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Aqsa Malik April 7, 2020

Analyzing Distinctions in Birth Outcomes and Maternal Morbidities across insurance types of African American Pregnant Women in Georgia

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Abstract

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To understand how insurance status affects pregnancy outcomes in a cohort of African American women is to gain a deeper insight into why African American women remain the most disproportionately affected by sexual and reproductive health conditions. This study examines pregnancy outcomes and complications across three insurance groups for African American women in the state of Georgia; low-income Medicaid, Right to Start Medicaid, and private insurance. The overall goal was to discover which insurance group would manifest the highest prevalence of adverse pregnancy outcomes. Through computational data analysis, the insurance groups were each characterized by common socioeconomic status indicators of age, marital status, household size, and years of education. Each insurance group was then analyzed for significant differences of pregnancy complications such as preterm birth, gestational diabetes or hypertension, preeclampsia, and substance use through one-way ANOVA and chi-square tests. Using Pearson's Correlation test, the correlation between income-ratio (income/household size) and multiple socioeconomic determinants was calculated. The results showed that insurance status is capturing multiple SES indicators as a majority and that there were no significant differences in adverse pregnancy outcomes across all insurance groups. Both Medicaid subcategories showed the highest rates of marijuana use compared to the privately insured group. The outliers can be attributed to the concept of entrepreneurship. The overall findings therefore suggest that socioeconomic determinants play a vital role in healthcare accessibility for pregnant African American women in Georgia.

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I. Introduction

Maternal and infant mortality rates are important indicators of the overall health of a society. These rates in the United States' remain consistently higher compared to other developed countries. As of 2019, the US faced 29.6 maternal deaths per 100,000 live births and 5.748 infant deaths per 1000 live births. The outlier state of Georgia exhibits the most severe maternal mortality crisis in the country with 66.3 pregnancy-related deaths per 100,000 live births (America's Health Ranking, 2019). Due to a state-wide primary care physician shortage, 79 out of 159 Georgia counties have no obstetrician/ gynecologists available and 9 counties, like Webster, do not even have a single doctor (Hart, 2018).

These mortality rates further persist amongst different racial and ethnic groups with the most striking disparities found in the African American community. African American women remain the most disproportionately affected by multiple sexual and reproductive health conditions as they are four times more likely to experience pregnancy-related deaths and complications compared to white women (Prather et al., 2016). Further, the maternal death rate for black women in Georgia is twice that for white women in Georgia and six times the rate for white women nationally.

According to the Center for Disease Control and Prevention, the leading causes for maternal and infant mortality rates are birth defects, low birthweight, preterm birth, maternal pregnancy complications, and injuries. The low-income Medicaid group offers a subcategory called "Adults with Children Under 19" that offers Medicaid to women under 35% of the federal poverty level (Table 1). Women who are disabled themselves or have a child with a disability, including both physical or mental conditions, are eligible to receive Medicaid.

The state of Georgia has developed strategies to reduce mortality rates in populations that experience higher susceptibility to complications including black, low-income, younger, and unmarried mothers. Right from the Start Medicaid (RSM) is a Georgia Medicaid program targeting low-income women by providing medical care for women during pregnancy, delivery, and 60 days after birth. To become eligible, women must reside in Georgia and meet or be under the 200% federal poverty level (Table 1). In addition, the children born under the RSM program may receive Medicaid until their first birthday and as long as they remain eligible, until their 19th birthday.

Table 1. Georgia Medicaid Eligibility for Adults - Income Limit (Annually)

	Right to Start	Adults with Children Under 19
Household Size	200% of FPL	35% of FPL
1		$3,720
2	$24,984	$5,484
3	$33,828	$6,612
4	$42,660	$7,836
Each Additional Person	Add $9,732 per year	Add $600 per year

Socioeconomic status is proportional to an individual's health status and healthcare provider quality. Lower socioeconomic statuses (SES) are associated with pregnancy complications of preterm delivery, preeclampsia/eclampsia, and gestational diabetes (Kim et al., 2018). Compared to white Americans, African Americans are more likely to be covered by publicly funded insurance than private or employment-based health insurance and twice as likely

to be uninsured. However, the effects of insurance status on pregnancy outcomes in pregnant African American women remains unclear. Our study aims to evaluate pregnancy outcomes in African American pregnant women who differ based on insurance status in Georgia. Lower socioeconomic individuals may have lower education levels, lower health literacy, limited accessibility to resources, and may have trouble attending prenatal visits or affording medications. It is hypothesized that both the low-income and RSM Medicaid insured women will demonstrate increased rates of adverse birth outcomes and maternal morbidities compared to the women who are privately insured. Our investigation's long-term implications include expanding understanding that will contribute to eliminating socioeconomic health disparities, reduce maternal and infant mortality rates, and represent African American women equitably in clinical research.

II. Methods

A review of literature was conducted prior to data analysis with a specific focus on how socioeconomic determinants of income, age, education level, household size, and insurance status affect pregnancy outcomes in African American pregnant women.

Study Population

This study will utilize a 5-year longitudinal study conducted at Emory University, School of Nursing, Rollins School of Public Health, School of Medicine, and the Department of Gynecology and Obstetrics (Corwin, 2017). A cohort of 485 singleton pregnant women who self-identify as African American between the ages of 18-40 were recruited and enrolled into the study during their 8-14 weeks of pregnancy. All 485 participants were recruited from both

Emory University Hospital Midtown, a private hospital, and Grady Memorial Hospital, a county-supported hospital serving as a safety net for low-income patients.

Demographic and health data were obtained from patient's self-reported surveys, prenatal administrative records, and maternal medical charts collected throughout and post-delivery. Participants completed questionnaires and provided biological samples of vaginal, oral, and gut microbiomes first during the 8-14-week period of their pregnancies, again during the 24-30 week period, and lastly post-delivery. During the first two visits, participants completed a demographic survey and questionnaires measuring psychosocial stressors. Clinical data of pre-pregnancy BMIs, gestational age, reproductive tract infections, pregnancy complications, and mode of delivery were also collected.

Measures

The health survey recorded information on diagnoses, medications, sexual encounters, hygiene self-care practices, substance use, and maternal complications. Demographic information collected includes age, years of education, marital status, health insurance status, household size, and self-reported annual income. In addition to the multiple indicators of SES including years of education, marital status, insurance status, an additional variable called income ratio was calculated by dividing an individual's self-reported income by their household size.

Health insurance is the most comprehensive variable used to divide our cohort. The cohort of 485 pregnant women from the study were divided into three groups based on their insurance status of low-income Medicaid, RSM Medicaid, or private health insurance. From the 180 women insured by low-income Medicaid, 132 women are enrolled at the Grady Hospital and 48 women at the Emory University Hospital. In the RSM Medicaid group consisting of 202

women, 152 women are enrolled at the Grady Hospital and 50 at the Emory University Hospital. From the 103 women who are privately insured, 6 women are enrolled at the Grady Hospital and 97 at the Emory University Hospital.

The independent variable will serve as the three groups; Low-Income Medicaid, RSM Medicaid, and private insurance. The dependent variable will be defined as the various pregnancy measures and outcomes. There are three birth outcomes measured; preterm birth, gestational age, birth weight, and pregnancy complications. Pregnancy complications include the presence of gestational diabetes, gestational or chronic hypertension, preeclampsia, or intrauterine growth restriction experienced throughout or post-pregnancy. Rates of substance abuse were self-reported through use of alcohol, marijuana, tobacco, or non-listed drugs. Different modes of labor were recorded including spontaneous, induced, none, or preterm premature rupture of the membranes (PPROM)- a pregnancy complication. Mode of birth, either vaginal or c-section were also recorded post-delivery.

Statistical Analysis

Microsoft Excel version 16.34 and R statistical computing program version 1.2.5033 were utilized for both data entry and analysis. The demographic characteristics of each insurance group were characterized by analyzing common socioeconomic status indicators such as age, years of education, marital status, and household size. After the mean and standard deviation were calculated for all continuous variables, a one-way ANOVA test generated both an f-statistic and p-value to determine statistical significance. For categorical variables, a two-tailed chi-square test was performed to generate a chi-square value and p-value using a maximum 5 by 5 contingency table. To further examine the correlation between income-ratio and SES indicators of age, marital status, and education, a Pearson's correlation test generated a correlation

coefficient and a p-value. This test was done on each insurance group as well as the entire cohort to examine important interactions between these SES characteristics and insurance status.

III. Results

The purpose of this study was to determine correlation between insurance groups (low-income, RSM, Private) and deleterious birth outcomes and maternal morbidities in a cohort of 485 African American pregnant women residing in Georgia. It was posited that women in both Medicaid categories will exhibit higher rates of adverse pregnancy outcomes compared to the privately insured women. All three insurance groups were characterized using socioeconomic status indicators of age, household size, gravidity, parity, birth gestational age, prior and prior preterm births, and years of education. In accordance with expectation, significant statistical differences were found for age, household size, years of education, income, income-ratio, and parity. In comparison to the privately insured group, both Medicaid groups on average had less years of education, were younger, and had more prior children in larger household sizes. There were no significant differences in gravidity, prenatal body mass indexes (BMIs), gestational age from all study visits, prior term and prior preterm births (Table 2).

Table 2. Comparing statistical differences in continuous variables between African American pregnant women insured by low-income Medicaid, RSM Medicaid, or private insurance.

	Low-Income Medicaid	**RSM Medicaid**	**Privately Insured**	**f statistic**	**p-value**
Age	24.1 +/- 4.25	24.22 +/- 4.62	27.6 +/- 4.84	23.5	**< 0.0001**
Household Size	3.66 +/- 1.56	3.38 +/- 1.48	2.75 +/- 1.12	12.8	**<0.0001**
Gravidity	2.71+/- 1.70	2.40 +/- 1.43	2.34 +/- 1.43	2.72	0.06689
Prenatal BMI	27.7 +/- 7.27	29.2 +/- 8.43	28.6 +/- 7.82	1.9	0.1513
Gestational Age V1	11.3 +/- 3.01	11.2 +/- 2.56	11.7 +/- 1.84	0.879	0.4157
Gestational Age V2	26.7 +/-2.49	26.8 +/- 2.80	26.1 +/- 2.27	1.9	0.1511
Parity	0.547 +/- 0.879	0.443 +/- 0.790	0.296 +/- 0.596	7.7434	**<0.0001**
Birth Gestational Age	37.5 +/- 4.77	37.3 +/- 5.12	38.2 +/- 4.78	1.1004	0.3336
Prior Term Births	0.894 +/- 0.994	0.738 +/- 0.917	0.534 +/- 0.739	2.88	0.0569
Prior Pre-Term Births	0.200 +/- 0.563	0.149 +/- 0.486	0.0583 +/- 0.235	2.88	0.0569
Years of Education	2.09 +/- 0.863	2.31 +/- 0.907	3.61 +/- 0.952	101.04	**<0.0001**

Amongst the categorical measures found in Table 3, there were significant statistical differences found in marital status, marijuana usage, and income across all three groups. On average, pregnant African American women covered by low-income and RSM Medicaid were single compared to the privately insured pregnant women who were mostly married or partnered. Although all groups reported marijuana use, there were higher rates found from women covered by both forms of Medicaid (Table 3).

Interestingly, there were pregnant women in both Medicaid groups self-reporting the highest level of household income and privately insured women self-reporting the lowest measure of household income. This can be observed in Table 3 in which 5 Medicaid insured women report household incomes equal to 400% or above the federal poverty line and 10 privately insured women report household incomes equal to 100% or lower than the federal

poverty line. For the majority, however, both groups of Medicaid insured women report lower incomes compared to the privately insured women.

Table 3. Comparing statistical differences in discrete variables between African American pregnant women insured by low-income Medicaid, RSM Medicaid, or private insurance.

		Low-Income Medicaid	**RSM Medicaid**	**Privately Insured**	**X^2 Value**	**p-value**
Marital Status	Single	171	186	65	66.829	**<0.00001**
	Married/Partnered	9	16	38		
Income*	<100-149%	144	126	15	216.51	**<0.00001**
	150-199%	7	33	11		
	200-299%	4	5	15		
	300-399%	1	4	19		
	400%<	2	3	29		
	Intrauterine Growth Restriction	18	20	6	1.8217	0.402179
	Gestational Diabetes	2	6	5	3.6319	0.162687
	Gestational Hypertension	14	24	9	2.2031	0.332357
	Preeclampsia	14	24	9	2.2031	0.332357
	Chronic Hypertension	4	5	1	0.8299	0.660372
	Live Birth Outcomes	162	182	97	1.6724	0.43335
Mode of Birth	C-Section	28	40	23	1.812	0.404128
	Vaginal	134	144	74		
Substance Use	Alcohol	8	15	4	2.373	0.305295
	Marijuana	39	57	8	17.208	**0.000183**
	Tobacco	30	29	8	4.1451	0.12864
	Other Drugs	1	1	0		
Modes of Labor	Spontaneous	105	104	57	2.5548	0.278762
	Induced	42	65	33	3.8577	0.145315
	None	12	11	5		
	PPROM	3	3	2		

*Income levels (<100%), (100-131%), (132-149%) were combined. For low-income Medicaid, counts of 133, 8, 3, respectively. For RSM Medicaid, counts of 67, 42, 17, respectively. For private insurance, counts of 10, 3, 2, respectively.

Within the entire cohort of 485 pregnant African American women, the income-ratio was moderately correlated to SES factors of age, marital status, and education with correlation coefficients of 0.284, 0.272, and 0.506, respectively (Table 4). Within each subcategory, there were distinctions in the level of correlation. For example, in the low-income Medicaid group, there is low correlation between income-ratio and age compared to both the RSM Medicaid and privately insured group with moderate correlation. The highest correlation found occurred in the entire cohort between income-ratio and education with a correlation coefficient of 0.506.

Table 4. Examining the correlation between income-ratio and age, marital status, and education between African American pregnant women insured by low-income Medicaid, RSM Medicaid, and private insurance (Pearson's Correlation Test).

	Age		Marital Status		Education	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Low-Income Medicaid (n=180)	-0.0101	0.9001	0.0368	0.6458	0.184	**0.0209**
RSM Medicaid (n=202)	0.162	**0.0344**	0.153	**0.0452**	0.355	**1.91E-06**
Privately Insured (n=103)	0.224	**0.0348**	-0.037	0.731	0.266	0.0116
All (n=485)	0.284	**3.30E-09**	0.272	**1.63E-08**	0.506	**2.20E-16**

IV. Discussion

Originally, based on the question of which insurance group would result in the most adverse pregnancy outcomes in African American pregnant women residing in Georgia, it was hypothesized that both Medicaid groups (low-income and RSM), would exhibit the highest rates of pregnancy complications and maternal morbidities. However, the data suggests that there were no significant differences in pregnancy outcomes across all three insurance groups. Our study further revealed how an individual's income-ratio (income/household size) is moderately correlated to common SES determinants of age, marital status, and years of education.

In the initial steps to characterize each insurance group, our study examined multiple SES indicators to ensure our three insurance groups were representative. Although these SES indicators of age, household size, income, and marital status do accurately capture the women for the most part, the important differences for each individual are apparent. Our study reveals how those insured by low-income Medicaid may not all be captured as being on average younger, single, or earning a lower income with a larger household size compared to those women who are privately insured. These socioeconomic determinants within themselves are able to capture individuals at different levels. For instance, the outliers from Table 3 could be explained through the concept of entrepreneurship. These women who may be insured by low-income Medicaid may earn stipends from outside sources and will self-report these large incomes to the study even though it is not reported to the federal government. There is evidence for privately insured women who report low annual incomes as being younger women residing within their parents' household and receive healthcare services through reliance on familial health insurance. This data ultimately reveals how income is not always a direct solution to healthcare accessibility. There are several different barriers that exist for individuals at all levels of common SES determinants that hinder complete healthcare accessibility resulting in adverse healthcare and pregnancy outcomes.

At the time, there is no sufficient evidence to fully evaluate the long-term effects of marijuana use on newly born infants and marijuana use is discouraged by pregnant women. The higher rates of marijuana use by women insured by both Medicaid subtypes compared to the privately insured women from Table 3 may be explained by accessibility. As the most commonly reported illicit drug used during pregnancy, marijuana has a high prevalence of 15-28% in young, urban low socioeconomic women (Kim et al, 2018). It is possible that some of these

women rely on marijuana to reduce and manage their symptoms of nausea, vomiting, and abdominal pain because they may not be able to afford pharmaceutical medications. For an individual earning a low-income, it may be easier to have accessibility to illegal substances than to adequate healthcare treatment.

In summation, according to the results, since it was found that there were no significant differences in birth outcomes or maternal morbidities across all insurance groups, the hypothesis of both Medicaid groups producing the most adverse conditions is unsupported.

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