Comparison of Smoking During Pregnancy Prevalence from Natality Records, the Pregnancy Risk Assessment Monitoring Program, and the Behavioral Risk Factor Surveillance System

Sarah Milder, MPH, Mary Ann Honors, PhD, MPH, Laura Houghtaling, MPH, Kristin Shaw, MPH, Tom Eckstein, MBA, Arundel Metrics, Inc.

Background

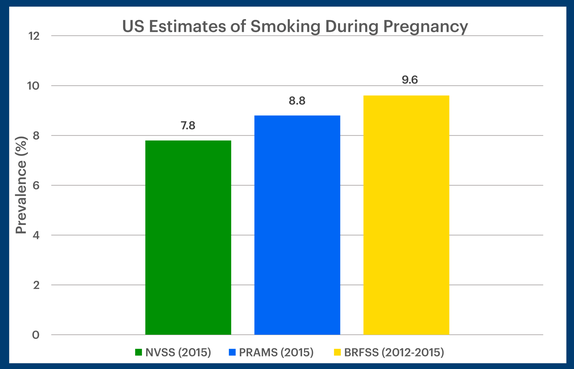
- Maternal smoking linked to preterm birth, low birthweight, miscarriage, ectopic pregnancy, and increased risk of sudden unexpected infant death
- Birth certificate data often used to determine prevalence of smoking during pregnancy, estimates not available in all states
- Objective: compare state-level smoking during pregnancy prevalence estimates from CDC Wonder natality records, Pregnancy Risk Assessment Monitoring Program (PRAMS), and Behavioral Risk Factor Surveillance System (BRFSS)

Methods

- US and state-level estimates of smoking prevalence during pregnancy were calculated from:
  - 2015 natality records (NVSS) - mothers aged 18-44, suppressed if missing responses >15%
  - 2015 PRAMS: women with recent live birth, suppressed if response rate <55%
  - 2012-2015 BRFSS: pregnant women aged 18-44, suppressed if sample size <50 or relative standard error >30%
- Two-sample t-tests used to evaluate differences in state estimates by source

National Results

- NVSS and PRAMS estimates differed by 1 percentage point
- BRFSS estimate was 0.8% and 1.8% higher than PRAMS and NVSS estimates, respectively



Smoking	NVSS	PRAMS	BRFSS
Yes Response	296,455	4,018	949
Respondents	3,978,497	40,033	10,834

Figure 1 (left): National prevalence estimates by data source

Figure 2 (right): State-level prevalence estimates by source

1.7% ≤ 6.6%
6.7% ≤ 10.0%
10.1% ≤ 13.3%
13.4 ≤ 15.6%
≥ 15.7%

**=suppressed*
NA=Not available

State	NVSS	PRAMS	BRFSS
AK	12.5	11.4	*
AL	10.4	11.0	15.2
AR	14.6	15.8	24.7
AZ	5.3	NA	*
CA	1.7	NA	*
CO	6.4	5.9	13.8
CT	NA	4.5	*
DE	10.0	9.0	*
FL	5.8	*	*
GA	5.7	*	*
HI	*	4.9	*
IA	13.7	14.2	*
ID	9.6	NA	13.7
IL	6.6	7.8	*
IN	14.3	NA	17.1
KS	11.0	NA	11.9
KY	19.5	NA	13.2
LA	6.9	11.6	*
MA	5.7	5.2	8.0
MD	6.5	5.9	*
ME	15.6	*	19.5
MI	12.3	13.3	15.6
MN	9.4	*	11.8
MO	15.9	15.1	15.9
MS	10.2	*	17.3
MT	15.9	NA	13.5
NC	9.4	*	14.2
ND	14.4	NA	13.8
NE	10.1	10.3	9.8
NH	12.5	8.6	*
NJ	NA	4.4	*
NM	6.6	7.1	*
NV	4.8	NA	*
NY	5.0	6.8	*
OH	15.2	14.6	20.7
OK	12.2	13.7	12.0
OR	9.9	8.7	*
PA	12.5	10.8	20.4
RI	7.5	*	*
SC	9.8	*	16.3
SD	14.0	NA	19.2
TN	14.3	16.0	*
TX	3.6	5.1	*
UT	3.5	4.0	*
VA	6.8	6.2	6.5
VT	16.6	16.0	18.7
WA	7.2	7.0	10.2
WI	12.0	9.7	13.7
WV	25.2	25.2	18.9
WY	15.2	13.5	*

State-level Results

- NVSS and PRAMS estimates were not statistically different
  - Of the 28 states with 2015 estimates from both sources, the difference in estimates ranged from no difference in West Virginia (25.2%) to a 4.7 percentage point difference in Louisiana (6.9% natality file vs. 11.6% PRAMS)
  - Half of states differed by 1 percentage point or less
- BRFSS estimates differed significantly from both the natality and PRAMS estimates (t-tests, p=0.0001)
- Estimates were available for 27 states from 2012-2015 BRFSS, most states except Connecticut and New Jersey (not reported) and Hawaii (suppressed) from NVSS, and 32 states, including Connecticut, Hawaii and New Jersey from PRAMS

Conclusions

- Smoking during pregnancy prevalence estimates are similar between 2015 NVSS and PRAMS
- Smoking during pregnancy prevalence estimates are similar between 2015 natality files and PRAMS
- BRFSS may not be a reliable source for calculating state-level smoking prevalence estimates during pregnancy due to the difference in estimates with NVSS and PRAMS and the low number of pregnant women sampled

Limitations

- All sources likely underestimate the true prevalence of smoking during pregnancy due to social desirability bias
- Different data sources ascertain smoking during pregnancy at different times from mother (during pregnancy, immediately after birth, and several months after birth)
- PRAMS and BRFSS estimates are from self-report surveys and are subject to recall and reporting bias
- Birth certificate data are completed by hospital staff who may use different forms to collect information and may not be trained uniformly across hospitals

Acknowledgments
We thank the advisory committee, who provided guidance in the development of the *America's Health Rankings® Health of Women and Children Report*, the PRAMS Working Group and the Centers for Disease Control and Prevention (CDC) and United Health Foundation for their continued support of this project.

Disclosure
Arundel Metrics receives funding from United Health Foundation to produce America's Health Rankings. Arundel Metrics (arundelmetrics.com) is a small, data-driven consulting firm specializing in public health measurement and index generation.