

# “Education level as a potentially overlooked predictor of receiving prenatal care in a Denver metropolitan Health First Colorado population”

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## Executive Summary of Findings

- Definitions of prenatal care vary from self-reported information that is often contained on birth certificates to claims data. Furthermore, definitions of how to look at prenatal care as determined by different stakeholders can greatly impact the number of women who are included in prenatal care counts. Specifically, the HEDIS definition of prenatal care achieves significantly different numbers from birth certificate reported prenatal care.
- Education as a risk factor for not receiving prenatal care has been overlooked. Providers and health plans should focus on those women with a high school education or less as they are less likely to engage in prenatal care.

## Background

Receiving timely prenatal care is an important component of a healthy pregnancy and delivery. Prenatal care can help to prevent adverse neonatal outcomes (e.g., neural tube defects) and is especially important in high-risk pregnancies. For example, it can lower preeclampsia risk and ensure management of conditions such as diabetes.<sup>1</sup> Nationally, according to birth certificate data, approximately 6% of women do not receive any prenatal care or they receive it late in their pregnancy.<sup>2</sup>

Identifying characteristics of women who are at risk to not receive prenatal care can help providers and health



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plans address the needs of these high-risk populations more efficiently with limited resources. While numerous risk factors are associated with not receiving prenatal care, such as uninsured status, age, smoking, and education,<sup>3</sup> work specific to these risk factors in a sub-section of the Denver metropolitan area (i.e., Denver, Adams, Arapahoe, and Douglas counties) may yield valuable insights for managed care providers to reach goals established by important stakeholders.

While timely prenatal care is important, it can be difficult to determine from a macro level whether any particular woman has received prenatal care within a certain timeframe, such as the first trimester. For example, information collected from birth certificates is often self-report and can differ substantially from claims-based definitions. On average, 81% of women on Medicaid receive prenatal care in the first trimester as identified from birth certificate data.<sup>4</sup> When considering claims-defined definitions of prenatal care within a certain timeframe, definitions diverge from self-report recorded in birth certificates.

The goal of this analysis was to collect and assemble various data streams to identify important factors that are associated with receiving prenatal care and compare the sources of care information. This report combines birth certificate data available from the Colorado Department of Public Health and Environment (CDPHE) as well as claims and member enrollment data from Colorado Access (COA), a nonprofit health care plan that is focused on public insurance. COA is the Regional Accountable Entity (RAE) for two regions within the program of Health First Colorado (Colorado's Medicaid Program). These regions encompass a portion of the Denver metropolitan area, as stated above.

## Methods

### Definition of Prenatal Care

Any prenatal care visit during pregnancy recorded in claims data as defined by the Healthcare Effectiveness Data and Information Set (HEDIS) and RAE key performance indicator (KPI) definition (see Appendix A for definition)<sup>5</sup> was the primary outcome. HEDIS-defined prenatal care and birth certificate recorded prenatal care were also compared in order to assess self-report versus claim-based information.

## Population Inclusion Criteria

Women who were COA members in 2016 from estimated conception date through delivery date who also had records in birth certificate data were included in the analyses (N = 5,253). These restrictions were used to account for instances where a woman became a COA member partially through her pregnancy but may have received care that was covered by another health plan, or may have delivered under coverage of another health plan. The pregnancy date was determined by using a gestational age estimate provided by CDPHE birth certificate data to estimate the date of conception (e.g., if the gestational age estimate at time of birth was 40 weeks, then subtracting 40 weeks from the date of delivery would arrive at the estimated date of conception as 40 weeks earlier).

The HEDIS definition of a prenatal care visit in the first trimester excludes women who experience a fetal demise. For the purposes of these analyses only members who had a live birth were included.

## Statistical Methods

The variable “any prenatal care” was developed from claims meeting HEDIS criteria and falling within the pregnancy time period. These visits were compared to self-reported prenatal care visits from the birth certificate data with a Kappa statistic. HEDIS-defined prenatal care was used as the primary outcome in multivariate analyses due to the potential of biased self-report and low agreement between the two. Adjusted analyses used multivariate logistic regression to explore the independent effects of important predictors (e.g., the effect of education regardless of age). Manual mixed selection was used to determine a parsimonious model that only included variables with an alpha <0.05. Covariates were obtained from birth certificate and COA member data and included numerous behavioral and health related predictors. Age, smoking during pregnancy, education level, race/ethnicity, body mass index (BMI), enrollment span in Health First Colorado, and previous pregnancies were examined. BMI was categorized as < 18.5 as low, 18.5-25 as healthy, 26-29 as overweight, and greater than or equal to 30 as obese.

## Results

Birth certificate reported and HEDIS-defined any prenatal care were in low agreement (Kappa = 0.08, 95%CI 0.06 – 0.11). Eighty percent (4,231) of women received care according to the HEDIS definition, and 97% (5,253) reported through birth certificate that they received care (Table 1).

Birth Certificate Reported vs. HEDIS-Defined Any Prenatal Care		
	Birth Certificate Reported	
HEDIS-Defined	No	Yes
No	72	950
Yes	62	4,169

Table 1

A cross-table analysis identified that Asian and Hispanic women had lower frequencies of prenatal care. Similarly, women who smoke and women with a high school education or less had reduced frequencies of prenatal care (Table 2).

Cross Table of Characteristics Between Prenatal Care Groups				
	HEDIS no N(%)	HEDIS yes N(%)	Statistic	p-value
Race Ethnicity			X <sup>2</sup> =30 df=5	<.0001
Non-Hispanic White	297 (16.8%)	1,446 (83.2%)		
African American	118 (17.6%)	554 (82.4%)		
Asian/Pacific Islander	69 (28.4%)	174 (71.6%)		
Hispanic	520 (21.0%)	1,958 (79.0%)		
Native American	7 (14.0%)	43 (86.0%)		
Other/Unknown	33 (14.3%)	197 (85.7%)		
Age (mean)	26.5	27.3	t = 3.9, df = 1 and 5434	0.001
BMI Groups			X <sup>2</sup> = 2.5, df = 3	0.467
Low	44 (21.5%)	161 (19.6%)		
Healthy	394 (19.2%)	1,663 (80.8%)		
Overweight	262 (18.8%)	1,134 (81.2%)		
Obese	278 (17.6%)	1,300 (82.4%)		
Smoking (yes)	161 (22.4%)	557 (77.6%)	X <sup>2</sup> = 5.4, df = 2	0.02
Previous Pregnancy (yes)	841 (19.4%)	3,491 (80.6%)	X <sup>2</sup> = 0.6, df = 2	0.45
Education			X <sup>2</sup> = 90, df = 6	<0.001
Some College	259 (13.9%)	1,600 (86.1%)		
College Graduate	36 (13.4%)	233 (86.6%)		
High School Graduate or GED	388 (20.4%)	1,515 (79.6%)		

Table 2

Less Than High School	340 (26.8%)	929 (73.2%)		
Master's Degree or Beyond	6 (10.7%)	50 (89.3%)		
Days of Membership (mean)	860	810	t = 2.6, 1 and 5434 df	0.009

Table 2 (continued)

A multivariate logistic regression identified education, race/ethnicity, age, and smoking status as significant adjusted predictors of HEDIS-defined any prenatal care during pregnancy (Table 3). Women with a high school diploma/ General Educational Development (GED) or less had lower odds of obtaining HEDIS-defined prenatal care independent of age. Women who smoked during pregnancy had reduced odds of obtaining prenatal care. Asian and Hispanic women had reduced adjusted odds of obtaining prenatal care. Finally, with increasing maternal age, odds of prenatal care increased.

Logistic Regression of Education on HEDIS-Defined Any Prenatal Care				
	Odds Ratio	2.5%	97.5%	P-value
Education (ref = Some College)				
College Graduate	0.97	0.66	1.42	0.87
High School Graduate or GED	0.66	0.56	0.79	<0.001
Less Than High School	0.49	0.40	0.59	<0.001
Master's Degree or Beyond	1.21	0.51	2.88	0.66
Race Ethnicity (ref = Non-Hispanic White)				
African American	0.97	0.76	1.24	0.83
Asian/Pacific Islander	0.55	0.40	0.76	0.002
Hispanic	0.82	0.69	0.97	0.022
Native American	1.34	0.59	3.04	0.48
Other/Unknown	1.20	0.81	1.80	0.36
Smoking (yes)	0.74	0.60	0.90	0.003
Age	1.01	1.00	1.03	0.046

Table 3

## Discussion/Conclusion

Eighty percent of women included in the analyses received at least one prenatal care visit at some point during their pregnancy, according to the HEDIS definition. This finding may underrepresent actual prenatal care engagement within the population, due to limitations with the HEDIS definition, as well as billing and coding variations that would be missed within available data.

Prenatal care frequency defined by birth certificate data differed substantially from results based on the HEDIS definition for prenatal care. According to the HEDIS definition, 1,022 women did not have a prenatal care visit, though 950 of those same women (93%) had at least one birth certificate reported prenatal care visit. Some of this variation may be due to limitations with the HEDIS definition and available data. Additionally, the prenatal care data collected on birth certificates may be inflated due to self-report biases such that women may be more likely to respond that they received prenatal care when they had not, or if they had received care, it was care for other health related conditions outside of pregnancy.

These analyses replicate previous reports and find that race/ethnicity, age, education, and smoking status are independent predictors of HEDIS-defined any prenatal care. Notably, education level was important regardless of maternal age; where those with a high school diploma/GED or less were significantly less likely to engage in prenatal care during pregnancy. Further, age had only a modest effect ( $p=0.046$ ) after accounting for education level, which supports the importance of the education variable. This may have unique relevance, as age is a well-documented characteristic used in the health care sector to stratify risk amongst pregnant women. Health plans should consider including education information in membership documentation and devoting prenatal care related resources to those women reporting a high school/GED diploma or lower education status.

## References

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