



Background

The Center for Disease Control and Prevention defines anemia as a hemoglobin (Hgb) level below 11 g/dL in the first trimester, 10.5g/dL in the second trimester, and 11 g/dL in the third trimester.¹ In addition, severe anemia is defined as Hgb level below 6 g/dL.¹

The prevalence of anemia in pregnant non-Hispanic Black women is two times higher than that of non-Hispanic white women.²

This retrospective cohort study aimed to determine the effect of race, ethnicity, insurance status, and socioeconomic status on anemia.

Methods

We utilized institutional data to identify all patients who were admitted for delivery between March 1, 2018, and February 28, 2020. Data points included demographic variables including self-identified race and ethnicity, insurance status, and zip code of residence; and admission hemoglobin. Zip codes were matched to median household income from US Census data. We compared variables among patients with Hgb $\geq$ 11 g/dL (non-anemic), Hgb $\geq$ 9 and $<$ 11 g/dL (mildly anemic), Hgb $\geq$ 6 and $<$ 9 g/dL (moderately anemic), and Hgb $<$ 6 g/dL (severely anemic) using chi-squared test and Mann Whitney U test. A multivariable logistic regression calculated odds ratios between anemic states and our predictors of interest.

Results

Of 5358 identified patients, 4403 (82%) were anemic (mild 2828 (52.8%), moderate 1566 (29%), severe 8 (0.2%)). African American race and government insurance status were associated with more severe degrees of anemia; also, median household income declined for mild and moderate anemia (Table). The odds of being anemic were 1.99 times higher for African American women than white women ($p < 0.0001$) and 1.73 times higher for patients with government versus non-government insurance ($p < 0.0001$). Conversely, the odds of anemia were 0.72 times lower for Hispanic versus non-Hispanic ethnicity ($p < 0.01$). Anemic states clustered by zip code (bottom of Table).

N=5358		Non-anemic N=954 (17.8%)	Mildly anemic N=2828 (52.8%)	Moderately anemic N=1566 (29.2%)	Severely anemic N=8 (0.2%)	<i>p</i>
Race	African American N=3905 (72.9%)	583 (14.9%)	2063 (52.8%)	1251 (32.0%)	8 (0.2%)	$p<0.0001$
	White N=887 (16.6%)	248 (28.0%)	468 (52.8%)	171 (19.3%)	0 (0%)	
	Other* N=564 (10.5%)	123 (21.8%)	297 (52.7%)	144 (25.5%)	0 (0%)	
Ethnicity	Not Hispanic N=4813 (89.8%)	836 (17.4%)	2551 (53%)	1418 (29.5%)	8 (0.2%)	$p<0.002$
	Hispanic/Latino N=405 (7.6%)	92 (22.7%)	212 (52.4%)	101 (24.9%)	0 (0%)	
	Unknown N=140 (2.5%)	27 (19.3%)	66 (47.1%)	47 (33.6%)	0 (0%)	
Insurance	Government N=3413 (63.7%)	504 (14.5%)	1771 (52.0%)	1138 (33.3%)	8 (0%)	$p<0.0001$
	Private N=1691 (31.6%)	411 (24.3%)	909 (53.7%)	371 (22.0%)	0 (0%)	
	Other** N=195 (4.7%)	35 (18.0%)	121 (62.0%)	39 (20.0%)	0 (0%)	
Household income	Median income in USD***	37,864 (31,646-52,910) [21,154-132,754]	37,123 (31646-44,489) [21,154-61,972]	37,123 (31,646-42,864) [20,263-58,616]	38,540 (30,504-55,048) [21,155-61,357]	$p<0.0001$

Data expressed as n (%).

*Includes Asian Mideast Indian [n=212 (4%)], American Indian or Alaskan Native [n=5 (0.1%)], Native Hawaiian/Pacific Islander [n=4 (0.1%)], and other [(n=343 (6%)).

** Includes self-paid [n=195 (5.9%)].

*** Data expressed as median (interquartile range) and [range].

Conclusion

Anemia on admission for delivery is associated with social determinants of health. Understanding determinants of anemia is imperative as it is associated with maternal complications such as transfusion, cesarean delivery, gestational diabetes mellitus, hypertension, premature rupture of membranes, placental abruption, polyhydramnios, and oligohydramnios.³ Future research should focus on how social determinants of health lead to anemia and possible remedies for this public health issue.

Limitations

Single-Center study

References

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- 3.Lin L, Wei Y, Zhu W, et al. Gestational diabetes mellitus Prevalence Survey study Group. Prevalence, risk factors and associated adverse pregnancy outcomes of anemia in Chinese pregnant women: a multicenter retrospective study. BMC Pregnancy Childbirth. 2018 Apr 23;18(1):111.

Anemic States Clustered by Zip Code

