Association between pregnant cigarette smoking and offspring birthweight using **Oracle EHR Real-World Data**

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Introduction

- Incidence of mothers smoking during pregnancy has been falling in the United States in recent years¹. Maternal smoking in pregnancy was associated with a higher risk of low infant birthweight².
- Related research that investigates the association between smoking during pregnancy and low birthweight using more recent Electronic Health Record (EHR) data is limited.
- Understanding the impact of pregnant smoking on birthweight can help improve birthweight outcomes.

Results

Sample Characteristics

- Of the 107,902 maternal records extracted, 10,235 (9.5%) indicated cigarette smoking during pregnancy (**Table 1**).
- Mean age was 29.02 (SD=5.83), 75.2% were White, 54.4% were married or living with a domestic partner, 57.8% had a commercial insurance, 15.5% had a CCI score of 1 or higher.
- Mean time from smoking indication to infant birth was 1.32 (SD=2.30) months, and mean infant birthweight was 3,259.70g (SD=621.53). 9,275 (8.6%) had low infant birthweight (<2500g).

Table 1. Demographic, Smoking, and Birth Characteristics among Mothers Extracted from OERWD.

	Total	
Characteristics	N=1	07,902
	N/Mean	%/SD
Demographics	20.02	E QZ
Age (years), Medii (SD)	29.02	5.05
Age (years), N (70)	870/0	81.5%
35-44	10820	18.4%
45-64	133	0.1%
65+	0	0.0%
Race. N (%)		
White	81102	75.2%
Black	10012	9.3%
Asian, American Indian, Alaska Native, Native Hawaiian, or	6270	E 99/
Other Pacific Islander	0270	5.0%
Other	5465	5.1%
Unknown	5053	4.7%
Ethnicity, N (%)		
Hispanic	20681	19.2%
Non-Hispanic	84229	78.1%
Unknown	2992	2.8%
Marital Status, N (%)	50/52	E 4 40/
Married/Domestic Partner	58052	54.4%
Single/Separated	59220	5.4%
	/180	3.4%
Insurance Type, N (%)		5.770
Commercial	62345	57.8%
Medicaid	28043	26.0%
Medicare	505	0.5%
Other	7404	6.9%
Self-Pay	1482	1.4%
Unknown	8123	7.5%
CCI	_	
0	91238	84.6%
1	14154	13.1%
2	1896	1.8%
3+	614	0.6%
Smoking Characteristics		
Smoking Status, N (%)	10235	0.5%
Former	16060	15 7%
Never	80698	74.8%
Smoking, N (%)		
Yes	10235	9.5%
No	97667	90.5%
Months from smoking indication to infant birth, Mean (SD)	1.32	2.30
Birth Characteristics		
Infant Birthweight (grams), Mean (SD)	3259.70	621.53
Low Birthweight (<2500 grams), N (%)		
Yes	9275	8.6%
No	98627	91.4%

Conclusions

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- The results of this study indicate a correlation between pregnant maternal smoking and negative birthweight outcomes (higher probability of low birthweight and lower continuous birthweight).
- Among smokers, mothers who reported current smoker as smoking status within 9 months of birth had lower birthweight compared to mothers who reported smoking previously.
- These findings highlight the importance of prenatal counseling and public health policy that can help reduce the incidence of pregnant smoking.

Objective

The aim of this research is to evaluate the association between smoking during pregnancy and infant birthweight at time of birth using Electronic Health Record (EHR) data.

Data source:

 This non-interventional study utilized retrospective, deidentified EHR data from Oracle EHR Real-Word Data (OERWD). OERWD is extracted from 139 health systems which have consented to the use of their respective EHR data. Data from 01/2013 to 07/2023 were examined. • Average CDC birthweight in 2013-2023 were obtained from the natality dataset tool³

Representativeness of Data

Standardized mean differences (Cohen's d) between average OERWD birthweight and average CDC birthweight by year were all very small, <0.2 (small effect size)⁴, indicating differences were negligible **(Figure 1**). The birthweight data from OERWD is representative of the population.

Figure 1. Standardized Mean Differences between Average CDC Birthweight and Average OERWD **Birthweight by Year**



Limitations

- As with any EHR data, this study only captured individuals who seek care in a healthcare setting. Missing fields and errors or inconsistencies in the coding of diagnoses, procedures, treatments, or other variables were possible.
- Smoking indications may be present for smoking status before conception. Smoking cessation due to a realization of pregnancy may not be captured.
- Due to the retrospective, non-interventional nature of this study, causal relationships cannot be established.

Methods

Eligibility

- Mother's age is 18-45 years. Mother has a valid record of infant birthweight where date of birth is
- 01/01/2013 07/31/2023. Mother has a valid indication of
- smoking status within 9 months of birth. • Mother has a valid state of
- residence.

- Standardized mean differences (Cohen's d) between average OERWD birthweight and average CDC birthweight by year were used to determine whether birthweight data from OERWD is representative of the population⁴. • Descriptives (means, standard deviations, counts, and percentages) were used to describe sample characteristics.

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- Generalized linear models were used to investigate the association between smoking status during pregnancy and infant birthweight, controlling for year of infant birth, maternal state of residence, age, race, ethnicity, marital status, insurance type, and Charlson Comorbidity Index (CCI).
- Logistic regression for binary indicator of low infant birthweight (yes vs. no) • Linear regression for continuous infant birthweight

Multivariable Results: Association between Smoking Status and Infant Birthweight

- (Figure 2).
- with a 21.49g decréase (p<0.001) (**Figure 3**).

Figure 2. Odds Ratios of Smoking Status Predicting Low Birthweight (<2500g)



Figure 3. Adjusted Mean Birthweight by Smoking Status



References

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Statistical Analyses

• After controlling for demographics and CCI score, smoking during pregnancy was associated with lower infant birthweight. Specifically, compared to mothers who reported never smoking within 9 months of delivery, mothers who reported smoking previously (OR=1.06, p=0.064) and mothers who reported currently smoking (OR=1.77, p<0.001) were more likely to have a low birthweight (<2,500g) offspring

• Mothers who reported currently smoking within 9 months of giving birth were associated with a 198.53g decrease (p<0.001) in offspring birthweight. Mothers who reported smoking previously were associated