

Scientific Letters**Age-Specific Seroprevalence and Predictors of Cytomegalovirus IgG Seropositivity in Bosnia and Herzegovina: a 10-Year Cross-Sectional Study****Keywords:** Cytomegalovirus; Seroprevalence; Balkans.**Published:** November 01, 2026**Received:** April 01, 2026**Accepted:** October 31, 2026

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To the Editor.

Cytomegalovirus (CMV) IgG seropositivity indicates previous exposure and is relevant to congenital CMV prevention, but contemporary seroepidemiological data from Bosnia and Herzegovina are limited.^{1–3} In this 10-year, hospital-based cross-sectional study of 3,731 individuals tested at University Clinical Hospital Mostar during 2015–2024, 83.5% were CMV IgG-positive. Increasing age and female sex were independently associated with seropositivity, while the 2020–2024 testing period was associated with lower adjusted odds than 2015–2019. Among women aged 15–49 years, seroprevalence was 85%, leaving a meaningful proportion potentially susceptible to primary infection. These findings describe a clinically tested population, not a representative national sample, and support locally appropriate CMV prevention education while underscoring the need for population-based surveillance.

Methods. We retrospectively analyzed electronic records for individuals undergoing CMV serological testing at University Clinical Hospital Mostar, Bosnia and Herzegovina, from 1 January 2015 through 31 December 2024. For individuals tested more than once, only the first result was included. The analytic dataset comprised 3,731 individuals with demographic information and a valid qualitative CMV IgG result. A subgroup analysis included women aged 15–49 years (n=1,428).

CMV IgG was measured using commercial enzyme-linked fluorescent assays on automated VIDAS® platforms (bioMérieux, France). Results were classified using manufacturer cut-offs: negative <4.00 UA/mL, equivocal 4.00–6.00 UA/mL and positive >6.00 UA/mL. Equivocal results were excluded from the binary IgG analysis; the final descriptive analysis included 3,731 individuals with positive or negative

results. The authors report that the assay platform and cut-offs were unchanged during the study period.

We used chi-square tests for unadjusted comparisons and binary logistic regression to estimate adjusted odds ratios (ORs) and 95% confidence intervals (CIs). The overall model included age (continuous), sex, residence (urban/rural) and period (2015–2019 vs 2020–2024). The women-of-reproductive-age model included age and residence. Statistical significance was defined as $p < 0.05$. Adjusted predicted probabilities by age and sex were calculated from the overall model, holding residence at urban and period at 2020–2024. The study was approved by the institutional ethics committee; records were de-identified and the requirement for individual consent was waived.

Results. Of 3,731 individuals, 3,116 (83.5%) were CMV IgG-positive and 615 (16.5%) were negative; 58.5% were female. Crude seroprevalence increased with age, from 49.3% among children aged 1–5 years to 94.6% among individuals older than 65 years ($p < 0.001$). Seroprevalence was higher among females than males (85.8% vs 80.2%; $p < 0.001$) and among urban than rural residents (84.9% vs 82.0%; $p = 0.018$). The proportion positive was lower in 2020–2024 than in 2015–2019 (82.2% vs 88.7%; $p < 0.001$), although the later-period group was on average 2.52 years older.

In the multivariable model, age was associated with higher odds of IgG positivity (OR per year 1.044, 95% CI 1.039–1.050; $p < 0.001$), equivalent to approximately 54% higher odds per decade. Female sex was independently associated with positivity (OR 1.580, 95% CI 1.314–1.899; $p < 0.001$). Urban residence was not independently associated after adjustment (OR 1.162, 95% CI 0.967–1.398; $p = 0.109$). Compared with 2015–2019, testing during 2020–2024 was associated with lower adjusted odds of positivity (OR 0.511, 95% CI 0.397–0.657; $p < 0.001$). The model had a Nagelkerke R^2 of 0.164 and an area under the receiver operating

Table 1. Adjusted associations with CMV IgG seropositivity.

Independent Variable	Adjusted Odds Ratio (aOR)	95% Confidence Interval (CI)	p-value
Overall Cohort Model (n=3,731)			
Age (per 1-year increase)	1.044	1.039–1.050	<0.001
Sex (Female vs. Male)	1.580	1.314–1.899	<0.001
Place of Residence (Urban vs. Rural)	1.162	0.967–1.398	0.109
Time Period (2020–2024 vs. 2015–2019)	0.511	0.397–0.657	<0.001
Women of Reproductive Age Subgroup Model (n=1,428)			
Age (per 1-year increase)	1.054	1.030–1.078	<0.001
Place of Residence (Urban vs. Rural)	1.456	1.070–1.982	0.017

characteristic curve of 0.735 (95% CI 0.713–0.757) (**Table 1**).

Among women aged 15–49 years, 85% were IgG-positive. Within this subgroup, age (OR per year 1.054, 95% CI 1.030–1.078; $p<0.001$) and urban residence (OR 1.456, 95% CI 1.070–1.982; $p=0.017$) were independently associated with positivity. Model explanatory power was modest (Nagelkerke $R^2=0.035$). Model-predicted probabilities increased with age in both sexes; at age 30, estimates were 0.72 for females and 0.62 for males, rising to 0.86 and 0.80, respectively, by age 50. These are conditional model estimates for urban residents tested in 2020–2024, not crude age-specific prevalence estimates (**Figure 1**).

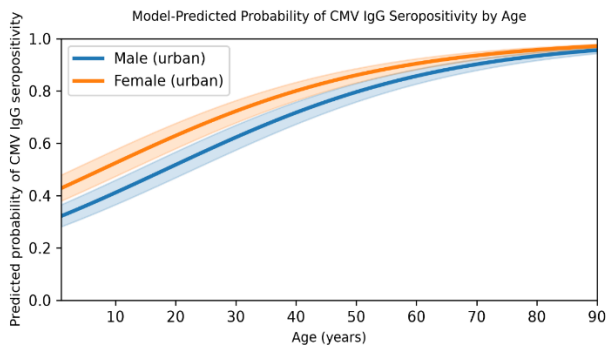


Figure 1. Adjusted predicted probability of CMV IgG seropositivity by age and sex. Estimates are derived from the multivariable logistic regression model for urban residents in 2020–2024. Shaded bands indicate 95% confidence intervals. These model-based conditional probabilities should not be interpreted as observed population prevalence.

Discussion. This large, decade-long hospital-based analysis found high CMV IgG seropositivity and a clear age gradient, consistent with cumulative exposure over the life course. The 83.5% estimate is similar to the 81.4% previously reported from a Mostar single-center series, while estimates from other European populations vary substantially by geography and sampling frame.^{3–7} The current data extend local evidence across a more recent period and include adjusted analyses of age, sex, residence and calendar period.

Female sex remained associated with seropositivity after adjustment. Differences in household contact,

childcare exposure or other social and behavioral factors could contribute, but these mechanisms were not measured and cannot be inferred from this dataset. Among women aged 15–49 years, approximately 15% were IgG-negative and therefore lacked serological evidence of prior infection. This finding supports clear prevention education about reducing CMV exposure, particularly during contact with young children. IgG positivity does not confer sterilizing immunity: non-primary maternal infection can also result in congenital CMV, so prevention messages should not imply that seropositive women have no risk.^{1,2,8}

The lower adjusted odds of positivity in the 2020–2024 testing period require cautious interpretation. Because CMV IgG generally persists after infection, this cross-sectional difference should not be taken as evidence of a population-level decline in cumulative exposure. Changes in referral patterns, clinical indications, prenatal testing or healthcare use may have altered the composition of the tested population; however, testing indications were not consistently available to assess these explanations. The hospital-based design also limits generalizability, and unmeasured factors—including parity, household composition, socioeconomic circumstances and childcare exposure—may confound observed associations. The cross-sectional data cannot estimate incidence or identify the timing of primary infection.

Conclusions. CMV IgG seropositivity was common among individuals tested at a tertiary-care hospital in Mostar. Age and female sex were independently associated with positivity, while calendar-period differences may reflect changes in the tested population. Population-based studies with consistent sampling and information on testing indications are needed to establish national seroprevalence and temporal trends.

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