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## Breastfeeding duration and cytomegalovirus seroprevalence among U.S. children aged 1–5 years: The National Health and Nutrition Examination Surveys, 2011–2012 and 2017–2018

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Dear Editor, Petersen et al reported that cytomegalovirus (CMV) seroprevalence among U.S. children aged 1–5 years in the National Health and Nutrition Examination Survey (NHANES) increased from 20.7% in 2011–2012 to 28.2% in 2017–2018, with significant increases among 1-year-olds, non-Hispanic White children, those living at or above the poverty level, and being the only child 5 years in the household [1]. As we previously reported, 2011–2012 NHANES results indicated that these groups had significantly lower CMV seroprevalence in comparison to children that were older, Hispanic, living below the poverty level, and living with another child 5 years in the household, respectively [2, 3].

The direction of change in CMV seroprevalence over time varied by race and Hispanic origin and poverty index; seroprevalence also was higher among children who were ever versus never breastfed in 2017–2018 but the duration of breastfeeding was not assessed [1]. Longer breastfeeding duration increases risk of CMV infection in the infant [4]. Therefore, we examined the effect of breastfeeding duration (never, <6 months, and ≥6 months) on CMV seroprevalence using combined NHANES 2011–2012 and 2017–2018 data in an overall model, and models stratified by poverty index, race and Hispanic origin, and age, and adjusted for survey cycle, number of children 5 years in the household, and education of the head of household.

From 2011–2012 to 2017–2018, overall CMV seroprevalence increased among children breastfed <6 months, from 17.1% (95% confidence interval [CI]: 11.1%–24.6%) to 26.7% (95% CI: 19.9%–34.3%,  $p=0.040$ ), and among children breastfed ≥6 months, from 27.4% (95% CI: 13.9%–44.8%)<sup>1</sup> to 34.9% (95% CI: 28.1%–42.2%,  $p=0.333$ ). Compared to those

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never breastfed, higher CMV seroprevalence was independently associated with <6 months of breastfeeding among 1-year-olds (adjusted odds ratio [aOR]=5.1, 95% CI: 1.7–15.3, p=0.005) and Hispanic children (aOR=2.0, 95% CI: 1.1–3.5, p=0.022). Children who were breastfed  $\geq$  6 months had higher CMV seroprevalence (aOR ranging from 2.2 to 7.8) across all subgroups (p<0.05 for all, except non-Hispanic White children and children 2–3 years of age) (Table 1). After accounting for breastfeeding duration, seroprevalence increased over time among non-Hispanic White children (aOR=3.3, 95% CI: 1.3–8.4), among those living at or above poverty (aOR=2.2, 95% CI: 1.2–4.1), and among 1-year-olds (aOR=2.9, 95% CI: 1.4–6.1).

Longer breastfeeding duration was significantly associated with higher CMV seroprevalence in all family income and race and Hispanic origin subgroups, except non-Hispanic White children. CMV seroprevalence among 1-year-olds, which was independently associated with breastfeeding <6 and  $\geq$  6 months, increased in recent years. This increase could result in a higher risk of transmission among children in the household and daycare, and to parents and caregivers, with possible changes in CMV seroprevalence overall. During 1999–2004, CMV seroprevalence was lower among non-Hispanic White women (~50%) compared to non-Hispanic Black and Hispanic women (>85%) [5]. However, updated estimates of CMV seroprevalence among children, adolescents, and adults will be needed to inform efforts to determine optimal ages for vaccination.

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<sup>1</sup>This proportion does not meet the National Center for Health Statistics reliability criteria.

Table 1.

Estimated Adjusted Odds Ratios (95% Confidence Intervals) of CMV IgG Seroprevalence in U.S. Children 1–5 Years of Age in Multivariable Logistic Regression Models, Overall and by Subgroups

Strata	Breastfed < 6m Compared to never breastfed	Breastfed 6m	2017–2018 compared to 2011–2012 (ref)	Age 2–3 years Compared to age 1 year	Age 4–5 years	1 other children <5 years in household compared to none	Complete HS/GED and above compared to less than HS	At or above compared to below poverty level	Non-Hispanic Black Compared to non-Hispanic White	Hispanic
<b>Overall n=1306</b>	1.4* (1.0–2.0) <sup>a</sup> 0.077~	2.7 (1.6–4.8)	1.6 (0.9–2.6)	1.3 (0.8–1.9)	1.8 (1.1–2.9)	1.4 (1.0–2.1)	0.5 (0.3–0.9)	0.9 (0.6–1.3)	1.5 (0.9–2.4)	2.0 (1.4–2.8)
<b>Below poverty level n=469</b>	1.5 (0.9–2.5)	3.2 (1.4–7.2)	0.8 (0.4–1.6)	1.1 (0.5–2.5)	2.6 (1.3–5.0)	1.4 (0.9–2.2)	0.3 (0.2–0.7)		1.5 (0.7–3.0)	2.6 (1.3–5.4)
<b>At or above poverty level n=730</b>	0.128	0.007	0.573	0.805	0.008	0.157	0.002		0.269	0.010
<b>Non-Hispanic White n=353</b>	1.1 (0.5–2.3)	2.3 (1.0–5.1)	3.3 (1.3–8.4)	0.9 (0.4–1.9)	1.3 (0.4–3.6)	1.7 (1.0–2.9)	0.6 (0.2–1.5)	1.1 (0.5–2.4)		
<b>Non-Hispanic Black n=366</b>	0.807	0.054	0.017	0.726	0.664	0.070	0.252	0.852		
<b>Hispanic n=387</b>	0.832	0.028	0.058	0.164	0.016	0.211	0.071	0.543		
<b>Age 1 year n=235</b>	0.022	0.003	0.724	0.339	0.148	0.121	0.030	0.054		
<b>Age 2–3 years n=568</b>	0.9 (0.4–2.2)	2.2 (0.9–5.6)	1.4 (0.7–2.8)	1.5 (0.7–3.2)	1.6 (0.8–3.1)	1.8 (0.9–3.6)	0.6 (0.3–0.9)	0.5 (0.3–1.0)		
<b>Age 4–5 years n=503</b>	1.5 (0.7–3.3)	2.7 (1.3–5.8)	1.5 (0.7–3.0)	1.9 (0.8–4.7)	2.6 (1.2–5.5)	1.5 (0.8–2.7)	0.5 (0.2–1.1)	1.3 (0.6–2.9)		

HS = high school, GED = general education development

\* Odds ratio from stratified adjusted model.

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95% confidence interval for the odds ratio,

p-value

Data source: National Health and Nutrition Examination Survey (NHANES), 2011–2012 and 2017–2018. The NHANES is a cross-sectional national survey designed to be representative of the United States civilian non-institutionalized population.

Adjusted odds ratios, 95% confidence intervals for the odds ratios and p-values for the beta terms from logistic regression models overall and stratified on poverty, race and Hispanic origin, and age and adjusted for the all remaining covariates (breastfeeding duration, survey cycle, number of children <5 years of age in the household, and education of the head of household).

Logistic regression models were examined using SUDAAN software package (Version 10.0, RTI International, Research Triangle Park, N.C.). Logistic regression analysis incorporating the complex sample design and examination sample weights for both the 2011–2012 and 2017–2018 survey cycles from the NHANES. Overall and subgroup sample sizes are shown; actual sample size may be smaller due to non-response. Darker shaded area designates statistical significance of the beta term ( $p < 0.05$ ) from the stratified analyses.

Race and Hispanic origin were based on respondents' self-report and classified as non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic Asian and all "other" non-Hispanics including those multi-racial. Estimates were not shown for non-Hispanic Asians or all "other" because sample size was too small.

Poverty level was categorized from a poverty index ratio (PIR) calculated by dividing the family income by a poverty threshold specific for family size, using the U.S. Department of Health and Human Services' poverty guidelines and categorized as either below poverty ( $PIR < 1$ ) or at or above poverty ( $PIR \geq 1$ ) [6].