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# Differences in Maternal and Infant Cord Blood Vitamin D Between Racial/Ethnic Groups

Summer Undergraduate  
Research Program

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**Child Health  
Research Institute**

## Background

- Vitamin D is a fat-soluble secosteroid that plays an important role in bone metabolism and skeletal health obtained by dietary intake and sunlight exposure.
- Vitamin D deficiency is most common among darker pigmented women who emigrated to higher latitudes, further exacerbating heart disease and diabetes in African and South Asian groups.<sup>1</sup>
- Previous studies have demonstrated that low vitamin D levels in pregnant women may be related to increased risk of low birth weight and preterm delivery; less is known about how these impacts are different between racial/ethnic groups.
- This study aimed to investigate the relationship between 25-hydroxyvitamin D (25(OH)D) levels in maternal blood and infant cord blood and certain ethnic group, prematurity status, and low birth weight.



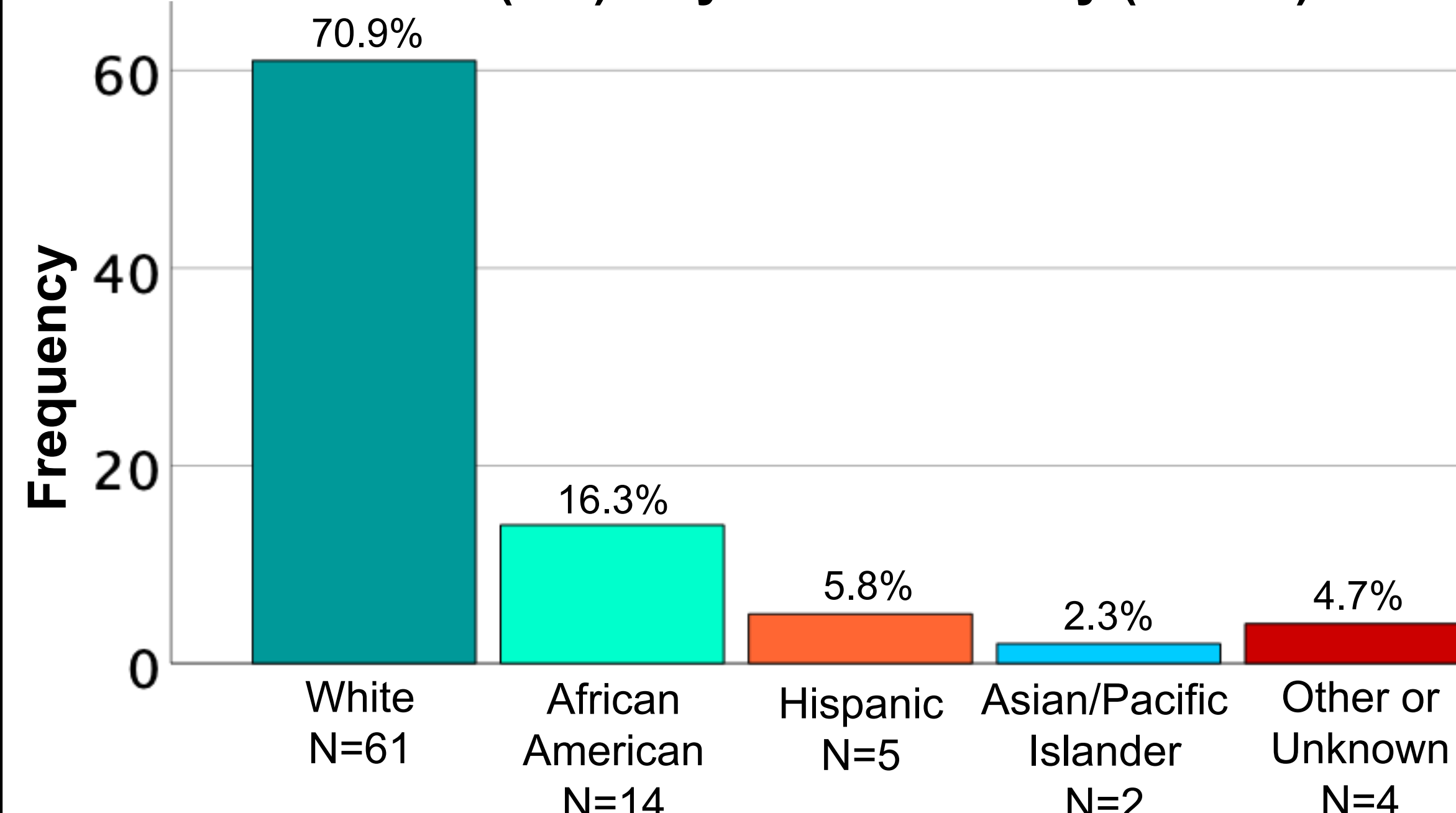
**We hypothesize that mothers and infants with dark pigmentations will have lower 25(OH)D levels.**

## Experimental Design

- An IRB approved study enrolled mother-infant pairs (N = 86) and collected maternal blood samples and umbilical cord samples to analyze 25(OH)D levels.
- Descriptive statistics were generated using IBM SPSS Statistics 28 software. The Kruskal-Willis tests comparisons were used to assess differences in 25(OH)D levels between categorical variables for maternal and infant samples.
- Subgroups were defined by infant race, preterm birth (<37 weeks/≥37 weeks), and low birth weight (≤2500 g/>2500 g).
- A p-value of <0.05 was considered significant.

## Demographics

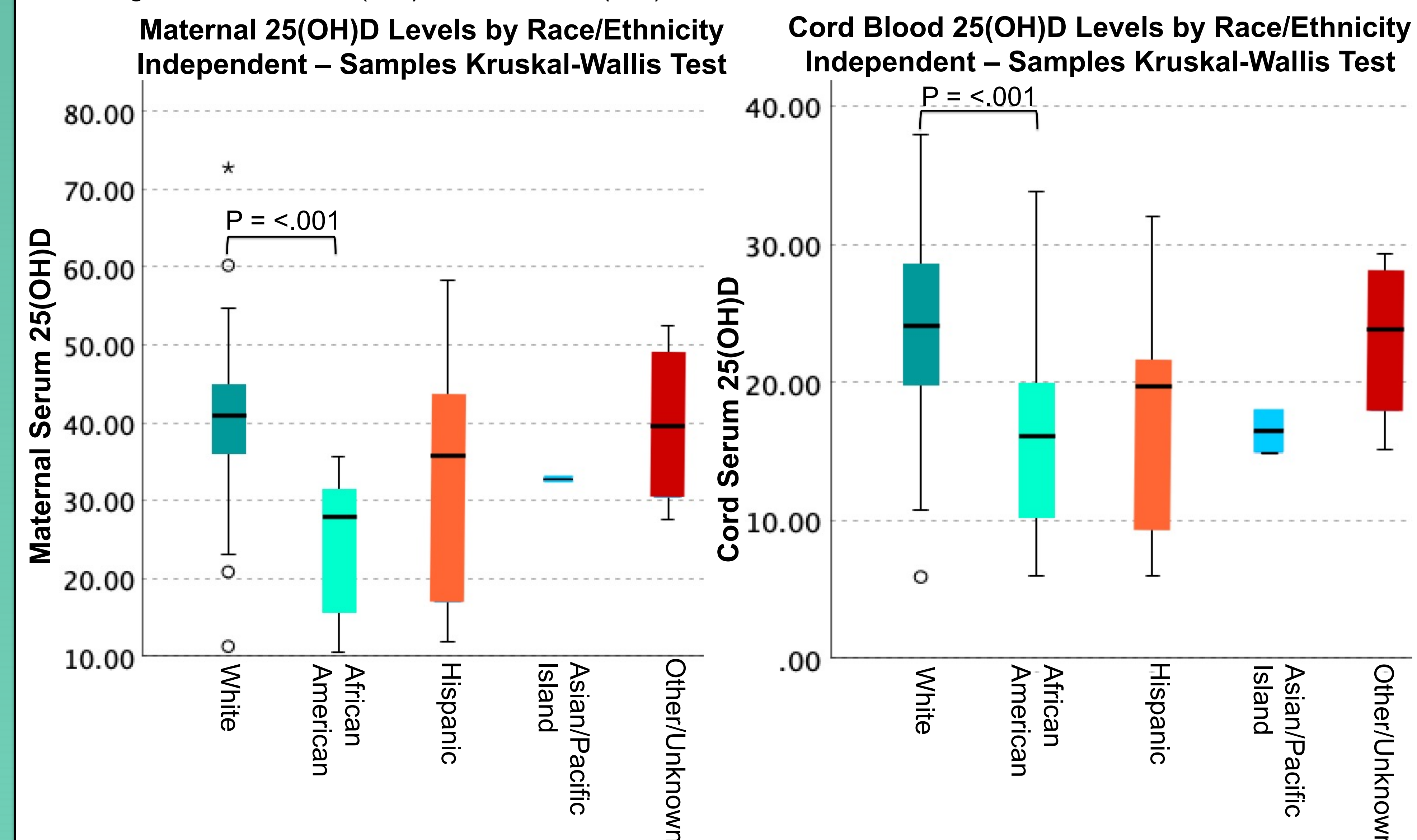
**25(OH)D by Race/Ethnicity (N = 86)**



Categorical Variables	
<b>Neonate Sex</b>	
Male Infant	49 (57%)
Female Infant	37 (43%)
<b>Prematurity</b>	
Premature	9 (6.3%)
Mature	77 (93.7%)
<b>Birth Weight</b>	
Low Birth Weight	7 (0.6%)
Not Low Birth Weight	79 (99.4%)

## Results

- Median maternal 25(OH)D levels were (38.06 ng/mL) and infants 25(OH)D levels were (22.52 ng/mL).
- The median White infants 25(OH)D (24.02 ng/mL) and their mothers 25(OH)D level (40.76 ng/mL) is higher compared to the median African American infants 25(OH)D (16.03 ng/mL) and their mothers 25(OH)D (27.79 ng/mL) level.
- White participants had significantly higher 25(OH)D levels in both maternal (40.76 vs 27.79, p = <.001) and infant serum (24.02 vs 16.03, p = <.001).
- No statistically significant differences were found between preterm and full-term infants, nor for birth weight in maternal 25(OH)D and cord 25(OH)D level.



**Figure 1.** Comparison of 25(OH)D levels for Maternal 25(OH)D between each Race/Ethnic groups

**Figure 2.** Comparison of 25(OH)D levels for Cord 25(OH)D between each Race/Ethnic groups

**Table 1:** Descriptive Statistics for Maternal 25(OH)D levels of interest in ng/mL

Characteristics	N	Median	Interquartile Range
White	61		
Maternal		40.76	35.87-44.99
African American	14		
Maternal		27.79	15.30-32.03

**Table 2:** Descriptive Statistics for Cord Blood 25(OH)D levels of interest in ng/mL

Characteristics	N	Median	Interquartile Range
White	61		
Cord Blood		24.02	19.76-28.66
African American	14		
Cord Blood		16.03	9.46-20.02

**Table 3:** Descriptive Statistics for Maternal and Cord 25(OH)D levels of interest in ng/mL

Characteristics	N	Median	Interquartile Range
Maternal	86	38.06	30.50-43.64
Cord Blood	86	22.52	17.94-27.81

## Discussion

- Low 25(OH)D level was present in African American women (Median 27.79, 10.44-35.59) and infants (Median 16.03, 5.98-33.82), but the highest level were noted in White women (Median 40.76, 11.28-72.77) and infants (24.02, 5.90-37.94).
- In China, a study with a larger cohort had found that low maternal 25(OH)D level was associated with neonatal low birth weight.<sup>2</sup>
- Our findings did not indicate a difference in 25(OH)D level by prematurity status or low birth weight status, but our lack of findings may be due to a small sample size or other confounding effects.
- A limitation of this study is that it does not include a larger sample size of mothers and infants from different Race/Ethnic groups.

## Conclusion

- In this study, we showed that 25(OH)D in maternal and infant cord blood were significantly different between race/ethnic groups.
- The results showed that using a maternal 25(OH)D level to reflect on early infancy 25(OH)D is inappropriate.
- Future directions include examining differences with larger and more diverse sample sizes.
- Such research should include measuring Vitamin D intake in pregnancy and the consequential clinical outcomes.
- The priority group for low 25(OH)D screening are neonates born to mothers with low 25(OH)D levels, as well as women of African descent.

## References

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