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Cytomegalovirus seroprevalence among U.S. children 1 to 5 years of age: The National Health and Nutrition Examination Surveys (NHANES), 2017 – March 2020 Pre-pandemic dataset

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Dear Editor,

Cytomegalovirus (CMV) seroprevalence among U.S. children 1-5 years of age was 28.2% during 2017–2018 in the National Health and Nutrition Examination Survey (NHANES) [1]. In this report, we provide updated estimates of CMV IgG seroprevalence using the larger NHANES 2017–March 2020 pre-pandemic dataset.

Data collected from 2019 to March 2020, when survey field operations were suspended due to the COVID-19 pandemic, were combined with the 2017–2018 cycle to create a nationally representative NHANES 2017–March 2020 pre-pandemic dataset [2]. We calculated national estimates using the examination sample weights to account for the differential probabilities of selection, nonresponse, and noncoverage, as previously described [2]. We calculated standard errors using Taylor Series Linearization in SUDAAN to account for the complex sample design and 95% confidence intervals (CI) using the exact method developed by Korn and Graubard [3]. We assessed CMV IgG seroprevalence overall and the weighted proportion of combined low and intermediate IgG avidity indicating recent (4 months) CMV infection among IgG-positive children. We examined factors associated with overall CMV IgG seroprevalence (i.e., age, sex, race and Hispanic origin, poverty index, education of the head of the household, mother’s age when the child was born, breastfeeding history, and number of children 5 years in the household) using univariate analysis and multivariable models.

Among the 1,574 children 1-5 years of age examined, 957 (60.8%) were tested for CMV IgG antibody. Overall weighted CMV IgG seroprevalence was 29.0% (95% CI: 24.4%-33.9%). Among IgG-positive children, 14.4% (95% CI: 9.0%-21.3%) were

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determined to have recent CMV infection. In univariate and multivariable analyses, CMV IgG seroprevalence was significantly higher in children 4-5 years of age (vs. 1 year), whose head of household had not completed high school (vs. those who completed high school, high school equivalency or some college), and in children who were breastfed either <6 months or 6 months (vs. never) (Table 1).

In summary, roughly one in three U.S. children 1-5 years of age were CMV-seropositive during the pre-pandemic period 2017–2020. CMV seroprevalence appeared to increase from 20.7% in 2011–2012 [4] to 29.0% in 2017–March 2020. Compared with 2011–2012, CMV seroprevalence no longer differed by race and Hispanic origin, poverty index, and having another child 5 years of age in the household [4, 5]. Additionally, this larger sample provided more reliable CMV seroprevalence estimates for non-Hispanic Black children than the 2017–2018 NHANES [1]. Breastfeeding remained the factor most strongly associated with CMV seroprevalence.

It is unknown whether the pandemic will further influence CMV transmission. Mitigation measures in childcare facilities (e.g. smaller class sizes and increased hand hygiene and disinfection) may decrease exposures to CMV [6]. Although the lockdown may have negatively affected counseling and social support for breastfeeding initiation [7], women may have spent more time at home with their infants during the pandemic, possibly breastfeeding longer [8]. Continued monitoring of CMV seroprevalence among young children may help better understand the potential impact of the pandemic on CMV seroprevalence.

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References

1. Petersen MR, Patel EU, Abraham AG, Quinn TC, Tobian AAR. Changes in Cytomegalovirus Seroprevalence Among U.S. Children Aged 1 to 5 Years: The National Health and Nutrition Examination Surveys. *Clin Infect Dis* 2020.
2. Centers for Disease Control and Prevention. National Center for Health Statistics. National Health and Nutrition Examination Survey. NHANES Analytic Guidance and Brief Overview for the 2017-March 2020 Pre-pandemic Data Files. Available at: <https://www.cdc.gov/nchs/nhanes/continuousnhanes/overviewbrief.aspx?Cycle=2017-2020>.
3. Korn E, Graubard B. Confidence intervals for proportions with small expected number of positive counts estimated from survey data. *Surv Methodol* 1998; 24(2): 193–201.
4. Lanzieri TM, Kruszon-Moran D, Amin MM, et al. Seroprevalence of cytomegalovirus among children 1 to 5 years of age in the United States from the National Health and Nutrition Examination Survey of 2011 to 2012. *Clin Vaccine Immunol* 2015; 22(2): 245–7. [PubMed: 25520150]
5. Schminck S, Kruszon-Moran D, Dollard SC, Lanzieri TM. Effect of Breastfeeding and Additional Household Children on Cytomegalovirus Seroprevalence among U.S. Children 1 to 5 Years of Age. *Clin Vaccine Immunol* 2017; 24(11).
6. Coronado F, Blough S, Bergeron D, et al. Implementing Mitigation Strategies in Early Care and Education Settings for Prevention of SARS-CoV-2 Transmission - Eight States, September-October 2020. *MMWR Morb Mortal Wkly Rep* 2020; 69(49): 1868–72. [PubMed: 33301431]

7. Ceulemans M, Verbakel JY, Van Calsteren K, Eerdeken A, Allegaert K, Foulon V. SARS-CoV-2 Infections and Impact of the COVID-19 Pandemic in Pregnancy and Breastfeeding: Results from an Observational Study in Primary Care in Belgium. *Int J Environ Res Public Health* 2020; 17(18).
8. Snyder K, Worlton G. Social Support During COVID-19: Perspectives of Breastfeeding Mothers. *Breastfeed Med* 2021; 16(1): 39–45. [PubMed: 33372829]
9. Parker JD, Talih M, Malec DJ, et al. National Center for Health Statistics Data Presentation Standards for Proportions. *Vital Health Stat* 2 2017; (175): 1–22.

Cytomegalovirus (CMV) IgG Seroprevalence in U.S. Children 1-5 Years of Age by Selected Factors, NHANES, 2017 – March 2020 Pre-pandemic dataset

Table 1.

Variable	2017-2020 Pre-pandemic			P-value ^d	Odds Ratio ^b (95% CI)	Odds Ratio ^c (95% CI)
	Children Examined n	Children Tested for CMV n (%)	CMV IgG weighted Seroprevalence % (95% CI)			
Total	1574	957 (60.8)	29.0 (24.4-33.9)			
Age group (years)						
1 (ref)	357	197 (55.2)	23.2 (16.8-30.7)	1.0	1.0	1.0
2-3	658	391 (59.4)	24.1 (17.5-31.8)	0.837	0.9 (0.6-1.5)	0.9 (0.6-1.5)
4-5	559	369 (66.0)	35.9 (29.0-43.3)	0.013	1.6 (0.9-2.8)	1.7 (1.0-2.8)
Sex						
Male (ref)	812	498 (61.3)	26.3 (21.2-31.9)	1.0	1.0	1.0
Female	762	459 (60.2)	31.9 (24.9-39.4)	0.171	1.2 (0.8-2.0)	
Race and Hispanic origin						
Non-Hispanic White (ref)	537	347 (64.6)	25.7 (19.6-32.6)	1.0	1.0	1.0
Non-Hispanic Black	428	247 (57.7)	21.8 (15.2-29.8)	0.411	1.0 (0.6-1.8)	
All Hispanic	348	214 (61.5)	33.6 (24.8-43.5)	0.104	1.1 (0.7-1.8)	
Poverty level						
Below poverty line	494	314 (63.6)	29.1 (21.8-37.2)	1.0	1.0	1.0
At or above poverty line (ref)	894	535 (59.8)	28.5 (23.7-33.8)	0.879	1.0 (0.7-1.5)	
Education of the head of household						
Less than high school diploma (ref)	231	151 (65.4)	38.2 (28.5-48.8)	1.0	1.0	1.0
High school/GED or some college	870	536 (61.6)	23.7 (18.0-30.1)	0.010	0.5 (0.3-1.0)	0.5 (0.3-0.9)
Completed college or more	379	212 (55.9)	34.7 (27.4-42.6)	0.544	0.6 (0.3-1.4)	0.8 (0.5-1.3)
Mother's age when born						
14-19 years (ref)	116	76 (65.5)	25.7 (13.0-42.3)	1.0	1.0	1.0
20-29 years	832	496 (59.6)	29.6 (24.2-35.5)	0.547	1.4 (0.7-2.8)	
30-49 years	617	380 (61.6)	29.0 (21.6-37.4)	0.660	1.3 (0.5-3.0)	
Breastfeeding history						

Variable	2017-2020 Pre-pandemic			P-value ^d	Odds Ratio ^b (95% CI)	Odds Ratio ^c (95% CI)
	Children Examined n	Children Tested for CMV n (%)	CMV IgG weighted Seroprevalence % (95% CI)			
Never (ref)	329	209 (63.5)	15.6 (10.5-22.0)	1.0		
<6 months	676	402 (59.5)	27.4 (21.2-34.3)	0.002	2.1 (1.4-3.3)	2.0 (1.3-3.2)
6 months	560	339 (60.5)	35.6 (30.2-41.2)	<0.001	3.1 (1.9-5.2)	2.7 (1.7-4.3)
Number of other children 5 years of age living in the household						
None (ref)	751	460 (61.3)	26.1 (20.8-31.9)	1.0		
1	823	497 (60.4)	31.9 (25.8-38.4)	0.103	1.2 (0.9-1.6)	

^a P-value <0.05 from t-statistic comparing subgroup to reference group for each covariable

^b Odds ratio adjusted for age group, sex, race and Hispanic origin, poverty level, education of the head of household, mother's age when born, breastfeeding history, and number of other children 5 years of age living in the household using logistic regression model (full model)

^c Odds ratio adjusted for age group, education of the head of household, and breastfeeding history (reduced model with significant variables)
ref=reference group

All estimates met data presentation standards for proportions [9], except the estimate for the non-Hispanic Asian subgroup, therefore estimates for that group are not reported separately.