

# Assessing the Validity and Reliability of Three Indicators Self-Reported on the Pregnancy Risk Assessment Monitoring System Survey

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## ABSTRACT

**Objectives.** We investigated the reliability and validity of three self-reported indicators from the Pregnancy Risk Assessment Monitoring System (PRAMS) survey.

**Methods.** We used 2008 PRAMS ( $n=15,646$ ) data from 12 states that had implemented the 2003 revised U.S. Certificate of Live Birth. We estimated reliability by kappa coefficient and validity by sensitivity and specificity using the birth certificate data as the reference for the following: prenatal participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); Medicaid payment for delivery; and breastfeeding initiation. These indicators were examined across several demographic subgroups.

**Results.** The reliability was high for all three measures: 0.81 for WIC participation, 0.67 for Medicaid payment of delivery, and 0.72 for breastfeeding initiation. The validity of PRAMS indicators was also high: WIC participation (sensitivity = 90.8%, specificity = 90.6%), Medicaid payment for delivery (sensitivity = 82.4%, specificity = 85.6%), and breastfeeding initiation (sensitivity = 94.3%, specificity = 76.0%). The prevalence estimates were higher on PRAMS than the birth certificate for each of the indicators except Medicaid-paid delivery among non-Hispanic black women. Kappa values within most subgroups remained in the moderate range (0.40–0.80). Sensitivity and specificity values were lower for Hispanic women who responded to the PRAMS survey in Spanish and for breastfeeding initiation among women who delivered very low birthweight and very preterm infants.

**Conclusion.** The validity and reliability of the PRAMS data for measures assessed were high. Our findings support the use of PRAMS data for epidemiological surveillance, research, and planning.

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The Pregnancy Risk Assessment Monitoring System (PRAMS) is one of the largest state-based surveillance systems of women with live births documenting experiences before, during, and after pregnancy. The data from PRAMS surveys are linked to the birth certificate information. The birth certificate is an important source of data for examining infant health at the state and national levels and is used widely.<sup>1-3</sup> Many studies have examined the reliability and validity of data from the U.S. birth certificate and other data sources such as postpartum surveys, medical records, and registry data.<sup>1-19</sup> Some indicators on the birth certificate are found to be more reliable than others, such as maternal demographics, insurance, and birthweight.<sup>4,5,7,13,15,19</sup> Birth certificate data have been reported to have lower sensitivity for tobacco and alcohol use;<sup>6,10</sup> birth defects;<sup>20</sup> prenatal care;<sup>11</sup> and maternal weight gain, medical risks, and obstetric complications,<sup>2,8,9,12,13</sup> although the sensitivity varies by subgroups of women and birth outcomes for many items.<sup>16,17</sup>

Because PRAMS data are self-reported, it is important to examine the reliability and validity with other population-based data-collection systems such as the birth certificate, which is an established system mandated to assess the health of mothers and babies in the U.S. According to state laws, each live birth must be registered and a birth certificate must be filed. Federal law mandates the national collection and publication of birth certificate data.<sup>21</sup> A new electronic birth certificate reporting standard was implemented in 2003, replacing the version that had been in place since 1989.<sup>22</sup> The 2003 version updated the birth certificate by revising or dropping items and adding new elements with detailed guidance provided on coding data.<sup>23</sup>

States participating in the Centers for Disease Control and Prevention's (CDC's) PRAMS project sample women with recent live-born deliveries using the state birth certificate files. Selected data from the state birth certificate file are linked to the PRAMS survey of women with live-born infants. Some of the measures on the new birth certificate reporting standard are the same as or similar to those on the PRAMS survey. Several studies have compared the validity of measures on PRAMS with birth certificate data, and this study examines additional indicators that had not been assessed previously.<sup>7,18</sup>

Little has been available on the validity and reliability of information on participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) during pregnancy; Medicaid payment for delivery; and breastfeeding initiation in the early postpartum period, comparing PRAMS data with other data sources. WIC and Medicaid are important sources

of services for low-income women and, because these data are used to examine research and programming questions, we investigated the reliability and validity of these indicators. The PRAMS data were compared with the birth certificate as the standard because the comparison of PRAMS data might provide insight about improving the accuracy and quality of PRAMS data. In addition, this investigation may provide insight into using both sources of data in concert to maximize the accuracy of information on women and children. Two research questions guided this investigation: (1) What degree of agreement/reliability exists between PRAMS survey responses and the birth certificate on participation in prenatal WIC services, Medicaid payment for delivery, and breastfeeding initiation? and (2) Do the reliability and validity vary by selected maternal characteristics and birth outcomes as suggested by previous research?<sup>17</sup>

## METHODS

We analyzed 2008 data from PRAMS, which collects population-based information on maternal behaviors and experiences during pregnancy from women in participating jurisdictions who have recently given birth to a live infant. The PRAMS projects are collaborative efforts among states and the PRAMS program at CDC through a cooperative agreement with each participating state. Each month, a stratified sample of approximately 100–300 women is selected from each PRAMS jurisdiction, and a survey is mailed to these women approximately 2–6 months after they deliver. Several attempts are made to contact selected women by mail; if there is no response, PRAMS interviewers attempt to contact the women by phone. Results from the PRAMS survey are linked to information from the state birth certificate, and selected items from the birth file are included in the PRAMS dataset. The data are statistically weighted to adjust for sampling design, noncoverage, and nonresponse. More information about PRAMS methodology is available elsewhere.<sup>24</sup>

For this study, we included 2008 PRAMS data on 15,646 women from 12 states that had implemented the 2003 U.S. Certificate of Live Birth and had response rates for PRAMS of  $\geq 65\%$ . From the total sample of women available for analysis, 95% ( $n=14,869$ ) provided information on WIC participation, 97% ( $n=15,240$ ) provided information on Medicaid payment for delivery, and 93% ( $n=14,576$ ) provided information on breastfeeding initiation on both systems. It is important to realize that although specific guidance is provided by the National Center for Health Statistics on data collection, the way birth certificate data are collected can

vary greatly by state (i.e., use of worksheets, face-to-face interviews, or data abstraction from medical records, with varying levels of training for birth clerks; and differing methods of record abstraction including handwritten medical records in large physical file folders, all-electronic records, or a combination of the two).<sup>23</sup> In addition, how records are stored and abstracted may vary from institution to institution within a state, adding complexity to the way birth certificate data are ascertained.

As Gayle and colleagues did in their 1988 study,<sup>7</sup> we used the birth certificate data as the standard against which PRAMS survey data were assessed for all three indicators examined (Figure). We used the birth certificate as the standard because the three measures we examined were included on birth certificates in the prenatal or very early postpartum period compared with the self-reports on the PRAMS survey, which used data collected 2–6 months postpartum. In addition, two of the indicators were assessed from facility-based labor and delivery records and WIC status came from maternal reports.<sup>23</sup> For example, breastfeeding initiation occurs within the first few hours to within a day or two of delivery; therefore, it is possible that data captured prior to discharge on the birth certificate might be more accurate than data ascertained several

months postpartum, as is the case with the PRAMS survey.

We examined these indicators across selected subgroups: race/ethnicity (non-Hispanic white, non-Hispanic black, and Hispanic), language (among Hispanic people and whether women responded to the PRAMS survey in English or Spanish), maternal education (<high school, high school, or >high school), and marital status (married or single, including widowed or divorced). In addition to the maternal indicators, we also examined several birth outcome indicators based on previous research.<sup>17</sup> These indicators included length of gestation, defined as early preterm birth (<32 weeks gestation), and preterm birth (32 to <37 weeks gestation) and birthweight, categorized as very low birthweight (<1,500 grams) and low birthweight (1,500–2,499 grams).

Data were analyzed using SUDAAN<sup>®</sup> to account for the complex sample survey design.<sup>25</sup> The measures of agreement used to assess reliability and validity included concordance across the two data sources, kappa corrected for chance agreement, sensitivity, specificity, and predictive value positive (PVP). We used kappa correlations to assess the degree of agreement between self-reported information from the PRAMS survey and recorded information from the birth certificate.

**Figure. Questions on the 2008 PRAMS survey and the 2003 U.S. Standard Certificate of Live Birth**

PRAMS <sup>a</sup>	Birth certificate <sup>b</sup>
How was your delivery paid for? Check all that apply. Health insurance or HMO Medicaid Personal income Other State specific _____	Principal source of payment for this delivery: Private Medicaid Self-pay Other (specify) _____
During your most recent pregnancy, were you on WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)? Yes No	Did the mother get WIC food for herself during this pregnancy? Yes No
Did you ever breastfeed or pump breast milk to feed your new baby after delivery? Yes No	Is the infant being breastfed at discharge? Yes No

<sup>a</sup>Centers for Disease Control and Prevention (US). PRAMS: what is PRAMS? [cited 2013 Jun 7]. Available from: URL: <http://www.cdc.gov/prams>

<sup>b</sup>Centers for Disease Control and Prevention (US). U.S. standard certificate of live birth [cited 2013 Jun 7]. Available from: URL: <http://www.cdc.gov/nchs/data/dvs/birth11-03final-ACC.pdf>

PRAMS = Pregnancy Risk Assessment Monitoring System

HMO = health maintenance organization

WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

Generally, a kappa value of  $>0.60$  represented very good to excellent agreement,  $0.40$ – $0.60$  represented moderate agreement, and  $<0.40$  indicated poor agreement.<sup>26,27</sup> Previous research has shown that sensitivity is an important measure in assessing validity.<sup>17</sup> For our study, we defined sensitivity thusly: of the births with a certain indicator on the birth certificate, what proportion also self-reported having that indicator on PRAMS; and we defined specificity as: of the births *without* a certain indicator on the birth certificate, what proportion also did not report the indicator on PRAMS. We used the PVP to assess the quality of PRAMS responses and the certainty with which a response on PRAMS was in agreement with the birth certificate.

## RESULTS

Overall, most women were non-Hispanic white, were 18–34 years of age, reported more than a high school education, were married, and delivered a baby of normal birthweight at term (Table 1). The prevalence of WIC participation during pregnancy was 43.5% on PRAMS and 41.9% on the birth certificate, Medicaid payment for delivery was 40.1% on PRAMS and 37.7%

on the birth certificate, and breastfeeding initiation was 77.2% on PRAMS and 75.7% on the birth certificate. Agreement between PRAMS and birth certificates for all three variables was high, with kappa ranging from 0.67 for Medicaid payment for delivery to 0.81 for participation in the WIC program during pregnancy (Table 2). Overall sensitivity ranged from 82.4% for Medicaid payment for delivery to 94.3% for breastfeeding initiation. PVP was high for all three measures overall—87.4% for WIC participation during pregnancy, 77.6% for delivery payment, and 92.5% for breastfeeding initiation (data not shown).

Agreement between PRAMS and birth certificate prevalence estimates for WIC participation and breastfeeding initiation was high overall. When stratified by maternal race/ethnicity and several other demographic indicators, the difference in prevalence estimates varied among the three measures examined (Table 3). Differences in PRAMS vs. birth certificate prevalence estimates, when stratified by birth outcome, ranged from 1.5%–4.6% for WIC participation during pregnancy, 0.4%–2.5% for Medicaid delivery payment, and 1.1%–19.1% for breastfeeding initiation (Table 3).

As shown in Table 4, concordance was generally high

**Table 1. Distribution of maternal characteristics and birth outcomes for women who responded to the 2008 PRAMS survey**

Characteristic	Sample size N	Weighted distribution Percent
Race/ethnicity (n=14,478)		
Non-Hispanic white	7,290	65.27
Non-Hispanic black	2,384	13.77
Hispanic	2,602	14.39
Other	2,202	6.58
Age (in years) (n=15,646)		
<18	495	3.65
18–24	4,798	30.11
25–34	8,028	51.99
≥35	2,325	14.26
Education (n=15,503)		
<High school	2,884	18.50
High school	3,814	25.89
>High school	8,805	55.61
Marital status (n=15,635)		
Married	9,564	62.05
Unmarried	6,071	37.95
Infant birthweight (n=15,563)		
Very low birthweight (<1,500 grams)	718	1.29
Moderately low birthweight (1,500–2,499 grams)	3,582	5.95
Normal birthweight (≥2,500 grams)	11,263	92.75
Infant gestational age (n=15,642)		
Very preterm (<32 weeks)	800	1.54
Moderately preterm (32 to <37 weeks)	2,558	7.28
Term (≥37 weeks)	12,284	91.18

PRAMS = Pregnancy Risk Assessment Monitoring System

**Table 2. Concordance, reliability, sensitivity, and specificity for WIC enrollment, Medicaid payment for delivery, and breastfeeding initiation: PRAMS and birth certificate data, 2008**

Measure	PRAMS survey Percent	Birth certificate <sup>a</sup> Percent	Percent difference	Concordance Percent	Reliability Kappa <sup>b</sup>	Sensitivity Percent	Specificity Percent
WIC participation during pregnancy (n=14,683)	43.5	41.9	1.6	90.7	0.81	90.8	90.6
Delivery payment by Medicaid (n=15,058)	40.1	37.7	2.4	84.4	0.67	82.4	85.6
Breastfeeding initiation (n=14,048)	77.2	75.7	1.5	89.9	0.72	94.3	76.0

<sup>a</sup>Birth certificate data were used as the reference group to calculate reliability, sensitivity, and specificity.

<sup>b</sup>Reliability was measured using the kappa coefficient corrected for chance agreement.

WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

PRAMS = Pregnancy Risk Assessment Monitoring System

**Table 3. Differences between PRAMS and birth certificate data by maternal characteristics, 2008**

Characteristic	WIC participation during pregnancy			Delivery payment by Medicaid			Breastfeeding initiation		
	PRAMS Percent	BC Percent	Difference	PRAMS Percent	BC Percent	Difference	PRAMS Percent	BC Percent	Difference
<b>Race/ethnicity</b>									
Non-Hispanic white	32.6	31.9	0.7	30.3	28.6	1.7	76.9	76.2	0.7
Non-Hispanic black	71.6	67.9	3.7	60.8	64.4	3.6	62.6	58.2	4.4
Hispanic <sup>a</sup>	64.7	61.3	3.4	62.0	51.1	10.9	84.7	78.5	6.2
English-language survey	80.6	76.1	4.5	78.4	68.3	10.1	87.2	87.0	0.2
Spanish-language survey									
<b>Education</b>									
<High school	77.4	75.7	1.7	72.8	71.5	1.3	65.7	63.9	1.8
High school	62.7	59.8	2.9	58.4	56.2	2.2	68.6	66.3	2.3
>High school	23.7	22.9	0.8	21.4	18.8	2.6	84.4	83.6	0.8
<b>Marital status</b>									
Married	24.1	23.5	0.6	21.9	20.0	1.9	84.1	83.3	0.8
Unmarried <sup>b</sup>	75.5	72.1	3.4	70.6	67.6	3.0	65.2	62.6	2.6
<b>Birth outcomes<sup>c</sup></b>									
Very low birthweight (<1,500 grams)	48.0	43.4	4.6	49.5	48.6	0.9	77.5	62.2	15.3
Low birthweight (<2,500 grams)	52.1	48.5	3.6	47.4	46.7	0.7	72.5	66.1	6.4
Normal birthweight (≥2,500 grams)	42.8	41.3	1.5	39.5	37.0	2.5	77.5	76.4	1.1
Very preterm (<32 weeks)	47.3	42.9	4.4	49.5	49.1	0.4	80.1	61.0	19.1
Preterm (<37 weeks)	47.6	45.1	2.5	42.7	41.4	1.3	70.4	65.7	4.7
Term (≥37 weeks)	43.1	41.6	1.5	39.8	37.4	2.4	77.8	76.6	1.2

<sup>a</sup>Hispanic women were separated into those who responded to the survey in English vs. Spanish.

<sup>b</sup>Single, divorced, or widowed

<sup>c</sup>Low birthweight and very low birthweight were not mutually exclusive; preterm and very preterm were not mutually exclusive.

PRAMS = Pregnancy Risk Assessment Monitoring System

WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

BC = birth certificate

**Table 4. Concordance, reliability, sensitivity, and specificity for WIC participation, Medicaid payment for delivery, and breastfeeding initiation on birth certificate and PRAMS data, by selected characteristics, 2008**

Characteristic	WIC during pregnancy				Delivery payment by Medicaid <sup>b</sup>				Breastfeeding initiation			
	Concordance Percent	Reliability <sup>b</sup> Kappa	Sensitivity Percent	Specificity Percent	Concordance Percent	Reliability <sup>b</sup> Kappa	Sensitivity Percent	Specificity Percent	Concordance Percent	Reliability <sup>b</sup> Kappa	Sensitivity Percent	Specificity Percent
<b>Race/ethnicity</b>												
Non-Hispanic white	93.5	0.85	91.0	94.7	87.3	0.69	80.7	89.9	91.6	0.77	95.0	81.0
Non-Hispanic black	84.3	0.63	91.1	69.8	72.6	0.42	75.9	66.7	82.2	0.63	88.5	73.4
Hispanic	85.8	0.70	91.2	77.2	81.1	0.62	92.2	69.5	88.7	0.63	96.7	59.3
English language	84.0	0.53	92.5	57.0	78.4	0.46	91.6	50.0	83.9	0.28	90.8	37.5
Spanish language												
<b>Education</b>												
<High school	85.9	0.61	91.8	67.4	74.0	0.35	82.7	52.2	85.6	0.68	90.1	77.5
High school	87.6	0.74	92.0	81.0	78.7	0.56	83.0	73.1	86.8	0.70	91.9	77.0
>High school	93.7	0.82	88.0	95.4	90.2	0.70	81.1	92.3	92.5	0.72	96.0	74.7
<b>Marital status</b>												
Married	93.5	0.82	87.4	95.3	91.2	0.73	82.8	93.3	92.5	0.72	96.0	75.0
Unmarried <sup>d</sup>	86.1	0.64	92.7	69.1	72.9	0.37	82.2	53.4	85.3	0.68	90.4	76.9
<b>Birth outcomes<sup>e</sup></b>												
Very low birthweight	86.5	0.73	89.7	84.0	82.8	0.66	83.1	82.4	73.1	0.38	90.6	44.1
Low birthweight	87.9	0.76	91.3	84.7	81.2	0.62	80.7	81.7	81.9	0.58	91.2	63.8
Normal birthweight	90.9	0.81	90.7	91.0	84.7	0.68	82.6	85.9	90.4	0.73	94.5	77.2
Very preterm (<32 weeks)	87.4	0.75	90.5	85.2	83.1	0.66	83.2	83.1	74.2	0.40	94.5	42.4
Preterm (<37 weeks)	89.3	0.78	90.9	87.9	83.9	0.67	82.0	85.2	81.4	0.57	89.4	66.1
Term (≥37 weeks)	90.8	0.81	90.8	90.8	84.4	0.67	82.5	85.6	90.6	0.73	94.7	77.3

<sup>a</sup>Medicaid-paid delivery on the birth certificate was ascertained from hospital records for principal payment and was self-reported on the PRAMS survey; mother was asked to check all sources of payment for delivery.

<sup>b</sup>Reliability was measured using the kappa coefficient corrected for chance agreement.

<sup>c</sup>Hispanic women were separated into those who responded to the survey in English vs. Spanish.

<sup>d</sup>Single, divorced, or widowed

<sup>e</sup>Low birthweight and very low birthweight were not mutually exclusive; preterm and very preterm were not mutually exclusive.

WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

PRAMS = Pregnancy Risk Assessment Monitoring System



among all subgroups of women across all three variables. When stratified by maternal race/ethnicity, the kappa statistic, which assesses reliability of the prevalence estimates, was  $>0.60$  for most demographic groups with some exceptions. With regard to the indicator for WIC participation during pregnancy, reliability was lower among Hispanic women who responded to the PRAMS survey in Spanish vs. English (kappa = 0.53 and 0.70, respectively). Kappa statistic ranges for Medicaid payment for delivery indicated lower reliability of PRAMS compared with birth certificate prevalence estimates among several demographic subgroups: non-Hispanic black women (0.42), Hispanic women who responded to the survey in Spanish (0.46), those who had less than a high school education (0.35), and those who had completed high school (0.56). Kappa values for the breastfeeding initiation indicator among Hispanic women who responded to the survey in Spanish (0.28) and those who had low or very low birthweight infants (0.38) indicated less than moderate agreement. Sensitivity for all three measures ranged from 75.6% to 96.7% across characteristics and birth outcomes, indicating high validity of PRAMS data. Specificity ranged from 37.5% to 94.7% across the three indicators, with generally lower values for Hispanic women who responded in Spanish and several other groups, such as those who had a low birthweight baby or a preterm delivery. The PVP ranged from 71.0% for those with more than a high school education reporting on Medicaid payment for delivery to 95.0% for the same group reporting on breastfeeding initiation (data not shown).

## DISCUSSION

This study showed a high degree of overall agreement among self-reported WIC participation during pregnancy, Medicaid payment for delivery, and breastfeeding indicators on PRAMS and birth certificates, suggesting that self-reported data from PRAMS on these indicators is reliable and valid. PRAMS reported a higher prevalence of WIC participation, Medicaid-paid delivery, and breastfeeding initiation than was reported on birth certificates. Most differences and the lowest specificity were observed among Hispanic women who responded to the PRAMS survey in Spanish for all three measures, among women who were unmarried and those with less than a high school education on Medicaid payment for delivery, and among women with adverse pregnancy outcomes for breastfeeding initiation. Studies assessing the quality of self-reported data have reported that women's recall of events during the prenatal and early postnatal period is closely matched to the provider-reported or to the administra-

tive records.<sup>5,6,18</sup> In general, studies that have assessed a variety of self-reported information on health-care and screening behaviors have shown that individuals are able to recall health events with relative accuracy.<sup>28-31</sup>

Our study adds to the existing research showing that self-reported population-based surveillance data on selected indicators can be used for surveillance, monitoring, and research, and that in this case the two sources can potentially be combined to obtain accurate estimates of service use and breastfeeding initiation. For example, overall estimates of breastfeeding in the early postpartum period would improve by three percentage points if we use both sources of data, because of those with missing data on PRAMS, 80% had information available from the birth certificate.

Determining a standard against which self-reported data are assessed may vary depending on which items are examined and time of data collection; additionally, existing research shows that a standard may vary from program data (e.g., WIC enrollment) to routine data collected by using medical charts.<sup>4-20</sup> We used the birth certificate as the standard, as did a study comparing maternal recall of information with data reported on the birth certificate;<sup>7</sup> other studies have used surveys, medical and administrative records, and combined sources as the standard.<sup>12-17</sup> The rationale for using the birth certificate as our source had to do with the timing of events; in this case, the measurement of three indicators on the PRAMS survey was dependent on women's recall of events that occurred before pregnancy or during the early postpartum period. On the birth certificate, these data were collected near the time they were taking place. In sum, although we used the birth certificate as our standard, other data systems such as administrative (i.e., WIC program data or Medicaid enrollment) and program records can also be used to assess reliability and validity to improve data quality.

To account for insurance differences, Braveman and colleagues<sup>5</sup> suggested that insurance coverage is likely to be underestimated on the birth certificate, or insurance status may change from the time of delivery to 2-6 months postpartum. For example, women whose deliveries were paid for by Medicaid may not be covered by Medicaid by the time they receive and respond to the PRAMS survey. Our study showed that overall, for Medicaid payment of delivery, information on the PRAMS survey is valid and reliable with a sensitivity of 82.0% and kappa value of 0.67. It is important to note that the two systems ascertain this information using different methods and it is possible that women were not always aware of the actual source of delivery payment, as it may have occurred after they left the facility where they delivered the baby.<sup>5,31</sup>



Our study included a large number of Hispanic women who responded to the PRAMS survey in either English or Spanish, an important group to examine according to previous studies;<sup>9,17</sup> our results indicated clear patterns of less agreement and specificity for Hispanic women with lower English proficiency. In one study,<sup>17</sup> underreporting of adverse birth outcomes, medical risk factors, and tobacco use on the birth certificate was associated very strongly with the lack of English-language proficiency. We observed that, among Hispanic women who responded to the Spanish version of the survey, PRAMS prevalence estimates were consistently higher than those from the birth certificate for the three measures examined in our study. Whether this discrepancy was due to underreporting on the birth certificate or overreporting on PRAMS is difficult to assess. Another issue to keep in mind when interpreting these findings is the degree of acculturation and reporting of breastfeeding behaviors.<sup>32</sup> An important consideration is that on the PRAMS survey, Hispanic women can respond to the survey in either English or Spanish, which might facilitate better overall response due to better comprehension of the questions and possible answers. This comprehension would partially depend on women's literacy levels and comfort in responding to surveys, neither of which we were able to assess. Birth certificate data, in contrast with PRAMS data, are compiled from the prenatal charts or hospital records by a designated staff member, and it could not be determined whether someone was available to assist mothers who spoke a language other than English for the items that required reporting by the mother. Moreover, it is worth noting that for items that are ascertained from the facility records (i.e., delivery payment), language may not present a challenge.

Although the indicators of prenatal WIC participation and Medicaid payment for delivery had a high degree of agreement between the two data sources overall and by demographic groups, breastfeeding initiation presented a different situation. For example, PRAMS estimates on breastfeeding initiation were consistently higher than the birth certificate estimates; validation and reliability measures were high except for Hispanic women who responded to the PRAMS survey in Spanish and women who had very low birthweight babies or preterm deliveries. The differences could potentially be attributed to how the information was collected and recorded on the birth certificate and whether a bilingual staff member was available to ask the mother about breastfeeding. Less agreement between the two sources of data was observed among mothers who had delivered a low birthweight or preterm baby on the indicator of breastfeeding initiation,

again indicating either overreporting by mothers on the PRAMS survey or underreporting on the birth certificate. This disparity could also be due to differences in interpretation of how breastfeeding may be reported by mother vs. staff recording on the facility worksheet. Li and colleagues<sup>28</sup> found that overall, mothers' recall of breastfeeding practices was high if ascertained within three years. However, other researchers found that recall could vary by subgroups,<sup>30</sup> especially if women decided to stop breastfeeding after returning home. Within the context of this study, it is important to note that reporting on the birth certificate ascertainment is at the time of discharge and PRAMS is several months postpartum and based on women's recall.

The way birth certificate data are collected can vary greatly by state and even institutions within the states. We did not know which methods were used by the states included in the analysis. Regardless, it is important to continue to improve the quality of data collected and strive toward obtaining accurate estimates of health indicators, especially among specific groups such as those with lower literacy, those who are proficient in a language other than English, or those who may experience adverse birth outcomes.

### Limitations

This study was based on two datasets, and both datasets had limitations. Birth certificate data are completed by hospital staff members who may not be trained adequately and who use forms that vary at different hospitals; previous research has found inconsistent reliability with certain types of information from this source as compared with medical records.<sup>13</sup> While previous research focused on birth certificate data prior to the 2003 revision, additional studies assessing the validity and reliability are needed to inform data collection and surveillance activities, especially those employing utilization data such as enrollment in WIC or Medicaid. PRAMS data are subject to limitations related to recall bias and self-reporting. These factors may include recall errors regarding changes in participation in programs such as WIC; in insurance coverage, as most people are not able to recall coverage status with accuracy;<sup>31</sup> and in breastfeeding initiation, as it is measured 2–6 months after delivery.

### CONCLUSION

Overall results suggest that self-reported PRAMS data on WIC participation, Medicaid payment for delivery, and breastfeeding initiation confirm high validity and reliability between birth certificates and PRAMS survey responses. Our findings support the use of PRAMS

data for epidemiological surveillance, research, and planning.

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