Unintended Pregnancy Rates at the State Level

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CONTEXT: *Unintended pregnancy is a key reproductive health indicator, but rates have never been calculated for all 50 states.*

METHODS: *State-level estimates of unintended pregnancy rates in 2006 were calculated using data from several sources. The proportion of births resulting from unintended pregnancies was obtained from the Pregnancy Risk Assessment Monitoring System and similar state surveys, and the intention status of pregnancies ending in abortion from a national survey of abortion patients. These proportions were applied to birth and abortion counts for each state, and fetal losses were estimated. Rates of unintended pregnancy were obtained by dividing relevant figures by the number of women aged 15–44 in each state. Six states and the District of Columbia had no appropriate survey data; their rates were predicted using multivariate linear regression.*

RESULTS: *In 2006, the median state unintended pregnancy rate was 51 per 1,000 women aged 15–44. Most rates fell within a range of 40–65 unintended pregnancies per 1,000 women. The highest rate was in Mississippi (69); the lowest rate was in New Hampshire (36). Rates were generally highest in the South and Southwest, and in states with large urban populations. In 29 states and the District of Columbia, more than half of pregnancies were unintended; in nine, a consistent upward trend in unintended pregnancy rates between 2002 and 2006 was apparent; no state had a consistent decline.*

CONCLUSIONS: *These rates provide benchmarks for measuring the impact on unintended pregnancy of state policies and practices, such as those governing sex education and the funding of contraceptive services.*

Perspectives on Sexual and Reproductive Health, 2011, 43(2):78–87, doi: 10.1363/4307811

The unintended pregnancy rate is one of the most important indicators of a population's reproductive health. The large majority of U.S. women and men want to plan their pregnancies,[1] and improving their ability to do so remains a key goal of the national Healthy People initiative.[2] In addition, unplanned births have been associated with numerous undesirable outcomes, including inadequate or delayed initiation of prenatal care, use of tobacco and alcohol during pregnancy, premature birth, low birth weight, lack of breast-feeding, and negative physical and mental health outcomes among children.[3–9] Thus, reductions in unintended pregnancy rates could have widespread positive effects on the health of Americans.

The rate of unintended pregnancy fell nearly 20% between the early 1980s and the mid-1990s,[10] but it remained unchanged between 1994 and 2001.[11] Although rates continued to fall among higher income women (those with incomes at or above 200% of the federal poverty level) in 1994–2001, they rose among the poorest women (those below 100% of poverty); by 2001, a woman living in poverty was four times as likely as a woman living at 200% of poverty or higher to have an unintended pregnancy. In addition, racial disparities persisted during this period: In both 1994 and 2001, Hispanic women were twice as likely as white women to have an unintended pregnancy, while black women were nearly three times as likely as white women to do so.[11]

The dimensions of the problem have long been known as a result of analyses that combined national-level data on pregnancy intentions from the National Survey of Family Growth (NSFG) with national data on births and abortion incidence. However, such estimates have not been calculated for each state. Because teenage pregnancy rates,[12] abortion incidence rates and access to family planning services[13] all vary widely by state, rates of unintended pregnancy may vary as well, among both teenagers and adults. State-level data on unintended pregnancy rates would be highly useful to researchers, service providers, advocates and policymakers. For example, absent such rates, it is impossible to assess whether decreases in state abortion rates are driven by declines in unintended pregnancy rates or by other factors, such as harassment of women visiting abortion clinics, state restrictions on abortion or public opinion. Similarly, the lack of state data has hindered efforts to gauge the impact of state sex education policies and state-based efforts to reduce levels of unintended pregnancy, or to compare levels of teenage pregnancy to overall levels of unintended pregnancy among all women in the state.

Until recently, data on the intendedness of pregnancies resulting in births were available only for a limited

number of states. However, as of 2007, some 39 jurisdictions had joined the Pregnancy Risk Assessment Monitoring System (PRAMS).[14] A surveillance project of the Centers for Disease Control and Prevention (CDC) and individual state health departments, PRAMS collects state-specific, population-based data on maternal attitudes (including pregnancy intentions) and experiences before, during and shortly after a birth. In addition, seven states have instituted similar surveys. These newly available data on births, combined with the most complete state-level data on abortions, make it possible to estimate unintended pregnancy rates for all 50 states—the task we undertook in this analysis.

METHODS

Measures

In this article, a pregnancy is considered unintended if the woman reported that it was mistimed (i.e., she had wanted to become pregnant, but at a later date) or unwanted (i.e., she had not wanted to become pregnant then or at any time). Intended pregnancies are those that occurred either at the time the woman had desired or later.

The inadequacy of this traditional, demographically oriented measure of pregnancy intentions and the need for more nuanced measures have been widely noted.[15–27] For example, a pregnancy classified as unintended may have been unexpected and unplanned, but not necessarily unwelcome or unwanted. In addition, mistimed pregnancies include those that occurred only a little too soon or much too soon, and the extent of mistiming appears to be an important predictor of maternal behaviors and child health outcomes.[28,29] However, although other research and data collection are under way to refine measures of pregnancy intention, the PRAMS data available for this analysis include only the more limited, traditional measure of intention status.

The unintended pregnancy rate for a state is defined as the number of such pregnancies per 1,000 women aged 15–44 residing in the state. Similarly, the intended pregnancy rate is the number of intended pregnancies divided by the same population. Population denominators by age, race and ethnic group for each state are based on population estimates calculated by the National Center for Health Statistics and the U.S. Census Bureau.[30] In addition to these rates, we examine the proportion of all pregnancies among residents of the state that were unintended. We also assess the proportions of unintended pregnancies that were mistimed and unwanted, as well as the proportions ending in birth, abortion and fetal loss (including miscarriages).

Because the total number of pregnancies is the sum of all births, induced abortions and fetal losses, a number of data sources are needed to make these calculations. Our analyses are for 2006, the most recent year for which intention data on both births and abortions are available. However, for some states, the intention status of births was not measured in 2006. For these states, we used intention data from the closest available year—generally 2005 or 2007, though in a few cases it was necessary to use data from 2002 or 2003 (see appendix, page 84).

Pregnancy Outcomes

•***Births.*** PRAMS consists of annual surveys of state residents who have given birth in the state; the data can be weighted to represent all births in the state for the year of the survey. PRAMS surveys were conducted in 31 states in 2002, in 29 states in 2004, in 28 states in 2006 and in 36 states in 2007. In addition, two PRAMS surveys were conducted in New York—one for New York City and one for the rest of the state—and one was administered among Native American women in South Dakota in 2007.

Other states have (or have recently had) survey programs that are based on or similar to PRAMS and include questions on pregnancy intention. The Pregnancy Risk Assessment Tracking System has been administered annually in Idaho since 2001[31] and was administered in Connecticut in 2002 and 2003.[32] In Wyoming, the Maternal Outcomes Measurement System, based on PRAMS, conducted surveys in 2003, 2004 and 2005.[33] In California, Maternal and Infant Health Assessment surveys have collected similar data annually since 2000.[34] In Iowa, the annual Barriers to Prenatal Care survey has included questions on the intention status of births since 1991.[35] The Perinatal Risk Assessment survey has been conducted every two years in South Dakota beginning in 1997, including in 2003, 2005 and 2007.[36] Finally, Kentucky began conducting a PRAMS-based survey in 2007.[37]

Using intention status data from the jurisdictions that carried out at least one round of a PRAMS or similar survey, we were able to directly estimate rates of unintended pregnancy for 44 states. (We indirectly predicted rates for the remaining six states and the District of Columbia) For each available state, we tabulated the proportion of births that were unintended (and the proportions mistimed and unwanted).* These proportions were applied to the total number of births reported for the state in U.S. vital statistics.[38–40]

In some states, the PRAMS survey response rate was lower than 70%, the cutoff used by the CDC for inclusion in publicly disseminated findings. Estimates from surveys with lower-than-optimal response rates can be greatly affected by slight variations in the composition of the sample. We were cautious in including estimates from surveys with response rates below 70%. However, for some states, the only data available on intention status of births came

*Tabulations of the proportion of births resulting from unintended pregnancies were obtained from states' published reports, through requests made directly to state health departments or from the CDC's CPONDER interactive data analysis system (source: Centers for Disease Control and Prevention, CPONDER—CDC's PRAMS On-line Data for Epidemiologic Research, 2010, <http://www.cdc.gov/prams/cponder.htm>, accessed Sept. 13, 2010).

from a single survey with a response rate below the 70% threshold; in others, annual survey response rates consistently fell below 70% or varied from year to year. We carefully examined data from surveys with response rates below 70% and rejected those that appeared to have been affected by skewed samples—a problem that occurred for only one state, South Dakota. We have, however, noted in the appendix those estimates that are based on surveys with response rates below 70%, and provided estimates of unintended pregnancy rates based on the low and high values of the confidence intervals surrounding the state-specific estimates of the proportion of births that were unintended.

•***Abortions.*** Although most aborted pregnancies were unintended, some women obtain abortions following an intended conception. Currently, no state-level data are available on the intendedness of pregnancies that are terminated (PRAMS is limited to births). However, a question on the intention status of the pregnancy was included in a nationally representative survey of women who obtained abortions in 2008,[41] allowing for the first reliable national-level estimates of the intendedness of pregnancies ending in induced abortion. (Data on the intendedness of pregnancies ending in abortion are also available from the NSFG, but abortions are substantially underreported in that survey, raising questions about the representativeness of the abortions that are reported.[42]) Because of the lack of state-level data, and because the proportion of aborted pregnancies in the national-level data that were intended is quite small (less than 5%), we applied the national-level estimates to the number of abortions obtained by residents of each state to estimate the number of unintended pregnancies ending in abortion in the state.

Most states conduct annual surveillance of abortions provided in the state and the number of abortions obtained by residents. However, abortions are almost always underreported to state surveillance systems.[43] Therefore, we used the abortion counts obtained from state surveillance systems in 2002, 2004 and 2006 and adjusted them on the basis of a periodic national census of abortion providers conducted by the Guttmacher Institute.[13,44–46]

•***Fetal losses.*** Fetal losses are often included in vital statistics reports, but are undercounted to an even greater degree than induced abortions because in most states, only fetal deaths occurring at or after 20 weeks' gestation are required to be reported. Moreover, women underreport fetal loss in surveys of pregnancy histories,[42] in part because many spontaneous abortions occur at very early gestations and are not detected. A reasonable approximation of the total number of fetal losses is the sum of 20% of all births and 10% of all induced abortions.*[47] We estimated fetal loss separately for intended and unintended pregnancies.

States Without Surveys

We used a multivariate linear regression model to make estimates for the seven jurisdictions that lacked PRAMS or similar data on the intention status of births: Arizona, District of Columbia, Indiana, Kansas, Nevada, New Hampshire and South Dakota.† In the model, each state with data represented an observation. The dependent variable was the state's unintended pregnancy rate. We included as independent variables several demographic characteristics known to be associated with unintended pregnancy rates: age,[11] race and ethnicity,[11] marital status[30] and poverty status.[48] Because this was a state-level, rather than individual-level, model, some characteristics required multiple measures. For example, race and ethnicity were entered as three variables: proportion of women aged 15–44 who were non-Hispanic white, proportion who were non-Hispanic black and proportion who were Hispanic (other racial and ethnic groups were omitted to prevent overspecification). Finally, we included the state's overall pregnancy rate as a key independent variable. Marital status did not contribute significantly to the model; after we removed it, the final model explained 92% of the variance in rates. (We used the same model to predict the intended pregnancy rates for these states; that model explained 86% of the variance.)

To test the accuracy of the model, we used additional regression models to predict the unintended pregnancy rate for each of the 44 states with PRAMS or similar data. In 44 separate regressions, one state was omitted and data from the other 43 states were used to predict the unintended pregnancy rate of the omitted state. We then compared each model's predictions with the actual rate. Twenty-three of the 44 predicted rates (52%) were within 2.0 points of the actual rate, and 41 (93%) were within 5.0 points. The largest differences between a predicted value and an actual value were 8.4 rate points, in Idaho, and 8.8 rate points, in Wyoming (see appendix for additional tests).

In light of the accuracy of these results and the high proportion of variance explained by our model, we used the model to predict rates for the seven jurisdictions without PRAMS or similar data. We applied each predicted rate to the number of women aged 15–44 in the state to estimate the number of unintended pregnancies and the proportion of pregnancies that were unintended. In addition, we calculated the number of unintended pregnancies ending in birth for these states by subtracting the number of unintended pregnancies ending in abortion or fetal loss from the predicted total number of unintended pregnancies. (We estimated the number of unintended pregnancies ending in fetal loss for these states by assuming that the proportion of all fetal losses that resulted from unintended conceptions was the same as the ratio of unintended pregnancies to all pregnancies.)

*We thus estimated that 14–16% of all pregnancies ended in fetal loss; this range is consistent with estimates based on national data corrected for abortion underreporting.[42]

†Data from South Dakota's Perinatal Risk Assessment surveys were not comparable with those of other states (see appendix).

RESULTS

Numbers and Rates of Unintended Pregnancy

Not surprisingly, states with the largest populations of women aged 15–44 had the greatest numbers of unintended pregnancies in 2006 (Table 1). The median state unintended pregnancy rate was 51 per 1,000 women aged 15–44, and most rates fell within a range of 40–65. The lowest rate was in New Hampshire (36), followed by Maine, North Dakota, Vermont and West Virginia (37–39); the highest was in Mississippi (69), followed by California, Delaware, the District of Columbia, Hawaii and Nevada (66–67).

Intended pregnancy rates also varied, but states with high unintended pregnancy rates did not necessarily have high intended pregnancy rates. For example, Delaware had one of the highest unintended pregnancy rates (66 per 1,000 women) but a relatively low intended rate (45). New Hampshire's unintended and intended pregnancy rates were both low (36 and 42, respectively), while Nevada's were both high (66 and 60, respectively). And

TABLE 1. Number and percentage of pregnancies that were unintended; pregnancy rate, by intention status; and percentage distributions of unintended pregnancies, by wantedness and by outcome—all according to state, 2006

State	Unintended pregnancies		Pregnancy rate		% distribution of unintended pregnancies				
	No.	As % of all pregnancies	Unintended	Intended	By wantedness		By outcome		
					Mistimed	Unwanted	Birth	Abortion	Fetal loss
Alabama	48,000	55	51	42	u	u	63	23	14
Alaska	8,000	53	55	53	67	33	61	26	13
Arizona*	74,000	51	59	57	u	u	59	27	14
Arkansas	31,000	56	54	43	72	28	68	18	14
California	513,000	56	66	51	u	u	47	42	11
Colorado	48,000	48	48	52	71	30	58	29	13
Connecticut†	37,000	51	53	50	64	36	37	54	9
Delaware‡	12,000	60	66	45	66	34	49	40	11
District of Columbia*	10,000	59	67	50	u	u	26	64	10
Florida§	223,000	59	64	45	67	33	49	40	11
Georgia	122,000	57	60	44	68	32	61	26	13
Hawaii	17,000	59	66	50	63	37	52	36	12
Idaho	13,000	41	43	65	74	26	65	21	14
Illinois	143,000	53	53	48	70	30	53	35	12
Indiana*	58,000	48	45	48	u	u	64	22	15
Iowa	24,000	44	42	53	79	21	60	27	13
Kansas*	27,000	48	49	52	u	u	64	22	15
Kentucky‡	35,000	45	40	48	64	36	68	18	14
Louisiana‡	49,000	58	55	39	72	28	71	15	15
Maine	10,000	50	37	41	71	29	57	31	13
Maryland	75,000	56	63	48	66	34	41	48	10
Massachusetts‡	59,000	47	43	48	65	35	41	49	10
Michigan	105,000	53	51	45	65	35	50	39	11
Minnesota	46,000	44	44	54	72	28	57	30	13
Mississippi	42,000	65	69	38	68	32	66	21	14
Missouri‡	61,000	53	51	45	68	32	61	25	13
Montana**	9,000	53	48	47	68	32	64	23	14
Nebraska	16,000	46	44	55	72	28	68	18	14
Nevada*	33,000	52	66	60	u	u	45	42	13
New Hampshire*	9,000	43	36	42	u	u	53	33	14
New Jersey	112,000	55	63	53	63	37	36	54	9
New Mexico	24,000	56	59	50	71	29	58	29	13
New York	266,000	56	65	50	65	35	33	59	9
North Carolina	106,000	56	58	44	68	32	57	30	13
North Dakota**	5,000	45	37	52	77	24	67	19	14
Ohio	118,000	54	51	42	66	34	59	28	13
Oklahoma	39,000	53	55	47	73	27	66	20	14
Oregon	35,000	49	47	50	71	29	53	35	12
Pennsylvania‡	121,000	55	49	42	70	30	55	33	12
Rhode Island	10,000	50	45	43	67	33	46	44	11
South Carolina	52,000	58	58	43	71	29	60	27	13
South Dakota*	7,000	47	48	52	u	u	72	13	15
Tennessee‡	70,000	58	55	40	69	31	62	24	13
Texas	309,000	53	62	54	67	33	58	29	13
Utah	26,000	38	45	74	76	23	71	15	15
Vermont	5,000	50	38	41	67	33	50	38	12
Virginia‡	85,000	52	53	48	65	35	51	37	12
Washington	64,000	49	48	51	68	32	50	38	12
West Virginia	14,000	50	39	41	67	33	66	20	14
Wisconsin‡	45,000	45	40	48	70	30	62	25	13
Wyoming‡	5,000	45	54	52	74	26	63	23	14

*Unintended pregnancy rate was estimated using multivariate linear regression. †Intention status of births was estimated from 2003 data. ‡Intention status of births was estimated from 2007 data. §Intention status of births was estimated from 2005 data. **Intention status of births was estimated from 2002 data. *Notes:* Numbers of pregnancies are rounded to the nearest thousand. Pregnancy rates are per 1,000 women aged 15–44. Percentages for unintended pregnancy outcomes may not sum to 100 because of rounding. u=unavailable.

in Utah and Idaho, unintended pregnancy rates were low (45 and 43), but intended pregnancy rates were unusually high (74 and 65).

In 2006, the median proportion of pregnancies that were unintended was 53%. In 29 states and the District of Columbia, more than half of pregnancies were unintended; in the remainder, 38–50% were unintended. Nearly two-thirds of pregnancies in Mississippi were unintended, while only about two in five of those in Utah and Idaho were.

In general, unintended pregnancy rates were relatively high in states with large urban populations, such as California, New York, New Jersey, Maryland and Delaware, and in southern and southwestern states (Figure 1).

Pregnancy Wantedness and Outcomes

In every state, the proportion of unintended pregnancies that were mistimed was much larger than the proportion that were unwanted (Table 1). In nearly every state, roughly 65–75% of unintended pregnancies were characterized as mistimed, and 25–35% as unwanted. Only a few states fell outside these ranges: Unwanted pregnancies made up 21% of unintended pregnancies in Iowa and 23% of those in Utah, and they represented 37% of unintended pregnancies in Hawaii and New Jersey.

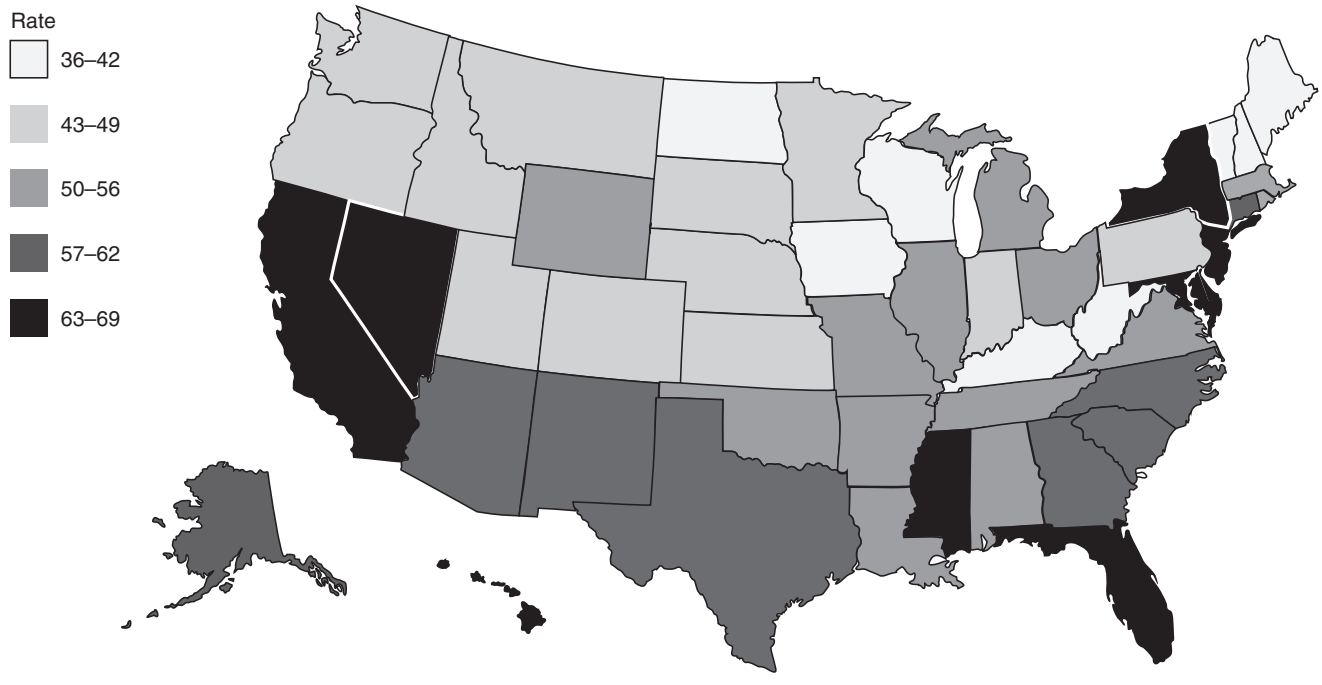
The proportions of unintended pregnancies ending in births and abortions varied widely. The median proportion of unintended pregnancies ending in birth was 58%, and the median proportion ending in abortion was 29% (the remainder ended in fetal loss). States where relatively low proportions ended in birth included New York (33%), New Jersey (36%), Connecticut (37%), Maryland (41%) and Massachusetts (41%). The states with the highest proportions of unintended pregnancies ending in birth were South Dakota (72%); Louisiana and Utah (71% each); and Arkansas, Kentucky and Nebraska (68% each).

Trends

Some evidence suggests an upward trend in unintended pregnancy rates between 2002 and 2006 (Table 2). Among the 34 states with data for both years, rates increased in 23 and decreased in eight; three states showed little or no change (1% or less). Eleven states had an increase of at least 10%, while only one state had a decrease of greater than 5%. The largest relative increases were in Maine (21%), North Carolina (17%), South Carolina (16%), Mississippi (16%), Minnesota (14%) and Wyoming (14%). These states also had the greatest absolute increases; the largest was in Mississippi (10 points). The greatest relative declines were in Michigan (8%) and Illinois (5%).

For 30 states, data were available for 2002, 2004 and 2006. Very little change (no more than 1.0 point every two years) occurred in Alaska Florida, Idaho, Louisiana and New Jersey. A steady rise in unintended pregnancy rates appears to have occurred in nine states. In many other states, such as Maryland, Oklahoma, Rhode Island, Texas and Washington, changes in the rates may primarily reflect year-to-year random fluctuations rather than steady increases or decreases. No states showed a consistent decline across the three time periods.

FIGURE 1. Number of unintended pregnancies per 1,000 women aged 15–44, by state, 2006



Note: Rates for Arizona, District of Columbia, Indiana, Kansas, Nevada, New Hampshire and South Dakota were estimated by multivariate linear regression.

TABLE 2. Rates of unintended pregnancy, selected years; and percentage change in rates between 2002 and 2006—all according to state

State	2002	2004	2006	% change
Alabama	48	50	51	6
Alaska	53	54	55	3
Arizona	u	u	u	u
Arkansas	51	53	54	7
California	68	u	66	–3
Colorado	50	48	48	–3
Connecticut*	47	u	53	13
Delaware†	u	u	66	u
District of Columbia	u	u	u	u
Florida‡	63	63	64	2
Georgia	u	57	60	u
Hawaii	60	60	66	11
Idaho	43	42	43	0
Illinois	56	52	53	–5
Indiana	u	u	u	u
Iowa	40	39	42	5
Kansas	u	u	u	u
Kentucky†	u	u	40	u
Louisiana†	54	54	55	2
Maine	31	35	37	21
Maryland	65	60	63	–3
Massachusetts†	u	u	43	u
Michigan	55	51	51	–8
Minnesota	39	41	44	14
Mississippi	59	60	69	16
Missouri†	u	u	51	u
Montana§	44	u	48	8
Nebraska	46	49	44	–4
Nevada	u	u	u	u
New Hampshire	u	u	u	u
New Jersey	63	63	63	1
New Mexico	54	55	59	10
New York	u	67	65	u
North Carolina	49	53	58	17
North Dakota§	33	u	37	12
Ohio	48	48	51	7
Oklahoma	53	55	55	2
Oregon	49	46	47	–4
Pennsylvania†	u	u	49	u
Rhode Island	45	48	45	1
South Carolina	50	52	58	16
South Dakota	u	u	u	u
Tennessee†	u	u	55	u
Texas	61	60	62	2
Utah	42	41	45	6
Vermont	34	35	38	13
Virginia†	u	u	53	u
Washington	49	45	48	–2
West Virginia	37	39	39	6
Wisconsin†	u	u	40	u
Wyoming†,**	47	44	54	14

*Intention status of births in 2006 was estimated from 2003 data. †Intention status of births in 2006 was estimated from 2007 data. ‡Intention status of births in 2006 was estimated from 2005 data. §Intention status of births in 2006 was estimated from 2002 data. **Intention status of births in 2002 was estimated from 2003 data. *Note:* u=unavailable.

DISCUSSION

Our findings, while descriptive, indicate that unintended pregnancy rates and trends in these rates vary significantly among the states. Variation in demographic and socioeconomic factors (e.g., racial and ethnic composition, age and poverty) is likely a major contributor to the differences among state rates. Factors unmeasured in this analysis, such as funding and availability of family planning services and state policies (e.g., sex education, contraceptive coverage in insurance plans), also likely have an effect. Further research is necessary to elucidate the relative importance of these factors.

The proportions of unintended pregnancies ending in abortion and birth vary quite a bit by state. Many states with high proportions of unintended pregnancies ending in abortion are ones where abortion access is relatively good, while several states with low proportions ending in abortion are ones in which access to abortion is more limited.[49] However, cross-sectional analyses are not sufficient to establish causality. Additional research is needed to examine this relationship in more detail, ideally using trend data.

Our results suggest, but do not provide clear evidence of, an upward trend in the unintended pregnancy rate in some states. In fact, if we sum the state totals to calculate a national rate, the result—56 unintended pregnancies per 1,000 women aged 15–44—is higher than the most recent national estimate (51 per 1,000 in 2001).[11] However, our summed estimate may not be comparable to estimates calculated from national-level data. First, the national estimates are based on a nationally representative survey, the NSFG. Our estimates are based on dozens of state surveys, some of which failed to meet the CDC's recommended response rate of 70%. Moreover, we are missing survey data from six states and the District of Columbia. In addition, the NSFG estimates of the intention status of pregnancies ending in birth are based on multiple questions and allow for uncertainty and ambivalence, whereas the PRAMS surveys include only a single relevant question, which limits the classification of births to four discrete categories: occurred sooner than wanted, occurred later than wanted, occurred at the right time or was not wanted at any time. As a result, a more accurate estimate of the national level of unintended pregnancy, and any assessment of national trends, should be calculated using nationally representative data. Newly available data from the 2006–2008 NSFG will soon allow us to make such calculations.

These findings are subject to a number of limitations. First, the analyses rely on a wide range of data sources. This approach was necessary because no one source provides all the information needed to calculate rates of pregnancy outcomes, but it introduces potential sources of error. In the appendix, we describe the sources of variance that may affect the state-level estimates of the proportion of births that are unintended, as these estimates are the most important piece of information in our analysis.

The use of a single, national-level estimate of the proportion of aborted pregnancies that were intended is another limitation of the study. The proportion of abortions that followed intended conceptions is likely to vary by state. However, the overall proportion is small, so such variation likely had only a small impact on the total unintended pregnancy rate for each state.

At the same time, the strengths of the data we have used are worth highlighting: We have combined the best available national and state-level sources of information on pregnancy intentions for births and abortions; the counts

of births are from vital statistics, and the abortion estimates are based on a census, rather than a sample survey, of abortion providers; and the population estimates are anchored to the decennial census.

We hope that the findings in this article will serve a number of purposes. Most importantly, they can be used as a key indicator of women's reproductive health in each state, since the prevention of unintended pregnancy is a central goal in improving maternal and child health. If updated rates become available in the coming years, individual states can use our benchmark data to monitor progress in their efforts to improve women's reproductive health and reduce rates of unintended pregnancy through policies and programs. However, the rates are also an essential piece of the broader reproductive health puzzle. State-level statistics on pregnancies ending in abortion have been available for some time, but these numbers do not necessarily capture trends in unintended pregnancy.

The variation among states in the proportions of unintended pregnancies that end in abortion and in birth also has policy implications. Efforts to reduce unintended pregnancy rates by focusing only on reducing abortions (e.g., by restricting access to the procedure) would seem less likely to succeed than efforts that increase access to and use of contraceptives, particularly in states with a high proportion of unintended pregnancies ending in birth. In fact, at the national level, declines in the abortion rate have not been accompanied by declines in the unintended pregnancy rate.[11] These data will allow for an investigation of such issues. Finally, further analyses of these data will identify populations at increased risk of unintended pregnancy, allowing for targeted programs to improve reproductive health at the state level.

APPENDIX

The accuracy of the state-level estimates of the proportion of births that were unintended may have been affected by issues pertaining to the source data, but we took steps to minimize the impact of these issues.

Issues Related to Specific State Surveys

•***Idaho.*** The Pregnancy Risk Assessment Tracking System survey in Idaho was limited to mothers aged 18 and older. Therefore, estimates of the proportion of pregnancies that were unintended among women younger than 20 could be inaccurate if the likelihood of having an unintended birth differed between older and younger teenagers. We compared the distribution of births by intention status among 18- and 19-year-old women in Idaho with the distribution among women younger than 20 in surrounding states—Montana, Wyoming, Utah, Oregon and Washington. The distributions were comparable, suggesting that the distribution among 18- and 19-year-olds in Idaho was likely to be accurate for all teenagers in the state.

•***Iowa.*** Estimates of intention status from the Iowa Barriers to Prenatal Care surveys are not weighted. However, the surveys have large samples (more than 15,000 births each year, and 17,489 in 2006) that are thought to be representative of all births in the state. In addition, our estimate of the unintended pregnancy rate using survey data was lower than the estimate obtained from our state-level regression model (42 vs. 43 per 1,000 women), and is therefore a more conservative estimate.

•***New York.*** No single data source for pregnancy intention exists for New York State as a whole. However, separate Pregnancy Risk Assessment Monitoring System (PRAMS) surveys have been conducted for New York City and for the rest of the state. We calculated state-level rates and numbers by combining data from the two.

APPENDIX TABLE 1. Central, lower and upper estimates of unintended pregnancy rates, 2006, by state

State	Central	Lower	Upper
Alabama	51	49	54
Alaska	55	52	58
Arizona*	59	57	62
Arkansas	54	52	57
California	66	65	68
Colorado	48	46	51
Connecticut	53	50	55
Delaware	66	63	69
District of Columbia*	67	61	74
Florida	64	62	66
Georgia	60	58	63
Hawaii	66	64	68
Idaho	43	41	45
Illinois	53	51	55
Indiana*	45	44	47
Iowa	42	41	42
Kansas*	49	47	50
Kentucky	40	35	45
Louisiana	55	52	57
Maine	37	35	40
Maryland	63	60	66
Massachusetts	43	41	45
Michigan	51	48	53
Minnesota	44	42	46
Mississippi	69	65	73
Missouri	51	49	54
Montana	48	45	51
Nebraska	44	42	47
Nevada*	66	62	69
New Hampshire*	36	33	39
New Jersey	63	62	65
New Mexico	59	57	62
New York	65	64	67
North Carolina	58	55	60
North Dakota	37	34	39
Ohio	51	48	54
Oklahoma	55	51	58
Oregon	47	44	50
Pennsylvania	49	46	53
Rhode Island	45	43	47
South Carolina	58	55	61
South Dakota*	48	45	50
Tennessee	55	51	59
Texas	62	58	65
Utah	45	42	48
Vermont	38	37	40
Virginia	53	48	57
Washington	48	46	51
West Virginia	39	37	42
Wisconsin	40	37	42
Wyoming	54	51	57

*Lower and upper rates are based on 95% confidence interval values surrounding predicted rate from regression analysis. *Notes:* Rates are per 1,000 women aged 15–44. Lower and upper estimates are derived using the values of the lower and upper 95% confidence limits around the estimated proportion of births that are unintended.

•***South Carolina.*** For estimates of the proportion of births resulting from unintended pregnancies in 2006 in South Carolina, we used the interactive data retrieval system SCAN, available on the state health department's Web site. While SCAN provides estimates from the PRAMS surveys, the results for 2006 differ from those from the Centers for Disease Control and Prevention (CDC) CPONDER data analysis system. SCAN includes a full year's worth of data for 2006, while CPONDER includes only data for April–September. Data for 2002 and 2004 are identical in SCAN and CPONDER.

•***South Dakota.*** This state conducted Perinatal Risk Assessment surveys in 2003, 2005 and 2007. However, the response rates were relatively low in comparison with those for PRAMS in other states (23% in 2003, 34% in 2005 and 33% in 2007), and the samples appear to have been skewed toward more highly educated mothers. Furthermore, the surveys' measure of intention status differs from that of PRAMS surveys; in addition to being able to choose the usual intention categories, mothers could indicate that they had been "unsure" of their pregnancy intentions or select an "other" intention category. Together, these two categories accounted for 17% of all births. Therefore, rather than use this source, we predicted the South Dakota rate via regression.

•***States without 2006 intention data.*** In 14 states, data on the intention status of pregnancies resulting in births were unavailable for 2006, though data were available for other years. To estimate the number of unintended births in these states, we applied the proportion of births resulting from unintended pregnancies in an adjacent year (2005 or 2007) to the actual number of births in the state in 2006. For three states, PRAMS or similar data were not available for an adjacent year, so we used the most recent available data—2002 PRAMS data for Montana and North Dakota, and 2003 Pregnancy Risk Assessment Tracking System data for Connecticut.

In addition, we did not have 2002 data on intention status for Wyoming. Thus, for our examination of trends, we estimated the number of unintended births in 2002 using intention data for 2003.

Issues Related to Response Rates

•***Low response rates.*** The CDC does not recommend the use of data from PRAMS surveys that had response rates below 70% (or 65% for surveys conducted after 2006). However, we used intention status data from surveys that did not meet the 70% threshold when no other data were available. For 2002, these surveys were in Idaho (55%), Mississippi (61%), Montana (54%), Oregon (69%) and Texas (56%); for 2004, Alabama (64%), Idaho (56%), Ohio (67%) and Texas (64%); for 2006, Alabama (60%), Idaho (64%), New Mexico (64%), North Carolina (59%), South Carolina (67%) and Texas (54%); and for 2007, Delaware (65%), Kentucky (62%), Louisiana (56%), Tennessee (63%), Virginia (57%), Wisconsin (69%) and Wyoming (68%).

We compared the estimates of unintended pregnancy obtained using these data with the estimates calculated from state-level regression models. For each state, we ran a separate model excluding that state and predicting its unintended pregnancy rate using the data from all other states. We then compared the predicted unintended pregnancy rate to the estimate obtained from the PRAMS or similar data. In all but four cases, the estimates from the regression model were nearly identical to or slightly higher than those obtained from the state's data. Therefore, to err on the cautious side, we used the estimates derived from state data. We also used the PRAMS-derived estimates in the four cases where those estimates were higher than the estimates from our regression model—Delaware, Montana, Tennessee and Wyoming. No relationship was apparent between the size of the discrepancy in unintended birth rates and the state's response rate.

Of the four states with predicted rates lower than those obtained from the surveys, Wyoming is the only state for which we had PRAMS or other data from prior or subsequent years that we could compare with our estimate of intention status; the 2007 PRAMS-based estimate from Wyoming is only slightly higher than the estimate using the state's 2005 Maternal Outcomes Measurement System survey, and may be consistent with a slight upward trend. Even so, our estimates for Delaware, Montana, Tennessee and Wyoming could be slightly higher than the true values, but we reasoned that the estimates from the PRAMS data may be closer to the true values than the estimates obtained from the regression model. The PRAMS-based unintended pregnancy rate and the model-predicted unintended pregnancy rate were 66 and 61 per 1,000 women aged 15–44, respectively, for Delaware; 48 and 46 for Montana; 55 and 51 for Tennessee; and 54 and 45 for Wyoming.

•***Confidence intervals.*** The size of the confidence intervals around the estimates of the proportion of births that were unintended varied somewhat by state, but was plus or minus 4.0 rate points or less for all states except six: Kentucky (6.2), New York State (excluding New York City, 5.0), Pennsylvania (5.0), South Carolina (4.1), Tennessee (5.0), and Virginia (5.3). We calculated unintended pregnancy rate ranges for 2006 using the lowest and highest values of the confidence interval to demonstrate the potential effect on the estimated rates (Appendix Table 1).

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Acknowledgments

The authors thank Leslie Harrison, Indu Ahluwalia, Denise D'Angelo and the many state health department data coordinators and staff for their assistance in obtaining the data used in this analysis; Rachel Gold, Stanley Henshaw, Rachel Jones, Susheela Singh and Adam Sonfield for providing advice on the analysis and reviewing early drafts of this article; and Deva Cats-Baril for able research assistance.

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