journal References:

Sarangarm, P., Young, B., Rayburn, W., Jaiswal, P., Dodd, M., Phelan, S., & Bakhireva, L. (2012). Agreement between self-report and prescription data in medical records for pregnant women. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 94(3), 153-161

M72 - Non-prescription medicines for pain, fever, inflammation

Module: M

Question Number: 72

Tier: 2

Question:

72 – Did you take any of the following medication types – in addition to the ones previously listed?

Non-prescription medicines for pain, fever, inflammation

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, acetaminophen (Tylenol); ibuprofen (Motrin, Advil); naproxen (Aleve); aspirin]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Medication and underlying condition

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M73 - Migraine medication

Module: M

Question Number: 73

Tier: 2

Question:

73 – Did you take any of the following medication types – in addition to the ones previously listed?

Migraine medication

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, almotriptan (Axert); eletriptan (Relpax); frovatriptan (Frova); naratriptan (Amerge); rizatriptan (Maxalt); sumatriptan (Imitrex, Zecuity); xolmatriptan (Zomig); dihydroergotamine mesylate (Migranal, Midrin); topiramate (Topamax)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Medication and underlying condition

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M74 - Muscle relaxant medication

Module: M

Question Number: 74

Tier: 2

Question:

74 – Did you take any of the following medication types – in addition to the ones previously listed?

Muscle relaxants?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, cyclobenzaprine (Flexeril, Amrix); carisoprodol (Soma); baclofen (Gablofen); dantrolene (Dantrium); tizandine (Zanaflex); diazepam (Valium)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Medication and underlying condition

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M75 - Allergy medication

Module: M

Question Number: 75

Tier: 2

Question:

75 – Did you take any of the following medication types – in addition to the ones previously listed?

Allergy medication?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, diphenhydramine (Benedryl); fexofenadine (Allegra); loratadine (Claritin); clemastine (Tavist); cetirizine hydrochloride (Zyrtec)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Medication and underlying condition

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M76 - Acne medication

Module: M

Question Number: 76

Tier: 2

Question:

76 – Did you take any of the following medication types - in addition to the ones previously listed?

Acne Medication?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, benzoyl peroxide; salicylic acid; tretinoin (Retin A); isotretinoin (Accutane); azelaic acid (Azelex, Finacea); spironolactone (Aldactone)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Medication and underlying condition

Validity: Face

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M77 - Sedatives and Sleep aids

Module: M

Question Number: 77

Tier: 2

Question:

77 – Did you take any of the following medication types - in addition to the ones previously listed?

Sedatives / Sleep aids?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, doxepin (Silenor); estazolam (ProSom); eszopiclone (Lunesta); ramelteon (Rozerem); temazepam (Restoril); triazolam (Halcion); zaleplon (Sonata); zolpidem (Ambien, Edluar); zopiclone (Zimovane, Imovane); melatonin]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

N/A

Validity: N/A

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M78 - Female hormone medication

Module: M

Question Number: 78, 78a, 78b

Tier: 1

Question:

78 – Did you take any of the following medication types - in addition to the ones previously listed?

Female hormone medication? (for birth control, to get pregnant, other reasons)

[Responses: Yes; No; Declined; Don't Know]

78a – For birth control

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, combination birth control pills; progestin-only mini-pills (Micronor, Nor-QD); patch (Ortho Evra); ring (Nuvaring); shot (Depo-Provera); implant (Implanon, Nexplanon); hormone IUD (Mirena, Skyla, Liletta) copper IUD (Paragard)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

78b – To get pregnant

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, clomiphene citrate (Clomid, Serophene); human chorionic gonadotropin (Pregnyl, Novarel, Ovidrel, Profasi); GnRH (Factrel, Lutrepulse); GnRH agonist (Lupron, Zoladex, Synarel); GNRH antagonist (Antagon, Cetrotide); FSH (Bravelle, Follistim, Fertinex, Gonal-F, Metrodin); hMG (Pergonal, Repronex)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Female hormone medications

Validity:**Rationale:****Description of Supporting Papers:****Other surveys which use the question or a version of it:**

MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study

MARBLES is a longitudinal study conducted by the UC Davis Department of Public Health. The study began in 2006 and investigates possible prenatal and postpartum biological and environmental exposures and risk factors that may contribute to the development of autism. Data were collected for the study via parent interview, laboratory analysis, accessing medical records, and collecting dust samples from the home environment. This was all done with the aim of examining the relationship between environmental exposures and endogenous conditions with future behavioral outcomes, namely autism.

National Health and Nutrition Examination Survey (NHANES 2013).

Question RXQ.033 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/DSQ_H.pdf

Journal References:

National Health and Nutrition Examination Survey (NHANES 2013).

Question RXQ.033 Available from:

http://www.cdc.gov/nchs/data/nhanes/nhanes_13_14/DSQ_H.pdf

M79 - Mental Health medication (other than for depression)

Module: M

Question Number: 79

Tier: 2

Question:

79 – Did you take any of the following medication types - in addition to the ones previously listed?

Seizure medication?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, imipramine (Tofranil); monoamine oxidase inhibitor (Nardil); alprazolam (Xanax); diazepam (Valium); lorazepam (Ativan); oxazepam (Serax); clonazepam (Klonopin); chlordiazepoxide (Librium); tranlycypromine (Parnate); olanzapine (Zyprexa); haloperidol (Haldol)]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M80 - Seizure medication

Module: M

Question Number: 80

Tier: 2

Question:

80 – Did you take any of the following medication types - in addition to the ones previously listed?

Cough medication?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, dextromethorphan; guaifenesin]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M81 - Cough medication

Module: M

Question Number: 81

Tier: 2

Question:

81 – Did you take any of the following medication types - in addition to the ones previously listed?

Cough medication?

[Responses: Yes; No; Declined; Don't Know]

Name of medication (if you recall) (Possible names of medications listed below):

[Responses: _____, dextromethorphan; guaifenesin]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Validity:

Rationale:

Description of Supporting Papers:

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

M82 - Other medication

Module: M

Question Number: 82

Tier: 2

Question:

82 - Did you take any of the following medication types - in addition to the ones previously listed?

Other medication?

[Responses: Yes, No, Declined, Don't Know]

Name of medication (if you recall):

[Responses: _____]

If yes, when did you take the medication? (Mark all that apply)

Medication #1

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Medication #2

[Responses: In the 3 months Before Pregnancy; During Pregnancy; While Breastfeeding; Declined; Don't Know]

Potential Exposures:

Prescription medications and their breakdown products

Validity: Criterion

Rationale:

(Sarangarm et al. 2012)

The Kappa coefficient and 95% confidence intervals for the medications exhibiting good to almost-perfect agreement are as follows: antidiabetic medication ($k=0.9$, 95% CI 0.8-1.0), thyroid medication ($k=0.82$, 95% CI 0.67-0.97), asthma medication ($k=0.75$, 95% CI 0.5-1.0), antidepressants (specifically SSRIs - $k=0.83$, 0.69-0.98). All other categories displayed poor to moderate agreement, ranging from a Kappa of 0.35 to 0.71.

Description of Supporting Papers:

(Sarangarm et al. 2012)

A 2012 study sought to determine the level of agreement between self-reported and prescription medication data in EMRs, with respect to various medication classes. The classes of interest included antidiabetic medications, opioid analgesics, antibiotics, antifungals, antivirals, gastrointestinal agents, asthma medications, antidepressants, migraine medications, thyroid medications, and antihypertension medications. The study population consisted of 404 pregnant women, 80% of which identified as Latina. All participants were included in the study at University of New Mexico Hospital and its five

satellite clinics. Self-reported data about medication use was compared against the participant's EMR. Only prescription medications were included in the final analysis. The study found a high degree of agreement for antidiabetic, thyroid, asthma medication and antidepressants. All other categories displayed poor to moderate agreement.

Other surveys which use the question or a version of it:

N/A

Journal References:

Sarangarm, P., Young, B., Rayburn, W., Jaiswal, P., Dodd, M., Phelan, S., & Bakhireva, L. (2012). Agreement between self-report and prescription data in medical records for pregnant women. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 94(3), 153-161

D Module (Maternal Diet) -

Itemized Rationale Summary of

the Early Life Exposures Assessment Tool for Autism Studies

[D1 - Restrictive diet during pregnancy](#)
[D2 - Bottled water intake during pregnancy](#)
[D3 - Fish consumption during pregnancy](#)
[D3a - Milk consumption during pregnancy](#)
[D3b - Cheese consumption during pregnancy](#)
[D3c - Yogurt consumption during pregnancy](#)
[D3d - Fruit juice intake during pregnancy](#)
[D3e - Fruit-flavored/Sugary drink consumption during pregnancy](#)
[D3f - Fruit intake during pregnancy](#)
[D3g - Orange juice intake during pregnancy](#)
[D3h - Salad greens consumption during pregnancy](#)
[D3i - Mustard greens/spinach/other greens consumption during pregnancy](#)
[D3j - Cruciferous vegetable intake during pregnancy](#)
[D3k - Salad dressing/mayonnaise intake during pregnancy](#)
[D3l - Fried potato intake during pregnancy](#)
[D3m - Other potato consumption during pregnancy](#)
[D3n - Salsa consumption during pregnancy](#)
[D3o - Tomato-based sauce consumption during pregnancy](#)
[D3p - Pea consumption during pregnancy](#)
[D3q - Other vegetable intake during pregnancy](#)
[D3r - Bean consumption during pregnancy](#)
[D3s - Peanut/peanut product consumption during pregnancy](#)
[D3t - Tofu consumption during pregnancy](#)
[D3u - Soy milk consumption during pregnancy](#)
[D3v - Egg consumption during pregnancy](#)
[D3w - Fish consumption during pregnancy](#)
[D3x - Other seafood/shellfish consumption during pregnancy](#)
[D3y - Poultry consumption during pregnancy](#)
[D3z - Red meat consumption during pregnancy](#)
[D3aa - Canned meat consumption during pregnancy](#)
[D3bb - Hot/cooked cereal consumption during pregnancy](#)
[D3cc - Cold cereal consumption during pregnancy](#)

[D3dd - Whole-grain bread consumption during pregnancy](#)
[D3ee – White bread consumption during pregnancy](#)
[D3ff – Rice consumption during pregnancy](#)
[D3gg – Tortilla consumption during pregnancy](#)
[D3hh - Pasta/noodle consumption during pregnancy](#)
[D3ii – Cracker/pretzel/crisp consumption during pregnancy](#)
[D3jj - Popcorn consumption during pregnancy](#)
[D3kk - Meal-replacement shake consumption during pregnancy](#)
[D3ll - Protein/power bar consumption during pregnancy](#)
[D3mm – Potato/tortilla/corn chip consumption during pregnancy](#)
[D3nn – Deep-fat fried food consumption during pregnancy](#)
[D3oo – Doughnut/pastry consumption during pregnancy](#)
[D3pp – Cookie/Cake/Brownie consumption during pregnancy](#)
[D3qq - Candy consumption during pregnancy](#)
[D3rr – Soda consumption during pregnancy](#)
[D4 - Artificial sweetener consumption during pregnancy](#)

D1 - Restrictive diet during pregnancy

Module: D

Question Number: 1, 1a, 1b, 1c

Tier: 1

Question:

1 – Were you on any restrictive diets? (Mark all that apply or ‘None’ if you were not on a restrictive diet during that time period)

1a – Before you found out you were pregnant?

[Responses: *Vegan; Vegetarian; Low-Carb; Low-Calorie; Low-Fat; Gluten-free; dairy/casein-free; Other (Describe); None; Declined; Don't Know*]

1b – After you found out you were pregnant?

[Responses: *Vegan; Vegetarian; Low-Carb; Low-Calorie; Low-Fat; Gluten-free; dairy/casein-free; Other (Describe); None; Declined; Don't Know*]

1c – During Breastfeeding?

[Responses: *Vegan; Vegetarian; Low-Carb; Low-Calorie; Low-Fat; Gluten-free; dairy/casein-free; Other (Describe); None; Declined; Don't Know*]

Potential Exposures:

Homocysteine, folate, Vitamin B12, Vitamin C, fiber, fat, cholesterol, total energy intake, magnesium, nutrient deficiencies, diet quality

Validity: Face + Criterion (surrogate for dietary components)

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Vegan Diet - (Haddad et al., 1999)

A study comparing the nutritional status of vegans compared to non-vegetarians found that intake of female vegans compared with that of female non-vegetarians was significantly lower, both in quantity and as a percentage of energy, in protein ($52 \pm 13\text{g/d}$ vs $74 \pm 14\text{g/d}$; $12 \pm 1\%$ vs $15 \pm 3\%$), total fat ($52 \pm 20\text{g/d}$ vs $76 \pm 27\text{g/d}$; $25 \pm 7\%$ vs $34 \pm 5\%$), saturated fat ($52 \pm 13\text{g/d}$ vs $74 \pm 14\text{g/d}$; $6 \pm 4\%$ vs $12 \pm 3\%$), and monounsaturated fat ($19 \pm 3\text{g/d}$ vs $30 \pm 13\text{g/d}$; $10 \pm 4\%$ vs $14 \pm 3\%$). Female vegans consumed more dietary fiber ($38 \pm 11\text{g/d}$ vs $15 \pm 6\text{g/d}$) and less dietary cholesterol ($20 \pm 30\text{mg}$ vs $235 \pm 65\text{mg}$). Foods consumed by female vegans provided significantly higher amounts of ascorbate ($230 \pm 150\text{mg}$ vs $115 \pm 60\text{mg}$), thiamine ($1.97 \pm .64\text{mg}$ vs $1.40 \pm 0.42\text{mg}$), folate ($435 \pm 155\mu\text{g}$ vs $240 \pm 115\mu\text{g}$), magnesium ($420 \pm 125\text{mg}$ vs $300 \pm 120\text{mg}$), and copper ($2.2 \pm 0.6\text{mg}$ vs $1.5 \pm 0.8\text{mg}$), and lower amounts of vitamin B-12 ($1.4 \pm 1.2\mu\text{g}$ vs $4.6 \pm 2.9\mu\text{g}$).

Vegetarian Diet - (Huang et al., 2003)

Mean Vitamin B12 intake of vegetarians (0.74 [0.5, 1.0] ug) is lower than that of non-vegetarians (3.32 [2.6, 4.0]). Mean plasma B12 in vegetarians (191.8 [164.0, 220.0] pmol/L) is lower than in non-vegetarians (310.9 [278.2, 343.6]). Mean plasma pyridoxal 5'-phosphate (PLP) in vegetarians (58.5 [48.2, 68.7] pmol/L) is lower than in non-vegetarians (85.9 [73.4, 98.5]). Mean plasma homocysteine in vegetarians (13.2 [10.6, 15.7] umol/L) is higher than in non-vegetarians (9.8 [9.1, 10.6]). Mean plasma folate in vegetarians (28.5 [23.6, 33.3] nmol/L) is higher than in non-vegetarians (19.6 [17.2, 22.0]).

Low Carb Diet - (Green-Finestone et al., 2005)

Approximately 22.5% of low-carb females versus 53.8% non-low-carb females met recommendations for fruit and vegetable consumption (5+ servings/day). Mean Vitamin C intake was 114.4 mg (SEM=2.83) for low-carb females versus 214.7 (SEM=3.33) for non-low-carb females. Mean fiber intake was 5.7 (per 1000 kcal) (SEM=0.07) for low-carb females vs. 7.51 (SEM=0.08) for non-low-carb females. Mean fat intake was 109.7 g (SEM=1.84) for low-carb females versus 92.2 (SEM=0.92) for non-low-carb females. Mean cholesterol intake was 400.1 mg (SEM=9.36) for low-carb females versus 309.6 (SEM=3.64) for non-low-carb females.

Low-fat Diet - (Howard et al., 2010)

Mean total energy intake was 1424 kcal for low-fat group versus 1526 kcal for non-low-fat group. Mean cholesterol intake was 196 mg for low-fat group versus 243 mg for non-low-fat group. Mean dietary fiber intake was 16.7 mg for low-fat group versus 14.1 mg for non-low-fat group. Mean vegetables and fruit (servings/d) was 4.9 for low-fat group versus 3.6 for non-low-fat group.

Gluten-free Diet - (Wild et al., 2010)

A study comparing nutrient intake between those on a gluten-free diet and those in the UK Women's Cohort Study found that females on a gluten-free diet had statistically significantly lower intakes of magnesium (253.0mg vs 318.9mg), iron (10.7mg vs 12.5mg), zinc (7.7mg vs 8.5mg), manganese (2.8mg vs 3.9mg), selenium (39.2µg vs 58.0 µg) and folate (264.3µg vs 291.5µg) compared to females in the UK Women's Cohort Study (p<0.05).

Diet Quality - (Kennedy et al., 2001)

A study examining the relationship between popular diets and diet quality as measured by the Healthy Eating Index (HEI) where a higher score equals a 'healthier' diet found that a vegetarian diet had an HEI of 60.8, a low-carbohydrate diet had an HEI of 44.6, a low-fat diet had an HEI of 70.5, and the high carbohydrate Pyramid diet had an HEI of 82.9.

Description of Supporting Papers:

Vegan Diet - (Haddad et al., 1999)

A case-control study examining the dietary and nutritional status of individuals compared with individuals on a non-vegetarian group. Subjects were either students at Loma Linda University in CA (vegans) or employees of health-care facilities in the local area (non-vegetarian). Subjects were taught how to keep accurate food records. The first day of the

record consisted of a 24-h recall completed by a trained interviewer to instruct participants in the degree of detail needed for the record. Participants recorded the type and quantity of food and beverages consumed for 2 weekdays and 1 weekend day; in total, 4-d food intake records were obtained from each participant. Food records were analyzed by using NUTRITIONIST IV software (version 2.01 1993; N-Squared Computing, Salem, OR). For the clinical and biochemical measures, fasting, peripheral venous blood samples were collected in the morning between 0700 and 0900 by venipuncture and complete blood counts, a chemistry panel, a serum immunoglobulin analysis, and a complement fraction analysis were performed. Serum folic acid and vitamin B-12 concentrations were determined by simultaneous radioassays (Quantaphase-II, 1911040; Bio-Rad Laboratories, Richmond, CA) using a gamma counter (model LB1213; EGNG Berthold, Wildbad, Germany). Trace element-free tubes (Becton Dickinson, Rutherford, NJ) were used to collect blood for plasma zinc analysis by atomic absorption spectrophotometry (model AA-475; Varian, Sunneyvale, CA).

Vegetarian Diet - (Huang et al., 2003)

Fasting venous blood samples were obtained from 37 vegetarians and 32 nonvegetarians in Taichung, Taiwan. Plasma homocysteine, folate and vitamin B-12 were measured. Vitamin B-6 status was assessed by direct measures [plasma pyridoxal 5'-phosphate (PLP) and urinary 4-pyridoxic acid (4-PA)] and indirect measures [erythrocyte alanine (EALT-AC) and aspartate (EAST-AC) aminotransaminase activity coefficient].

Low Carb Diet - (Green-Finestone et al., 2005)

This study was undertaken to assess how low-carbohydrate-density diets below the acceptable macronutrient distribution range relate to food and micronutrient intake and sociodemographic and health-related characteristics. The multistage stratified cluster design in the 1990 Ontario Health Survey was used. There were 5,194 subjects, 12 to 18 years of age, in sampled households. Dietary data were collected via a food frequency questionnaire. Low-carbohydrate-density diets were consumed by 27.6% of males and 24.1% of females.

Low-fat Diet - (Howard et al., 2010)

The Women's Health Initiative Dietary Modification Trial tested the effects on chronic disease of a dietary pattern lower in fat and higher in vegetables, fruit, and grains. The objective was to evaluate the effects of dietary carbohydrate changes on lipids and lipoprotein composition. Postmenopausal women were randomly assigned to an intervention or a comparison group for a mean of 8.1 y. Lipoprotein analyses and subclasses were based on subsamples of 2730 and 209 participants, respectively.

(Kennedy et al., 2001)

The goal of this study was to examine the association between a range of health and nutrition indicators and popular diets. The Continuing Survey of Food Intake by Individuals (CSFII) 1994-1996 data were used to examine the relationship between prototype popular diets and diet quality as measured by the healthy eating index (HEI), consumption patterns, and body mass index (BMI). The sample population consisted of 10,014 adults, aged 19 years and older, from the 1994-1996 CSFII were included in the

analyses of extant data. More than 200 individual studies were included in the review of the literature. The prototype diets included vegetarian (no meat, poultry, or fish on day of survey) and non-vegetarian. The nonvegetarian group was further subdivided into low carbohydrate (less than 30% of energy from carbohydrate), medium (30% to 55%), and high (greater than 55% of energy). Within the high carbohydrate group, participants were classified as having Pyramid or non-Pyramid eating patterns. The Pyramid group was defined as 30% or less of energy from fat and at least one serving from the five major food groups in the USDA Food Guide Pyramid. Finally, the non-Pyramid group was further subdivided into low fat (less than 15% of energy from fat) and moderate fat (15% to 30% of energy from fat). In addition, a review of the published scientific literature was conducted; all studies identified were included in the review.

Gluten-free Diet - (Wild et al., 2010)

A study comparing nutrient intake between women with histologically confirmed Celiac disease that had been on a strict gluten-free diet (GFD) for 6 months or more (n=45) and comparable populations of the UK Women's Cohort Study (UKWCS) (n=708). The women on the GFD were given the EPIC validated food diary and telephone contact was made to clarify details, where necessary. The diaries were analyzed using Microdiet version 2.52 (2005; Downlee Systems Ltd, Chapel le firth, UK), a computerized nutrient data bank, which has details of Glutafin 'Gluten Free Dietary' range built-in. Data for gluten-free foods provided by other manufacturers were also added to the database. Women in the UKWCS were given a food frequency questionnaire and a 4-day semi-weighted food diary to assess dietary intake. The sample used in analyses were randomly selected cancer-free women that had a fully coded food diary available. Nutrient intakes for these women were estimated from food diaries using in-house MS Access-based software based on the Fifth Edition of the Composition of Foods and related supplementary food tables

Other surveys which use the question or a version of it:

CHARGE study (Childhood Autism Risks from Genetics and the Environment)

Journal References:

Greene-Finestone LS, Campbell MK, Evers SE, et al. Adolescents' low-carbohydrate-density diets are related to poorer dietary intakes. *J Am Diet Assoc*, 2005; 105(11): 1783-e1.

Haddad EH, Berk LS, Kettering JD, et al. Dietary intake and biochemical, hematologic, and immune status of vegans compared with nonvegetarians. *Am J Clin Nutr*. 1999; 70(suppl): 586S-93S.

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Howard BV, Curb JD, Eaton CB, et al. Low-fat dietary pattern and lipoprotein risk factors: The Women's Health Initiative Dietary Modification Trial. *Am J Clin Nutr*. 2010; 91(4): 860-874.

Huang YC, Chang SJ, Chiu YT, et al., The status of plasma homocysteine and related B-vitamins in healthy young vegetarians and nonvegetarians. *Eur J Nutr*. 2003; 42(2): 84-90.

Kennedy ET, Bowman SA, Spence JT, et al. Popular diets: correlation to health, nutrition, and obesity. *J Am Diet Assoc*, 2001; 101(4): 411-420.

Wild D, Robins GG, Burley VJ, et al. Evidence of high sugar intake, and low fibre and mineral intake, in the gluten-free diet. *Aliment Pharmacol Ther*. 2010; 32(4): 573-81.

D2 - Nausea during pregnancy

Module: D

Question Number: 2, 2a

Tier: 2

Question:

2 – Did nausea or vomiting during pregnancy change your eating habits during pregnancy?

[Responses: Yes; No; Declined; Don't Know]

2a – While you were nauseated or vomiting, did you tend to eat more or less of these foods?

Milk/Cheese/Yogurt/Dairy

[Responses: More; Less; Same: None: Don't Know]

Bread/Cereal/Pasta/Grains

[Responses: More; Less; Same: None: Don't Know]

Meat/Fish/Poultry/Eggs

[Responses: More; Less; Same: None: Don't Know]

Fruits/Vegetables

[Responses: More; Less; Same: None: Don't Know]

Sweets/Chocolate/Snacks

[Responses: More; Less; Same: None: Don't Know]

Coffee/Esspresso Drinks

[Responses: More; Less; Same: None: Don't Know]

Pop/Cola/Soda/Soft Drinks

[Responses: More; Less; Same: None: Don't Know]

Potential Exposures:

To be used in conjunction with the other questions in part D to determine amounts of certain foods consumed.

Validation: Face + criterion

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

D3 - Bottled water intake during pregnancy

Module: D

Question Number: 3, 3a, 3b

Tier: 2

Question:

3 – Did you consume any bottled water during pregnancy and/or while breastfeeding? (at least 8 ounces, include any type)

[Responses: Yes; No; Declined; Don't Know]

3a – How often? (mark how often, on average, for each time period)

During Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Never; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Never; Declined; Don't Know]

Potential Exposures:

Phthalates

Validation: Face + criterion

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Phthalates - (*Al-Saleh et al., 2011*)

Phthalate levels were highest in bottled water stored at 4°C. The average DEHP level was 0.663±0.209µg/L, with a maximum value of 1.254 µg/L.

Description of Supporting Papers:

Phthalates - (*Al-Saleh et al., 2011*)

The aim of this study was to determine the phthalate concentration in an array of bottled water brands at 4°C for one month, room temperature, for two months and 40-45°C for three months. The phthalate species of interest were DMP (di-methyl phthalate), DEP (diethylphthalate), DBP (di-*n*-butyl phthalate), BBP (benzyl butyl phthalate), and DEHP (diethyl hexyl phthalate). Temperature and exposure to sunlight were positively correlated with phthalate degradation and lower concentrations in the water sampled. DEHP is the only phthalate for which there currently exists regulation in Saudi Arabia, and it never exceeded the United States EPA maximum contaminant level (<6µg/L). While this was the case, the investigators recommended implementation of residue monitoring for quality assurance in countries with a high consumption of bottled water per capita. This is due to the known endocrine-disrupting nature of phthalates.

Other surveys which use the question or a version of it:

PhenX: Measure #060301 (Residential History) Question: 1d

Journal References:

Al-Saleh I, Shinwari N, Alsabbaheen A. Phthalates residues in plastic bottled waters. *J Toxicol Sci.* 2011; 36(4): 469-478

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

D4 - Milk consumption during pregnancy

Module: D

Question Number: 4, 4a; 4b

Tier: 1

Question:

4 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Milk (include only cow's milk; to drink or on cereal; **not** soy or almond milk; **not** small amounts in coffee or tea)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

4a – What kind of milk did you usually drink?

[Responses: Whole or full fat; 2% or Reduced Fat; 1% Fat; Non-fat or Skim; Declined; Don't Know]

4b – How often was the milk drank organic (from animals that are given no antibiotics or growth hormones)?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Dairy, calcium, fat, protein, sugar (carbohydrates)

Validity: Criterion

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI's Observing Protein and Energy) Study was 0.76 (SEE 0.073).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean dairy servings was 0.64 (SEE 0.44) for the OPEN study and 0.73 (SEE 0.029) for the EATS study. The de-attenuated Pearson Correlation Coefficient

for mean calcium servings for female sample population was 0.44 (SEE 0.080) for the OPEN study and 0.56 (SEE 0.053) for the EATS study.

Nutrients - (USDA)

Face validity for dairy, calcium, fat, protein, sugar (carbohydrates).

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

PhenX: Measure #050401 (Dairy Food Intake, Daily Servings) Question: 1

NCI Multifactor Screener (2000): Question: 2.

NCI Five Factor Screener (2005): Question: NAC.020

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

D5 - Cheese consumption during pregnancy

Module: D

Question Number: 5

Tier: 1

Question:

5 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Cheese (include as a snack, on burgers, pizza, or sandwiches, & mixed into foods such as lasagna, enchiladas or casseroles)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Dairy, calcium, carbohydrates, fat

Validity: Face + Criterion

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean dairy servings was 0.64 (SEE 0.44) for the OPEN study and 0.73 (SEE 0.029) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean calcium servings for female sample population was 0.44 (SEE 0.080) for the OPEN study and 0.56 (SEE 0.053) for the EATS study.

Nutrients - (USDA)

Face validity for dairy, calcium, carbohydrates, fat.

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

PhenX: Measure #050401 (Dairy Food Intake, Daily Servings) Question #2

NCI Five Factor Screener (2005): Question: NAC.138

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D6 - Yogurt consumption during pregnancy

Module: D

Question Number: 6

Tier: 1

Question:

6 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Yogurt

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Dairy, calcium, riboflavin (vitamin B2) and thiamin (vitamin B1), fiber, iron, sugar (carbohydrates)

Validity: Face + criterion.

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean dairy servings was 0.64 (SEE 0.44) for the OPEN study and 0.73 (SEE 0.029) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean calcium servings for female sample population was 0.44 (SEE 0.080) for the OPEN study and 0.56 (SEE 0.053) for the EATS study.

Self-report - (Cummings et al., 1987)

This was one of the questions used for the Block instrument. Daily calcium intake, including rating of portion size, was highly correlated ($r=0.76$) with average daily calcium intake calculated from the seven-day food records.

Nutrients - (USDA)

Face validity for dairy, calcium, riboflavin (vitamin B2) and thiamin (vitamin B1), fiber, iron, sugar (carbohydrates)

Riboflavin - (Sunaric et al., 2012)

A study evaluating the riboflavin content of different types of milk found that the mean value of the riboflavin content was 1.34 µg/mL in yogurt.

Thiamin - (Akalın et al., 2009)

A study examining the concentration of thiamin in dairy products, found that the two yogurt samples they looked at had thiamin concentrations 0.355 and 0.404mg/kg.

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Calcium - (Cummings et al., 1987)

To assess the ability of food frequency methods to measure current dietary calcium intake in elderly women, the authors administered two types of food frequency instruments to 37 randomly selected women who attended two senior citizen's centers in San Francisco, and they compared those responses to seven-day food records. The Block food frequency list contained the 34 foods that represented 85% of the intake of calcium among adult participants in NHANES II.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Riboflavin - (Sunaric et al., 2012)

An analytic study out of Serbia examined the riboflavin content in the raw cow and goat milk, commercial dairy products (UHT, pasteurized milk and yogurt) and non-dairy substitutes such as rice and soy milk using protein precipitation with HClO₄ and quantification of riboflavin by isocratic HPLC-FLD.

Thiamin - (Akalin et al., 2009)

An analytic study out of Turkey, examined the concentration of thiamin in dairy products using high-performance liquid chromatography (HPLC) with a reversed-phase C-18 column connected to fluorescence detector. Two samples of yogurt were obtained from a large food store in Izmir, Turkey, and analyzed in triplicate.

Other surveys which use the question or a version of it:

N/A

Journal References:

Akalin AS, Gönç S, Dinkçi N. Liquid chromatographic determination of thiamin in dairy products. *Int J Food Sci Nutr.* 2004; 55(4):345-349

Cummings SR, Block G, McHenry K, Baron RB. Evaluation of two food frequency methods of measuring dietary calcium intake. *Am J Epidemiol.* 126, 1987: 796-802.

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

Sunaric S, Denic M, Kocic G. Evaluation of riboflavin content in dairy products and non-dairy substitutes. *Ital J Food Sci.* 2012; 24(4): 352-357

USDA Nutrient values from Agricultural Research Service (ARS) Nutrient Database for Standard Reference. Available from:

https://www.ars.usda.gov/main/site_main.htm?modecode=12-35-45-00

D7 - Fruit juice intake during pregnancy

Module: D

Question Number: 7

Tier: 1

Question:

7 – During pregnancy, about how often did you usually eat or drink each of the following foods?

100% Fruit Juice (including orange, mango, apple, grape, grapefruit; **not** fruit-flavored/sugary drinks)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Folate, Fruit, vitamins, sugar (carbohydrates)

Validity: Face + Criterion

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study.

Nutrients - (USDA)

Face validity for folate, fruit, vitamins, iron, and sugar (carbohydrates)

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000):Question: 6

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D8 - Fruit-flavored/Sugary drink consumption during pregnancy

Module: D

Question Number: 8

Tier: 1

Question:

8 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Fruit-flavored / Sugary Drinks (including Kool-aid, lemonade, cranberry cocktail, Hi-C, Tang, Gatorade, Sunny Delight, Tampico, **not** diet or sugar-free drinks)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Sugars / high fructose / sucrose intake, potential for hyperglycemia

Validation: Face for hyperglycemia + Criterion

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean added sugar servings was 0.66 (SEE 0.045) for the OPEN study and 0.66 (SEE 0.032) for the EATS study.

Nutrients - (USDA)

Face validity for folate, sugars / high fructose / sucrose intake

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Five-Factor Screener (2005): Question: NAC.060

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from: https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

USDA National Nutrient Database for Standard Reference. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D9 - Fruit intake during pregnancy

Module: D

Question Number: 9

Tier: 1

Question:

9 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Fruit (including fresh, frozen, or canned; fruit salad, applesauce, smoothies; berries, melons, mangos, bananas, apples, oranges, grapes; **not** juices)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Folate, iron, fiber, sugar (carbohydrates)

Validity:

Face + Criterion

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item ‘screener’ designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fruits and vegetables serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the OPEN (NCI’s Observing Protein and Energy) Study was 0.62 (SEE 0.083). The correlation for average fruits and vegetables serving in the female study population between the true intake and the EATS (Eating at America’s Table Study) was 0.54 (SEE 0.059).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for folate, iron, fiber, sugar (carbohydrates)

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 7

NCI Five-factor Screener (2005): Question: NAC.070

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from: https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D10 - Orange juice intake during pregnancy

Module: D

Question Number: 10

Tier: 2

Question:

10 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Orange Juice or Oranges

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Folate, fiber, sugar (carbohydrates), calcium

Validity: Face value for fiber. Criterion for folate.

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Nutrients - (USDA)

Face validity for folate, fiber, sugar (carbohydrates), calcium

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay ($p < 0.0004$).

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Other surveys which use the question or a version of it:

N/A

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D11 - Salad greens consumption during pregnancy

Module: D

Question Number: 11

Tier: 1

Question:

11 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Green leafy lettuce salad (with or without other vegetables)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fiber, folate, pesticides (in combination with other questions on fruit and vegetable intake and whether they were organic)

Validity: Face

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item ‘screener’ designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fruits and vegetables serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the OPEN (NCI’s Observing Protein and Energy) Study was 0.62 (SEE 0.083). The correlation for average fruits and vegetables serving in the female study population between the true intake and the EATS (Eating at America’s Table Study) was 0.54 (SEE 0.059).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study.

Nutrients - (USDA)

Face validity for folate and folate

Pesticides - (Ripley et al., 2000)

A Canadian study found that out of 325 lettuce samples, 85.2% contained a detectable pesticide residue and 10.5% had residue levels that exceeded the maximum residue limits (MRL) for Canada. It should be noted that MLRs vary between the US and Canada.

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Pesticides - (Ripley et al., 2000)

A Canadian study that sought to determine if pesticides were present on Ontario-produced fruits and vegetables between 1991 and 1995, and if so, to determine if residues violated maximum residue limits (MRLs). 1536 vegetable and 802 fruit samples were analyzed. Emphasis was on the raw agricultural product as first offered for sale, which was analyzed unwashed, whole, and with the peel or skin intact. The samples were analyzed by using multi-residue screens that could simultaneously detect a large number of pesticides. Specific single-residue methods were also performed for various individual pesticides. In this way pesticides currently used, as well as those used in the past (e.g., DDT), could be determined at very low concentrations.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 9

NCI Five-factor Screener (2005): Question: NAC.090

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Ripley BD, Lissemore LI, Leishman PD, et al. Pesticide residues on fruits and vegetables from Ontario, Canada, 1991–1995. *JAOAC Int.* 2000; 83(1): 196-213.

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D12 - Mustard greens/spinach/other greens consumption during pregnancy

Module:

Question Number: 12

Tier: 1

Question:

12 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Spinach, or Chard, Collards, Mustard Greens

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Folate, fiber, pesticides (in combination with other questions on fruit and vegetable intake and whether they were organic)

Validity: Face + Criterion

Rationale:

Nutrients - (USDA)

Face validity for folate and fiber

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay ($p < 0.0004$).

Pesticides - (Ripley et al., 2000)

A Canadian study found that out of 11 spinach samples, 36.4% contained a detectable amount of DTC, 18.2% contained a detectable amount of Parathion, 9.1% contained a detectable amount of Carbaryl, 9.1% contained a detectable amount of dimethoate, and 9.1% contained a detectable amount of metalaxyl, though none of these exceeded the maximum residue limits (MRL) for Canada. It should be noted that MRLs vary between the US and Canada.

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Pesticides - (Ripley et al., 2000)

A Canadian study that sought to determine if pesticides were present on Ontario-produced fruits and vegetables between 1991 and 1995, and if so, to determine if residues violated maximum residue limits (MRLs). 1536 vegetable and 802 fruit samples were analyzed. Emphasis was on the raw agricultural product as first offered for sale, which was analyzed unwashed, whole, and with the peel or skin intact. The samples were analyzed by using multi-residue screens that could simultaneously detect a large number of pesticides. Specific single-residue methods were also performed for various individual pesticides. In this way pesticides currently used, as well as those used in the past (e.g., DDT), could be determined at very low concentrations.

Other surveys which use the question or a version of it:

NCI Five-factor Screener (2005): Question: NAC.090

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

Ripley BD, Lissemore LI, Leishman PD, et al. Pesticide residues on fruits and vegetables from Ontario, Canada, 1991–1995. *JAOAC Int.* 2000; 83(1): 196-213.

USDA National Nutrient Database for Standard Reference: Folate. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D13 - Cruciferous vegetable intake during pregnancy

Module: D

Question Number: 13

Tier: 1

Question:

13 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Broccoli, Cauliflower, Cabbage, Coleslaw

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit and vegetable servings, sulfuraphane, glucosinolates, pesticides (in combination with other questions on fruit and vegetable intake and whether they were organic)

Validity: Criterion

Rationale:

Sulfuraphane - (Singh et al., 2014)

After 18 weeks, subjects who were treated with sulfuraphane displayed an improvement across three metrics commonly used to quantify ASD symptoms: the Aberrant Behavior Checklist (ABC), Social Responsiveness Scale (SRS), and Clinical Global Impression Improvement Scale (CGI-I). In the experimental group, there was a 34% decrease in ABC symptoms ($p < 0.001$), 17% decrease in SRS ($p = 0.017$), and a significantly greater proportion of experimental participants improved in the CGI-I than did the control group ($p = 0.015-0.007$).

Glucosinolates - (Kishad, et al., 1999)

A study evaluating the variation in amounts and types of glucosinolates in crops of *Brassica oleracea* found that the predominant glucosinolates in broccoli were 4-methylsulfinylbutyl glucosinolate (glucoraphanin), 3-butenyl glucosinolate (gluconapin), and 3-indolylmethyl glucosinoate (glucobrassicin). Glucoraphanin concentration in broccoli ranged from 0.8 $\mu\text{mol g}^{-1}$ DW in EV6-1 to 21.7 $\mu\text{mol g}^{-1}$ DW in Brigadier. Concentrations of the other glucosinolates in broccoli varied similarly over a wide range. In Brussels sprouts, cabbage, cauliflower, and kale, the predominant glucosinolates were sinigrin (8.9, 7.8, 9.3, and 10.4 $\mu\text{mol g}^{-1}$ DW, respectively) and glucobrassicin (3.2, 0.9, 1.3, and 1.2 $\mu\text{mol g}^{-1}$ DW, respectively). Brussels sprouts also had significant amounts of gluconapin (6.9 $\mu\text{mol g}^{-1}$ DW).

Pesticides - (Ripley et al., 2000)

A Canadian study found that out of 52 broccoli samples, 50.0% contained a detectable pesticide residue though none of these exceeded the maximum residue limits (MRL) for Canada. It should be noted that MRLs vary between the US and Canada.

Description of Supporting Papers:

Sulforaphane - (Singh et al., 2014)

In a placebo-controlled, double-blind, randomized clinical trial, daily treatment with sulforaphane for 4 – 18 weeks resulted in significant improvements in aberrant behavior and social impairment in a majority of young males diagnosed with moderate to severe autism. Symptoms rose to their original levels upon cessation of the treatment.

Glucosinolates - (Kishad, et al., 1999)

Intact glucosinolates in broccoli (n=50 accessions), Brussels sprouts (n=4 accessions), cabbage (n=6 accessions), cauliflower (n=3 accessions), and kale (n=2 accessions) were evaluated in order to determine variation in amounts and types across groups grown under similar conditions and using the same analytical procedure.

Pesticides - (Ripley et al., 2000)

A Canadian study that sought to determine if pesticides were present on Ontario-produced fruits and vegetables between 1991 and 1995, and if so, to determine if residues violated maximum residue limits (MRLs). 1536 vegetable and 802 fruit samples were analyzed. Emphasis was on the raw agricultural product as first offered for sale, which was analyzed unwashed, whole, and with the peel or skin intact. The samples were analyzed by using multi-residue screens that could simultaneously detect a large number of pesticides. Specific single-residue methods were also performed for various individual pesticides. In this way pesticides currently used, as well as those used in the past (e.g., DDT), could be determined at very low concentrations.

Other surveys which use the question or a version of it:

N/A

Journal References:

Kushad MM, Brown AF, Kurilich AC, et al. Variation of glucosinolates in vegetable crops of *Brassica oleracea*. *J. Agric. Food Chem.* 1999; 47: 1541–1548.

Ripley BD, Lissemore LI, Leishman PD, et al. Pesticide residues on fruits and vegetables from Ontario, Canada, 1991–1995. *JAOAC Int.* 2000; 83(1): 196-213.

Singh, K., Connors, S. L., Macklin, E. A., Smith, K. D., Fahey, J. W., Talalay, P., & Zimmerman, A. W.. Sulforaphane treatment of autism spectrum disorder (ASD). *Proceedings of the National Academy of Sciences*, 111(43), 2014: 15550-15555.

D14 - Salad dressing/mayonnaise intake during pregnancy

Module: D

Question Number: 14

Tier: 1

Question:

14 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Regular-fat Salad Dressing or Mayonnaise (including on salad and sandwiches; not low-fat, light, or diet dressing)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fat, Sugar (carbohydrates)

Validity: Face + Criterion

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI's Observing Protein and Energy) Study was 0.76 (SEE 0.073).

Nutrients - (USDA)

Face validity for fat and sugar (carbohydrates)

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 8

Journal References:

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D15 - Fried potato intake during pregnancy

Module: D

Question Number: 15

Tier: 2

Question:

15 – During pregnancy, about how often did you usually eat or drink each of the following foods?

French Fries, Home Fries, or Hash Brown Potatoes

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit/Vegetable servings, Fiber, Fried foods, pesticides (in combination with other questions on fruit and vegetable intake and whether they were organic), arsenic

Validity: Face value for fiber and fried foods. Criterion validity for fruit & vegetable servings.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item ‘screener’ designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI’s Observing Protein and Energy) Study was 0.76 (SEE 0.073). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber

Pesticides - (Ripley et al., 2000)

A Canadian study found that out of 126 potato samples, 27.8% contained a detectable pesticide residue though none of these had residue levels that exceeded the maximum residue limits (MRL) for Canada. It should be noted that MRLs vary between the US and Canada.

Arsenic - (MacIntosh et al., 1997)

A study comparing toenail arsenic levels with arsenic levels that were calculated from food frequency questionnaire reported food items and then empirically weighted found that a moderate correlation between the two levels ($r=0.33$, $p=0.001$).

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Pesticides - (Ripley et al., 2000)

A Canadian study that sought to determine if pesticides were present on Ontario-produced fruits and vegetables between 1991 and 1995, and if so, to determine if residues violated maximum residue limits (MRLs). 1536 vegetable and 802 fruit samples were analyzed. Emphasis was on the raw agricultural product as first offered for sale, which was analyzed unwashed, whole, and with the peel or skin intact. The samples were analyzed by using multi-residue screens that could simultaneously detect a large number of pesticides. Specific single-residue methods were also performed for various individual pesticides. In this way pesticides currently used, as well as those used in the past (e.g., DDT), could be determined at very low concentrations.

Arsenic - (MacIntosh et al., 1997)

A study comparing toenail arsenic levels from 969 men and women that had participated in NHANES and for whom FFQ data from 1984 were available with arsenic levels that

were calculated from the FFQ using a database for the content of arsenic in those food items and then empirically weighted.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 8

NCI Five-factor Screener (2005): Question: NAC.100

PhenX: Measure #050701 (Fruits and Vegetables Intake) Questions: 4

PhenX: Measure #050601 (Fiber Intake) Question: 8

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

MacIntosh DL, Williams PL, Hunter DJ, et al. Evaluation of a food frequency questionnaire-food composition approach for estimating dietary intake of inorganic arsenic and methylmercury. *Cancer Epidemiol Biomarkers Prev*. 1997; 6(12): 1043-1050

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Ripley BD, Lissemore LI, Leishman PD, et al. Pesticide residues on fruits and vegetables from Ontario, Canada, 1991–1995. *J AOAC Int*. 2000; 83(1): 196-213.

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr*. 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D16 - Other potato consumption during pregnancy

Module: D

Question Number: 16

Tier: 2

Question:

16 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Other Potatoes (including baked, boiled/steamed, or mashed potatoes and potato salad; **not** yams or sweet potatoes)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit/Vegetable servings, Fiber, Folate, Carbohydrates, Arsenic

Validity: Face + criterion for fiber and folate.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item ‘screener’ designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI’s Observing Protein and Energy) Study was 0.76 (SEE 0.073). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber, folate, carbohydrates

Arsenic - (MacIntosh et al., 1997)

A study comparing toenail arsenic levels with arsenic levels that were calculated from food frequency questionnaire reported food items and then empirically weighted found that a moderate correlation between the two levels ($r=0.33$, $p=0.001$).

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Arsenic - (MacIntosh et al., 1997)

A study comparing toenail arsenic levels from 969 men and women that had participated in NHANES and for whom FFQ data from 1984 were available with arsenic levels that were calculated from the FFQ using a database for the content of arsenic in those food items and then empirically weighted.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 11

NCI Five-factor Screener (2005): Question: NAC.110

PhenX: Measure #050701 (Fruits and Vegetables Intake) Questions: 5

PhenX: Measure #050601 (Fiber Intake) Question: 9

Journal References:

MacIntosh DL, Williams PL, Hunter DJ, et al. Evaluation of a food frequency questionnaire-food composition approach for estimating dietary intake of inorganic arsenic and methylmercury. *Cancer Epidemiol Biomarkers Prev.* 1997; 6(12): 1043-1050

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D17 - Salsa consumption during pregnancy

Module: D

Question Number: 17

Tier: 2

Question:

17 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Salsa

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit/Vegetable servings, Fiber, Folate, Iron

Validity: Face + Criterion

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for folate and iron

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Five-factor Screener (2005): Question: NAC.132

PhenX: Measure #050701 (Fruits and Vegetables Intake) Questions: 9

PhenX: Measure #050601 (Fiber Intake) Question: 13

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference: Folate. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D18 - Tomato-based sauce consumption during pregnancy

Module: D

Question Number: 18

Tier: 2

Question:

18 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Tomato Sauces (including spaghetti/pasta sauce or pizza with tomato sauce; Do not include ketchup)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit/Vegetable servings, Fiber, Carotenoids (lycopene), pesticides

Validity: Face + Criterion.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item ‘screener’ designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI’s Observing Protein and Energy) Study was 0.76 (SEE 0.073). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber and carotenoids (lycopene)

Pesticides - (Ripley et al., 2000)

A Canadian study found that out of 90 tomato samples, 48.9% contained a detectable pesticide residue, however, none of these had residue levels that exceeded the maximum residue limits (MRL) for Canada. It should be noted that MLRs vary between the US and Canada.

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Pesticides - (Ripley et al., 2000)

A Canadian study that sought to determine if pesticides were present on Ontario-produced fruits and vegetables between 1991 and 1995, and if so, to determine if residues violated maximum residue limits (MRLs). 1536 vegetable and 802 fruit samples were analyzed. Emphasis was on the raw agricultural product as first offered for sale, which was analyzed unwashed, whole, and with the peel or skin intact. The samples were analyzed by using multi-residue screens that could simultaneously detect a large number of pesticides. Specific single-residue methods were also performed for various individual pesticides. In this way pesticides currently used, as well as those used in the past (e.g., DDT), could be determined at very low concentrations.

Other surveys which use the question or a version of it:

NCI Five-factor Screener (2005): Question: NAC.131

PhenX: Measure #050701 (Fruits and Vegetables Intake) Questions: 8

PhenX: Measure #050601 (Fiber Intake) Question: 12

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

Ripley BD, Lissemore LI, Leishman PD, et al. Pesticide residues on fruits and vegetables from Ontario, Canada, 1991–1995. *JAOAC Int.* 2000; 83(1): 196-213.

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D19 - Pea consumption during pregnancy

Module: D

Question Number: 19

Tier: 2

Question:

19 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Peas

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit/vegetable servings, Fiber, Iron, Sugar (carbohydrates)

Validity: Face + Criterion.

Rationale:

Nutrients - (USDA)

Face validity for fiber, iron, sugar (carbohydrates)

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

N/A

Journal References:

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D20 - Other vegetable intake during pregnancy

Module: D

Question Number: 20, 20a, 20b

Tier: 2

Question:

20 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Other Vegetables (including raw, cooked, canned, or frozen; tomatoes, string/green beans, corn, bean sprouts, carrots, sweet potatoes; not ones already listed)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

20a – How often were the fruits and vegetables you ate organic?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

20b – How often were the fruits and vegetables you ate washed prior to eating them?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Fruit/Vegetable servings, Fiber, Folate, pesticides (in combination with other questions on fruit and vegetable intake and whether they were organic)

Validity: Face + Criterion.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fruits and vegetables serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the OPEN (NCI's Observing Protein and Energy) Study was 0.62 (SEE 0.083). The correlation for average fruit and vegetables serving in the female study population between the true intake and the EATS (Eating at America's Table) Study was 0.54 (SEE 0.059). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor

Screeners for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber and folate

Pesticides - (Lairon, 2010)

A review article reporting on the safety of organic foods found that 94-100% of organic food does not contain any pesticide residues.

Pesticides - (Radwan et al., 2005)

A study measuring pesticide residuals on hot peppers, sweet peppers, and eggplants after household washing techniques found that washing with tap water removed 81.1 to 99.6% of pesticide residues off of the three types of vegetables.

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Pesticides - (Lairon, 2010)

A review article reporting on the safety and nutritional quality of organic foods.

Pesticides - (Radwan et al., 2005)

A study measured pesticide residuals on hot peppers, sweet peppers, and eggplants after household washing and cooking techniques. Profenofos (Selecron 72% EC), was sprayed on field-grown pepper and eggplant at the recommended rate of 1.28 kg a.i./ha. The effect

of different washing solutions (tap water, 1% soap, 2% acetic acid, 0.01% potassium permanganate, 0.1% sodium hydroxide, and 1% sodium chloride) and some household processing (Blanching, frying, pickling for 1 week, and pickling for 2 weeks) on the removal of such residues from treated vegetables were investigated. Profenofos residues were quantified by using gas chromatography.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 13

NCI Five-factor Screener (2005): Question: NAC.130

PhenX: Measure #050701 (Fruits and Vegetables Intake) Questions: 7

PhenX: Measure #050601 (Fiber Intake) Question: 11

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Lairon D. Nutritional quality and safety of organic food. A review. *Agron Sustain Dev*. 2010; 30: 33–41

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Radwan MA, Abu-Elamayem MM, Shiboob MH, Abdel-Aal, A. Residual behaviour of profenofos on some field-grown vegetables and its removal using various washing solutions and household processing.

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr*. 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D21 - Bean consumption during pregnancy

Module: D

Question Number: 21

Tier: 2

Question:

21 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Cooked or Canned Beans (including pinto, red or black beans, refried, baked, pork and beans, bean soup, and in burritos, **not** green beans)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fruit/vegetable servings, fiber, iron, protein, sugar (carbohydrates)

Validity: Face value for fiber, iron, and protein.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item ‘screener’ designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI’s Observing Protein and Energy) Study was 0.76 (SEE 0.073). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fruits and vegetables servings was 0.73 (SEE 0.078) for the OPEN study and 0.54 (SEE 0.060) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean fiber servings for female sample population was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber, iron, and protein

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 12

NCI Five-factor Screener (2005): Question: NAC.120

PhenX: Measure #050701 (Fruits and Vegetables Intake) Questions: 6

PhenX: Measure #050601 (Fiber Intake) Question: 10

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

Thompson, F.E., , Midthune, D., Subar, A. F., Kahle, L. L., Schatzkin, A., Kipnis, V.. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. Public Health Nutrition. 7(8). 2004: 1097-1106.

USDA Nutrient values from Agricultural Research Service (ARS) Nutrient Database for Standard Reference. Available from: https://www.ars.usda.gov/main/site_main.htm?modecode=12-35-45-00

USDA Choose My Plate: Protein. Available from: <http://www.choosemyplate.gov/food-groups/protein-foods.html>

D22 - Peanut/peanut product consumption during pregnancy

Module: D

Question Number: 22

Tier: 2

Question:

22 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Peanuts, Walnuts, Seeds, Other Nuts (**not** peanut butter)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Legumes, protein, fiber, and fat.

Validity: Face.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI's Observing Protein and Energy) Study was 0.76 (SEE 0.073). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Nutrients - (USDA)

Face validity for protein, fiber, and fat

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 15

Journal References:

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D23 - Tofu consumption during pregnancy

Module: D

Question Number: 23

Tier: 1

Question:

23 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Tofu or Tofu Products

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Legume, Fiber, Folate, Protein, Phytoestrogens (Isoflavones)

Validity: Face for fiber, folate, and protein. Criterion validity for isoflavones/phytoestrogens.

Rationale:

Nutrients - (USDA)

Face validity for fiber, folate, and protein

Self-report / Phytoestrogens - (Yamamoto et al., 2001)

Spearman correlation coefficients for daidzein of energy-adjusted intakes from FFQ with those from a dietary report (DR), serum concentration and creatinine-adjusted urinary excretion were 0.64, 0.31 and 0.43, respectively. Correlations between two FFQ estimates with a 1-y interval were 0.76. The original FFQ and the shorter versions have sufficient validity and reproducibility to be used in epidemiologic studies. When adjusted for energy intake, the Spearman's correlation coefficient for daidzein intake between FFQ/DR, FFQ/Serum, FFQ/Urine, DR/Serum, DR/Urine were the following: 0.6 (95% CI, 0.5-0.69), 0.26 (95% CI, 0.13-0.39), 0.40 (95% CI, 0.21-0.60), 0.37 (95% CI, 0.25-0.49), 0.48 (95% CI, 0.31-0.64). The Spearman's correlation coefficient for genistein intake between FFQ/DR, FFQ/Serum, FFQ/Urine, DR/Serum, DR/Urine were the following: 0.59 (95% CI, 0.5-0.68), 0.22 (95% CI, 0.08-0.35), 0.30 (95% CI, 0.08-0.51), 0.33 (95% CI, 0.21-0.45), 0.36 (95% CI, 0.18, 0.55).

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Self-report / Phytoestrogens - (Yamamoto et al., 2001)

A Japanese study of the validity of a long and short FFQ, comparison of agreement between the FFQ and Dietary Report (DR) and between the FFQ and blood and urine

samples. The exposure of interest was isoflavone, via tofu and tofu-product intake. Isoflavone is a phytoestrogen, commonly known to have an active estrogenic effect.

Other surveys which use the question or a version of it:

N/A

Journal References:

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

Yamamoto S, Sobue T, Sasaki S, et al. Validity and reproducibility of a self-administered food-frequency questionnaire to assess isoflavone intake in a Japanese population in comparison with dietary records and blood and urine isoflavones. *J Nutr*. 2001; 131(10): 2741-2747.

D24 - Soy milk consumption during pregnancy

Module: D

Question Number: 24

Tier: 1

Question:

24 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Soy Milk (including in soy lattes, on cereal)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, Phytoestrogens (Isoflavones)

Validity: Face for protein. Criterion validity for isoflavone and phytoestrogens.

Rationale:

Nutrients - (USDA)

Face validity for protein

Self-report / Phytoestrogen - (Yamamoto et al., 2001)

Spearman correlation coefficients for daidzein of energy-adjusted intakes from FFQ with those from a dietary report (DR), serum concentration and creatinine-adjusted urinary excretion were 0.64, 0.31 and 0.43, respectively. Correlations between two FFQ estimates with a 1-y interval were 0.76. The original FFQ and the shorter versions have sufficient validity and reproducibility to be used in epidemiologic studies. When adjusted for energy intake, the Spearman's correlation coefficient for daidzein intake between FFQ/DR, FFQ/Serum, FFQ/Urine, DR/Serum, DR/Urine were the following: 0.6 (95% CI, 0.5-0.69), 0.26 (95% CI, 0.13-0.39), 0.40 (95% CI, 0.21-0.60), 0.37 (95% CI, 0.25-0.49), 0.48 (95% CI, 0.31-0.64). The Spearman's correlation coefficient for genistein intake between FFQ/DR, FFQ/Serum, FFQ/Urine, DR/Serum, DR/Urine were the following: 0.59 (95% CI, 0.5-0.68), 0.22 (95% CI, 0.08-0.35), 0.30 (95% CI, 0.08-0.51), 0.33 (95% CI, 0.21-0.45), 0.36 (95% CI, 0.18, 0.55).

Phytoestrogen - (Frankenfeld et al. 2003)

The correlation coefficient between soy milk intake as assessed by a FFQ and prediction of plasma isoflavone concentrations had a value of 0.36 ($p < 0.01$).

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Self-report / Phytoestrogen - (Yamamoto et al., 2001):

A Japanese study of the validity of a long and short FFQ, comparison of agreement between the FFQ and Dietary Report (DR) and between the FFQ and blood and urine samples. The exposure of interest was isoflavone, via tofu and tofu-product intake. Isoflavone is a phytoestrogen, commonly known to have an active estrogenic effect.

Phytoestrogen - (Frankenfeld et al., 2003)

A cross-sectional study of post-menopausal women, conducted with the aim of elucidating the patterns and correlates of soy consumption within that population. Validity was assessed between a soy FFQ and a gold standard (plasma isoflavone concentration).

Other surveys which use the question or a version of it:

N/A

Journal References:

Frankenfeld CL, Patterson RE, Horner NK, et al. Validation of a soy food-frequency questionnaire and evaluation of correlates of plasma isoflavone concentrations in postmenopausal women. *Am J Clin Nutr.* 2003; 77(3): 674-80.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

Yamamoto S, Sobue T, Sasaki S, et al. Validity and reproducibility of a self-administered food-frequency questionnaire to assess isoflavone intake in a Japanese population in comparison with dietary records and blood and urine isoflavones. *J Nutr.* 2001; 131(10): 2741-2747.

D25 - Egg consumption during pregnancy

Module: D

Question Number: 5

Tier: 2

Question:

25 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Eggs (including in breakfast sandwiches)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, Choline

Validity: Face validity for protein and choline.

Rationale:

Nutrients - (USDA)

Face validity for protein and choline

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

N/A

Journal References:

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D26 - Fish consumption during pregnancy

Module: D

Question Number: 26, 26a

Tier: 1

Question:

26 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Fish (finfish, including canned fish)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

26a – What type(s) of fish did you eat most often? (Mark up to 3 that you ate most often)

[Responses: Pollock; Catfish; Salmon (Wild); Salmon (Farmed); Mackerel; Mahi Mahi; Swordfish; Sea bass; Tilapia; Halibut; Shark; Tilefish; Marlin; Bass; Cod; Haddock; Tuna (Canned chunk light, Skipjack); Tuna (Ahi, Albacore; Yellowfin; Other); Sea Bream; Herring and kippers, plaice and sole; Trout, sardines and pilchards; Other Fish: _____; Declined; Don't know]

Potential Exposures:

Protein, omega-3 fatty acids, choline, mercury, PBDEs, other contaminants.

Validity: Face validity for protein, omega-3 fatty acids and choline.

Rationale:

Nutrients - (USDA)

Face validity for protein, omega-3 fatty acids, and choline

Mercury - (American Heart Association, 2015)

The American Heart Association lists the mean mercury levels of the top 10 most consumed fish in the US, ranging from non-detectable (Shrimp and clams) to 0.12 ppm (canned tuna)

PBDEs - (Brown et al., 2006)

A study examining the levels of polychlorinated dibenzo-dioxins (PCDDs), polychlorinated dibenzo-furans (PCDFs), coplanar polychlorinated biphenyls (coPCBs), and polybrominated diphenyl ethers (PBDEs) in fish collected from San Francisco Bay in 2000 and from the California coast in 2001 found that the mean concentration of the sum of BDEs 47, 99, 100, 153, and 154 was 302 ng/g lipid weight. For all fish of all species from all sampling areas, the mean PCDD/PCDF International Toxic Equivalent (I-TEQ) was 33.1 pg/g lipid. For the three coPCBs (77, 126, 169), the mean I-TEQ for all fish of all species from all sampling areas was 109 pg/g lipid. The highest concentrations of both PCDD/PCDF/coPCBs and PBDEs were found in the highly populated areas of San Francisco Bay, the Los Angeles area, and San Diego Bay.

Description of Supporting Papers:*Nutrients - (USDA)*

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Mercury - American Heart Association (Fish 101):

An NGO-website which outlines the nutritional benefits of fish in addition to potential exposures such as mercury.

PBDEs - (Brown et al., 2006)

A study examined the levels of polychlorinated dibenzo-dioxins (PCDDs), polychlorinated dibenzo-furans (PCDFs), coplanar polychlorinated biphenyls (coPCBs), and polybrominated diphenyl ethers (PBDEs) in fish collected from San Francisco Bay in 2000 and from the California coast in 2001. Sixty-five composite samples were analyzed for PCDD/PCDF/coPCBs, and 43 composite samples were analyzed for PBDEs.

Other surveys which use the question or a version of it:

N/A

Journal References:

American Heart Association: Fish 101. Available from:

http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/Fish-101_UCM_305986_Article.jsp

Brown FB, Winkler J, Visita P, et al. Levels of PBDEs, PCDDs, PCDFs, and coplanar PCBs in edible fish from California coastal waters. *Chemosphere*. 2006; 64(2): 276-286

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D27 - Other seafood/shellfish consumption during pregnancy

Module: D

Question Number: 27

Tier: 2

Question:

27 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Other Seafood / Shellfish (shrimp, mussels/clams, crab, lobster, calamari, oysters, etc)
[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, omega-3 fatty acids, mercury, PBDE.

Validity: Face validity for protein, omega-3 fatty acids and choline.

Rationale:

Nutrients - (USDA)

Face validity for protein and omega-3 fatty acids

Mercury - (American Heart Association, 2015)

The American Heart Association lists the mean mercury levels of the top 10 most consumed fish in the US, ranging from non-detectable (Shrimp and clams) to 0.12 ppm (canned tuna)

PBDEs - (Brown et al., 2006)

A study examining the levels of polychlorinated dibenzo-dioxins (PCDDs), polychlorinated dibenzo-furans (PCDFs), coplanar polychlorinated biphenyls (coPCBs), and polybrominated diphenyl ethers (PBDEs) in fish collected from San Francisco Bay in 2000 and from the California coast in 2001 found that the mean concentration of the sum of BDEs 47, 99, 100, 153, and 154 was 302 ng/g lipid weight. For all fish of all species from all sampling areas, the mean PCDD/PCDF International Toxic Equivalent (I-TEQ) was 33.1 pg/g lipid. For the three coPCBs (77, 126, 169), the mean I-TEQ for all fish of all species from all sampling areas was 109 pg/g lipid. The highest concentrations of both PCDD/PCDF/coPCBs and PBDEs were found in the highly populated areas of San Francisco Bay, the Los Angeles area, and San Diego Bay.

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

American Heart Association (Fish 101):

An NGO-website which outlines the nutritional benefits of fish in addition to potential exposures such as mercury.

Mercury - American Heart Association (Fish 101):

An NGO-website which outlines the nutritional benefits of fish in addition to potential exposures such as mercury.

PBDEs - (Brown et al., 2006)

A study examined the levels of polychlorinated dibenzo-dioxins (PCDDs), polychlorinated dibenzo-furans (PCDFs), coplanar polychlorinated biphenyls (coPCBs), and polybrominated diphenyl ethers (PBDEs) in fish collected from San Francisco Bay in 2000 and from the California coast in 2001. Sixty-five composite samples were analyzed for PCDD/PCDF/coPCBs, and 43 composite samples were analyzed for PBDEs.

Other surveys which use the question or a version of it:

N/A

Journal References:

American Heart Association: Fish 101. Available from:

http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/Fish-101_UCM_305986_Article.jsp

Brown FB, Winkler J, Visita P, et al. Levels of PBDEs, PCDDs, PCDFs, and coplanar PCBs in edible fish from California coastal waters. *Chemosphere*. 2006; 64(2): 276-286

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D28 - Poultry consumption during pregnancy

Module: D

Question Number: 28

Tier: 2

Question:

28 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Poultry (chicken, turkey, duck, goose)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, choline

Validity: Face validity for protein/choline.

Rationale:

Nutrients - (USDA)

Face validity for protein and choline

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

N/A

Journal References:

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D29 - Red meat consumption during pregnancy

Module: D

Question Number: 29

Tier: 1

Question:

29 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Red Meat (including beef, pork, lamb, liver, include processed meats, hot dogs, sausages)
[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, Fat, potentially hormones, antibiotics

Validity: Face + Criterion.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI's Observing Protein and Energy) Study was 0.76 (SEE 0.073).

Nutrients - (USDA)

Face validity for protein and fat

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Five Factor Screener (2005): Question: NAC.134

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D30 - Canned meat consumption during pregnancy

Module: D

Question Number: 30

Tier: 2

Question:

30 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Canned Meat (any kind, including Spam, tuna, etc)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Contaminants, primarily polybrominated diphenyl ethers (PBDEs), BPA

Validity: Face validity for contaminants and PBDEs.

Rationale:

No studies were found on the validity of the recall or self-report of this question.

PBDE - (Wu et al., 2015)

A study comparing serum PBDE levels with self-reported canned meat intake from a food frequency questionnaire found a statistically significant positive association between the intake frequency of canned meat and serum concentrations of BDE-47, 99 and 154, between canned meat entrees and BDE-154 and 209, as well as between tuna and white fish and BDE-153.

BPA - (Goodson et al., 2010)

A study examining the levels of bisphenol A (BPA) and bisphenol F (BPF) in various canned foods quantified BPA in 37 canned foods at levels from 0.007 mg/kg, with one sample of meat containing a mean level of 0.38 mg/kg. All other samples contained <0.07 mg/kg BPA. BPF isomers, however, were not detected in any of the canned foods with detection limits of 0.005 mg/kg for the 2,2' and 2,4' isomers and 0.01 mg/kg for the 4,4' isomer.

Description of Supporting Papers:

PBDE - (Wu et al., 2015)

A study comparing serum PBDE levels with self-reported canned meat intake recruited participants from selected communities in northern and central California. Trained field staff visited participants' homes to collect blood samples from adult and child participants. In addition, blood samples were collected from ten spouses of participating older adults. Following the home visit, a food frequency questionnaire was administered via phone interview for food items commonly consumed by Americans and hypothesized to contain high level of PBDEs.

BPA - (Goodson et al., 2010)

A study from the UK examining the levels of bisphenol A (BPA) and bisphenol F (BPF) in various canned foods purchased 62 different canned foods from retail outlets in the UK from January to November 2000. The contents of these were extracted and analyzed by gas chromatography–mass spectrometry for BPA and BPF isomers.

Other surveys which use the question or a version of it:

N/A

Journal References:

Goodson A, Summerfield W, Cooper I. Survey of bisphenol A and bisphenol F in canned foods. *Food Addit Contam.* 2002; 19(8): 796-802.

Wu X, Bennett DH, Moran RE, et al. Polybrominated diphenyl ether serum concentrations in a Californian population of children, their parents, and older adults: an exposure assessment study. *Environ Health.* 2015; 14: 23

D31 - Hot/cooked cereal consumption during pregnancy

Module: D

Question Number: 31

Tier: 2

Question:

31 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Hot or Cooked Cereals? (including oatmeal, cream of wheat, or grits).

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Fiber, Folate, Iron

Validity: Face validity for folate, grains, and iron.

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fiber servings was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber, folate, and iron

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay.

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Other surveys which use the question or a version of it:

NCI Five-factor Screener (2005): Question: NAC.010

NCI Five-factor Screener (2005): Question: NAC.015

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaresdelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D32 - Cold cereal consumption during pregnancy

Module: D

Question Number: 32, 32a

Tier: 2

Question:

32 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Cold Breakfast Cereals (including as snacks)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

32a – What kinds of cold breakfast cereal did you usually eat? (Mark one or two types)

[Responses: All bran cereals (including All Bran, Fiber One, 100% Bran, or Bran Buds); Cereals with some bran or fiber (including Cheerios, Raisin Bran, Shredded Wheat, Total, Wheaties, 40% Bran flakes, Granola, Grape Nuts, Muselix); Cereals with little bran or fiber (including Corn Flakes, Honey Nut Cheerios, Froot Loops, Rice Krispies, Kix, Frosted Flakes, Special K, Cap'n Crunch, Blueberry Morning, Product 19, etc.); Other: ____; Declined; Don't Know]

Potential Exposures:

Grains, Fiber, Folate, Iron, sugar

Validation: Face validity for folate, grains, and iron.

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fiber servings was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber, folate, iron and sugar

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay ($p < 0.0004$).

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Other surveys which use the question or a version of it:

NCI Five-factor Screener (2005): Question: NAC.010

NCI Five-factor Screener (2005): Question: NAC.015

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from: <http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference. Available from: <http://ndb.nal.usda.gov/ndb/nutrients/index>

D33 - Whole-grain bread consumption during pregnancy

Module: D

Question Number: 33

Tier: 2

Question:

33 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Whole-grain Bread (including toast, rolls, pitas, bagels, buns, English muffins, and in sandwiches; including whole or cracked wheat, bran, oatmeal, pumpernickel, multigrain, rye)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Whole grains, Grains, Fiber, Folate, Carbohydrates

Validation: Face validity for fiber and folate.

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fiber servings was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study.

Nutrients - (USDA)

Face validity for fiber, folate, and carbohydrates

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 5

NCI Five-factor Screener (2005): Question: NAC.135

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D34 - White bread consumption during pregnancy

Module: D

Question Number: 34

Tier: 2

Question:

34 – During pregnancy, about how often did you usually eat or drink each of the following foods?

White Bread (including toast, rolls, pitas, bagels, bun, English muffins, and in sandwiches)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Folate, Fortified Vitamins, Carbohydrates

Validity: Face validity for fiber and folate.

Rationale:

Nutrients - (USDA)

Face validity for folate, and carbohydrates

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

N/A

Journal References:

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D35 - Rice consumption during pregnancy

Module: D

Question Number: 35

Tier: 2

Question:

35 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Rice (including in mixed dishes)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Whole grains, Fiber, Folate, Carbohydrates, Arsenic

Validity: Face validity for grains, whole grains, and fiber.

Rationale:

Nutrients - (USDA)

Face validity for fiber, folate, and carbohydrates

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay ($p < 0.0004$).

Arsenic - (MacIntosh et al., 1997)

A study comparing toenail arsenic levels with arsenic levels that were calculated from food frequency questionnaire reported food items and then empirically weighted found that a moderate correlation between the two levels ($r = 0.33$, $p = 0.001$).

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Arsenic - (MacIntosh et al., 1997)

A study comparing toenail arsenic levels from 969 men and women that had participated in NHANES and for whom FFQ data from 1984 were available with arsenic levels that were calculated from the FFQ using a database for the content of arsenic in those food items and then empirically weighted.

Other surveys which use the question or a version of it:

N/A

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

MacIntosh DL, Williams PL, Hunter DJ, et al. Evaluation of a food frequency questionnaire-food composition approach for estimating dietary intake of inorganic arsenic and methylmercury. *Cancer Epidemiol Biomarkers Prev.* 1997; 6(12): 1043-1050

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D36 - Tortilla consumption during pregnancy

Module: D

Question Number: 36

Tier: 2

Question:

36 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Tortillas (including as part of a burrito, enchilada, or other dish)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Whole grains, Fiber, Folate, Carbohydrates

Validity: Face validity for grains, whole grains, and fiber. Criterion validity for folate.

Rationale:

Nutrients - (USDA)

Face validity for fiber, folate, and carbohydrates

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay ($p < 0.0004$).

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Other surveys which use the question or a version of it:

N/A

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D37 - Pasta/noodle consumption during pregnancy

Module: D

Question Number: 37, 37a

Tier: 2

Question:

37 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Pasta (including spaghetti, noodles, macaroni and cheese, pasta salad, rice noodles, soba, other pasta)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

37a – How often was the rice, pasta, or tortillas you ate whole grain? [Brown or wheat, not white, refined]

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Whole grains, Grains, Fiber, Folate, Carbohydrates

Validity: Face validity for fiber and folate. Criterion validity for fruit/vegetable intake.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI's Observing Protein and Energy) Study was 0.76 (SEE 0.073).

Nutrients - (USDA)

Face validity for fiber, folate, and carbohydrates

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument;

multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 14

Journal References:

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D38 - Cracker/pretzel/crisp consumption during pregnancy

Module: D

Question Number: 38

Tier: 2

Question:

38 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Crackers, Pretzels, or Crisps

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Folate. Sodium/Salt, (carbohydrates)

Validity: Face validity for grains. Criterion validity for folate.

Rationale:

Nutrients - (USDA)

Face validity for folate and sodium/salt

Folate - (Clifford et al., 2005)

RBC folate correlated with total folate intake using a folate-targeted food/supplement screener. Correlations between RBC folate levels (using 4 analytical methods) and folate intake, as dietary folate equivalents (DFEs) ranged from 0.2676 with chemiluminescence to 0.4622 with radioassay ($p < 0.0004$).

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Folate - (Clifford et al., 2005)

In this study, researchers examined the correlation between RBC folate levels and folate intake as measured by the Block Folic Acid/Dietary Folate Equivalents Screener, an 18-item folate-targeted food/supplement screener developed for this study.

Other surveys which use the question or a version of it:

N/A

Journal References:

Clifford AJ, Noceti EM, Block-Joy A, et al. Erythrocyte folate and its response to folic acid supplementation is assay dependent in women. *J Nutr.* 2005; 135(1):137-43.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D39 - Popcorn consumption during pregnancy

Module: D

Question Number: 39

Tier: 2

Question:

39 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Popcorn

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

39a – How often was the popcorn you ate microwave popcorn?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Perfluorooctanoic acid, fiber

Validity: Face value for fiber. Criterion validity for PFOAs.

Rationale:

Perfluorooctanoic acid - *(Begley et al., 2005)*

Popcorn bags were found to have a concentration of Perfluorooctanoic acid (PFOA) of 6-290 µg/kg.

Perfluorooctanoic acid - *(Renner et al., 2006)*

Microwave popcorn wrappers have ~4000 mg/kg PFOA in the coating. During popping, 3-4 mg/kg PFOA migrated from the microwave popcorn bags to the popcorn oil.

Nutrients - (USDA)

Face validity for fiber

Description of Supporting Papers:

Perfluorooctanoic acid - *(Begley et al., 2005)*

PFOA is a known developmental toxicant, its effect include increased mortality, reduced body weight and delayed sexual maturation (rodent studies). This study sought to determine the amount of PFOA present in various commercial food-contact materials. The migration characteristics of PFOA on these media was investigated. PFOA is part of the lining of microwave popcorn bags.

Perfluorooctanoic acid - *(Renner et al., 2006)*

This article publicized the finding in an FDA study that found that microwave popcorn is a greater contributor of PFOAs to the American diet than Teflon pans.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

N/A

Journal References:

Begley TH, White K, Honigfort P, et al. Perfluorochemicals: potential sources of and migration from food packaging. *Food addit and contam.* 2005; 22(10): 1023-1031.

Renner R. It's in the microwave popcorn, not the Teflon pan. *Environ Sci Technol.* 2006; 40(1): 4-4.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D40 - Meal-replacement shake consumption during pregnancy

Module: D

Question Number: 40

Tier: 2

Question:

40 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Meal-replacement shakes (i.e. Slim-Fast, Carnation Instant Breakfast)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, fortified vitamins

Validation: Face

Rationale:

Nutrients - (USDA)

Face validity for protein and vitamins

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

CHARGE (Childhood Autism Risk from Genes and Environment) Study Environmental Exposure Questionnaire

Journal References:

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D41 - Protein/power bar consumption during pregnancy

Module: D

Question Number: 41

Tier: 2

Question:

41 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Protein or Power Bars

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Protein, fortified vitamins

Validation: N/A

Rationale:

Nutrients - (USDA)

Face validity for protein and vitamins

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

CHARGE (Childhood Autism Risk from Genes and Environment) Study Environmental Exposure Questionnaire

Journal References:

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D42 - Potato/tortilla/corn chip consumption during pregnancy

Module: D

Question Number: 42

Tier: 2

Question:

42 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Potato, Tortilla, or Corn Chips (**not** low fat, baked)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fats, salt, carbohydrates

Validity: Criterion validity for fats.

Rationale:

Self-report - (Thompson et al., 2004)

This is one of the questions used for a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The correlation for average fat serving in the female study population between the true intake (estimated from multiple non-consecutive 24-hour recalls in a measurement error model) and the NIH-AARP (National Institutes of Health–American Association of Retired Persons) Diet and Health Study Screener was 0.65 (SEE 0.032). The correlation for average fat serving in the female study population between the true intake and the OPEN (NCI's Observing Protein and Energy) Study was 0.76 (SEE 0.073). The correlation for average fiber serving in the female study population between the true intake and the OPEN study was 0.45 (SEE 0.070).

Nutrients - (USDA)

Face validity for fats, salt, and carbohydrates

Description of Supporting Papers:

Self-report - (Thompson et al., 2004)

To describe the methods used to develop and score a 17-item 'screener' designed to estimate intake of fruit and vegetables, percentage energy from fat and fiber. The ability of this screener and a food-frequency questionnaire to measure these exposures is evaluated. The study was designed using US national food consumption data, stepwise multiple regression was used to identify the foods to be included on the instrument; multiple regression analysis was used to develop scoring algorithms. The performance of the screener was evaluated in three different studies. Estimates of intakes measured by the screener and the FFQ were compared with true usual intake based on a measurement error model.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Multifactor Screener (2000): Question: 16

Journal References:

National Cancer Institute Multifactor Screener: Questionnaire. Available from:
https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Thompson FE, Midthune D, Subar AF, et al. Performance of a short tool to assess dietary intakes of fruits and vegetables, percentage energy from fat and fibre. *Public Health Nutr.* 2004; 7(8): 1097-1106.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D43 - Deep-fat fried food consumption during pregnancy

Module: D

Question Number: 43

Tier: 2

Question:

43 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Deep-fat Fried Foods Other than French Fries

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Fats, Acrylamide, Heterocyclic amines, Aldehydes

Validity: Face

Rationale:

Nutrients - (USDA)

Face validity for fats

Acrylamide - (Ahn et al., 2010)

A study verifying earlier findings of acrylamide in various foods found that acrylamide is absent from the raw or boiled foods but present at significant levels in fried, grilled, baked and toasted foods. The highest result was 12000 µg/kg acrylamide in overcooked oil-fried chips.

Heterocyclic Amines - (Sinha et al, 1998)

A study examining HCA values in beef samples cooked in ways to represent US cooking practices found that the measured values of the specific HCAs varied with the cut of beef, cooking method, and doneness level. In general, 2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline (MeIQx) content increased with doneness under each cooking condition for steak and hamburger patties, up to 8.2 ng/g. 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) was the predominant HCA produced in steak (1.9 to 30 ng/g), but was formed only in very well done fried or grilled hamburger. 2-amino-3,4,8-trimethylimidazo[4,5-f]quinoxaline (DiMeIQx) was found in trace levels in pan-fried steaks only, while 2-amino-3-methylimidazo[4,5-f]quinoline (IQ) and MeIQ were not detectable in any of the samples. Roast beef did not contain any of the HCAs, but the gravy made from the drippings from well done roasts had 2 ng/g of PhIP and 7 ng/g of MeIQx.

Aldehydes - (Wu et al., 1992)

A study examining aldehyde levels in various oils after deep frying and stir-frying found that deep fried soybean oil contained 87.49% aldehydes, stir-fried soybean oil corn oil and lard contained 62.31, 70.76, and 77.60% aldehydes, respectively.

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Acrylamide - (Ahn et al., 2010)

A study from the UK that set out to verify earlier findings from Sweden that found acrylamide in various cooked foods. The UK versions of some of the key food groups analysed in Sweden were purchased from shops in York. Loaves of thickly sliced white and wholemeal brown bread were purchased from a local supermarket. Bread was toasted for 75±380 s using a metal-bodied toaster.

Heterocyclic Amines - (Sinha et al, 1998)

A study examining HCA values in beef samples cooked in ways to represent US cooking practices measured five HCAs [2-amino-3-methylimidazo[4,5-f]quinoline (IQ), 2-amino-3,4-dimethylimidazo[4,5-f]quinoline (MeIQ), 2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline (MeIQx), 2-amino-3,4,8-trimethylimidazo[4,5-f]quinoxaline (DiMeIQx) and 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP)] in different types of cooked beef using solid-phase extraction and HPLC. Steak and hamburger patties were pan-fried, oven-broiled, and grilled/barbecued to four levels of doneness (rare, medium, well done or very well done), while beef roasts were oven cooked to three levels of doneness (rare, medium or well done).

Aldehydes - (Wu et al., 1992)

A study examining aldehyde levels in various oils heated 900 g soybean oil by deep frying at 200° C for 1 hour. Soybean oil, corn oil and lard were heated by stir frying at 55°C. Aldehyde levels were monitored using gas chromatography and gas chromatography-mass spectrometry.

Other surveys which use the question or a version of it:

N/A

Journal References:

Ahn JS, Castle L, Clarke DB, et al. Verification of the findings of acrylamide in heated foods. *Food Addit Contam.* 2002; 19(12): 1116-1124

Sinha R, Rothman N, Salmon CP, et al. Heterocyclic amine content in beef cooked by different methods to varying degrees of doneness and gravy made from meat drippings. *Food Chem Toxicol.* 1998; 36(4): 279-87.

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

Wu CM, Chen SY. Volatile compounds in oils after deep frying or stir frying and subsequent storage. *J Am Oil Chem Soc*. 1992; 69(9): 858-865.

D44 - Doughnut/pastry consumption during pregnancy

Module: D

Question Number: 44

Tier: 2

Question:

44 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Doughnuts, Sweet rolls, Biscuits, Pastries, Scones, Danish, Muffins, Pop-tarts (**not** sugar-free items)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Fat, Sweets/empty calories, sugar (carbohydrates)

Validity: Face validity for sweets. Criterion validity for grains and fats.

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean fiber servings was 0.54 (SEE 0.070) for the OPEN study and 0.55 (SEE 0.054) for the EATS study. The de-attenuated Pearson Correlation Coefficient for mean added sugar servings for female sample population was 0.66 (SEE 0.045) for the OPEN study and 0.66 (SEE 0.032) for the EATS study.

Nutrients - (USDA)

Face validity for fats and sugar (carbohydrates)

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Five Factor Screener (2005): Question: NAC.137

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D45 - Cookie/Cake/Brownie consumption during pregnancy

Module: D

Question Number: 45

Tier: 2

Question:

45 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Cookies, Cake, Pie, or Brownies (include low-fat; **not** sugar-free items)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Grains, Fat, Sweets/empty calories, sugar (carbohydrates)

Validity: Face validity for sweets. Criterion validity for grains and fats.

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean added sugar servings was 0.66 (SEE 0.045) for the OPEN study and 0.66 (SEE 0.032) for the EATS study.

Nutrients - (USDA)

Face validity for fats and sugar (carbohydrates)

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Five Factor Screener (2005): Question: NAC.137

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D46 - Candy consumption during pregnancy

Module: D

Question Number: 46

Tier: 2

Question:

46 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Candy, Chocolate, other Sweets (any kind, including chocolate bars)

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Sweets/empty calories, sugar (carbohydrates)

Validation: Face.

Rationale:

Nutrients - (USDA)

Face validity for sugar (carbohydrates)

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

N/A

Journal References:

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

D47 - Soda consumption during pregnancy

Module: D

Question Number: 47

Tier: 2

Question:

47 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Pop, Soda, Cola, or Fizzy Soft Drinks? [e.g. Pepsi, Coke, Coca-cola, Dr. Pepper, Mountain Dew, Sprite]

[Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

47a – How often was the pop/soda you drank diet?

[Responses: Always or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know]

Potential Exposures:

Sweets/empty calories, Sugar (carbohydrates), high fructose / sucrose corn syrup, aspartame, acesulfame K, neotame, saccharin, sucralose

Validity: Face

Rationale:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

This is one of the questions used for the Five-Factor Screener to assess fiber, calcium added sugar, dairy and fruit and vegetable intake. For the female sample population, the de-attenuated Pearson Correlation Coefficient between true intake and the Five-Factor Screener for estimated mean added sugar servings was 0.66 (SEE 0.045) for the OPEN study and 0.66 (SEE 0.032) for the EATS study.

Nutrients - (USDA)

Face validity for sugar (carbohydrates), high fructose / sucrose corn syrup, aspartame, acesulfame K, neotame, saccharin, sucralose

Description of Supporting Papers:

Self-report - (National Cancer Institute 2005 Five-Factor Screener, 2005)

An indirect assessment of the validity of parts of the Five-Factor Screener in two studies: NCI's Observing Protein and Energy (OPEN) Study and the Eating at America's Table Study (EATS). In both studies, multiple 24-hour recalls in conjunction with a measurement error model were used to assess validity.

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Other surveys which use the question or a version of it:

NCI Five Factor Screener (2005):Question: NAC.030

Journal References:

National Cancer Institute 2005 Five-Factor Screener: Questionnaire. Available from:
ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Survey_Questionnaires/NHIS/2005/English/QCANCER.pdf

National Cancer Institute 2005 Five-Factor Screener: Validation Results. Available from:
<http://healthcaredelivery.cancer.gov/nhis/5factor/results.html>

USDA National Nutrient Database for Standard Reference. Available from:
<http://ndb.nal.usda.gov/ndb/nutrients/index>

D48 - Artificial sweetener consumption during pregnancy

Module: D

Question Number: 48

Tier: 2

Question:

48 – During pregnancy, about how often did you usually eat or drink each of the following foods?

Artificial Sweeteners or Sugar Substitutes? [e.g. aspartame, NutraSweet, Splenda, Equal, Sweet’N Low; Include those added to coffee or tea and those contained in diet, low-calorie, or sugar- free drinks and foods: diet soda, Crystal Light, sugar-free Kool-aid, light yogurt]

Responses: Never; Less than 1 time per month; 1-3 times per month; 1-2 times per week; 3-4 times per week; 5-6 times per week; 1 time per day; 2 times per day; 3 times per day; 4 times per day; 5 times or more per day]

Potential Exposures:

Aspartame, acesulfame K, neotame, saccharin, sucralose

Validation: Face

Rationale:

Women likely to remember consuming low-calorie foods/beverages. No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

D49 - Fish consumption before pregnancy and while breastfeeding

Module: D

Question Number: 49

Tier: 2

Question:

49 – We asked about how often you ate fish during pregnancy above. How often did you eat fish... (Mark how often, on average, for each time period. For 'Before Pregnancy' think about the 3 months immediately before becoming pregnant)

During Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Never; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Never; Declined; Don't Know]

Potential Exposures:

Protein, omega-3 fatty acids, choline, mercury, PBDEs, other contaminants.

Validation: Face

Rationale:

Nutrients - (USDA)

Face validity for protein and omega-3 fatty acids

Mercury - (American Heart Association, 2015)

The American Heart Association lists the mean mercury levels of the top 10 most consumed fish in the US, ranging from non-detectable (Shrimp and clams) to 0.12 ppm (canned tuna)

PBDEs - (Brown et al., 2006)

A study examining the levels of polychlorinated dibenzo-dioxins (PCDDs), polychlorinated dibenzo-furans (PCDFs), coplanar polychlorinated biphenyls (coPCBs), and polybrominated diphenyl ethers (PBDEs) in fish collected from San Francisco Bay in 2000 and from the California coast in 2001 found that the mean concentration of the sum of BDEs 47, 99, 100, 153, and 154 was 302 ng/g lipid weight. For all fish of all species from all sampling areas, the mean PCDD/PCDF International Toxic Equivalent (I-TEQ) was 33.1 pg/g lipid. For the three coPCBs (77, 126, 169), the mean I-TEQ for all fish of all species from all sampling areas was 109 pg/g lipid. The highest concentrations of both PCDD/PCDF/coPCBs and PBDEs were found in the highly populated areas of San Francisco Bay, the Los Angeles area, and San Diego Bay.

Description of Supporting Papers:

Nutrients - (USDA)

The USDA Food Composition Databases lists the amount of each nutrient found in each type of food/drink item.

Mercury - American Heart Association (Fish 101):

An NGO-website which outlines the nutritional benefits of fish in addition to potential exposures such as mercury.

PBDEs - (Brown et al., 2006)

A study examined the levels of polychlorinated dibenzo-dioxins (PCDDs), polychlorinated dibenzo-furans (PCDFs), coplanar polychlorinated biphenyls (coPCBs), and polybrominated diphenyl ethers (PBDEs) in fish collected from San Francisco Bay in 2000 and from the California coast in 2001. Sixty-five composite samples were analyzed for PCDD/PCDF/coPCBs, and 43 composite samples were analyzed for PBDEs.

Other surveys which use the question or a version of it:

N/A

Journal References:

American Heart Association: Fish 101. Available from:

http://www.heart.org/HEARTORG/GettingHealthy/NutritionCenter/Fish-101_UCM_305986_Article.jsp

Brown FB, Winkler J, Visita P, et al. Levels of PBDEs, PCDDs, PCDFs, and coplanar PCBs in edible fish from California coastal waters. *Chemosphere*. 2006; 64(2): 276-286

USDA National Nutrient Database for Standard Reference. Available from:

<http://ndb.nal.usda.gov/ndb/nutrients/index>

S Module (Supplements) -
Itemized Rationale Summary of
the Early Life Exposures Assessment Tool for Autism Studies

[S1 – FOLIC ACID VITAMINS](#)

[S2 - PRENATAL VITAMINS](#)

[S3 - OTHER MULTIVITAMINS](#)

[S4 - Iron](#)

[S5 - Folic Acid](#)

[S6 - B complex](#)

[S7 - Vitamin B12](#)

[S8 - Vitamin B6](#)

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[S17 - Zinc](#)

[S18 - Fish Oil](#)

[S19 - Flaxseed](#)

[S20 - Gingko biloba](#)

[S21 - Ginseng](#)

[S22 - St. John's Wort](#)

[S23 - Coenzyme Q-10](#)

[S24 - Probiotics](#)

[S25 - Turmeric or Curcumin](#)

[S26 - Other supplements](#)

[S27 - Other supplements](#)

S1 - Folic Acid Vitamins

Module: S

Question Number: 1, 1a, 1b

Tier: 1

Question:

1 – Did you take any of the following supplements in the 3 months before pregnancy, during your pregnancy, during the first 6 months of breastfeeding or while feeding your child breast milk?

Vitamin or supplement containing folic acid (at least 400 mcg)? (include multivitamins, prenatal, or single vitamins)

[Responses: Yes; No; Declined; Don't Know]

1a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Month; 2nd Month; 3rd Month; 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

1b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Micronutrients, including folic acid and iron.

Validity: Face + Criterion

Rationale:

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for multivitamins was 0.81 (95% CI: 0.75, 0.86) and the weighted kappa when the answers were recoded into quartiles was 0.78 (95% CI: 0.69, 0.87).

Folate - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for folate intake was 0.76 (95% CI: 0.69, 0.82), adjusted for age, sex, race, and current smoking.

Folate – (Vioque et al., 2013)

A study examining reproducibility and validity of a food frequency questionnaire (FFQ) among pregnant women in the Mediterranean area found 55% agreement between mean nutrient plasma concentrations and daily folate supplement plus food intake by the FFQ at week 12. The correlation, after adjusting for total energy intake and plasma carotenoids was statistically significant ($r=0.53$) only when diet and supplements were combined.

Description of Supporting Papers:

Self-report & Folate - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Folate – (Vioque et al., 2013)

A Mediterranean area study examined reproducibility and validity of a food frequency questionnaire (FFQ) among 740 pregnant women from a population-based birth cohort. The study compared energy-adjusted intake of several carotenoids, folate, vitamin B12, vitamin C and α -tocopherol of the FFQ in the first trimester with their concentration in blood specimens. Diet alone or in combination with supplements were examined.

Other surveys which use the question or a version of it:

N/A

Journal References:

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

Vioque J, Navarrete-Muñoz E-M, Gimenez-Monzó D, et al. Reproducibility and validity of a food frequency questionnaire among pregnant women in a Mediterranean area. *Nutr J.* 2013; 12: 26.

S2 - Prenatal Vitamins

Module: S

Question Number: 2, 2a, 2b, 2c

Tier: 1

Question:

2 – Did you take any of the following supplements in the 3 months before pregnancy, during your pregnancy, during the first 6 months of breastfeeding or while feeding your child breast milk?

Prenatal vitamins? (i.e. multivitamins that are specifically designed for pregnancy, usually containing extra folic acid)

[Responses: Yes; No; Declined; Don't Know]

2a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Month; 2nd Month; 3rd Month; 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

2b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

2c – Did the prenatal vitamin you took contain iron? [most gummy variants do not contain iron]

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Micronutrients, including folic acid and iron.

Validity: Face + Criterion

Rationale:

No studies examining the validity of self-report of prenatal vitamins have been found, however, there are studies examining the validity of self-report of multivitamins.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for multivitamins was 0.81 (95% CI: 0.75, 0.86) and the weighted kappa when the answers were recoded into quartiles was 0.78 (95% CI: 0.69, 0.87).

Description of Supporting Papers:*Self-report - (Satia-Abouta et al., 2003)*

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-1/2/3/4

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

S3 - Other Multivitamins

Module: S

Question Number: 3, 3a, 3b, 3c

Tier: 1

Question:

3 – Did you take any of the following supplements in the 3 months before pregnancy, during your pregnancy, during the first 6 months of breastfeeding or while feeding your child breast milk?

Other multivitamins?

[Responses: Yes; No; Declined; Don't Know]

3a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Month; 2nd Month; 3rd Month; 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

3b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

3c – Did the multivitamin you took contain iron? [most gummy variants do not contain iron]

[Responses: Yes; No; Declined; Don't Know]

Potential Exposures:

Micronutrients – different amounts

Validity: Face + Criterion

Rationale:

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for multivitamins was 0.81 (95% CI: 0.75, 0.86) and the weighted kappa when the answers were recoded into quartiles was 0.78 (95% CI: 0.69, 0.87).

Description of Supporting Papers:

Self-report - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

NCI Five-Factor Screener (2005): Question: NAC.180

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-5/6/7/8

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

National Cancer Institute Multifactor Screener: Questionnaire. Available from:

https://epi.grants.cancer.gov/nhis/multifactor/multi_screener.pdf

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord*. 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol*. 2003; 157(10): 944-954.

S4 - Iron

Module: S

Question Number: 4

Tier: 1

Question:

4 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Iron?

[Responses: Yes; No; Declined; Don't Know]

3a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

3b – How often? (Mark how often, **on average**)

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Iron

Validity: Face + Criterion

Rationale:

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for iron was 0.74 (95% CI: 0.66, 0.80) and the weighted kappa when the answers were recoded into quartiles was 0.66 (95% CI: 0.55, 0.77).

Iron - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for iron intake was 0.64 (95% CI= 0.54, 0.73), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Iron - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in

King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-45/46/47/48

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord*. 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol*. 2003; 157(10): 944-954.

S5 - Folic Acid

Module: S

Question Number: 5, 5a, 5b

Tier: 2

Question:

5 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Folic Acid?

[Responses: Yes; No; Declined; Don't Know]

5a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

5b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Folic acid

Validity: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for folate was 0.84 (95% CI: 0.78, 0.88) and the weighted kappa when the answers were recoded into quartiles was 0.75 (95% CI: 0.66, 0.84).

Folate - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for folate intake was 0.76 (95% CI: 0.69, 0.82), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Folate - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-25/26/27/28

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy, S. P., Wilkens, L. R., Yonemori, K. M., & Steffen, A. (2009). Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand.

Murphy, S. P., Wilkens, L. R., Yonemori, K. M., & Steffen, A. (2009). Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC.

S6 - B complex

Module: S

Question Number: 6, 6a, 6b

Tier: 1

Question:

6 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

B complexes (Stress Tabs)?

[Responses: Yes; No; Declined; Don't Know]

6a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

6b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

B complex vitamins

Validity: Face

Rationale:

This question is part of an instrument known as Supplement Frequency Questionnaire (SURE-QX). It is a publicly available validated source for the standard instrument found on PhenX.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify

intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM,. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S7 - Vitamin B12

Module: S

Question Number: 7, 7a, 7b

Tier: 1

Question:

7 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Vitamin B12?

[Responses: Yes; No; Declined; Don't Know]

7a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

7b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Vitamin B12

Validity: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for B12 was 0.84 (95% CI: 0.79, 0.88) and the weighted kappa when the answers were recoded into quartiles was 0.73 (95% CI: 0.63, 0.82).

Vitamin B12 - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for vitamin B12 intake was 0.69 (95% CI: 0.60, 0.77), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Vitamin B12 - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-21/22/23/24

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord*. 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol*. 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S8 - Vitamin B6

Module: S

Question Number: 8, 8a, 8b

Tier: 1

Question:

8 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Vitamin B6?

[Responses: Yes; No; Declined; Don't Know]

8a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

8b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Vitamin B6

Validation: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for B6 was 0.80 (95% CI: 0.74, 0.85) and the weighted kappa when the answers were recoded into quartiles was 0.75 (95% CI: 0.65, 0.85).

Vitamin B6 - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for vitamin B6 intake was 0.69 (95% CI: 0.59, 0.76), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Vitamin B6 - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-17/18/19/20

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S9 - Vitamin A/Retinol

Module: S

Question Number: 9, 9a, 9b

Tier: 1

Question:

9 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Vitamin A or Retinol?

[Responses: Yes; No; Declined; Don't Know]

9a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

9b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Vitamin A/Retinol

Validity: Face + Criterion

Rationale:

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for Retinol was 0.78 (95% CI: 0.71, 0.84) and the weighted kappa when the answers were recoded into quartiles was 0.65 (95% CI: 0.55, 0.74).

Retinol - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for retinol intake was 0.72 (95% CI: 0.63, 0.79), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Retinol - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members

of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-9/10/11/12

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

S10 - Beta Carotene

Module: S

Question Number: 10, 10a, 10b

Tier: 1

Question:

10 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Beta Carotene?

[Responses: Yes; No; Declined; Don't Know]

10a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

10b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Beta Carotene

Validity: Face + Criterion

Rationale:

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for beta-carotene was 0.69 (95% CI: 0.60, 0.77) and the weighted kappa when the answers were recoded into quartiles was 0.67 (95% CI: 0.57, 0.77).

Beta Carotene - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for beta-carotene intake was 0.58 (95% CI= 0.46, 0.68), adjusted for age, sex, race, and current smoking. The enhanced Pearson's correlation coefficient, which takes oversampled high users into account, was 0.31 (95% CI= 0.19, 0.43).

Description of Supporting Papers:

Self-report & Beta carotene - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

EARLI: Section 6. Diet. Questions 6-13/14/15/16

Journal References:

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord*. 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol*. 2003; 157(10): 944-954.

S11 - Vitamin C

Module: S

Question Number: 11, 11a, 11b

Tier: 1

Question:

11 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Vitamin C?

[Responses: Yes; No; Declined; Don't Know]

11a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

11b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Vitamin C

Validity: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for Vitamin C was 0.85 (95% CI: 0.79, 0.89) and the weighted kappa when the answers were recoded into quartiles was 0.71 (95% CI: 0.61, 0.80).

Vitamin C - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for Vitamin C intake was 0.77 (95% CI= 0.69, 0.83), adjusted for age, sex, race, and current smoking. An enhanced Pearson's correlation coefficient, which took oversampled high users into account, yielded a value of 0.29 (95% CI = 0.13, 0.44). The enhanced difference in average serum Vitamin C concentration between daily users and non-users was significant, with a p-value of 0.03.

Description of Supporting Papers:

Self-report & Iron - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-29/30/31/32

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<http://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S12 - Vitamin D

Module: S

Question Number: 12, 12a, 12b

Tier: 1

Question:

12 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Vitamin D?

[Responses: Yes; No; Declined; Don't Know]

12a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

12b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Vitamin D

Validity: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for Vitamin D was 0.76 (95% CI: 0.70, 0.83) and the weighted kappa when the answers were recoded into quartiles was 0.62 (95% CI: 0.52, 0.73).

Vitamin D - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for Vitamin D intake was 0.68 (95% CI= 0.58, 0.76), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Vitamin D - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-33/34/35/36

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009.

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S13 - Vitamin E

Module: S

Question Number: 13, 13a, 13b

Tier: 1

Question:

13 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Vitamin E?

[Responses: Yes; No; Declined; Don't Know]

13a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

13b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Vitamin E

Validity: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for Vitamin E was 0.87 (95% CI: 0.82, 0.90) and the weighted kappa when the answers were recoded into quartiles was 0.65 (95% CI: 0.54, 0.76).

Vitamin E - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for Vitamin E/Alpha-tocopherol intake was 0.81 (95% CI= 0.75, 0.86), adjusted for age, sex, race, and current smoking. An enhanced Pearson's correlation coefficient that took oversampled high users into account yielded a value of 0.69 (95% CI = 0.61, 0.76).

Description of Supporting Papers:

Self-report & Vitamin E - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-41/42/43/44

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<http://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S14 - Calcium (including antacid)

Module: S

Question Number: 14, 14a, 14b

Tier: 2

Question:

14 - Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Calcium? (including in an antacid)

[Responses: Yes; No; Declined; Don't Know]

14a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

14b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Calcium

Validity: Face + Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for calcium was 0.77 (95% CI: 0.70, 0.83) and the weighted kappa when the answers were recoded into quartiles was 0.58 (95% CI: 0.47, 0.70).

Calcium - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for Vitamin E/Alpha-tocopherol intake was 0.69 (95% CI= 0.59, 0.76), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Calcium - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-49/50/51/52

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord*. 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol*. 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S15 - Niacin

Module: S

Question Number: 15, 15a, 15b

Tier: 1

Question:

15 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Niacin?

[Responses: Yes; No; Declined; Don't Know]

15a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

15b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Niacin

Validity: Criterion

Rationale:

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for niacin was 0.74 (95% CI: 0.65, 0.80) and the weighted kappa when the answers were recoded into quartiles was 0.72 (95% CI: 0.63, 0.82).

Niacin - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for niacin intake was 0.76 (95% CI= 0.68, 0.82), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Niacin - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members

of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

N/A

Journal References:

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

S16 - Selenium

Module: S

Question Number: 16, 16a, 16b

Tier: 1

Question:

16 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Selenium?

[Responses: Yes; No; Declined; Don't Know]

16a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

16b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Selenium

Validity: Criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for selenium was 0.80 (95% CI: 0.73, 0.85) and the weighted kappa when the answers were recoded into quartiles was 0.70 (95% CI: 0.61, 0.80).

Selenium - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for selenium intake was 0.77 (95% CI= 0.69, 0.83), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Selenium - (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

N/A

Journal References:

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S17 - Zinc

Module: S

Question Number: 17, 17a, 17b

Tier: 2

Question:

17 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Zinc?

[Responses: Yes; No; Declined; Don't Know]

17a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

17b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Zinc

Validity: Face + criterion

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Self-report - (Satia-Abouta et al., 2003)

A study examining test-retest reliability between self-administered questionnaires completed at baseline and 3 months later for supplemental nutrient intakes (from multivitamins plus single supplements and mixtures) over the previous 10 years found the intraclass correlations for niacin was 0.79 (95% CI: 0.71, 0.84) and the weighted kappa when the answers were recoded into quartiles was 0.71 (95% CI: 0.61, 0.80).

Zinc - (Satia-Abouta et al., 2003)

Validation of self-reported supplement use between the self-administered questionnaire and interview/label transcription yielded high validity. The Pearson's correlation coefficient for selenium intake was 0.74 (95% CI= 0.66, 0.81), adjusted for age, sex, race, and current smoking.

Description of Supporting Papers:

Self-report & Zinc- (Satia-Abouta et al., 2003)

A 2003 report sought to describe the validity of mailed self-administered questionnaires (SAQ) on vitamin and supplement use. The study population consisted of 220 members of the VITAL (Vitamins and Lifestyle) study cohort, aged 50-75 years and residing in King County of Washington State. The gender distribution of the population was 112 males, while 108 were female. The distribution between general and oversampled high users was uneven, with 149 randomly selected from the VITAL study respondents and 71 randomly oversampled high users of either/or Vitamin C, E, and calcium supplements. The VITAL SAQ inquired into frequency/duration of use and usual dose of vitamins and supplements. Supplement use was assessed via three methods: the aforementioned SAQ, in-person interview with transcription of supplement labels, and biologic markers (i.e. serum, plasma and urine sample collection).

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-57/58/59/60

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol.* 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S18 - Fish Oil

Module: S

Question Number: 18, 18a, 18b

Tier: 2

Question:

18 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Fish Oil or Omega 3 Fatty Acids?

[Responses: Yes; No; Declined; Don't Know]

18a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

18b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Fish oil, Omega 3 Fatty Acids

Validity: Face

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

EARLI: Section 6. Diet. Questions 6-81/82/83/84

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord*. 2012; 4(1): 7.

Satia-Abouta J, Patterson RE, King IB, et al. Reliability and Validity of Self-Report of Vitamin and Mineral Supplement Use in the Vitamins and Lifestyle Study. *Amer J Epidemiol*. 2003; 157(10): 944-954.

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S19 - Flaxseed

Module: S

Question Number: 19, 19b

Tier: 2

Question:

19 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Flaxseed?

[Responses: Yes; No; Declined; Don't Know]

19a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

19b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Flaxseed

Validity: Face

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S20 - Ginkgo biloba

Module: S

Question Number: 20, 20a, 20b

Tier: 2

Question:

20 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Ginkgo Biloba?

[Responses: Yes; No; Declined; Don't Know]

20a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

20b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Ginkgo biloba

Validity: Face

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

S21 - Ginseng

Module: S

Question Number: 21, 21a, 21b

Tier: 2

Question:

21 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Ginseng?

[Responses: Yes; No; Declined; Don't Know]

21a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

21b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Ginseng

Validity: Face

Rationale:

At the time of data collection, there was no validation study found for ginseng intake.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-73/74/75/76

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

S22 - St. John's Wort

Module: S

Question Number: 22, 22a, 22b

Tier: 2

Question:

22 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

St. John's Wort?

[Responses: Yes; No; Declined; Don't Know]

22a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

22b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

St. John's Wort, marker for potential underlying condition (depression)

Validity: Face

Rationale:

At the time of data collection, there was no validation study found for St. John's Wort intake.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-69/70/71/72

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

S23 - Coenzyme Q-10

Module: S

Question Number: 23, 23a, 23b

Tier: 2

Question:

23 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Co-enzyme Q-10?

[Responses: Yes; No; Declined; Don't Know]

23a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

23b – How Often? [mark how often, **on average**, across each time period]
Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Coenzyme Q-10

Validity: Face

Rationale:

This question comes from PhenX, a publicly available validated questionnaire.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

PhenX: Measure #050500 (Dietary Supplements use); Question 1

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

(The journal references below are the supporting papers for PhenX Measure #050501.)

Murphy SP, Wilkens LR, Yonemori KM, et al. Development of a supplement composition database for the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Eighth International Food Data Conference, Bangkok, Thailand. 2009

Murphy SP, Wilkens LR, Yonemori KM. Development of the SURE-QX, a publicly available questionnaire to quantify intakes from commonly consumed dietary supplements. Poster presented at the Seventh International Conference on Diet and Activity Methods, Washington, DC. 2009.

S24 - Probiotics

Module: S

Question Number: 24, 24a, 24b

Tier: 2

Question:

24 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Probiotics?

[Responses: Yes; No; Declined; Don't Know]

24a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

24b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Probiotics

Validity: Face

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

S25 - Turmeric or Curcumin

Module: S

Question Number: 25, 25a, 25b

Tier: 2

Question:

25 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Turmeric or Curcumin?

[Responses: Yes; No; Declined; Don't Know]

25a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

25b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Turmeric, Curcumin

Validity: Face

Rationale:

No studies were found on the validity of the recall or self-report of this question.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

S26 - Other supplements

Module: S

Question Number: 26, 26a, 26b

Tier: 2

Question:

26 – Did you take any of the following single vitamin, mineral, or herbal supplements? (Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Others? Describe: _____

[Responses: Describe: _____; Yes; No; Declined; Don't Know]

26a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

26b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Other supplements

Validity: Face

Rationale:

This is a catchall intended to identify any interesting unknown exposures.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-85/86/87/88

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

S27 - Other supplements

Module: S

Question Number: 27, 27a, 27b

Tier: 2

Question:

27 – Did you take any of the following single vitamin, mineral, or herbal supplements?
(Items 4-24 are asking for additional or separate single vitamins, minerals, or herbs, not in a multivitamin)

Others? Describe: _____

[Responses: Describe: _____; Yes; No; Declined; Don't Know]

27a – If yes, when? [mark **all** time periods that apply]

[Responses: In 3 Months Before Pregnancy; 1st Trimester; 2nd Trimester; 3rd Trimester; During Pregnancy, Unsure When; While Breastfeeding (Mos 1-6); Declined; Don't Know]

27b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: Daily or More; 4-6 Days Per Week; 1-3 Days Per Week; 1-4 Days Per Month; Less Than Once per Month; Declined; Don't Know]

Potential Exposures:

Other supplements

Validity: Face

Rationale:

This is a catchall intended to identify any interesting unknown exposures.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

MARBLES: Part 7B: Maternal Illnesses, Medications, & Procedures; Question 34a/b/c

CHARGE: Part 7: Question 40a/b

EARLI: Section 6. Diet. Questions 6-85/86/87/88

Journal References:

Hertz-Picciotto I, Bennett D, Walker CK, et al. *Markers of Autism Risk in Babies—Learning Early Signs (MARBLES)*. Available from: <http://marbles.ucdavis.edu/>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Newschaffer CJ, Croen LA, Fallin MD, et al. Infant siblings and the investigation of autism risk factors. *J Neurodev Disord.* 2012; 4(1): 7.

L Module (Lifestyle) -

Itemized Rationale Summary of

the Early Life Exposures Assessment Tool for Autism Studies

- [L1 - Activity levels prior to pregnancy](#)
- [L2 - Activity levels during pregnancy](#)
- [L3 - Time spent outside during pregnancy](#)
- [L4 - Sunscreen use during pregnancy](#)
- [L5 - Caffeinated Soda](#)
- [L6 - Caffeinated tea](#)
- [L7 - Caffeinated Coffee](#)
- [L8 - Caffeinated Espresso Drinks](#)
- [L9 - Caffeinated Energy Drinks](#)
- [L10 - Cigarettes smoked during index period](#)
- [L11 - E-Cigarettes/Vape Pens smoked during index period](#)
- [L12 - Other tobacco or nicotine products](#)
- [L13 - Alcohol](#)
- [L14 - Marijuana](#)
- [L15 - Other recreational, illicit or street drugs](#)
- [L16 - Biological father smoking prior to conception](#)
- [L17 - Others smoking cigarettes in household during index period](#)
- [L18 - Other products smoked in household during index period](#)

L1 - Activity levels prior to pregnancy

Module: L

Question Number: 1

Tier: 1

Question:

1 – Which of the above statements best describes the way you spent your time during most of the year prior to your pregnancy?

[Responses: a) Most of my time was spent without very much physical activity. I mostly did things like sitting in front of a computer, watching television, reading or playing cards. If I did anything else, it was likely to be light chores around the house, yard, or garden, or some easy-going game like bowling or catch. Only occasionally, no more than once or twice a month, did I do anything more vigorous, like jogging, playing tennis or active gardening; b) Weekdays, I did few active things. But most weekends I was able to get outdoors for some light exercise- going for walks, playing a round of golf (without motorized carts), or doing some active chores around the house; c) Three times per week, on the average, I engaged in some moderate activity- such as brisk walking or slow jogging, swimming or riding a bike for 15-20 minutes or more. Or I spent 45 minutes to an hour or more doing moderately difficult chores- such as raking or washing windows, mowing the lawn or vacuuming, or playing games such as doubles tennis, basketball, or cricket; d) I engaged in a regular program of physical fitness involving some kind of heavy physical activity at least three times per week. Examples of heavy physical activity are: jogging, running or riding fast on a bicycle for 30 minutes or more; heavy gardening or other chores for an hour or more; active games or sports such as tennis or handball or soccer for an hour or more; or a regular program involving calisthenics and jogging or the equivalent for 30 minutes or more; e) I engaged in a regular program of physical fitness along the lines described in the last paragraph (d), but I did it almost daily- five or more times per week.

Potential Exposures:

Physical activity level

Validity: Criterion

Rationale:

Self-report – (Ainsworth et al, 1999)

A study validating the Kaiser Physical Activity Survey (KPAS) found age-adjusted correlations between the KPAS and a daily physical activity record of 0.22 for ‘Active Living Habits’, 0.35 for ‘Occupation’, 0.56 for ‘Caregiving’, 0.64 for ‘Housework’, and 0.73 for ‘Sports/Exercise’. When the KPAS was compared to accelerometer records were much lower: 0.34 for ‘Active Living Habits’, 0.16 for ‘Occupation’, 0.17 for ‘Caregiving’, -0.03 for ‘Housework’, and 0.57 for ‘Sports/Exercise’.

Description of Supporting Papers:

Self-report – (Ainsworth et al, 1999)

A study validating the Kaiser Physical Activity Survey (KPAS) enrolled 50 women aged 18-60 years. On the first day of participation, the participants completed the KPAS questionnaire and performed a maximal treadmill graded exercise test to determine their cardiorespiratory fitness. Over the next 7 days, each participant kept detailed records of all physical activities in a book developed for this study and simultaneously wore a Caltrac accelerometer to obtain direct measure of their daily physical activity. One month after the first day of the study, the participants completed the KPAS questionnaire for a second time and were instructed once again to record their physical activity in a record book and wear a Caltrac accelerometer during the following week. The survey has seven sections: housework/caregiving, occupation, active living habits, sports/exercise activities, personal feelings about exercise, contemplation about exercise, and personal characteristics. The first four sections are used to classify physical activity status.

Other surveys which use the question or a version of it:

PhenX: Measure #150900 (Total Physical Activity - Screener)

Journal References:

Ainsworth BE, Sternfeld B, Richardson MT, et al. Evaluation of the Kaiser Physical Activity Survey in women. *Med Sci Sports Exerc.* 2000; 32(7): 1327-38.

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

L2 - Activity levels during pregnancy

Module: L

Question Number: 2

Tier: 2

Question:

2 – Which of the above statements best describes the way you spent your time during most of your pregnancy?

[Responses: a) Most of my time was spent without very much physical activity. I mostly did things like sitting in front of a computer, watching television, reading or playing cards. If I did anything else, it was likely to be light chores around the house, yard, or garden, or some easy-going game like bowling or catch. Only occasionally, no more than once or twice a month, did I do anything more vigorous, like jogging, playing tennis or active gardening; b) Weekdays, I did few active things. But most weekends I was able to get outdoors for some light exercise- going for walks, playing a round of golf (without motorized carts), or doing some active chores around the house; c) Three times per week, on the average, I engaged in some moderate activity- such as brisk walking or slow jogging, swimming or riding a bike for 15-20 minutes or more. Or I spent 45 minutes to an hour or more doing moderately difficult chores- such as raking or washing windows, mowing the lawn or vacuuming, or playing games such as doubles tennis, basketball, or cricket; d) I engaged in a regular program of physical fitness involving some kind of heavy physical activity at least three times per week. Examples of heavy physical activity are: jogging, running or riding fast on a bicycle for 30 minutes or more; heavy gardening or other chores for an hour or more; active games or sports such as tennis or handball or soccer for an hour or more; or a regular program involving calisthenics and jogging or the equivalent for 30 minutes or more; e) I engaged in a regular program of physical fitness along the lines described in the last paragraph (d), but I did it almost daily- five or more times per week.

Potential Exposures:

Physical activity level

Validity: Criterion

Rationale:

Self-report - (Schmidt et al., 2006)

A study validating the Kaiser Physical Activity Survey (KPAS) in pregnant women found that spearman correlations between the KPAS were $r = 0.59$ for weighted total activity, $r = 0.23$ for household/caregiving, $r = 0.25$ for occupational activity, $r = 0.32$ for active living, and $r = 0.40$ for sports/exercise.

Description of Supporting Papers:

Self-report - (Schmidt et al., 2006)

A study validating the Kaiser Physical Activity Survey (KPAS) in pregnant women recruited 63 women from Western Massachusetts. Women at any stage of pregnancy were eligible. The Kaiser Physical Activity Survey (KPAS) was administered by an

interviewer and included a visual handout of the categorical responses. All questions were assigned the time frame of the current trimester of pregnancy. Activities were divided into four subgroups: household/caregiving, occupational activity, active living habits, and sports/exercise. The Actigraph accelerometer was used as an objective measure of current trimester physical activity.

Other surveys which use the question or a version of it:

PhenX: Measure #150900 (Total Physical Activity - Screener)

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Schmidt MD, Freedson PS, Pekow P, et al. Validation of the Kaiser Physical Activity Survey in pregnant women. *Med Sci Sports Exerc.* 2006; 38(1): 42-50.

L3 - Time spent outside during pregnancy

Module: L

Question Number: 3, 3a

Tier: 2

Question:

3 – During pregnancy, about how many hours per week did you spend outside, on average?

[Responses: _____ hours per week]

3a – How many of those hours were during mid-day sun? (mid-day = typically from 10a-4pm)

[Responses: _____ hours per week]

Potential Exposures:

Ultraviolet (UV) radiation, air pollution, other outdoor exposures.

Validity:

Criterion validity for UV light. Face validity for air pollution and other outdoor exposures

Rationale:

Though there were other questions available from the NCI that obtained more detail on UV exposure, we decided to combine outdoor exposure for outdoor air pollutants with our question on UV for less burden.

Recall - (Chodick et al., 2007)

A study evaluating the agreement between contemporaneously recorded and subsequently recalled time spent outdoors found that after 6 months, the agreement between reported outdoor time during weekdays ($\kappa_w = 0.49$; 95% confidence interval [CI], 0.39–0.59) was significantly higher than for weekends ($\kappa_w = 0.23$; 95% CI, 0.12–0.34) ($p < 0.05$).

UV - (Chodick et al., 2008)

A study examining the agreement between diary records of time spent outdoors and personal ultraviolet radiation (UVR) dose measurements found a significant correlation between the two. The Pearson correlation coefficient was higher in northern regions (0.69, $p < 0.001$) compared with southern regions (0.57, $P < 0.001$).

Description of Supporting Papers:

Recall - (Chodick et al., 2007)

A study evaluating the agreement between contemporaneously recorded and subsequently recalled time spent outdoors during 1 week among 125 radiologic technologists participating in the US Radiologic Technologists cohort study. The participants recorded time spent outdoors for 7 consecutive days in a daily diary. Six

months later, study participants completed a mailed self-administered questionnaire of the number of outdoor hours during the same 7-day period.

UV - (Chodick et al., 2008)

A study examining the agreement between diary records of time spent outdoors and personal ultraviolet radiation (UVR) dose measurements recruited 124 radiologic technologists participating in the US Radiologic Technologists cohort study. All study participants were asked to contemporaneously record their activities, and whether they were in the shade or not, in a diary every 30 min between 9:00 A.M. and 5:00 P.M. for seven consecutive days between September 1 and October 5, 2004. The personal solar UVR exposure was measured using PS film dosimeters, which relate the change of optical absorbance at 330 nm in J/m². The PS badges were worn by each participant on their left shoulder, attached to the outside of their clothing, between 9:00 A.M. and 5:00 P.M. Eastern Daylight Time. Each participant placed a new PS dosimeter on their left shoulder each day during the 7 day period, allowing for the daily exposure to be measured.

Other surveys which use the question or a version of it:

PhenX: Measure #061300 (Ultraviolet Light Exposure) Questions: 6a/b/c/d and 7a/b/c/d

Journal References:

Chodick G, Freedman MD, Kwok RK, et al. Agreement between contemporaneously recorded and subsequently recalled time spent outdoors: implications for environmental exposure studies. *Ann Epidemiol.* 2007; 17(2): 106-11.

Chodick G, Kleinerman RA, Linet MS, et al. Agreement between diary records of time spent outdoors and personal ultraviolet radiation dose measurements. *Photochem Photobiol.* 2008; 84(3): 713–718.

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

L4 - Sunscreen use during pregnancy

Module: L

Question Number: 4

Tier: 2

Question:

4 – During pregnancy, how often did you apply sunscreen (15+ SPF) to your skin on sunny days that you were outdoors? [*including that used just on your face*]
[Responses: *almost or almost always; Most of the time; About half of the time; Sometimes; Rarely; Never; Declined; Don't Know*]

Potential Exposures:

UV light, chemical preservatives, mercury, benzophenone-3 (oxybenzone)

Validity: Criterion validity for UV light. Face validity for chemical preservatives, mercury, and benzophenone-3 (oxybenzone).

Rationale:

Sunscreen partially protects from UV exposure, but presents its own exposures, such as chemical preservatives, mercury and benzophenone-3.

Self-report - (O'Riordan et al., 2006)

A study examining the validity of beachgoers' self-reported sun protection and UV exposure found moderate to substantial agreement between reported use of sunscreen and a swabbing procedure ($\kappa=0.42-0.57$).

UV light - (Sayre et al., 2008)

An article highlighting the erythema protection of sunscreens reported that an SPF of 15 filters 94% of UV-B and an SPF of 30 filters 97% of UV-B, and both filter a large portion of erythema UVA.

Description of Supporting Papers:

Self-report - (O'Riordan et al., 2006)

A study examining the validity of beachgoers' self-reported sun protection and UV exposure enrolled 88 participants while they were waiting for admittance into the beach over 3 days during February/March 2004. Upon enrollment, participants completed the Sun Habits Survey, which took approximately 5 minutes, their skin was swabbed in four anatomical sites for the presence of sunscreen, and a team member made note of their clothing. Once these procedures were completed, participants went about their usual beach activities. Periodically, a researcher would conduct a mid-study observation (unknown to the participant) to observe the sun habits of participants while on the beach. On leaving the beach, participants completed an exit survey of their sun protection practices and participated in a follow-up sunscreen swab.

UV light - (Sayre et al., 2008)

A comment article in response to the FDA's proposed amendment of the Final Monograph for Over-the-counter Sunscreen Products. In this article, the author breaks down the mathematics of Sun Protection Factor (SPF) in terms of UVB and UVA blockage.

Other surveys which use the question or a version of it:

N/A

Journal References:

O'Riordan DL, Nehl E, Gies P, et al. Validity of beachgoers' self-report of their sun habits. *Arch Dermatol*. 2006; 142(10): 1304-11.

L5 - Caffeinated Soda

Module: L

Question Number: 5, 5a, 5b

Tier: 2

Question:

5 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Caffeinated soda?

[Responses: Yes; No; Declined; Don't Know]

5a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

5b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Caffeine

Validity: Criterion.

Rationale:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events found that the accuracy of recall of caffeinated soda consumption during pregnancy 69% comparing reported intake during the 8th week of pregnancy and reported intake 28-34 years later.

Self-report - (Schliep et al., 2013)

A Pearson's product-moment correlation coefficient on log-transformed values was used to illustrate the relationship between FFQs and the 24HDRs. Caffeine correlation coefficient was 0.68, coffee (cups/day) was 0.91, coffee drinks/cocoa (cups/day) was 0.39, tea (cups/day) was 0.57, soda (cups/day) was 0.68.

Caffeine - (James et al., 1988)

Correlation between plasma caffeine and self-reported caffeine use in 14 heavy users of tea and/or coffee (11 women and 3 men) was 0.97 ($p < 0.001$).

Description of Supporting Papers:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events followed up with 173 participants of The North Carolina Early Pregnancy Study. At the end of their 8th week of pregnancy, these subjects had completed a questionnaire that collected behavioral characteristics during early pregnancy, including their intake of alcoholic and caffeinated beverages, and their use of antibiotics and vitamins over the first 8 weeks of gestation. These baseline questionnaires were completed between 1982 and 1986. The participants were recontacted in 2010–2011 and provided previously collected information about their baseline study pregnancy. For recalled early pregnancy behaviors, participants were asked to indicate how sure they were of their responses using a 4-level scale (1-quite unsure, 2-unsure, 3-sure, and 4-quite sure).

Self-report - (Schliep et al., 2013)

A recent study of 259 women aged 18-44 years from western New York over the course of 1-2 menstrual cycles sought to validate food-frequency questionnaires (FFQ) for caffeine intake. The BioCycle allowed the authors to compare the validity of FFQs and 24-hour dietary recalls (24HDR)

Caffeine - (James et al., 1988)

The goal of this study was to see how useful certain bioanalytic procedures were for assessing the reliability of self-reported caffeine intake and how well the reporting individual complies with a caffeine reduction regimen. Individuals who reported daily consumption of 8 or more cups of tea or coffee and indicated interest in reducing intake were selected. Fourteen individuals (11 women and 3 men) met the criteria and entered the study, which consisted of self-monitoring behaviors, blood sampling, third party independent assessment of caffeine intake, and examination by a medical practitioner. Self-reporting was fairly accurate, the authors believing that it was due to the presence of independent assessment by a friend or family member to report discrepancies.

Other surveys which use the question or a version of it:

PhenX: Measure #050301 (Caffeine Intake), Question #: 1

CHARGE: Mother's Diet Survey, Part 1, Question 8a

National Birth Defects Prevention Study CATI Maternal Questionnaire (Caffeine) D45 – 50

Fred Hutchinson Cancer Research Center, Caffeine Questionnaire, 2004.

Journal References:

Chin HB, Baird DD, McConnaughey DR, et al. Long-term Recall of Pregnancy-related Events. *Epidemiology*. 2017; 28(4): 575-579

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

James JE, Paull I, Cameron-Traub E, et al. Biochemical validation of self-reported caffeine consumption during caffeine fading. *J Behav Med*. 1988; 11(1): 15-30.

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:
<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

Schliep KC, Schisterman EF, Mumford SL, et al. Validation of different instruments for caffeine measurement among premenopausal women in the BioCycle study. *Am J Epidemiol*. 2013; 177(7): 690–699.

Uthamanthil RK, et al. *Fred Hutch Shared Resources*. Available from:
<https://sharedresources.fredhutch.org/sites/default/files/SuppBeverageQSample.pdf>

L6 - Caffeinated tea

Module: L

Question Number: 6, 6a, 6b

Tier: 2

Question:

6 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Caffeinated tea? (Include black, ear grey & chai teas. Do not include green, white, or herbal teas that contain little or no caffeine)

[Responses: Yes; No; Declined; Don't Know]

6a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

6b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Caffeine

Validity: Criterion.

Rationale:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events found that the accuracy of recall of caffeinated tea consumption during pregnancy 80% comparing reported intake during the 8th week of pregnancy and reported intake 28-34 years later.

Self-report - (Schliep et al., 2013)

A Pearson's product-moment correlation coefficient on log-transformed values was used to illustrate the relationship between FFQs and the 24HDRs. Caffeine correlation coefficient was 0.68, coffee (cups/day) was 0.91, coffee drinks/cocoa (cups/day) was 0.39, tea (cups/day) was 0.57, soda (cups/day) was 0.68.

Correlation between plasma caffeine and self-reported caffeine use in 14 heavy users of tea and/or coffee (11 women and 3 men) was 0.97 ($p < 0.001$).

Description of Supporting Papers:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events followed up with 173 participants of The North Carolina Early Pregnancy Study. At the end of their 8th week of pregnancy, these subjects had completed a questionnaire that collected behavioral characteristics during early pregnancy, including their intake of alcoholic and caffeinated beverages, and their use of antibiotics and vitamins over the first 8 weeks of gestation. These baseline questionnaires were completed between 1982 and 1986. The participants were recontacted in 2010–2011 and provided previously collected information about their baseline study pregnancy. For recalled early pregnancy behaviors, participants were asked to indicate how sure they were of their responses using a 4-level scale (1-quite unsure, 2-unsure, 3-sure, and 4-quite sure).

Self-report - (Schliep et al., 2013)

A recent study of 259 women aged 18-44 years from western New York over the course of 1-2 menstrual cycles sought to validate food-frequency questionnaires (FFQ) for caffeine intake. The BioCycle allowed the authors to compare the validity of FFQs and 24-hour dietary recalls (24HDR)

Caffeine - (James et al., 1988)

The goal of this study was to see how useful certain bioanalytic procedures were for assessing the reliability of self-reported caffeine intake and how well the reporting individual complies with a caffeine reduction regimen. Individuals who reported daily consumption of 8 or more cups of tea or coffee and indicated interest in reducing intake were selected. Fourteen individuals (11 women and 3 men) met the criteria and entered the study, which consisted of self-monitoring behaviors, blood sampling, third party independent assessment of caffeine intake, and examination by a medical practitioner. Self-reporting was fairly accurate, the authors believing that it was due to the presence of independent assessment by a friend or family member to report discrepancies.

Other surveys which use the question or a version of it:

PhenX: Measure #050301 (Caffeine Intake), Question #: 1

CHARGE: Mother's Diet Survey, Part 1, Question 8c

National Birth Defects Prevention Study CATI Maternal Questionnaire (Caffeine) D43 – 44

Fred Hutchinson Cancer Research Center, Caffeine Questionnaire, 2004.

Journal References:

Chin HB, Baird DD, McConnaughey DR, et al. Long-term Recall of Pregnancy-related Events. *Epidemiology*. 2017; 28(4): 575-579

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

James JE, Paull I, Cameron-Traub E, et al. Biochemical validation of self-reported caffeine consumption during caffeine fading. *J Behav Med*. 1988; 11(1): 15-30.

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:
<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

Schliep KC, Schisterman EF, Mumford SL, et al. Validation of different instruments for caffeine measurement among premenopausal women in the BioCycle study. *Am J Epidemiol*. 2013; 177(7): 690–699.

Uthamanthil RK, et al. *Fred Hutch Shared Resources*. Available from:
<https://sharedresources.fredhutch.org/sites/default/files/SuppBeverageQSample.pdf>

L7 - Caffeinated Coffee

Module: L

Question Number: 7, 7a, 7b

Tier: 2

Question:

7 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months of breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Caffeinated coffee? (brewed, drip)

[Responses: Yes; No; Declined; Don't Know]

7a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

7b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Caffeine

Validity: Criterion.

Rationale:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events found that the accuracy of recall of caffeinated coffee consumption during pregnancy 70% comparing reported intake during the 8th week of pregnancy and reported intake 28-34 years later.

Self-report - (Schliep et al., 2013)

A Pearson's product-moment correlation coefficient on log-transformed values was used to illustrate the relationship between FFQs and the 24HDRs. Caffeine correlation coefficient was 0.68, coffee (cups/day) was 0.91, coffee drinks/cocoa (cups/day) was 0.39, tea (cups/day) was 0.57, soda (cups/day) was 0.68.

Caffeine - (James et al., 1988)

Correlation between plasma caffeine and self-reported caffeine use in 14 heavy users of tea and/or coffee (11 women and 3 men) was 0.97 ($p < 0.001$).

Description of Supporting Papers:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events followed up with 173 participants of The North Carolina Early Pregnancy Study. At the end of their 8th week of pregnancy, these subjects had completed a questionnaire that collected behavioral characteristics during early pregnancy, including their intake of alcoholic and caffeinated beverages, and their use of antibiotics and vitamins over the first 8 weeks of gestation. These baseline questionnaires were completed between 1982 and 1986. The participants were recontacted in 2010–2011 and provided previously collected information about their baseline study pregnancy. For recalled early pregnancy behaviors, participants were asked to indicate how sure they were of their responses using a 4-level scale (1-quite unsure, 2-unsure, 3-sure, and 4-quite sure).

Self-report - (Schliep et al., 2013)

A recent study of 259 women aged 18-44 years from western New York over the course of 1-2 menstrual cycles sought to validate food-frequency questionnaires (FFQ) for caffeine intake. The BioCycle allowed the authors to compare the validity of FFQs and 24-hour dietary recalls (24HDR)

Caffeine - (James et al., 1988)

The goal of this study was to see how useful certain bioanalytic procedures were for assessing the reliability of self-reported caffeine intake and how well the reporting individual complies with a caffeine reduction regimen. Individuals who reported daily consumption of 8 or more cups of tea or coffee and indicated interest in reducing intake were selected. Fourteen individuals (11 women and 3 men) met the criteria and entered the study, which consisted of self-monitoring behaviors, blood sampling, third party independent assessment of caffeine intake, and examination by a medical practitioner. Self-reporting was fairly accurate, the authors believing that it was due to the presence of independent assessment by a friend or family member to report discrepancies.

Other surveys which use the question or a version of it:

PhenX: Measure #050301 (Caffeine Intake); Question #: 1

CHARGE: Mother's Diet Survey, Part 1, Question 8b

National Birth Defects Prevention Study CATI Maternal Questionnaire (Caffeine) D40 – 42

Fred Hutchinson Cancer Research Center, Caffeine Questionnaire, 2004.

Journal References:

Chin HB, Baird DD, McConnaughey DR, et al. Long-term Recall of Pregnancy-related Events. *Epidemiology*. 2017; 28(4): 575-579

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

James JE, Paull I, Cameron-Traub E, et al. Biochemical validation of self-reported caffeine consumption during caffeine fading. *J Behav Med*. 1988; 11(1): 15-30.

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:
<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

Schliep KC, Schisterman EF, Mumford SL, et al. Validation of different instruments for caffeine measurement among premenopausal women in the BioCycle study. *Am J Epidemiol*. 2013; 177(7): 690–699.

Uthamanthil RK, et al. *Fred Hutch Shared Resources*. Available from:
<https://sharedresources.fredhutch.org/sites/default/files/SuppBeverageQSample.pdf>

L8 - Caffeinated Espresso Drinks

Module: L

Question Number: 8, 8a, 8b

Tier: 2

Question:

8 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Caffeinated espresso drinks? (Include lattes, mochas, cappuccinos)

[Responses: Yes; No; Declined; Don't Know]

8a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

8b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Caffeine

Validity: Criterion.

Rationale:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events found that the accuracy of recall of caffeinated coffee consumption during pregnancy 70% comparing reported intake during the 8th week of pregnancy and reported intake 28-34 years later.

Self-report - (Schliep et al., 2013)

A Pearson's product-moment correlation coefficient on log-transformed values was used to illustrate the relationship between FFQs and the 24HDRs. Caffeine correlation coefficient was 0.68, coffee (cups/day) was 0.91, coffee drinks/cocoa (cups/day) was 0.39, tea (cups/day) was 0.57, soda (cups/day) was 0.68.

Caffeine - (James et al., 1988)

Correlation between plasma caffeine and self-reported caffeine use in 14 heavy users of tea and/or coffee (11 women and 3 men) was 0.97 ($p < 0.001$).

Description of Supporting Papers:

Recall - (Chin et al., 2017)

A study examining the long-term recall of pregnancy-related events followed up with 173 participants of The North Carolina Early Pregnancy Study. At the end of their 8th week of pregnancy, these subjects had completed a questionnaire that collected behavioral characteristics during early pregnancy, including their intake of alcoholic and caffeinated beverages, and their use of antibiotics and vitamins over the first 8 weeks of gestation. These baseline questionnaires were completed between 1982 and 1986. The participants were recontacted in 2010–2011 and provided previously collected information about their baseline study pregnancy. For recalled early pregnancy behaviors, participants were asked to indicate how sure they were of their responses using a 4-level scale (1-quite unsure, 2-unsure, 3-sure, and 4-quite sure).

Self-report - (Schliep et al., 2013)

A recent study of 259 women aged 18-44 years from western New York over the course of 1-2 menstrual cycles sought to validate food-frequency questionnaires (FFQ) for caffeine intake. The BioCycle allowed the authors to compare the validity of FFQs and 24-hour dietary recalls (24HDR)

Caffeine - (James et al., 1988)

The goal of this study was to see how useful certain bioanalytic procedures were for assessing the reliability of self-reported caffeine intake and how well the reporting individual complies with a caffeine reduction regimen. Individuals who reported daily consumption of 8 or more cups of tea or coffee and indicated interest in reducing intake were selected. Fourteen individuals (11 women and 3 men) met the criteria and entered the study, which consisted of self-monitoring behaviors, blood sampling, third party independent assessment of caffeine intake, and examination by a medical practitioner. Self-reporting was fairly accurate, the authors believing that it was due to the presence of independent assessment by a friend or family member to report discrepancies.

Other surveys which use the question or a version of it:

PhenX: Measure #050301 (Caffeine Intake); Question #: 1

Fred Hutchinson Cancer Research Center, Caffeine Questionnaire, 2004.

Journal References:

Chin HB, Baird DD, McConaughy DR, et al. Long-term Recall of Pregnancy-related Events. *Epidemiology*. 2017; 28(4): 575-579

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

James JE, Paull I, Cameron-Traub E, et al. Biochemical validation of self-reported caffeine consumption during caffeine fading. *J Behav Med*. 1988; 11(1): 15-30.

Schliep KC, Schisterman EF, Mumford SL, et al. Validation of different instruments for caffeine measurement among premenopausal women in the BioCycle study. *Am J Epidemiol*. 2013; 177(7): 690–699.

Uthamanthil RK, et al. *Fred Hutch Shared Resources*. Available from:
<https://sharedresources.fredhutch.org/sites/default/files/SuppBeverageQSample.pdf>

L9 - Caffeinated Energy Drinks

Module: L

Question Number: 9, 9a, 9b

Tier: 2

Question:

9 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Caffeinated energy drinks? (e.g., Red Bull)

[Responses: Yes; No; Declined; Don't Know]

9a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

9b – How Often? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Caffeine

Validity: Criterion.

Rationale:

No studies were found examining the validity of the self-report of caffeinated energy drinks, however, several studies examine caffeinated drinks in general and those are listed below.

Self-report - (Schliep et al., 2013)

A Pearson's product-moment correlation coefficient on log-transformed values was used to illustrate the relationship between FFQs and the 24HDRs. Caffeine correlation coefficient was 0.68, coffee (cups/day) was 0.91, coffee drinks/cocoa (cups/day) was 0.39, tea (cups/day) was 0.57, soda (cups/day) was 0.68.

Caffeine - (James et al., 1988)

Correlation between plasma caffeine and self-reported caffeine use in 14 heavy users of tea and/or coffee (11 women and 3 men) was 0.97 ($p < 0.001$).

Description of Supporting Papers:

Self-report - (Schliep et al., 2013)

A recent study of 259 women aged 18-44 years from western New York over the course of 1-2 menstrual cycles sought to validate food-frequency questionnaires (FFQ) for caffeine intake. The BioCycle allowed the authors to compare the validity of FFQs and 24-hour dietary recalls (24HDR)

Caffeine - (James et al., 1988)

The goal of this study was to see how useful certain bioanalytic procedures were for assessing the reliability of self-reported caffeine intake and how well the reporting individual complies with a caffeine reduction regimen. Individuals who reported daily consumption of 8 or more cups of tea or coffee and indicated interest in reducing intake were selected. Fourteen individuals (11 women and 3 men) met the criteria and entered the study, which consisted of self-monitoring behaviors, blood sampling, third party independent assessment of caffeine intake, and examination by a medical practitioner. Self-reporting was fairly accurate, the authors believing that it was due to the presence of independent assessment by a friend or family member to report discrepancies.

Other surveys which use the question or a version of it:

PhenX: Measure #050301 (Caffeine Intake), Question #: 1

Fred Hutchinson Cancer Research Center, Caffeine Questionnaire, 2004.

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

James JE, Paull I, Cameron-Traub E, et al. Biochemical validation of self-reported caffeine consumption during caffeine fading. *J Behav Med*. 1988; 11(1): 15-30.

Schliep KC, Schisterman EF, Mumford SL, et al. Validation of different instruments for caffeine measurement among premenopausal women in the BioCycle study. *Am J Epidemiol.* 2013; 177(7): 690–699.

Uthamanthil RK, et al. *Fred Hutch Shared Resources*. Available from:

<https://sharedresources.fredhutch.org/sites/default/files/SuppBeverageQSample.pdf>

L10 - Cigarettes smoked during index period

Module: L

Question Number: 10, 10a, 10b

Tier: 2

Question:

10 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Cigarettes?

[Responses: Yes; No; Declined; Don't Know]

10a – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

10b – How much did you smoke (on average)? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Nicotine, Cigarette smoke and smoke contaminants

Validity: Criterion

Rationale:

Given that substance use or other illicit behaviors may be embarrassing and could have perceived consequences, self-administered questionnaires are more likely to generate the most reliable response, as opposed in-person interviews or medical record data.

Recall – (Lindqvist et al., 2002)

A study validating self-reported smoking habits in smoking pregnant women found that of 407 women, reporting to be non-smokers, 6% were most likely smokers, and 3% had cotinine levels suggesting exposure to substantial passive smoking. Of 60 women, reporting smoking 1–10 cigarettes per day, 32% were likely to smoke more. It is likely that disagreement could be due to passive smoke.

Recall - (Gollenberg et al., 2010)

There was moderate agreement between the prospective and retrospective reports for cigarette use, with a kappa value of 0.43 (95%CI 0.22-0.65).

Self-report - (Rice et al., 2007)

Agreement between maternal report and antenatal records for binary variables and birth weight split by child behavioral problems different for smoking and alcohol consumption. Smoking prior to pregnancy has good strength of agreement, with a kappa value of 0.627 ($p=0.007$). Smoking during pregnancy had a kappa value of 0.771 ($p=0.001$).

Description of Supporting Papers:

Recall – (Lindqvist et al., 2002)

A study validating self-reported smoking habits in smoking pregnant women. During the period 1994–96, 496 women were enrolled into the study at an antenatal clinic. At gestational weeks 9–11, a blood sample was taken for routine medical analyzes and data were recorded concerning year of birth, profession, number of people in the household, number of spontaneous abortions and smoking habits. The following levels for smoking were used: non-smoker, 1–10 cigarettes smoked per day (light smoker), more than 10 cigarettes smoked per day (heavy smoker). Smoking habits at gestational week 32 were also recorded, but passive smoking was not routinely recorded. The serum samples were analyzed for cotinine by the bioanalytical laboratory of Pharmacia Consumer Healthcare in Helsingborg, using a validated and specific analytical method.

Recall - (Gollenberg et al., 2010)

A prospective pregnancy cohort study sought to validate self-reporting of consumption of cigarettes, alcohol, vitamins, caffeine and sport fish while attempting pregnancy. Self-report daily diaries were compared with a retrospective self-administered questionnaire applied a decade later. Validity was found to be low, although slightly low for alcohol and cigarette intake.

Self-report - (Rice et al., 2007)

A survey of women who had school aged children born following in-vitro fertilization was conducted. A self-administered questionnaire was given to the mothers, and included the Lewis & Murray scale (to inquire Aboutantenatal/obstetric complications) and the

Strengths & Difficulties Questionnaire (assessment of child behavior problems). Fully completed questionnaires were collected from 126 women.

Other surveys which use the question or a version of it:

PhenX: Measure #030802 (Tobacco - 30-Day Quantity and Frequency [Adult Protocol])

CHARGE: Mother's Lifestyle Questionnaire, Questions 4 – 6

National Birth Defects Prevention Study CATI Maternal Questionnaire (Tobacco - Mother) F2 – F4

National Cancer Institute and Centers for Disease Control and Prevention Co-sponsored Tobacco Use Supplement to the Current Population Survey (2006-2007): Questions B1, C1, C1a, H2, H4

Journal References:

Gollenberg AL, Mumford SL, Cooney MA, et al. Validity of retrospectively reported behaviors during the periconception window. *J Reprod Med*. 2011; 56(3-4), 130-7.

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Lindqvist R, Lendahls L, Tollbom O, et al. Smoking during pregnancy: comparison of self-reports and cotinine levels in 496 women. *Acta Obstet Gynecol Scand*. 2002; 81: 240–244.

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:
<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

Rice F, Lewis A, Harold G, et al. Agreement between maternal report and antenatal records for a range of pre and perinatal factors: the influence of maternal and child characteristics. *Early Hum Dev*. 2007; 83(8): 497-504.

U.S. Department of Commerce, Census Bureau. (2008). National Cancer Institute and Centers for Disease Control and Prevention Co-sponsored Tobacco Use Supplement to the Current Population Survey (2006-2007) Technical documentation. Available from:
https://cancercontrol.cancer.gov/brp/tcrb/tus-cps/archive/tuscps_english_2006.pdf

L11 - E-Cigarettes/Vape Pens smoked during index period

Module: L

Question Number: 11, 11a, 11b, 11c, 11d

Tier: 3

Question:

11 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

E-cigarettes/e-cigs, Vape Pens or Mods, Electronic Nicotine Delivery Devices, or other vaping products?

[Responses: Yes; No; Declined; Don't Know]

11a – Did you usually load the e-cigs with cartridges or liquid?

[Responses: Cartridge; Liquid; Declined; Don't Know]

11b – When? [mark **all** time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

11c – How many puffs did you take (on average)? [mark how often, **on average**, across each time period]

Before Pregnancy?

[Responses: ___ puffs per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ puffs per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ puffs per Day/Week/Month; Less than once per Month; Declined; Don't Know]

11d – What level of nicotine did you usually use? [mark all that apply]

Before Pregnancy?

[Responses: Zero (0 mg); Low (<8mg); Medium (8-16mg); High (>16mg); Declined; Don't Know]

During pregnancy?

[Responses: Zero (0 mg); Low (<8mg); Medium (8-16mg); High (>16mg); Declined; Don't Know]

While Breastfeeding?

[Responses: Zero (0 mg); Low (<8mg); Medium (8-16mg); High (>16mg); Declined; Don't Know]

Potential Exposures:

Nicotine, chemicals in vapor

Validity: Face

Rationale:

Given that substance use or other illicit behaviors may be embarrassing and could have perceived consequences, self-administered questionnaires are more likely to generate the most reliable response, as opposed in-person interviews or medical record data.

Question 11 is not validated to a satisfactory degree, given e-cigarettes are a fairly new product and there are a limited number of studies evaluating their use. However, perception of e-cigarettes among users is that they are generally safer than tobacco cigarettes, and therefore, use of e-cigarettes among pregnant women has been shown to be slightly higher than use of tobacco products. The studies listed here demonstrate this.

Perception - (McCubbin et al., 2017)

A systematic review summarizing the perceptions and beliefs about electronic cigarette (e-cigarette) use during pregnancy identified two common perceptions of e-cig use in pregnancy: (i) e-cigs are a safer and potentially healthier alternative (for mother and baby) compared to traditional cigarettes and (ii) e-cigs may be used as a tool for smoking cessation.

Prevalence - (Wagner et al., 2017)

A study assessing the prevalence of e-cigarette use during pregnancy, using a national sample of pregnant women found that 5.62% (n = 25) of women solely used tobacco cigarettes, 6.52% (n = 29) solely used e-cigarettes, 8.54% (n = 38) used both tobacco cigarettes and e-cigarettes, and 79.33% (n = 353) used neither tobacco cigarettes nor e-cigarettes during their current pregnancy. Of the e-cigarette users, 74.6% (n=50) reported switching to e-cigarettes when they learned they were pregnant.

Description of Supporting Papers:

Perception - (McCubbin et al., 2017)

A systematic review summarizing published findings from the past 10 years, specific to e-cig perceptions and use in pregnancy.

Prevalence - (Wagner et al., 2017)

A study assessing the prevalence of e-cigarette use during pregnancy, using a national sample of 445 pregnant women recruited online. An online survey was used to assess the prevalence and perceptions of e-cigarette use among pregnant women, including perceptions of e-cigarette safety.

Other surveys which use the question or a version of it:

CHARGE: Mother's Lifestyle Questionnaire, Questions 11 – 16

Journal References:

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

McCubbin A, Fallin-Bennett A, Barnett J, et al. Perceptions and use of electronic cigarettes in pregnancy. *Health Educ Res.* 2017; 32(1): 22-32.

Wagner NJ, Camerota M, Propper C. Prevalence and Perceptions of Electronic Cigarette Use during Pregnancy. *Matern Child Health J.* 2017; 21(8): 1655-1661.

L12 - Other tobacco or nicotine products

Module: L

Question Number: 12, 12a, 12b, 12c, 12d, 12e, 12f, 12g

Tier: 2

Question:

12 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Other tobacco or nicotine products? (Such as those listed in 12.a. below)

[Responses: Yes; No; Declined; Don't Know]

12a – Which type(s)? (Mark all that apply)

[Responses: Chewing Tobacco/Snuff; Nicotine Patch; Nicotine Gum/Lozenges; Cigar; Pipe; Hookah (Waterpipe); Bidi (Beedi); Other (Specify:); Declined; Don't Know]

12b – If you marked more than one in 12.a., which type did you use most often? (Mark only one)

[Responses: Chewing Tobacco/Snuff; Nicotine Patch; Nicotine Gum/Lozenges; Cigar; Pipe; Hookah (Waterpipe); Bidi (Beedi); Other (Specify:); Declined; Don't Know]

12c – For the tobacco/nicotine product you used most, **when** did you use it? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

12d – For the tobacco/nicotine product you used most, **how often** did you use it? [mark how often, on average, for each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

12e – If you marked two or more in 12.a., which type did you use second most often?
(Mark only one)

[Responses: Chewing Tobacco/Snuff; Nicotine Patch; Nicotine Gum/Lozenges; Cigar; Pipe; Hookah (Waterpipe); Bidi (Beedi); Other (Specify:); Declined; Don't Know]

12f – For the tobacco/nicotine product you used second most, **when** did you use it? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

12g – For the tobacco/nicotine product you used second most, **how often** did you use it?
[mark how often, on average, for each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Nicotine, chemicals/contaminants in product/smoke

Validity: Criterion for smokeless tobacco, nicotine

Rationale:

Given that substance use or other illicit behaviors may be embarrassing and could have perceived consequences, self-administered questionnaires are more likely to generate the most reliable response, as opposed in-person interviews or medical record data.

While no studies have been found validating the self-report of smokeless tobacco, a few studies have found that smokeless tobacco exposure was common enough among women

to justify inclusion in the ELEAT. The study listed below demonstrates the prevalence in several countries.

Prevalence - (Agaku et al., 2014)

Prevalence of current smokeless tobacco use among women was less than 1% in most countries examined, however prevalence was higher in Thailand (6.3%), India (18.4%), Bangladesh (27.9%), Indonesia (2.0%), Germany (3.4%), Italy (1.5%), Sweden (7.9%), Estonia (1.9%), Malta (1.5%), Philippines (1.2%), and Vietnam (2.3%). Prevalence in the United Kingdom was 0.5% (95% CI: 0.0 – 1.1). Use of cigars/Cigarillos among women in the countries examined was much lower, with the highest prevalence at 1.6% (Germany), and the next highest at 1.1% (Estonia), and most every other country below 0.5%. Similar results were found for pipe tobacco. Conversely, hookah use was much higher with prevalence rates among women in most countries in the European region above 1% and many above 3%. The prevalence rates for hookah use were less than 0.5% for most every country in the other regions. It should be noted that the United States was not examined in this study.

Description of Supporting Papers:

(Agaku et al., 2014)(L9h)

This study examined regional and socio-demographic variation in tobacco use. There was higher use of e-cigarettes and snus in higher income countries. Poly-tobacco use is also thought to contribute to the increased difficulty of anti-smoking campaigns.

Other surveys which use the question or a version of it:

CHARGE: Mother's Lifestyle Questionnaire, Questions 17 – 26

Journal References:

Agaku IT, Filippidis FT, Vardavas CI, et al. Poly-tobacco use among adults in 44 countries during 2008–2012: evidence for an integrative and comprehensive approach in tobacco control. *Drug Alcohol Depend.* 2014; 139: 60-70.

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

L13 - Alcohol

Module: L

Question Number: 13, 13a, 13b, 13c, 13d, 13e, 13f, 13g, 13h, 13i, 13j, 13k

Tier: 2

Question:

13 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Alcohol (any type)? (Such as those listed in 13.a. below)

[Responses: Yes; No; Declined; Don't Know]

13a – Which type(s) of alcohol did you drink? (Mark all that apply)

[Responses: Beer; Wine; Mixed Drink; Shot (liquor); Other (Specify:) _____; Declined; Don't Know]

13b – If you marked more than one in 13.a., which type of alcohol did you drink most often? (Mark only one)

[Responses: Beer; Wine; Mixed Drink; Shot (liquor); Other (Specify:) _____; Declined; Don't Know]

13c – For the type of alcohol you drank most often, **when** did you drink it? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

13d – For the type of alcohol you drank most often, **how often** did you drink it? [mark how often, on average, for each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

13e – For the type of alcohol you drank most often, on average, **how many drinks** did you consume on each occasion? (One drink = 1 12oz beer, 1 glass 4oz wine, or 1oz or 1 shot liquor (alone or in a mixed drink)

Before Pregnancy?

[Responses: __ drinks per occasion; Declined; Don't Know]

During pregnancy?

[Responses: __ drinks per occasion; Declined; Don't Know]

While Breastfeeding?

[Responses: __ drinks per occasion; Declined; Don't Know]

13f – If you marked two or more in 13.a., which type of alcohol did you drink second most often? (Mark only one)

[Responses: Beer; Wine; Mixed Drink; Shot (liquor); Other (Specify:); ____; Declined; Don't Know]

13g – For the type of alcohol you drank second most often, **when** did you drink it? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

13h – For the type of alcohol you drank second most often, **how often** did you drink it? [mark how often, on average, for each time period]

Before Pregnancy?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

13i – For the type of alcohol you drank second most often, on average, **how many drinks** did you consume on each occasion? (One drink = 1 12oz beer, 1 glass 4oz wine, or 1oz or 1 shot liquor (alone or in a mixed drink)

Before Pregnancy?

[Responses: ___ drinks per occasion; Declined; Don't Know]

During pregnancy?

[Responses: ___ drinks per occasion; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ drinks per occasion; Declined; Don't Know]

13j – Was there a day when you drank 4 or more drinks?

[Responses: Yes; No; Declined; Don't Know]

13k – When? (Mark all time periods that apply)

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

Potential Exposures:

Alcohol

Validity: Criterion

Rationale:

Given that substance use or other illicit behaviors may be embarrassing and could have perceived consequences, self-administered questionnaires are more likely to generate the most reliable response, as opposed in-person interviews or medical record data.

Recall - (Hannigan et al., 2010)

Correlation of antenatal and retrospective reports with the Michigan Alcoholism Screening Test scores (MAST) were calculated. MAST scores of antenatal average across-pregnancy absolute ounces of alcohol drank (AAD), when asked in the antenatal period and 14 years later were 0.55 and 0.35 respectively ($p < 0.001$). MAST scores of antenatal average across-pregnancy absolute ounces of alcohol drank per drinking day (AADD) when asked in the antenatal period and 14 years later were 0.40 and 0.37 respectively ($p < 0.001$). Retrospective AAD when asked in the antenatal period and 14 years later were 0.29 and 0.35 ($p < 0.001$). Retrospective AADD when asked in the antenatal period and 14 years later were 0.40 and 0.44 ($p < 0.001$).

Description of Supporting Papers:

Recall - (Hannigan et al., 2010)

In this study, drinking was assessed during pregnancy, and retrospectively about the same pregnancy, at a 14-year follow-up in 288 African American women using well-validated semi-structured interviews. Mothers were screened extensively at each prenatal visit for use of tobacco, alcohol, and illicit drugs using a structured interview. At each visit to the prenatal clinic, a previous 2- week recall by beverage type was obtained; questions linked to specific drinking habits, alcohol use, defined as the number of standard drinks, at particular times of the day and days of week, and binge drinking. At the 14-year follow-up visit, following their report of current alcohol use, mothers were asked if they drank alcohol during pregnancy. If a mother reported prenatal alcohol use she was asked to think back to a typical week during pregnancy and describe what she drank at each day during the week. Mothers were also asked if there were periods of time they drank more or less.

Other surveys which use the question or a version of it:

PhenX: Measure #030300 (Alcohol - 30-Day Quantity and Frequency)

CHARGE: Mother's Lifestyle Questionnaire, Questions 33 – 36

National Birth Defects Prevention Study CATI Maternal Questionnaire (Tobacco - Mother) F9 – F14

National Institute on Alcohol Abuse and Alcoholism (NIAAA) National Epidemiologic Survey on Alcohol and Related Conditions. Wave 1 (NESARC - WAVE 1). Alcohol Use Disorder and Associated Disabilities Interview Schedule - Diagnostic and Statistical Manual of Mental Disorders. Fourth Edition Version (AUDADIS-IV). Flashcard Booklet, Flashcards 13A-C, 16A-C, and 17A-C.

Journal References:

Grant BF, Dawson DA, Stinson FS, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): Reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. *Drug Alcohol Depend.* 2003; 71(1): 7-16.

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hannigan JH, Chiodo LM, Sokol RJ, et al. A 14-year retrospective maternal report of alcohol consumption in pregnancy predicts pregnancy and teen outcomes. *Alcohol.* 2010; 44(7-8): 583–594.

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:
<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

L14 - Marijuana

Module: L

Question Number: 14, 14a, 14b

Tier: 2

Question:

14 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Marijuana / Hashish?

[Responses: Yes; No; Declined; Don't Know]

14a – When? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

14b – How Often? [mark how often, on average, across each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Marijuana

Validity: Face

Rationale:

Given that substance use or other illicit behaviors may be embarrassing and could have perceived consequences, self-administered questionnaires are more likely to generate the most reliable response, as opposed in-person interviews or medical record data.

Recall - (Jacobson et al., 2002)

A study comparing the validity of antenatal and retrospective reports of pregnancy drinking, drug use, and smoking found that while antenatal and retrospective reports of prenatal marijuana smoking were statistically significantly different ($p < 0.001$), the correlation between the two (in days/week of use) was fairly high at $r = 0.49$.

Self-report - (Jacobson et al., 2002)

A study comparing the validity of antenatal and retrospective reports of pregnancy drinking, drug use, and smoking found that 9.6% of those women that denied using marijuana during pregnancy tested positive in urinalysis.

Description of Supporting Papers:

Recall & Self-report - (Jacobson et al., 2002)

A study comparing the validity of antenatal and retrospective reports of pregnancy drinking, drug use, and smoking interviewed 354 inner-city mothers regarding their alcohol, drug use, and smoking during pregnancy at each prenatal visit except the first, and retrospectively at 13 months postpartum. In addition, urine samples obtained from the mothers at the first prenatal visit were screened by enzyme-mediated immunoassay technique for benzoylecgonine, the primary metabolite of cocaine, cannabinoid metabolites, morphine, and methadone. Any sample that tested positive was retested before being designated positive in the medical record.

Other surveys which use the question or a version of it:

PhenX: Measure #031301 (Substances - 30-Day Quantity and Frequency)

CHARGE: Mother's Lifestyle Questionnaire, Questions 37 – 39

2008 National Survey on Drug Use and Health. CAI Specifications for Programming, English Version; November 2007, Question MJ06.

National Birth Defects Prevention Study CATI Maternal Questionnaire (Substance Abuse - Mother) F19

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

Jacobson SW, Chiodo LM, Sokol RJ, et al. Validity of maternal report of prenatal alcohol, cocaine, and smoking in relation to neurobehavioral outcome. *Pediatrics*. 2002; 109(5): 815-25.

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:
<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

U.S. Department of Health and Human Services. *2008 National Survey on Drug Use and Health*. Available from:
<https://www.samhsa.gov/data/sites/default/files/NSDUH2015MRB/NSDUHmrbCAIquex2015.pdf>

L15 - Other recreational, illicit or street drugs

Module: L

Question Number: 15, 15a, 15b, 15c, 15d, 15e, 15f, 15g

Tier: 2

Question:

15 – Did you ever consume/use any of the following substances in the 3 months before pregnancy, during your pregnancy, or during the first 6 months or breastfeeding (or while feeding your child breast milk)? Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Other recreational, illicit or street drugs? (Such as those listed in 15.a. below)

[Responses: Yes; No; Declined; Don't Know]

15a – If yes, which did you use? (Mark all that apply)

[Responses: Cocaine; Heroin; Methamphetamine (Meth); MDMA (ecstasy); Speed (amphetamine sulfate); Acid/LSD; Special K (ketamine); Other (Specify:) _____; Declined; Don't Know]

15b – If you marked more than one in 15.a., which street drug did you use most often? (Mark only one)

[Responses: Cocaine; Heroin; Methamphetamine (Meth); MDMA (ecstasy); Speed (amphetamine sulfate); Acid/LSD; Special K (ketamine); Other (Specify:) _____; Declined; Don't Know]

15c – For the street drug you used most, **when** did you use it? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

15d – For the street drug you used most, **how often** did you use it? [mark how often, on average, you used the recreational drug for each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

15e – If you marked two or more in 15.a., which street drug did you use second most often? (Mark only one)

[Responses: Cocaine; Heroin; Methamphetamine (Meth); MDMA (ecstasy); Speed (amphetamine sulfate); Acid/LSD; Special K (ketamine); Other (Specify:); Declined; Don't Know]

15f – For the street drug you used second most, **when** did you use it? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

While Breastfeeding?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

15g – For the street drug you used second most, **how often** did you use it? [mark how often, on average, you used the recreational drug for each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

While Breastfeeding?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Drugs

Validity: Face

Rationale:

Given that substance use or other illicit behaviors may be embarrassing and could have perceived consequences, self-administered questionnaires are more likely to generate the most reliable response, as opposed in-person interviews or medical record data.

Self-report - (Lester et al, 2001)

A study assessing drug use by pregnant women participating in the 4-site Maternal Lifestyle Study found 66% agreement between maternal self-report of cocaine and analysis of meconium samples of newborn babies.

Description of Supporting Papers:

Self-report - (Lester et al, 2001)

A study assessing drug use by pregnant women participating in the 4-site Maternal Lifestyle Study. Meconium specimens of 8527 newborns were analyzed by immunoassay with GC/MS confirmation for metabolites of cocaine, opiates, cannabinoids, amphetamines, and phencyclidine. Maternal self-report of drug use was determined by hospital interview.

Other surveys which use the question or a version of it:

PhenX: Measure #031301 (Substances - 30-Day Quantity and Frequency)

CHARGE: Mother's Lifestyle Questionnaire, Questions 37 – 39

2008 National Survey on Drug Use and Health. CAI Specifications for Programming, English Version; November 2007, Question CC06, CK06, HE06, LS04, and IN06

National Birth Defects Prevention Study CATI Maternal Questionnaire (Substance Abuse - Mother) F21 – F22

Journal References:

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:

<https://www.phenxtoolkit.org/index.php>

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect.* 2006; 114(7): 1119-1125.

Lester BM, ElSohly M, Wright LL, et al. The Maternal Lifestyle Study: Drug Use by Meconium Toxicology and Maternal Self-Report

Reefhuis J, Gilboa SM, Anderka M, et al. *National Birth Defects Prevention Study CATI Maternal Questionnaire*. Available from:

<https://www.cdc.gov/ncbddd/birthdefects/documents/nbdps-cati.pdf>

U.S. Department of Health and Human Services. *2008 National Survey on Drug Use and Health*. Available from:

<https://www.samhsa.gov/data/sites/default/files/NSDUH2015MRB/NSDUHmrbCAIquex2015.pdf>

L16 - Biological father smoking prior to conception

Module: L

Question Number: 16, 16a

Tier: 16: 1

16a: 2

Question:

16 – Questions about others who may have smoked cigarettes or other products. Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Did the biological father smoke cigarettes during the three months before conception?
[Responses: Yes; No; Declined; Don't Know]

16a - If yes, about how often did the biological father smoke cigarettes, on average? [1 pack = 20 cigarettes]
[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Sperm quality/DNA damage; Secondhand smoke (SHS) and nicotine

Validity: Criterion

Rationale:

Self-report - (Passaro et al., 1997)

A study examining agreement between self and proxy reports of paternal drinking and smoking behavior found that men's and women's reports of paternal smoking status were in nearly complete agreement (95%). For analyses of smoking amounts, agreement within one category remained high (90%), but perfect agreement on amount was somewhat lower (81%). Percent perfect agreement on smoking amount was especially low (50%) when non-smokers were excluded. When couples' reports were not in perfect agreement, women tended to report lower amounts of smoking and drinking for their partners compared to the men's self reports.

Sperm Quality - (Potts et al., 1999)

A study investigating the effects of male smoking on the DNA of human sperm found that sperm from subjects who smoked were significantly more sensitive to acid induced denaturation than non-smokers ($P < 0.02$) and possessed higher levels of DNA strand breaks ($P < 0.05$).

Nicotine - (Eisner et al., 2001)

The Spearman rank correlation coefficient between self-reported ETS exposure duration and directly measured personal nicotine concentration using passive badge monitors during the same 7-day period was 0.47, indicating moderate agreement ($p = 0.0006$). The exposure scores adjusting for exposure intensity and exposure intensity plus sensory

irritation and respiratory symptoms did not improve the correlation (Table 5). Excluding subjects with no measurable nicotine concentration did not affect these results appreciably. To examine the stability of recent ETS exposure over time, we compared the self-reported total hours of ETS exposure ascertained during the validation interview with the initial interview. The intraclass correlation was 0.72, indicating moderate to high stability over time. Measured nicotine concentrations were highest among persons who reported home exposure (median 0.61 µg/m³), followed by work exposure (0.03 µg/m³), other (outdoor) exposure (0.025 µg/m³), and no exposure (0 µg/m³; p = 0.03).

Description of Supporting Papers:

Self-report - (Passaro et al., 1997)

A study examining agreement between self and proxy reports of paternal drinking and smoking behavior using data on 8414 respondent pairs collected as part of the prospective, population-based Avon (England) Longitudinal Study of Pregnancy and Childhood. Information on the smoking and drinking habits of pregnant women's male partners was obtained through self-administered questionnaires completed by pregnant participants and by their partners.

Sperm Quality - (Potts et al., 1999)

A study investigating the effects of male smoking on the DNA of human sperm used the sperm chromatin structure assay (SCSA), which measures the sensitivity of sperm DNA to acid induced denaturation, and the terminal deoxynucleotidyl transferase assay TdTA), which measures DNA strand breaks by addition of the biotinylated nucleotide dUTP to 3'-OH ends of DNA, sites of DNA breakage, using the enzyme terminal deoxynucleotidyl transferase.

Nicotine - (Eisner et al., 2001)

In this validation study, 50 subjects were recruited from an ongoing longitudinal asthma cohort study in Northern California who had a positive screening question for ETS exposure or potential exposure. Each subject wore a passive nicotine badge monitor for 7 days. After the personal monitoring period, the ETS exposure survey instrument was readministered.

Other surveys which use the question or a version of it:

PhenX: Measure #060701 (Current Environmental Tobacco Smoke Exposure),
Questions: 1,2,3

National Birth Defects Prevention Study CATI Maternal Questionnaire (Tobacco - Mother) F15 – F16

Journal References:

Eisner MD, Katz PP, Yelin EH, et al. Measurement of Environmental Tobacco Smoke Exposure among Adults with Asthma. *Environ Health Perspect.* 2001; 109: 809–814.

Hamilton CM, Hendershot TP *PhenX Toolkit*. Available from:
<https://www.phenxtoolkit.org/index.php>

Passaro KT, Noss J, Savitz DA, et al. Agreement between self and partner reports of paternal drinking and smoking. The ALSPAC Study Team. Avon Longitudinal Study of Pregnancy and Childhood. *Int J Epidemiol.* 1997; 26(2): 315-320

Potts RJ, Newbury CJ, Smith G, et al. Sperm chromatin damage associated with male smoking. *Mutat Res.* 1999; 423(1-2): 103-11.

L17 - Others smoking cigarettes in household during index period

Module: L

Question Number: 17, 17a, 17b, 17c

Tier:

Question:

17 – Questions about others who may have smoked cigarettes or other products. Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Did you live with anyone before, during or after your pregnancy who smoked cigarettes?

[Responses: Yes; No; Declined; Don't Know]

17a – If yes, when did you live with the person who smoked cigarettes? (Mark all time periods that apply)

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

First Year of Life?

[Responses: Yes; No; Declined; Don't Know]

17b – Were cigarettes smoked inside your home?

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

First Year of Life?

[Responses: Yes; No; Declined; Don't Know]

17c – How often were cigarettes smoked inside your home?

Before Pregnancy?

[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

First Year of Life?

[Responses: ___ cigarettes per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Secondhand smoke (SHS) and nicotine

Validity: Criterion

Rationale:

Self-report - (George et al., 2006)

A study examining the accuracy of maternal self-reported smoking information found that among women that reported not smoking during pregnancy 22% were exposed to environmental tobacco smoke in early pregnancy, and 8% were exposed in late pregnancy.

Description of Supporting Papers:

Self-report - (George et al., 2006)

A study aimed to validate self-reported smoking, smoking cessation, and environmental tobacco smoke exposure in early and late pregnancy, using the biomarker cotinine as the gold standard. Prospective cohort study of 953 pregnant Swedish women between 1996 and 1998. In-person interviews and cotinine measurements were performed at 6 – 12 and 31 – 34 completed weeks of gestation. All women were asked about nicotine exposures throughout pregnancy, including cigarette smoking, oral snuff, nicotine replacement therapy, and environmental tobacco smoke exposure.

Other surveys which use the question or a version of it:

CHARGE: Mother's Lifestyle Questionnaire, Questions 27 – 30

Journal References:

George L, Granath F, Johansson ALV, et al. Self-reported nicotine exposure and plasma levels of cotinine in early and late pregnancy. *Acta Obstetrica et Gynecologica*. 2006; 85: 1331-1337.

Hertz-Picciotto I, Croen LA, Hansen R, et al. The CHARGE study: an epidemiologic investigation of genetic and environmental factors contributing to autism. *Environ Health Perspect*. 2006; 114(7): 1119-1125.

L18 - Other products smoked in household during index period

Module: L

Question Number: 18, 18a, 18b, 18c, 18d, 18e, 18f, 18g

Tier:

Question:

18 – Questions about others who may have smoked cigarettes or other products. Please answer as honestly as possible, keeping in mind that your answers will remain confidential and will be used for research purposes only.

Did anyone who lived in your home smoke any other products anywhere inside your home? (such as those listed in 18.a. below)

[Responses: Yes; No; Declined; Don't Know]

18a – If yes, what products? (Mark all that apply)

[Responses: E-cigarettes or Electronic Nicotine Delivery Device (ENDD); Cigars; Pipes; Marijuana/Hashish; Other (Specify:); Declined; Don't Know]

18b – If you marked more than one in 18.a., which of these products was smoked inside your home most often? (Mark only one)

[Responses: E-cigarettes or Electronic Nicotine Delivery Device (ENDD); Cigars; Pipes; Marijuana/Hashish; Other (Specify:); Declined; Don't Know]

18c – For the product smoked inside your home most, **when** was it smoked in your home? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

First Year of Life?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

18d – For the product smoked inside your home most, **how often** did they smoke it inside your home? [mark how often, on average, for each time period]

Before Pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: ___ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

First Year of Life?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

18e – If you marked two or more in 18.a., which of these was smoked inside your home second most often? (Mark only one)

[Responses: E-cigarettes or Electronic Nicotine Delivery Device (ENDD); Cigars; Pipes; Marijuana/Hashish; Other (Specify:); Declined; Don't Know]

18f – For the product smoked inside your home second most, **when** was it smoked in your home? [mark all time periods that apply]

Before Pregnancy?

[Responses: Yes; No; Declined; Don't Know]

During pregnancy?

[Responses: Yes (mark when); 1st Trimester; 2nd Trimester; 3rd Trimester; Unsure When; No; Declined; Don't Know]

First Year of Life?

[Responses: Did Not Breastfeed; Yes; No; Declined; Don't Know]

18g – For the product smoked inside your home second most, **how often** did they smoke it inside your home? [mark how often, on average, for each time period]

Before Pregnancy?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

During pregnancy?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

First Year of Life?

[Responses: __ times per Day/Week/Month; Less than once per Month; Declined; Don't Know]

Potential Exposures:

Secondhand smoke (SHS) and nicotine

Validity: Criterion

Rationale:

Studies examining the validity of self-report were not found.

Description of Supporting Papers:

N/A

Other surveys which use the question or a version of it:

N/A

Journal References:

N/A

H Module (Home and Environment) -

Itemized Rationale Summary of

the Early Life Exposures Assessment Tool for Autism Studies

[H1/4 - Street Address of Home](#)

[H5 - Type of home](#)

[H6 - Area of the home \(in square feet\)](#)

[H7 - Age of the home](#)

[H8 - Enclosed garage attached to home](#)

[H9 - Vehicles parked in attached garage](#)

[H10 - Gas-powered devices stored in home](#)

[H11 - Source of drinking water to the home](#)

[H12- Tap Water Contamination](#)

[H13 - Primary heating source in the home](#)

[H14 - Air conditioning in home](#)

[H15 - Peeling paint in home](#)

[H16 - Linoleum or vinyl flooring in the home](#)

[H17 - Type of stove in the home](#)

[H18 - Presence of fume hood in the residence](#)

[H19/20 - Mold or mildew in the home](#)

[H21 - Home's proximity to agricultural fields/golf course](#)

H1-4 - Street Address of Home

Module: H

Question Number: 1-4

Tier: 1

Question:

How many homes did you live in from the time of conception to the first birthday of this child?

[Responses: 1, 2, 3, 4, 5 or more [How many?], Refused, DK]

These answers relate to:

[Responses: The home I lived in during all of pregnancy and my child's first year of life, The home I lived in for the longest period of time during pregnancy and my child's first year, The home I lived in for the second longest period of time during pregnancy and my child's first year]

Street address of home *[include house/apt. number, street/road name, city, state or territory, zip code and country if not in the USA]*

[Responses: Vary]

When did you live at this address?

[Responses: From: _____, Until: _____, Refused, DK]

Potential Exposures: Address history can be used to establish exposures to:

Agricultural pesticides

Black carbon

Hazardous air pollutants

Air pollution

Environmental mercury releases from industrial facilities and power plants

Validity: Criterion

Rationale:

Agricultural Pesticides: (Roberts et al. 2007)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_address	exposure_agricultural_pesticides	Epidemiological evidence	High
question_address	outcome_autism	Epidemiological evidence	High

The validity of assessing exposure to agricultural pesticides through the use of the participant's address is based on an epidemiology study (Roberts et al. 2007). This is given a high level of validity. The study found an association between modeled levels of agricultural pesticides and Autism Spectrum Disorders. Odds ratios were used to determine the associations. For modeled levels of agricultural pesticides with respect to

address, the fourth nonzero quartile odds ratio for ASD risk was 6.1, with a 95% confidence interval of 2.4-15.3.

Black Carbon: (Franco Suglia et al. 2008)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_address	exposure_black_carbon	Epidemiological evidence	High
question_address	outcome_decreased_K-BIT_composite	Epidemiological evidence	High
question_address	outcome_decreased_K-BIT_nonverbal_matrices	Epidemiological evidence	High
question_address	outcome_decreased_WRAML	Epidemiological evidence	High

The validity of assessing exposure to black carbon through the use of the participants address is based on an epidemiology study (Franco Suglia et al. 2008). It is given a high level of validity. The study found an association between modeled levels of black carbon and decreased scores on the Kaufman Brief Intelligence Test (K-BIT) and the Wide Range Assessment of Memory and Learning (WRAML). Multiple linear regression analysis was used to determine the associations. Modeled levels of exposure to black carbon were associated with a 3.4 point decrease on the K-BIT composite intelligence quotient, with a 95% confidence interval of (-6.6)-(-0.3). A 4.2 point decrease with a 95% confidence interval of (-7.7)-(-0.2) was found in the non-verbal matrices K-BIT subtest. A 3.7 point decrease with a 95% confidence interval of (-7.2)-(-0.2) was found in the general WRAML.

Hazardous Air Pollutants (HAP's): (Windham et al. 2006)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_address	exposure_HAPs_heavy_metals	Epidemiological evidence	High
question_address	exposure_HAPs_chlorinated_solvents	Epidemiological evidence	High
question_address	outcome_autism	Epidemiological evidence	High

The validity of assessing exposure to hazardous air pollutants (HAPs) through the use of the participants address is based on an epidemiology study (Windham et al. 2006). This is given a high level of validity. The study found an association between modeled levels of chlorinated solvents and heavy metals (which are both HAP's), and Autism Spectrum

Disorders. Adjusted odds ratios were used to determine the associations. For modeled levels of heavy metals, the adjusted odds ratio for ASD risk by fourth quartile was 1.50, with a 95% confidence interval of 1.05-2.12. For modeled levels of chlorinated solvents, the adjusted odds ratio for ASD risk by fourth quartile was 1.55, with a 95% confidence interval of 1.08-2.23. These odds ratios relate the modeled exposure to the outcome of ASD.

Air Pollution: (Volk et al. 2011)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_address	exposure_air_pollution	Epidemiological evidence	High
question_address	outcome_autism	Epidemiological evidence	High

The validity of examining the association between autism and proximity of homes to major roads and/or freeways during and around the time of pregnancy/delivery as a stand-in for air pollution exposure is based on an epidemiology study (Volk et al. 2011). This is given a high level of validity. Odds ratios were used to determine the associations. Adjusted ratios did not alter the associations. The odds ratio of ASD cases being more likely to live within 309 meters of a freeway at the time of delivery was 1.86, with a 95% confidence interval of 1.04-3.45. The odds ratio for the association between residential proximity to a freeway during the third trimester and autism was found to be 2.22, with a confidence interval of 1.16-4.42.

Environmental Mercury Release from Industrial Facilities/Power Plants: (Palmer et al. 2008)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_address	exposure_mercury	Epidemiological evidence	High
question_address	outcome_autism	Epidemiological evidence	High

The validity of examining the association between amount of environmental mercury release and autism prevalence is based on an epidemiology study (Palmer et al. 2008). This is given a high level of validity. An incident risk ratio was used to find the association. For amount of Hg/1000 lb waste released into the environment, autism rates had an incidence ratio of 1.026, meaning that per 1000 pounds of release, there is a corresponding 2.6% increase in autism prevalence, with a p-value<0.05. When distance was taken into account, it was found that for every interval of 10 miles of distance from the source, the incident risk of autism diminished by 1.4%.

Description of Supporting Papers:

Roberts et al. 2007

An epidemiological study of 465 children with ASD and 6,975 control children who were born between 1996-1998 in California. Proximity to sites of pesticide use was

determined, with the goal of determining if proximity of maternal residence to pesticide-use sites during certain gestational periods was associated with increased risk of ASD in their children. The study found an association between modeled levels of agricultural pesticides and Autism Spectrum Disorders. Odds ratios were used to determine the associations. For modeled levels of agricultural pesticides with respect to address, the fourth nonzero quartile odds ratio for ASD risk was 6.1, with a 95% confidence interval of 2.4-15.3.

Franco Suglia et al. 2008

An epidemiological study of 202 children aged 8-11 years in Boston, Massachusetts. All children were given the Kaufman Brief Intelligence Test (K-BIT) and the Wide Range Assessment of Memory and Learning (WRAML). The K-BIT test correlates well to full-scale IQ scores, and the WRAML is a standard method of evaluating active learning and memorization. Performance on the tests was evaluated to see if there was an association with decreased scores and increased exposure to black carbon, which is a marker of traffic particles and the primary source of ultrafine particle exposure. Multiple linear regression analysis was used to determine the associations. modeled levels of exposure to black carbon were associated with a 3.4 point decrease on the K-BIT composite intelligence quotient, with a 95% confidence interval of (-6.6)-(-0.3). A 4.2 point decrease with a 95% confidence interval of (-7.7)-(-0.2) was found in the non-verbal matrices K-BIT subtest. A 3.7 point decrease with a 95% confidence interval of (-7.2)-(-0.2) was found in the general WRAML.

Windham et al. 2006

An epidemiological study of approximately 80,000 children born in 1994 to mothers who were residing in the San Francisco Bay Area at the time of their delivery. The study found an association between modeled levels of chlorinated solvents and heavy metals (which are both HAP's), and Autism Spectrum Disorders. Adjusted odds ratios were used to determine the associations. For modeled levels of heavy metals, the adjusted odds ratio for ASD risk by fourth quartile was 1.50, with a 95% confidence interval of 1.05-2.12. For modeled levels of chlorinated solvents, the adjusted odds ratio for ASD risk by fourth quartile was 1.55, with a 95% confidence interval of 1.08-2.23. These odds ratios relate the modeled exposure to the outcome of ASD.

Volk et al. 2011

An epidemiological study of 304 autism cases and 259 general population controls aged between 2-5 years at the time of the study and born in California. It sought to find if there was an association between autism and proximity to major roads and freeways at certain critical gestational periods. The proximity to major roads/freeways was used as a stand-in for measures of air pollution. Odds ratios were used to determine the associations. Adjusted ratios did not alter the associations. The odds ratio of ASD cases being more likely to live within 309 meters of a freeway at the time of delivery was 1.86, with a 95% confidence interval of 1.04-3.45. The odds ratio for the association between residential proximity to a freeway during the third trimester and autism was found to be 2.22, with a confidence interval of 1.16-4.42. There was no significant association found for major roadways and autism.

Palmer et al. 2008

An epidemiological study of autistic children in 1040 school districts in Texas in 2002, and an analysis of 1998 release disclosures of industrial facilities and power plants. The study sought to find an association between releases during 1998 and autism prevalence in 2002. The exposure of interest was environmental mercury, as it is known to have neurotoxic effects and previous studies have shown that body burden of mercury is significantly high in autistic populations as compared to the general population. An incident risk ratio was used to find the association. For amount of Hg/1000 lb waste released into the environment, autism rates had an incidence ratio of 1.026, meaning that per 1000 pounds of release, there is a corresponding 2.6% increase in autism prevalence, with a p-value<0.05.

Other Surveys using the question or a version of it:

PhenX Toolkit - Review Measure #010801 (Current Address)

Measure Release Date - February 6, 2009

Definition - Question asking the respondent for his/her current address.

Purpose - Current address is the location of the respondent's primary residence. The proximity of the respondent's residence to environmental sources may or may not influence his or her health (e.g., living within 100 meters of a major urban roadway might influence person's respiratory health). Current address information (street address, city, state, and zip code) can be easily geocoded (geographical latitudes and longitudes), if necessary.

National Health and Nutrition Examination Survey (NHANES). Screener Module 1. 2005-2006. Question number: SCQ.070

Journal References:

Palmer, R.F., Blanchard S., Wood R. Proximity to point sources of environmental mercury release as a predictor of autism prevalence. *Health & Place* 15(1) 2009: 18-24

Roberts, E.M., et al. Maternal residence near agricultural pesticide applications and autism spectrum disorders among children in the California Central Valley. *Environmental Health Perspectives* 115(10) 2007: 1482-1489

Suglia, S.F., et al. Association of black carbon with cognition among children in a prospective birth cohort study. *American Journal of Epidemiology*. 167(3) 2008: 280-286

Volk, H.E., et al. Residential proximity to freeways and autism in the CHARGE study. *Environmental health perspectives* 119(6) 2011: 873

Windham, G.C., et al. Autism spectrum disorders in relation to distribution of hazardous air pollutants in the San Francisco Bay area. *Environmental Health Perspectives* 114(9) 2006: 1438-1444

H5 - Type of home

Module: H

Question Number: 5

Tier: 1

Question:

What was the type of home?

[Responses: Single Family Home, Duplex/Triplex, Row House, Low rise apartment (1-3 floors), High rise apartment (>3 floors), Mobile home/Trailer, Other. Specify: _____, Refused, DK]

Potential Exposures: The question helps to understand air exchange rate, which has a modulating effect on exposure to multiple compounds. Newer homes have lower air exchange rates.

Validity: Face

Rationale: This is a standard question included on questionnaires related to residential history. It was included in this survey to provide consistency with other instruments.

Other Surveys using the question or a version of it:

PhenX - Review Measure #060101 (Characteristics of Current Residence)

Definition: Questions about the characteristics of the current residence.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the residence.
Measure Release Date - October 30, 2009

Inner City Asthma Survey, Home Evaluation-Home Environment Survey Questionnaire, Version 5.0, 1998, Question number: B1. (question 1)

Journal References: N/A

H6 - Area of the home (in square feet)

Module: H

Question Number: 6

Tier: 1

Question:

Approximately how many square feet was the home you lived in?

[Responses: <1000 square feet (sf), 1,000-2,000 sf, 2,000-3,000 sf, <3,000 sf, Refused, Don't Know]

Potential Exposures: The question helps us predict air exchange rate, which is important in determining exposure to many compounds. Larger homes were found to have lower air exchange rates. It has also been found to be related to PBDE serum levels with larger homes having lower concentrations, likely because there are fewer sources per square foot.

Validity: Criterion

Rationale:

Air Exchange Rate: (Chan et al. 2005)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_square_feet	exposure_air_exchange	Criterion	High

The association between square footage of a residence/degree of air infiltration was tested using multivariate regression. The value of the estimate for the coefficient for floor area is -2.9×10^{-3} , with a standard error of 3.2×10^{-5} .

PBDE's: (Rose et al. 2010)

Variable_One_ID	Variable_Two_ID	Validity Type	Validity Strength
question_square_feet	serum_PBDE	Criterion	Medium
exposure_PBDE	serum_PBDE	Face	High

The association between square footage and PBDE congeners levels was tested using regression analysis. Raw regression coefficients between BDE 197-209 and home size was found to be -0.20, with a standard error of 0.11 ($p=0.08$). When adjusted for the child's age, breastfeeding, and maternal education, the regression coefficient was -0.18, with a standard error of 0.05 ($p=0.11$). These results were not statistically significant, but demonstrate an association. The association between exposure_PBDE and serum_PBDE has a high face validity.

Description of Supporting Papers:

Air Exchange - Chan et al. 2005

Following a study of 70,000 residences across the United States (Chan et al., 2005), it was concluded that the year a residence was built and the floor area of a residence are the strongest predictors of the degree of air infiltration. There no potential exposures covered in the paper, rather the square footage and age of residence were tested to see if they were accurate predictors of air exchange rate. Questions H4 and H5 are of relative importance due to the modulating effect that air exchange rate can have on exposure.

PBDEs - Rose et al 2010

Plasma samples of 100 children aged 2-5 born in California were collected and analysed for the presence of eleven different PBDE congeners (BDE-28, 47, 66, 85, 99, 100, 153, 183, 197, 207, 209). Fifty of the children were classified as autistic (AU), twenty-five had developmental delay without autism (DD), and twenty-five were randomly selected from the general population (GP). In addition to serum analysis, parents/guardians were interviewed, to gain information regarding characteristics of the home environment, furniture purchases, socioeconomic factors, education, time spent in vehicles and dietary factors. With respect to home environment and square footage, significantly lower concentrations of BDE-209 was found in children living in larger homes. No association was found between house size and lower brominated congeners. A Spearman's rho-value of 0.53 ($p < .001$) demonstrated a positive correlation between the age of the home and home size.

Other Surveys using the question or a version of it:

N/A

Journal References:

Chan, W.R., Nazaroff, W.W., Price, P.N., Sohn, M.D., Gadgil, A.J.. Analyzing a database of residential air leakage in the United States, *Atmospheric Environment*. 39(19) 2005: 3445-3455. ISSN: 1352-2310, doi: <http://dx.doi.org/10.1016/j.atmosenv.2005.01.062>
Rose, M., Bennett, D. H., Bergman, Å., Fängström, B., Pessah, I. N., & Hertz-Picciotto, I.. PBDEs in 2– 5 year-old children from California and associations with diet and indoor environment. *Environmental Science & Technology*, 44(7) 2010: 2648-2653.

H7 - Age of the home

Module: H

Question Number: 7

Tier: 1

Question:

Can you tell us when the home was built?

[Responses: 2001-present, 1981-2000, 1961-1980, 1941-1960, 1940 or before?, Refused, DK]

Potential Exposures: The question helps to understand air exchange rate, which has a modulating effect on exposure to multiple compounds.

Validity: Criterion

Rationale:

(Chan et al., 2005)

Variable_One_ID	Validity_Two_ID	Validity Type	Validity Strength
question_year_built	exposure_air_exchange	Criterion	High

The association between the year the residence was built and degree of air infiltration was tested using multivariate regression. The value of the estimate for the coefficient for year built is -5.03×10^{-3} , with a standard error of 8.1×10^{-5} . As air exchange rate can be predicted by the year a residence was built, questions H4 and H5 are of relative importance due to the modulating effect that air exchange rate can have on exposure.

Description of Supporting Papers:

Following a study of 70,000 residences across the United States (Chan et al., 2005), it was concluded that the year a residence was built and the floor area of a residence are the strongest predictors of the degree of air infiltration.

Other Surveys using the question or a version of it:

PhenX - Review Measure #060101 (Characteristics of Current Residence)

Definition: Questions about the characteristics of the current residence.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the residence.

Measure Release Date - October 30, 2009

U.S. Environmental Protection Agency. MESA Air Pollution Study, 2006, Baseline Questionnaire, Exam 4, Question number: 3 (question 3)

Journal References:

Chan, W.R., Nazaroff W.W., Price P.N., Sohn, M.D., Gadgil, A.J. Analyzing a database of residential air leakage in the United States, *Atmospheric Environment*. 39(19) 2005 - 3445-3455. ISSN: 1352-2310, DOI: <http://dx.doi.org/10.1016/j.atmosenv.2005.01.062>

H8 - Enclosed garage attached to home

Module: H

Question Number: 8

Tier: 1

Question:

Was there an enclosed garage attached to this home?

[Responses: Yes, No, Refused, DK]

Potential Exposures: VOCs

Validity: Criterion

Rationale:

(Dodson et al. 2008)

Variable 1	Variable 2	Validity Type	Validity Strength
question_attached_garage	indoor_VOC	Criterion	High
exposure_VOC	indoor_VOC	Face	High

The presence of an attached garage has been found to be significantly associated with increased concentrations of several VOC's in the indoor residence (Dodson et al. 2008). It is thought that the presence of gas powered equipment in the garage would increase levels. The strength association between an attached garage and indoor levels of VOC's is high, based off of Criterion Validity. A Wilcoxon Rank Sum Test found a p-value<0.01 for the following chemicals: benzene, toluene, ethylbenzene, *m,p*-xylene, *o*-xylene, methyl *t*-butyl ether.

Description of Supporting Papers:

(Dodson et al. 2008)

A 2008 study quantified the contribution of the attached garage to indoor VOC levels, building on the work of previous studies which have found an association between elevated levels of VOC's in residence with attached garages. Concentration of 17 different VOC's were measured in the garages, basements, and shared hallways of 55 residences in the Boston, Massachusetts area. Eleven of the residences had an attached garages and basement, 24 only had a basement, and 10 were apartment buildings with a common hallway. Ten residences without any of the three features were included as controls. Approximately 40% of the indoor concentrations of BTEX (benzene, toluene, ethylbenzene, xylene) were found to result from the attached garage.

Other Surveys using the question or a version of it:

PhenX - Review Measure #060101 (Characteristics of Current Residence)

Definition: Questions about the characteristics of the current residence.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together

these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the residence.

Measure Release Date - October 30, 2009

U.S. Environmental Protection Agency. National Human Exposure Assessment Survey (NHEXAS), 1995, Question B27a (question 7)

Journal References:

Dodson, R.E., Levy, J.I., Spengler, J.D., Shine, J.P., Bennett, D.H.. Influence of basements, garages, and common hallways on indoor residential volatile organic compound concentrations. *Atmospheric Environment*. 42(7) 2008: 1569-1581

H9 - Vehicles parked in attached garage

Module: H

Question Number: 9

Tier: 2

Question:

Were automobiles, vans, trucks, or other motor vehicles parked in this attached garage?
(include snowmobiles, motorcycles)

[Responses: Yes, No, Refused, DK]

Potential Exposures covered in the question:

VOCs

Validity: Criterion

Rationale:

Variable 1	Variable 2	Validity Type	Validity Strength
question_vehicles_att_garage	indoor_VOC	Face	Medium

Considering that gasoline-using vehicles are a major source of VC emissions, it is fair to expect that parking such a vehicle in an attached garage will contribute to higher indoor VOC levels. This is given a Face validity of medium strength, since it builds on the validated question that the presence of an attached garage results in higher indoor VOC concentrations. We describe the evidence for increased exposure to an attached garage in question H6. As storage of vehicles and gas powered equipment are thought to be the source of this additional exposure, these follow-up questions are thought to improve the estimate of exposure.

Description of Supporting Papers:

See Question H6

Other Surveys which use the question or a version of it:

PhenX - Review Measure #060101 (Characteristics of Current Residence)

Definition: Questions about the characteristics of the current residence.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the residence.

Measure Release Date - October 30, 2009

U.S. Environmental Protection Agency. National Human Exposure Assessment Survey (NHEXAS), 1995, Question B27d (question 7a)

Journal References:

See Question H6

H10 - Gas-powered devices stored in home

Module: H

Question Number: 10

Tier: 2

Question:

Were any gas-powered devices stored in any room, basement, or attached garage in this home? (such as a lawn mower, snow blower, weed whacker, leaf blower, chainsaw, generator)

[Responses: Yes, No, Refused, DK]

Potential Exposures: VOCs

Validity: Face

Rationale:

Variable 1	Variable 2	Validity Type	Validity Strength
question_gas_devices_garage	indoor_VOC	Face	Medium

The presence of an attached garage has been found to contribute to indoor VOC concentrations (Dodson et al. 2008). Gas powered devices emit VOC's, so we expect that their storage in attached garages contributes to elevated VOC's concentrations indoors. We describe the evidence for increased exposure to an attached garage in question H6. As storage of vehicles and gas powered equipment are thought to be the source of this additional exposure, these follow-up questions are thought to improve the estimate of exposure.

Description of Supporting Papers:

See question H6

Other Surveys which use the question or a version of it:

PhenX - Review Measure #060101 (Characteristics of Current Residence)

Definition: Questions about the characteristics of the current residence.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the residence.

Measure Release Date - October 30, 2009

U.S. Environmental Protection Agency. National Human Exposure Assessment Survey (NHEXAS), 1995, Question B28 (question 8)

Journal References:

See question H6

H11 - Source of drinking water to the home

Module: H

Question Number: 11, 11a, 11b

Tier: 1

Question:

Did your drinking water come from your own private well or were you on a public water supply at this home?

[Responses: Private well, Public water supply, Refused, DK]

Did you ever have your private well water tested for lead or other contaminants?

[Responses: Yes, No, Refused, DK]

What were the results?

[Responses: No problems were ever reported; It contained (mark all that apply): Lead, Nitrates/nitrites, Pesticides, Arsenic, Copper, Giardia, Legionella, Shigella, Campylobacter, Salmonella, Cryptosporidium, or E.coli or other bacteria, Norovirus, Hepatitis A, Other, Refused, DK]

Potential Exposures: Lead and other water contaminants

Validity: Face

Rationale: Public records can theoretically be accessed to determine contaminant levels in water if the participant was on a public water supply. There are numerous compounds that might be found in tap water including lead, a known neurotoxicant. For individuals on a private well, they may have some information on lead or other contaminant levels in their water. Lead has been listed in reviews as a potential exposure of interest for neurodevelopment based on epidemiological studies. This is a standardly used question that relies on face validity.

Other Surveys which use the question or a version of it:

PhenX - Review Measure #060201 (Water Source)

Definition - Questions asking about the drinking water source and use of water filtration systems in the respondent's home.

Purpose - Some water sources contain contaminants and disinfection byproducts that may adversely affect a person's health. Public (municipal) water systems receive disinfection and other treatments that may remove some contaminants in order to comply with the Environmental Protection Agency (EPA) drinking water regulations. Private wells are not regulated by EPA and can contain high levels of potentially dangerous chemicals such as arsenic, nitrate, and pesticides. The likelihood that a private well has contaminants differs by well depth, well construction, location, and characteristics of the soil and aquifer. Additional information about the type of water filtration system used by the home is also valuable because the effectiveness of contaminant removal varies by type of filtration system.

Measure Release Date - October 30, 2009

Lynch, Charles. University of Iowa Medical School. *The Iowa Study of Environment and Health, Next-of-Kin Questionnaire*, Question numbers: 11, 12, and 13 (Source for Questions 1 through 3 in Protocol text)

Journal References: N/A

H12- Tap Water Contamination

Module: H

Question Number: 12, 12a

Tier: 2

Question:

Did you drink your tap water?

[Responses: Yes, No, Refused, DK]

Did you filter the tap water in any way? *[Mark all that apply]*

[Responses: Yes, using a pitcher [e.g. Brita]; Yes, using a system in the refrigerator; Yes, using a system in the sink/faucet; Yes, other: Specify: _____; No; Refused; DK]

Potential Exposure: Lead and other contaminants in the water.

Validity/Rationale: If there are contaminants in the tap water, these questions, about whether they drink the water or filter it, can be used to determine the exposure resulting from drinking the contaminated water. This is a standardly used question that relies on face validity.

H13 - Primary heating source in the home

Module: H

Question Number: 13

Tier: 1

Question:

What was the main heating source in the home?

[Responses: Gas-heated forced air (vents), Electric heated forced air (vents), Oil/Kerosene-fired furnace, Radiators (steam or hot water), Gas stove/fireplace/wall furnace, Wood burning stove/fireplace, Kerosene space heater, Radiant/ceramic heater, Electric space heater, Other: Specify: _____, No source of heat, Refused, DK]

Potential Exposure: Air pollutants

Validity: Face

Rationale: This is a standard question, as some types of heating sources increase air pollution.

Other surveys which use the question or a version of it:

PhenX: Measure #060100 (Characteristics of Current Home)

Question #: 14

Definition: Questions about the characteristics of the current home.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the home.

U.S. Environmental Protection Agency. National Human Exposure Assessment Survey (NHEXAS), 1995, Question numbers: B22 (question 2), B27a (question 7), B27d (question 7a), B28 (question 8), B29a, B29b, B29c, B31, B32, B33 (questions 11 through 16)

Journal References: N/A

H14 – Air conditioning in home

Module: H

Question Number: 14, 14a

Tier: 1

Question:

14 - Was air conditioning (refrigeration) used to cool this home?

[Responses: Y/N/Refused/DK]

14a - What type?

[Responses: Central unit/units, Window or wall unit/units, Portable unit/units, Swamp cooler, Other. Specify: _____, Refused, DK]

Potential Exposures: Particulate Matter, with validation for PM10

Validity: Criterion

Rationale:

(Janssen et al. 2002)

Variable 1	Variable 2	Validity Type	Validity Strength
question_air_conditioning	exposure_air_exchange	Epidemiologic al Evidence	Medium
question_air_conditioning	exposure_PM10	Epidemiologic al Evidence	Medium
question_air_conditioning	outcome_COPD	Epidemiologic al Evidence	Medium

This meta-analysis evaluated studies relating heart attacks with outdoor air pollution levels using time series analysis. It was found that the relationship between heart attacks and outdoor air pollution was stronger in cities where the fractions of homes having central air conditioning was lower. The reasoning is that homes with central air conditioning tend to have lower air exchange rate. In homes with lower air exchange rates, there is a weaker correlation between outdoor air pollution levels and personal exposure, leading to more exposure misclassification and thus a weaker relationship between outdoor air pollution and resulting health effects.

Description of Supporting Papers:

(Janssen et al. 2002)

A high-meta analysis of hospital admissions in 14 cities across the United States evaluated whether the presence of an air-conditioning unit could explain the effects not attributable to sociodemographic factors. Spearman's test found a correlation coefficient of 0.54, with $p < 0.05$.

Other Surveys which use the question or a version of it:

We have modified the answer choices from PhenX to include additional type of cooling.

PhenX - Measure #060101 (Characteristics of Current Home)

Definition - Questions about the characteristics of the current home.

Purpose - Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the home.

Measure Release Date - October 30, 2009

U.S. Environmental Protection Agency. National Human Exposure Assessment Survey (NHEXAS), 1995, Questions B29a & B29b (correspond to 11 & 12 on PhenX “Characteristics of Current Residence” Measure)

Journal References:

Janssen, N.A., Schwartz, J., Zanobetti, A., Suh, H.H.. Air Conditioning and Source-Specific Particles as Modifiers of the Effect of PM10 on Hospital Admissions for Heart and Lung Disease. *Environmental Health Perspectives*. 110(1) 2002: 43-49

H15 - Peeling paint in home

Module: H

Question Number: 15

Tier: 1

Question:

Did this home have peeling paint on the inside?

[Responses: Yes, No, Refused, DK]

Potential Exposures: Lead

Validity: Criterion

Rationale:

(Klitzman et al. 2005) Peeling paint has been associated with higher levels of lead in dust in old houses. Higher levels in dust mean that individuals are more exposed.

Description of Supporting Papers:

(Klitzman et al. 2005)

A 2005 study of 70 low-income homes in a Brooklyn neighborhood found that deteriorating LBP (lead-based paint) surfaces were associated with a higher probability of increased floor dust levels of lead. Damaged LBP surfaces are a strong predictor for LBP hazards, with an odds ratio of 2.8 (95% CI, 0.6-14.3). LBP hazards are defined as the presence of peeling LBP or elevated levels of lead dust. Dwellings with deteriorated LBP surfaces had much higher levels of dust lead levels than intact dwellings, with geometric means of 9.1 µg/ft² and 1.7 µg/ft², respectively.

Journal References:

Klitzman, S., Caravanos, J., Deitcher, D., Rothenburg, L., Belanoff, C., Kramer, R., Cohen, L.. Prevalence and Predictors of Residential Health Hazards: A Pilot Study. *Journal of Occupational and Environmental Hygiene*. 2(6) 2005: 293-301

H16 - Linoleum or vinyl flooring in the home

Module: H

Question Number: 16, 16a

Tier: 16: 1

16a: 2

Question:

16 - Did this home have either linoleum or vinyl flooring in any of the rooms?

[Responses: Yes, No, Refused, DK]

16a – How many rooms had vinyl or linoleum flooring?

[Response: ____ Number]

Potential Exposures: Phthalates

Validity: Criterion

Rationale:

Larsson et al. 2009 (Vinyl Flooring and ASD)

Variable 1	Variable 2	Validity Type	Validity Strength
question_vinyl_flooring	exposure_phthalates	Epidemiological Evidence	High
question_vinyl_flooring	outcome_autism	Epidemiological Evidence	High

The association between having vinyl flooring in the home and the outcome of autism had an odds ratio of 2.40 with a 95% confidence interval of 1.31-4.40.

Bornehag et al. 2004 (Phthalates and Asthma) .

Variable 1	Variable 2	Validity Type	Validity Strength
exposure_phthalates	concentration_indoor_phthalate_dust	Epidemiological Evidence	High
exposure_phthalates	outcome_asthma	Epidemiological Evidence	High

The association between concentration of DEHP in house dust and incidence of asthma in case children is strong, with a U-test (Mann-Whitney Test) value of 0.008.

Bornehag et al. 2005 (PVC flooring and Phthalate Dust Concentrations)

Variable 1	Variable 2	Validity Type	Validity Strength
observed_vinyl_flooring	concentration_phthalate_DEHP	Epidemiological Evidence	Medium

An association was observed between dust phthalate concentration of 0.868mg/g and homes with PVC versus a concentration of 0.700 mg/g dust in houses without PVC, with a Mann-Whitney U-test value of $p < 0.001$, indicating strong epidemiological validity. The geometric mean of DEHP concentration in dust is higher in bedroom with PVC than bedrooms without (0.994 vs. 0.638 mg/g dust, both $p < 0.001$ by t-test).

Description of Supporting Paper:

Larsson et al. 2009 (Vinyl Flooring and ASD)

A 2009 study of 4,779 children examined the potential contribution of various environmental factors to Autism Spectrum Disorder. One of the factors was the presence of PVC or vinyl flooring in the dwelling/child's room. The association between having vinyl flooring in the home and the outcome of autism had an odds ratio of 2.40 with a 95% confidence interval of 1.31-4.40.

Bornehag et al. 2004 (Phthalates and Asthma)

A 2004 study of 198 asthma symptomatic children and 212 healthy controls in Sweden investigated the contribution of indoor phthalate concentration to asthma and allergy symptoms. Phthalates of interest included butyl benzyl phthalate (BBzP), di-n-butyl phthalate and di(2-ethylhexyl phthalate) (DEHP). Following medical examination, building investigation, questionnaire and statistical analysis, DEHP concentrations in dust specifically were found to be associated with asthma.

Bornehag et al. 2005 (PVC flooring and Phthalate Dust Concentrations)

A 2005 study examined the relationship between building characteristics and indoor dust phthalate concentrations. BBzP and DEHP were measured in dust taken from children's bedrooms. BBzP and DEHP were found to have higher concentration in buildings with PVC flooring.

Journal References:

Larsson, M., Weiss B., Janson, S., Sundell, J., Bornehag, C.G.. Associations between indoor environmental factors and parental-reported autistic spectrum disorders in children 6-8 years of age. *NeuroToxicology*. 30(5) 2009: 822-831.

Bornehag, C.G., Sundell, J., Weschler, C.J., Sigsgaard, T., Lundgren, B., Hasselgren, M., Hagerhed-Engman, L.. The Association between Asthma and Allergic Symptoms in Children and Phthalates in House Dust: A Nested Case-Control Study. *Environmental Health Perspectives*. 112(4) 2004: 1393-1397

Bornehag, C.G., Lundgren, B., Weschler, C.J., Sigsgaard, T., Hagerhed-Engman, L., Sundell, J.. Phthalates in Indoor Dust and Their Association with Building Characteristics. *Environmental Health Perspectives*. 113(10) 2005: 1399-1404

H17 - Type of stove in the home

Module: H

Question Number: 17

Tier: 1

Question:

What kind of stove did this home have?

[Responses: Gas, Electric, Other, Refused, DK]

Potential Exposures: Nitrogen Dioxide

Validity: Criterion

Rationale:

Speizer et al. 1980 (NO2 Exposure and Respiratory Disease/Pulmonary Function)

Variable 1	Variable 2	Validity Type	Validity Strength
question_stove	concentration_indoor_NO2_gas_stove	Epidemiological	High
exposure_NO2	outcome_respiratory_disease	Criterion	High

There were two things discussed in this paper. First is the association between gas stove and higher respiratory symptoms. Second, they measure NO₂ and found levels were 4-7 times higher in homes with a gas stove than electric.

Morales et al. 2009 (Home Appliances and Cognition)

Variable 1	Variable 2	Validity Type	Validity Strength
question_stove	concentration_indoor_NO2_gas_stove	Face	Medium
exposure_NO2_gas_stove	outcome_attention_behavior	Epidemiological Evidence	Medium

Since gas stoves are known to emit NO₂, it follows that the indoor residential concentration of NO₂ will be higher in the dwellings of those who report having a gas stove. For this reason, we assign face validity of medium strength to the association. Epidemiological evidence of medium validity strength suggests that inattention and indoor NO₂ levels are correlated with an odds ratios of 1.06, and a 95% confidence interval of 1.01-1.12, P = 0.024.

Description of Supporting Paper:

Speizer et al. 1980 (NO2 Exposure and Respiratory Disease/Pulmonary Function)

A 1980 study of ~8,000 randomly selected children aged from 6-10y in six communities across the East Coast (USA) investigated the relationship between types of stoves in the home (gas/electrical) and respiratory health outcomes. Exposure was assessed by setting up indoor-outdoor monitors in selected homes, measuring forced-expirations, and questionnaire items inquiring into what type of stove was used in the dwelling and the health history of the child. Results indicated increased incidence of respiratory illness in individual who live in dwellings which use gas stoves for home cooking.

Morales et al. 2009 (Home Appliances and Cognition)

A 2009 study of 482 on the island of Menorca (Spain) investigated an association between GSTP1 polymorphisms, gas appliances at home, indoor nitrogen dioxide concentrations, and neurocognitive function (primarily instances of ADHD). Nitrogen Dioxide is the most toxic oxygen species released by gas-fueled household appliances, and can cause cell damage through oxidant injury, inflammation, and lipid peroxidation. Glutathione S-Transferase P1 is a phase II antioxidant and is one of the major enzymes protecting against damage caused by reactive oxygen species such as NO₂. Results indicated a correlation between attention behavior and indoor NO₂ concentrations, with evidence suggesting that individuals of genotype GSTP1-Val-105 were at higher risk of adverse effects of NO₂ damage.

Other surveys which use the question or a version of it:

N/A

Journal References:

Speizer, F.E., Ferris Jr., B., Bishop, Y.M., Spengler, J.. Respiratory Disease Rates and Pulmonary Function in Children Associated with NO₂ Exposure. *American Review or Respiratory Disease*. 121(1) 1980: 3-10

Morales, E., Julvez, J., Torrent, M., de Cid, R., Guxens, M., Bustamante, M., Künzli, N., Sunyer, J.. Associations of Early-life Exposure to Household Gas Appliances and Indoor Nitrogen Dioxide With Cognition and Attention Behavior in Preschoolers. *American Journal of Epidemiology*. 169(11) 2009: 1327-1336

H18 - Presence of fume hood in the residence

Module: H

Question Number: 18, 18a

Tier: 1

Question:

Was there a fume hood/fan over the stove?

[Responses: Yes, No, Refused, DK]

How often did you use it?

[Responses: All/most of the time, About half of the time, Rarely/never, Refused, DK]

Potential Exposure: Particles and NO₂

Validity/Rationale: Exposure is reduced to varying degree with use of a fume hood. Fume hood use also reduces exposure to cooking generated particulate matter and NO₂.

H19/H20 - Mold or mildew in the home

Module: H

Question Number: 19, 20

Tier: 2

Question:

Did this home have any mold or mildew on walls or other surfaces other than in the shower or bathtub?

[Responses: Yes, No, Refused, DK]

Did this home have any water damage?

[Responses: Yes, No, Refused, DK]

Potential Exposures: Mold

Validation: Criterion

Rationale:

(Brunekreef et al. 1989)

A 1989 study investigated the contribution of residential dampness to incidence of respiratory illness. For individuals who reported the presence of dampness/mold in their homes, the association between mold and respiratory symptoms has an odds ratio of 1.27-2.12. With respect to asthma, an odds ratio of 1.27 (range: 0.93,1.74) was observed. An odds ratio of 1.42 (range, 1.12-1.80) was observed for respiratory illness before age 2.

Description of Supporting Paper:

(Brunekreef et al. 1989) - A cohort study of 4,525 children between the ages of 8-12 across six cities in the U.S. (Kingston, TN, Steubenville, OH, Watertown, MA, St. Louis, MO, Topeka, KS, Portage, WI) used a questionnaire and two medical examinations spaced one year apart. Parents were asked about the home environment, whether there was any dampness/mold in the home, and provided their child's health history. After adjusting for age, sex, city of home, parental education, and maternal smoking, dampness was found to be a significant predictor of respiratory illness in children.

Other surveys which use the question or a version of it:

PhenX: Measure #060100 (Characteristics of Current Residence)

Question #: 9, 10

Definition: Questions about the characteristics of the current residence.

Purpose: Generally, people spend a large proportion of their days inside and at home. These questions provide information about a person's home environment. They include characteristics about the age of the home, length of time in the home (length of time exposed to home-related exposures), use of a garage (e.g. carbon monoxide or benzene exposure), heating source and HVAC system (particulate matter and ventilation), water damage (mold), and presence of pets (allergens or contaminated dust). Taken together these questions provide valuable information about factors that may affect the health or physiologic responses or epigenetic markers of those who live in the residence.

U.S. Department of Housing and Urban Development and the National Institute of Environmental Health Sciences. *National Survey of Lead Hazards and Allergens in*

Housing (NSLAH), 2001, Resident Questionnaire, Question numbers: Q14, Q15 (questions 9 and 10)

Journal References:

Brunekreef, B., Dockery, D.W., Speizer, F.E., Ware, J.H., Spengler, J.D., Ferris, B.G.. "Home Dampness and Respiratory Morbidity in Children. *American Review of Respiratory Disease*. 140(5) 1989: 1363-1367. doi: 10.1164/ajrccm/140.5.1363

H21 - Home's proximity to agricultural fields/golf course

Module: H

Question Number: 21

Tier: 2

Question:

Was this home within 1/4 mile (~400 meters) of an agricultural field or golf course?

[Responses: Yes, No, Refused, DK]

Potential Exposures: Pesticides

Validity: Criterion

Rationale:

(Shelton et al. 2014 - IN REVIEW)

Sensitivity ranged between 59% and 69%. Specificity was 80%. Positive predictive value ranged between 47% and 63%. The land use report and self-report had a moderate agreement ($\kappa = 0.41$, 95% CI 0.33, 0.48).

Description of Supporting Papers:

(Shelton et al. 2014 - IN REVIEW)

The purpose of this study was to assess if it was possible to estimate exposure to pesticide through self-reporting of proximity to agricultural fields and/or golf courses. The study sample was pulled from a case-control autism study. Using distance buffers of 1/2 and 1 mile, the total mass of organophosphate and carbamate pesticides applied per region per month was summed and average over each subject's pregnancy month. A comparison was made between self-report and land use report indicators as predictors of poundage of pesticide applied within 1/2 and 1 mile from the home during pregnancy. Results showed that self-reported proximity to fields could be a viable surrogate for pesticide exposure if land use report data is unavailable. They noted that self-report is more likely to underestimate the true exposure.

Other surveys which use the question or use a version of it:

N/A

Journal References:

Shelton, J.F., Geraghty, E.M., Tancredi, D.J., Hertz-Picciotto, I.. Self-reported proximity to agriculture and golf courses and neurodevelopment: A validation study. *(In review)*

E Module (Environment) -
Itemized Rationale Summary of
the Early Life Exposures Assessment Tool for Autism Studies

[E1 - Amount of furniture in home](#)
[E2 - Televisions in the home](#)
[E3 - Home renovation](#)
[E4 - New interior painting in the home](#)
[E5 - Carpet/rug installation in home](#)
[E6 - Indoor pesticide fogging in the home](#)
[E7 - Indoor pesticide spraying in home](#)
[E8 - Outdoor pesticide spray used in home](#)
[E9 - Professional application of pesticides to the interior of the home](#)
[E10 - Professional application of pesticides outside the home](#)
[E11 - Ownership of a dog or cat](#)
[E12/13/14/15 - Pest treatments for pets](#)
[E16/17 - Horse use and application of pesticides on horses](#)
[E18/19/20/24 - Air fresheners and mold/mildew cleaners](#)
[E21 - Stain resistant clothing](#)
[E22 - Brand of toothpaste used](#)
[E23/25/26/27/28/29/30/32 - Cosmetics use](#)
[E31 - Cellular phone use](#)
[E33, E33a, E33b - Blood lead](#)

E1 - Amount of furniture in home

Module: E

Question Number: 1, 1a

Tier: 1

Question:

How many pieces of furniture with cushions, such as sofas or chairs with cushions, were in your home while you were pregnant?

[Responses: _____, *Refused*, *DK*]

What year was each piece of furniture with cushions made?

[Responses: _____, (*depends on the amount of furniture*), *Refused*, *DK*]

Potential Exposures: PBDEs

Validity: Criterion. The year of purchase of the furniture will help researchers determine if PBDE or other flame retardants are likely to be in the furniture.

Rationale: (*Castorina et al. 2011*) Possessing three or more pieces of stuffed furniture was significantly correlated with 26.8% increase in serum PBDE levels (95% CI: 2.0-57.5)($p < 0.05$).

Description of Supporting Papers: (*Castorina et al. 2011*)

A 2011 study of 416 immigrant women residing in Monterey County found that possession of three or more pieces of stuffed furniture was associated with a significant increase in serum PBDE levels.

Other surveys which use the question or a version of it: N/A

Journal References:

Castorina, R., Bradman, A., Sjödin, A., Fenster, L., Jones, R.S., Harley, K.G., Eisen, E.A., Eskenazi, B.. Determinants of Serum Polybrominated Diphenyl Ether (PBDE) Levels among Pregnant Women in the CHAMACOS Cohort. *Environmental Science and Technology*. 45(15) 2011: 6553-6560.

E2 - Televisions in the home

Module: E

Question Number: 2, 2a, 2b

Tier: 2

Question:

2 - How many televisions were in the house while you were pregnant?

[Responses: ___ # of televisions, 0, Refused, DK]

2a - What year was the television most often watched purchased?

[Responses: _____, Refused, DK]

2b - What was the size of the television most watched?

[Responses: _____ inches, Refused, DK]

Potential Exposures: PBDEs

Validity: Criterion

Rationale:

(Bennett *et al.* - Unpublished)

BDE209 concentrations in residential dust have been found to have a statistically negative correlation with TV size, when other residential factors are taken into account ($p=0.034$). TV age also has a slightly negative significant association with BDE209 concentration in the home ($p=0.060$).

Description of Supporting Papers:

(Bennett *et al.* - Unpublished)

A study of 139 households used HSV3 vacuum samplers and surface wipes to assess predictors of dust concentrations of various PBDE congeners in the air and on home surfaces. While the study mainly focused on furniture, televisions were also assessed as predictors of PBDE concentrations in the homes.

Other surveys which use the question or a version of it: N/A

E3 - Home renovation

Module: E

Question Number: 3, 3a

Tier: 2

Question:

3 - From three months prior to when you became pregnant through the end of the first year after birth, were there any renovations to your home, such as adding a room, putting up or taking down a wall, replacing windows, or refinishing floors?

[Responses: Yes, No, Refused, DK]

3a - When? (Mark all that apply)

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

Potential Exposures: VOCs

Validity: Criterion

Rationale:

(Herbarth & Matysik 2010)

Average VOC levels prior to renovations ranged between $202.5 \pm 163.6 \mu\text{g}/\text{m}^3$, while levels immediately the day after renovations were $6000\text{-}11,955 \mu\text{g}/\text{m}^3$. Studies have looked at new paint (see E4) and new carpet (see E5), finding higher levels of VOCs associated with both. One would anticipate other new materials and new surfaces would also increase VOC levels.

Description of Supporting Papers:

(Herbarth & Matysik 2010)

A 2010 study sought to specify the time frame required for 26 different VOCs to reach a reference levels in recently renovated homes. Both active and passive samplers were used to measure time-dependent VOC levels in each home, and the researchers were able to derive a concentration-decay curve.

Other surveys which use the question or a version of it:

PhenX - Measure #061400 (Plastic Exposures at Work and Home)

Question #: 6

Definition: Questions about recent renovations and the type of flooring and walls in the person's work environment and home.

Purpose: Plasticized materials are often found in many building materials, such as walls, flooring, table tops, and furniture. Plasticized materials emit chemicals (phthalates) that may cause allergic reactions, respiratory problems, and may be associated with other adverse health outcomes

PhenX - Measure #061100 (Air Contaminants in the Home Environment)

Question #: 1

Definition: Questions about renovations to the home in the last year with optional questions about personal activities in the last 48 hours.

Purpose: Paints, adhesives and other chemicals used to renovate homes may affect a person's health for a time after the renovation occurred. In addition, normal daily activities may include exposure to paints, solvents, gasoline, wood dust, combustion emissions, and other substances.

Atmospheric and Environmental Research (AER) Inc. Relationship of Indoor, Outdoor and Personal Air (RIOPA) Study Baseline Questionnaire 1999,
Question numbers: 26

Finnish Institute of Occupational Health, The University of Helsinki, Department of Public Health. The Finnish Environment and Asthma Study. 1997-2000. Question numbers T22, T23, T24, T25, K15, K16, K16B, K20, K21, K22, K23

Journal References:

Herbarth, O., & Matysik, S. (2010). Decreasing concentrations of volatile organic compounds (VOC) emitted following home renovations. *Indoor air*, 20(2) 2010: 141-146

E4 - New interior painting in the home

Module: E

Question Number: 4, 4a

Tier: 2

Question:

4 – From three months prior to when you became pregnant through the end of the first year after birth, were any walls, ceilings, or furniture inside of the this home freshly painted/varnished?

[Responses: Yes, No, Refused, DK]

4a – When?

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

Potential Exposures: VOCs

Validity: Criterion

Rationale:

(Diez et al. 2000)

Variable 1	Variable 2	Validity Type	Validity Strength
question_indoor_painting	exposure_VOCS	Criterion	Medium

Painting a dwelling during pregnancy was correlated with increased concentration of aliphatic compounds (nonane, decane, undecane, dodecane), with an odds ratio of 2.4 (95% CI 1.1-5.3).

Description of Supporting Papers:

(Diez et al. 2000)

A 2000 study of 475 premature children and children with allergic risk factors in Leipzig, Germany, found that there is a correlation between painting the dwelling during pregnancy and increased VOC levels (namely nonane, undecane, dodecane, decane, styrene, benzene). Levels were independently measured for each compound. A positive response to the questionnaire item “during pregnancy painted dwelling” was associated with an increase in residential concentration of nonane, decane, undecane and dodecane (OR = 2.4, 95% CI 1.1-5.3).

Other surveys which use the question or a version of it:

PhenX- Measure #061101 (Air Contaminants in the Home Environment)

Question #: 3

Definition: Questions about renovations to the home in the last year with optional questions about personal activities in the last 48 hours.

Purpose: Paints, adhesives and other chemicals used to renovate homes may affect a person's health for a time after the renovation occurred. In addition, normal daily

activities may include exposure to paints, solvents, gasoline, wood dust, combustion emissions, and other substances.

Atmospheric and Environmental Research (AER) Inc. Relationship of Indoor, Outdoor and Personal Air (RIOPA) Study Baseline Questionnaire 1999, Question numbers: 63 through 66 (Source for questions 3 through 6 in Protocol text)

Journal References:

Diez, U., Kroeßner, T., Rehwagen, M., Richter, M., Wetzig, H., Schulz, R., Borte, M., Metzner, G., Krumbiegel, P., Herbarth, O.. Effects of indoor painting and smoking on airway symptoms in atopy risk children in the first year of life results of the LARS-study. *International Journal of Hygiene and Environmental Health*. 203(1) 2000: 23-28

E5 - Carpet/rug installation in home

Module: E

Question Number: 5, 5a

Tier: 2

Question:

5 - From three months prior to when you became pregnant through the end of the first year after birth were new carpets or rugs installed?

[Responses: Yes, No, Refused, DK]

5a - When?

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

Potential Exposures: VOCs, Aldehydes

Validity: Criterion

Rationale:

(Wang & Morrison 2006)

No statistical analysis was conducted, the only comparable variable is air concentration. Nonanal levels were higher in 1 year old homes as opposed to homes greater than 10 years old, with air concentrations of 80µg/m² and 8-20µg/m², respectively.

Description of Supporting Paper:

(Wang & Morrison 2006)

A 2006 paper summed up the results of field experiments conducted in four Rolla, Missouri homes. New carpets were suspected to be a significant source of aldehydes, due to the reaction of ozone in the air and the nonvolatile polymers coating the carpet which haven't yet dissipated. The ages of the dwelling were noted, and aldehyde concentrations (C₅-C₁₀, high molecular weight species) were measured indoors.

Other surveys which use the question or a version of it:

PhenX- Measure #061101 (Air Contaminants in the Home Environment) Question #: 4

Definition: Questions about renovations to the home in the last year with optional questions about personal activities in the last 48 hours.

Purpose: Paints, adhesives and other chemicals used to renovate homes may affect a person's health for a time after the renovation occurred. In addition, normal daily activities may include exposure to paints, solvents, gasoline, wood dust, combustion emissions, and other substances.

Atmospheric and Environmental Research (AER) Inc. Relationship of Indoor, Outdoor and Personal Air (RIOPA) Study Baseline Questionnaire 1999, Question numbers: 63 through 66 (Source for questions 3 through 6 in Protocol text)

Journal Reference:

Wang, H., Morrison, G. C.. Ozone-initiated secondary emission rates of aldehydes from indoor surfaces in four homes. *Environmental Science & Technology*, 40(17) 2006: 5263-5268.

E6 - Indoor pesticide fogging in the home

E7 - Indoor pesticide spraying in home

E9 - Professional application of pesticides to the interior of the home

Module: E

Question Number: 6, 6a, 6b, 7, 7a, 7b, 9, 9a, 9b

Tier: 6: 1 7:1 9:1
6a: 1 7a:1 9a:1
6b: 2 7b:2 9b:1

Question:

6 - Was any indoor pesticide fogger used in the home from three months prior to becoming pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Refused, DK]

7 - Was any pesticide spray used inside your home from three months prior to becoming pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Declined, DK]

9 – Did professionals apply any pesticides to kill insects/bugs inside your home from three months prior to becoming pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Declined, DK]

a - When?

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

b - Which pests were you treating?

[The following options were offered for the each of the aforementioned timeframes: Cockroaches, Ants, Flies, Mosquitos, Termites, Moths, Spiders, Snails, Rodents, Refused, DK]

Potential Exposures: Pesticides

Validity/Rationale: (Colt et al. 2004)

Variable 1	Variable 2	Validity Type	Validity Strength
question_pests_treated	elevated_dust_pesticides	Criterion	Medium
elevated_dust_pesticides	exposure_pesticides	Face	Medium

This question is one in a series of questions about use of pesticides in the participant's home. Each question in the series asks about use of a different type of pesticide application. The validity of a question inquiring into pesticide treatment practices being an accurate predictor of dust concentrations of pesticides in the indoor environment is of medium strength, based on criterion validity. We assume all types of pesticide loading contribute to elevated dust levels. It follows that an individual would have a higher

exposure to pesticides if there is an elevated concentration of pesticides in the dust they come into contact with on a daily basis, hence we have assigned a face validity of medium strength to that association.

Description of Supporting Papers:

(Colt et al. 2004)

Although the supporting paper focuses only on types of pests being treated, levels of exposure should vary by application type and thus our questions are based on type of application. A 2004 study (Colt et al. 2004) found an association between reported types of pests treated and pesticide concentrations in carpet dust. The most consistency was found between termites and chlordane, and flea/ticks and permethrin, with correlation coefficients of 0.30 or higher. This suggests that pesticide treatment practices might be valid predictors of pesticide exposure.

Other surveys which use the question or a version of it: N/A

Journal Reference:

Colt, J.S., Lubin, J., Camann, D., Davis, S., Cerhan, J., Severson, R.K., Cozen, W., Hartge, P.. Comparison of pesticide levels in carpet dust and self-reported pest treatment practices in four US sites. *Journal of Exposure Analysis and Environmental Epidemiology*. 14(1) 2004: 74-83

E8 - Outdoor pesticide spray used in home**E10 - Professional application of pesticides outside the home****Module:** E**Question Number:** 8, 8a, 8b, 10, 10a, 10b**Tier:** 8: 1 10: 1
8a: 1 10a: 1
8b: 2 10b: 2**Question:**

8 - Was any outdoor pesticide spray used in the home from three months prior to becoming pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Refused, DK]

10 - Did professionals (exterminators, landscape/garden service) apply any pesticides to kill bugs outside your home from three months prior to becoming pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Refused, DK]

a - When?

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

b - Which pests were you treating?

[The following options were offered for the each of the aforementioned timeframes: Cockroaches, Ants, Flies, Mosquitos, Termites, Moths, Spiders, Snails, Rodents, Refused, DK]

Potential Exposures: Pesticides**Validity/Rationale:**

(Colt et al. 2004)

Variable 1	Variable 2	Validity Type	Validity Strength
question_pests_treated	elevated_dust_pesticides	Criteria	Medium
elevated_dust_pesticides	exposure_pesticides	Face	Medium

This question asks about use of pesticides around the participant's home. It can be used to assess exposures to various pesticides. These exposures are of great concern for autism. The validity of a question inquiring into pesticide treatment practices being an accurate predictor of dust concentrations of pesticides in the indoor environment is of medium strength, based on criteria validity. It follows that an individual would have a higher exposure to pesticides if there is an elevated concentration of pesticides in the dust they come into contact with on a daily basis, hence we have assigned a face validity of medium strength to that association.

Description of Supporting Papers:

(Colt et al. 2004)

Although the supporting paper focuses only on types of pests being treated, levels of exposure should vary by application type and thus our questions are based on type of application. A 2004 study (Colt et al. 2004) found an association between reported types of pests treated and pesticide concentrations in carpet dust. The most consistency was found between termites and chlordane, and flea/ticks and permethrin, with correlation coefficients of 0.30 or higher. This suggests that pesticide treatment practices might be valid predictors of pesticide exposure.

Journal Reference:

Colt, J.S., Lubin, J., Camann, D., Davis, S., Cerhan, J., Severson, R.K., Cozen, W., Hartge, P.. Comparison of pesticide levels in carpet dust and self-reported pest treatment practices in four US sites. *Journal of Exposure Analysis and Environmental Epidemiology*. 14(1) 2004: 74-83

E11 - Ownership of a dog or cat

Module: E

Question Number: 11, 11a

Tier: 1

Question:

11 - Did you have a dog/cat from three months prior to becoming pregnant through the child's first year after birth?

[Responses: Yes, No, Refused, DK]

11a - Where did they live?

[Responses: Indoors, Outdoors, Both indoors and outdoors, Refused, DK]

Potential Exposures: This question is a screener question to determine if subsequent question on pet pesticide use should be used.

Validity: Expert Judgment

Rationale: N/A

Other surveys which use the question or a version of it: N/A

Descriptions of Supporting Papers: N/A

Journal References: N/A

E12/13/14/15 - Pest treatments for pets

Module: E

Question Number: 12, 12a, 13, 13a, 14, 14a, 15, 15a

Tier: 1

Question:

12 - Were little pouches that you break open and apply behind your pet's neck such as Frontline and Advantage, to kill fleas, ticks, or other bugs used on your pets from three months prior to becoming pregnant through the end of the child's first year after birth?
[Responses: Yes, No, Refused, DK]

12a - When? (Mark all that apply)
[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

13 - Were any other sprays, dusts, powders or skin applications for fleas or ticks used on your pets from three months prior to becoming pregnant through the end of the child's first year after birth?
[Responses: Yes, No, Refused, DK]

13a - When? (Mark all that apply)
[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

14 - Were flea or tick soaps or shampoos used on your pets from three months prior to becoming pregnant through the end of the child's first year after birth?
[Responses: Yes, No, Refused, DK]

14a - When? (Mark all that apply)
[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

15 - Were flea or tick collars used on your pets from three months prior to becoming pregnant through the end of the child's first year after birth?
[Responses: Yes, No, Refused, DK]

15a - When? (Mark all that apply)
[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

Potential Exposures: Pesticides

Validity/Rationale: There are no specific studies evaluating exposures following pet treatments. However, it is reasonable to assume exposure occurs while applying the pesticide to the pet, when contacting the pet following application, and through elevated levels in the home resulting from the pet contacting various surfaces in the home.

Other surveys which use the question or a version of it: N/A

Description of supporting papers: N/A

Journal References: N/A

E16/17 - Horse use and application of pesticides on horses

Module: E

Question Number: 16, 17, 17a

Tier: 2

Question:

16 - Did you own, lease, train or provide care for a horse regularly (once a week or more) at any time from three months before pregnancy until your child's first birthday?

[Responses: Yes, No, Refused, DK]

17 - Did you ever use fly repellent products on or around a horse at any time from three months before pregnancy until your child's first birthday? Please include fly sprays, wipes, roll-ons, spot-ons, or keeping the horse in a stable with an automatic fly repellent fogger/misting system.

[Responses: Yes, No, Refused, DK]

17a - When?

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

Potential Exposures: These questions ask about the use of fly repellent products on horses. These products generally contain pyrethroid pesticides. It is thought that there may be exposure to the individual applying these products because they often touch the horse during grooming following the application.

Validation/Reliability: Exposure following the use of these products has not been studied and thus there are no studies available for validation.

Other surveys which use the question or a version of it: N/A

Description of supporting papers: N/A

Journal References: N/A

E18/19/20/24 - Air fresheners and mold/mildew cleaners

Module: E

Question Number: 18, 18a, 19, 19a, 19b, 20, 20a, 24

Tier: 1

Question:

18, 19, 20 - Were air fresheners such as...

18 - Plug-ins, gels, oils, solids, or other types of products that continually or automatically freshen the air

19 - air freshener spray products that needed to be sprayed by a person

20 - air freshener candles

...used in your home from three months prior to becoming pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Refused, DK]

18a - When?

[Responses: (Before Pregnancy: Yes, No, Refused, DK), (During Pregnancy: First Trimester, Second Trimester, Third Trimester, No, Refused, DK), (First Year: 0-3 Months, 4-6 Months, 6-12 Months, No, Refused, DK)]

19a, 20a - How often on average during pregnancy?

[Responses: >3 times per day, 1-2 times per day, 1-6 times per week, <once per week, Never, Refused, DK]

19b, 20b - How often on average during the first year after birth?

[Responses: >3 times per day, 1-2 times per day, 1-6 times per week, <once per week, Never, Refused, DK]

24 - How often on average did you use mold and mildew cleaners such as Lysol or Formula 409?

[Responses: (During Pregnancy: >3 times per day, 1-2 times per day, 1-6 times per week, <once per week, Never, Refused, DK), (During child's first year: >3 times per day, 1-2 times per day, 1-6 times per week, <once per week, Never, Refused, DK)]

Potential Exposures: Mammary gland carcinogens, Endocrine-disrupting compounds (EDCs)

Validity: Criterion

Rationale:

(Zota et al. 2010)

This is a suite of questions, all of which need to be asked in order to get at one exposure.

The questions were modified to accommodate new product types. We aim to be complete about the range of air freshener products currently available on the market. As questions about air fresheners have proven to be strong predictors of indoor exposure to EDCs, we assign to this suite a high criterion validity. Breast cancer risk had an odds ratio of 2.1 (95% CI 1.4, 3.3) in the highest quartile of self-reported combined cleaning product use.

Description of Supporting Papers:

(Zota et al. 2010)

A 2010 population-based case study investigated the contribution of household cleaning products to breast cancer risk. The participants were 1508 Cape Cod, Massachusetts women, 787 of whom were diagnosed with breast cancer between 1988 and 1995, while the remaining 721 served as controls. Cleaning products studied included mold/mildew control products, air freshener spray, air freshening solids, air freshening candles, and stain resistant clothing. These products are thought to contain higher than average concentrations of EDCs. A comparison between the highest and lowest quartile of self-reported combined cleaning product use indicated that the highest quartile group had double the risk of breast cancer as the lowest quartile.

Other surveys which use the question or a version of it: N/A

Journal References:

Zota, A. R., Aschengrau, A., Rudel, R. A., Brody, J. G. Self-reported chemicals exposure, beliefs about disease causation, and risk of breast cancer in the Cape Cod Breast Cancer and Environment Study: a case-control study. *Environmental Health*. 9(1) 2010: 40.

E21 - Stain resistant clothing

Module: E

Question Number: 21, 21a, 21b

Tier: 2

Question:

21 - Did you wear stain resistant clothing from the time you became pregnant through the end of the child's first year after birth?

[Responses: Yes, No, Refused, DK]

21a - How often on average during pregnancy?

[Responses: Daily, 1-6 times per week, < once per week, Never, Refused, DK]

21b - How often on average during the first year after birth?

[Responses: Daily, 1-6 times per week, < once per week, Never, Refused, DK]

Potential Exposure: Perfluorinated Compounds (PFCs)

Validity: Criterion

Rationale: (*Wu et al.* 2015) Study participants who reported wearing stain-repellant clothing at least once a week or more we found to have significantly higher serum concentrations of PFOS ($p=0.04$) and marginally significantly higher concentrations of PFDA ($p=0.07$), PFOA ($p=0.07$), PFHxS ($p=0.05$) were observed for factors related to consumer product use.

Description of Supporting Papers: (*Wu et al.* 2015) A study which is currently in review investigated whether questionnaire responses could be accurate predictors of serum concentration of PFCs. The study population consisted of young children, parents of young children, and older adults. PFC concentrations were found to be highest in the oldest group. A moderate correlation was found between serum PFC concentrations between parents and children of the same family. Factors found to contribute to PFC exposure include diet, occupation, consumer product use, and residential dust.

Other surveys which use the question or a version of it: N/A

Journal References:

Wu, X.M., Bennett, D.H., Calafat, A.M., Kato, K., Strynar, M., Andersen, E., Moran, R.E., Tancredi, D.J., Tulse, N.S., Hertz-Picciotto, I.. Serum Concentrations of Perfluorinated Compounds (PFC) among Selected Populations of Children and Adults in California, *Environmental Research*, 2015, 136 (264-273).

E22 - Brand of toothpaste used**Module:** E**Question Number:** 22**Tier:** 1**Question:**

Please list the brand (i.e. Crest, Colgate) and product name/type (i.e. tartar control, whitening) of the toothpastes you used most often for each time period.

[Responses: Brand name/Product Name/Type used during pregnancy _____, Brand name/Product Name/Type used during first year of life _____, Refused, DK]

Potential Exposure: Triclocarban (TCC)

Validity/Rationale: Triclocarban is commonly used as an antimicrobial agent in various personal care products, including toothpaste. Exposure studies conducted for TCC-containing soaps show that enough absorption occurs to warrant further investigation into other PCP exposure routes, such as toothpaste.

Description of Supporting Papers: Schebb *et al.* 2011, This study measured human urine concentration of TCC (and its metabolites) for three days after showering with TCC-containing soap. An in-vitro study of TCC's role in human enzyme inhibition was also done. TCC was found to be a strong inhibitor of soluble epoxide hydrolase (sEH), while the inhibition of its metabolites was negligible.

Other surveys which use the question or a version of it: N/A

Journal References:

Schebb, N. H., Inceoglu, B., Ahn, K. C., Morisseau, C., Gee, S. J., & Hammock, B. D.. Investigation of human exposure to triclocarban after showering and preliminary evaluation of its biological effects. *Environmental science & technology*, 45(7), 2011: 3109-3115.

E23/25/26/27/28/29/30/32 - Cosmetics use**Module:** E**Question Number:** 23, 25, 26, 27, 28, 29, 30, 32**Tier:** 2 (Entire suite)**Question:**

How often on average did you use each of the following items/products (deodorant, lotion, liquid soap (include both antibacterial and non-antibacterial), hair gel, hair spray, nail polish, or perfume) during pregnancy and during the child's first year after birth?
[Responses: (During Pregnancy: >3 times per day, 1-2 times per day, 1-6 times per week, < once per week, never, Refused, DK), (First Year: : >3 times per day, 1-2 times per day, 1-6 times per week, < once per week, never, Refused, DK). Nail polish frequencies are as follows: 1+ times per week, 3-4 times per month, 1-2 times per month, < once per month, never, Refused, DK]

Potential Exposure: Phthalates**Validity/Rationale:** (Just et al. 2010)

Variable 1	Variable 2	Validity Type	Validity Strength
question_sum_of_products_used	urine_phthalate_metabolite_levels	Criterion	Medium
urine_phthalate_metabolite_levels	exposure_phthalates	Face	High

These questions are considered as a group. The variable for analysis is the summed frequency of all product use as all of these products are thought to contain phthalates. An existing study evaluated the sum of the number of specified personal care products used within the previous 48-hours of collection of a spot urine sample, and the phthalate metabolite levels in that sample. We make the assumptions that these findings can be applied to questions on frequency of use, giving this question a criterion strength of medium strength. It follows that an individual has been exposed to phthalates if phthalate metabolites are found in the urine, so that association has been assigned a face validity of high strength. Out of all the toiletries inquired about, perfumes in particular were found to be an especially high source of phthalate exposure. Women who state that they regularly use perfume were found to have urinary phthalate metabolite levels more than double than that of the control's.

Description of Supporting Paper:

(Just et al. 2010) The study population consisted of pregnant women of African-American or Dominican descent living in northern Manhattan or the South Bronx. Phthalate urinary metabolite levels were 2.3 times higher in individuals who reported using perfume, with a 95% confidence interval of 1.6-3.3. Metabolite concentrations increased by 7% for each 25% increase in the sum of uses of deodorant, lotion or mist (spray application), perfume, liquid soap or body wash, hair gel, hairspray, and nail products.

Other surveys which use the question or a version of it: N/A**Journal Reference:**

Just, A.C., Adibi, J.J., Rundle, A.G., Calafat, A.M., Camann, D.E., Hauser, R., Silva, M.J., Whyatt, R.M.. Urinary and air phthalate concentrations and self-reported use of personal care products among minority pregnant women in New York City. *Journal of Exposure Science and Environmental Epidemiology*. 20(7) 2010: 625-633

E31 - Cellular phone use

Module: E

Question Number: 31

Tier: 2

Question:

How often on average did you use a cellular phone during pregnancy and during the child's first year after birth?

[Responses: (During Pregnancy: More than 2 hours per day, 30 minutes to 2 hours per day, less than 30 minutes per day, only use phone occasionally, never, Refused, DK), (First Year: More than 2 hours per day, 30 minutes to 2 hours per day, less than 30 minutes per day, only use phone occasionally, never, Refused, DK)]

Potential Exposure: Radiofrequency energy

Validity/Rationale: Cell phone use has increased in recent years and we thought a question on this topic should be included.

E33, E33a, E33b - Blood Lead

Module: E

Question Number: 33, 33a, 33b

Tier: 1

Question: Was the blood of the child of interest tested for lead when he/she was young?
(Responses: yes, no, declined, don't know)

Where you told that the level of lead was a level you needed to be worried about? (Responses: yes, no, declined, don't know)

Did you take action on results? (Responses: yes [describe], no, declined, don't know)

Potential Exposure: Lead

Validity/Rationale: Many regions provide blood lead testing for children. In cases where children have been tested, these questions aim to get at the results and the potential indication of a high blood lead level, which would indicate high exposure.

O Module (Occupation and Exposures) -
Itemized Rationale Summary of
the Early Life Exposures Assessment Tool for Autism Studies

[O1 – 5 - Biological mother's occupation during pre-/post-pregnancy timeframe](#)

[O6 - Description of both biological parent's occupations during pre-/post-pregnancy](#)

[O7 – 10 - Biological mother's occupational history](#)

[O11 – 14 - Biological father's occupational history](#)

[O15 – 27 Occupational exposure to a suite of compounds](#)

O1 – 5 - Biological mother's occupation during pre-/post-pregnancy timeframe

Module: O

Question Number: 1-5

Tier: 1

Question:

1 -Between 3 months before pregnancy and the end of the child's first year of life, did you have a job or were you a student?

[Responses: Yes, No, Refused, DK]

2 -Please choose one of the following that describes your status:

[Responses: A stay-at-home parent or caregiver, disabled, unemployed/in between jobs, incarcerated, other: specify _____, Refused, DK]

3 -Between 3 months before pregnancy and the end of the child's first year of life, did you take any time off for the pregnancy or maternity leave?

[Responses: Yes, No, Refused, DK]

3a - Please mark all of the months you took off during each time period:

[Responses: Before Pregnancy (3 Months Before, 2 Months Before, 1 Month Before, None, Refused, DK), Pregnancy (Month 1, Month 2, Month 3, Month 4, Month 5, Month 6, Month 7, Month 8, Month 9, None, Refused, DK), First Year of Child's Life (Month 1, Month 2, Month 3, Month 4, Month 5, Month 6, Month 7, Month 8, Month 9, Month 10, Month 11, Month 12, None, Refused, DK)]

4 -Between 3 months before pregnancy and the end of the child's first year of life, did the child's father have a job or was he a student?

[Responses: Yes, No, Refused, DK]

5 -Please one of the following that describes his status:

[Responses: A stay-at-home parent or caregiver, disabled, unemployed/in between jobs, incarcerated, other: specify _____, Refused, DK]

Potential Exposures: Various occupational exposures

Validity: Face

Rationale: This series of questions is used to determine if and when the parents worked in order to determine what time periods occupational exposures must be evaluated.

Description of Supporting Papers: N/A

Other surveys which use the question or a version of it:

*MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
Part 12B (Occupational History)*

Journal References: N/A

O6 - Description of both biological parent's occupations during pre-/post-pregnancy

Module: O

Question Number: 6

Tier: 1

Question:

6 - Which of the following describes your occupation(s) and the child's biological father's occupation(s) during the period 3 months before pregnancy through the end of the child's first year? [Mark all that apply]

[Responses: Mother (Before Pregnancy, During Pregnancy, Child's First Year), Biological Father - A. Work in an office environment, B. Retail/Sales/Cashier, C. Food Preparation/Food Server/Waiter or Waitress, D. Health Care Worker/Doctor/Nurse, E. Janitor/Housekeeper, F. Warehouse/Stockroom, G. Manufacturing/Factory, H. Military, I. Repair Services/Mechanic/Plumber, J. Teacher/Teacher's Aid, K. Construction, L. Laboratory Technician/Scientist, M. Public Safety (Police, Firefighter, Security Guard), N. Agriculture/Farming, O. Not Employed, P. Other, Unknown, Refused]

Potential Exposures: Various occupational exposures

Validity: Face

Rationale: We felt it appropriate to update the occupational module in order to more accurately reflect the current American occupational landscape. The range of jobs listed in the instrument was carefully selected by the researchers based on their personal experience.

Description of Supporting Papers: N/A

Other surveys which use the question or a version of it: N/A

Journal References: N/A

O7 – 10 - Biological mother's occupational history

Module: O

Question Number: 7-10

Tier: 1

Question:

For the mother, we're going to ask about all of the companies, organizations or schools where you worked or attended, beginning with the one you had three months before pregnancy through the end of the child's first year of life. Include all employers, including "self-employed." If you worked at more than four places, please include only the four you worked at the for the longest periods of time. Begin with the employment/job you had three months before pregnancy.

If you marked "Not Employed" for the entire period from 3 months before pregnancy through the end of the first year of the child's life, skip to Question 12.

7a - List the name of the company, organization or school you worked for or attended. If you were self-employed, please list "self-employed".

[Responses: Company _____, Refused, DK]

7b - List what the company or organization made/did. If you were attending school, please list "education".

[Responses: They make/do _____, Refused, DK]

7c - Job title. If you were attending school, then job title is "student".

[Responses: Job Title _____, Refused, DK]

7d - List your duties or responsibilities for this job. If you were attending school, please list your major field of study.

[Responses: Duties _____, Refused, DK]

7e - Start Date

[Responses: Month __ __, Year __ __ __ __, Refused, DK]

7f - Stop Date

[Responses: Month __ __, Year __ __ __ __, Refused, DK]

7g - Hours per Week

[Responses: Hours __ __, Refused, DK]

Potential Exposures: Various occupational exposures

Validity: Face

Rationale: This portion of the module is a common feature occupational questionnaires, and can be used in numerous job lookup tables to ascertain potential exposures.

Other surveys which use the question or a version of it: *MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-Part 12B (Occupational History)*

O11 – 14 - Biological father’s occupational history

Module: O

Question Number: 11-14

Tier: 1

Question:

For the child’s biological father, we’re going to ask about all of the companies, organizations or schools where he worked or attended, beginning with the one he had three months before pregnancy through the end of the child’s first year of life. Include all employers, including “self-employed.” If he worked at more than four places, please include only the four he worked at the for the longest periods of time. Begin with the employment/job he had three months before pregnancy.

If you marked “Not Employed” for the entire period from 3 months before pregnancy through the end of the first year of the child’s life, skip to Question 12.

11a - List the name of the company, organization or school he worked for or attended. If he was self-employed, please list “self-employed”.

[Responses: Company _____, Refused, DK]

11b - List what the company or organization made/did. If he was attending school, please list “education”.

[Responses: They make/do _____, Refused, DK]

11c - Job title. If he was attending school, then job title is “student”.

[Responses: Job Title _____, Refused, DK]

11d - List his duties or responsibilities for this job. If he was attending school, please list his major field of study.

[Responses: Duties _____, Refused, DK]

11e - Start Date

[Responses: Month __ __, Year __ __ __ __, Refused, DK]

11f - Stop Date

[Responses: Month __ __, Year __ __ __ __, Refused, DK]

11g - Hours per Week

[Responses: Hours __ __, Refused, DK]

Potential Exposures: Various occupational exposures

Validity: Face

Rationale: This portion of the module is a common feature occupational questionnaires, and can be used in numerous job lookup tables to ascertain potential exposures.

Other surveys which use the question or a version of it:

*MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
Part 12B (Occupational History)*

O15 – 27 Occupational exposure to a suite of compounds

Module: O

Question Number: 15-27

Tier: 1

Question:

In work or daily life, were you or the child's biological father regularly exposed to any of the following during the 3 months before pregnancy, during pregnancy, or during the child's first year?

15 – Asbestos, 16 – Chemicals/Acids/Solvents, 17 – Coal or Stone Dusts, 18 – Coal Tar/Pitch/Asphalt 19 – Diesel Engine Exhaust, 20 – Dyes, 21 – Formaldehyde, 22 – Gasoline Exhaust, 23 – Pesticides/Herbicides, 24 – Textile Fibers/Dusts, 25 – Wood Dust, 26 – X-rays/Radioactive Materials, 27 – Varnish/Lacquer

[Responses: Biological Parent (Mother, Father),

Before Pregnancy (Yes, No),

During Pregnancy (Yes, No),

First Year (Yes, No),

Refused, DK]

Potential Exposures: Occupational exposures to the listed compounds

Validity: Face

Rationale: This section of the occupational module, in which specific exposures are listed, is consolidated from various other lists and based on the author's personal experience.

Other surveys which use the question or a version of it:

*MARBLES (Markers of Autism Risk in Babies: Learning Early Signs) Study-
Part 12B (Occupational History)*

