Seroprevalence of SARS-CoV-2 Antibodies in Kibera Urban Informal Settlement Nairobi, Kenya: December, 2020 – June, 2021

This is a preliminary report prepared by the U.S. Centers for Disease Control and Prevention's Division of Global Health Protection in Kenya, the KEMRI-Centre for Global Health Research, and the Washington State University Global Health Program in Kenya.

Summary

- The prevalence of SARS-CoV-2 antibodies has increased in Kibera from 43% in December 2020 to 64% by June 2021.
- The vast majority of the households have been exposed to the virus – 87% of households have had at least one person test seropositive by June 2021.
- Despite the high seroprevalence, we continue to record a high-level of transmission in this informal settlement.
- This highlights the importance of prioritizing additional mitigation measures, including COVID-19 vaccine distribution, in crowded, low socioeconomic settings.

BACKGROUND

Introduction: Urban informal settlements may be disproportionately affected by the COVID-19 pandemic due to overcrowding; water, sanitation, and hygiene (WASH) infrastructure constraints; and socio-economic challenges that make the adoption and implementation of public health mitigation measures difficult. Seroprevalence surveys (or serosurveys) are important in determining the population-level prevalence of infections, like SARS-CoV-2. Since 2005, the Kenya Medical Research Institute (KEMRI), with support from the U.S. Centers for Disease Control and Prevention in Kenya (CDC Kenya), has conducted longitudinal surveillance for infectious diseases among approximately 25,000 residents of Kibera (the largest urban, densely populated, informal settlement in Nairobi) through a platform called the Population-Based Infectious Disease Surveillance (PBIDS). To help inform the COVID-19 response in Kenya, three serosurveys to track the spread of SARS-CoV-2 infections in Kibera have been conducted on the PBIDS platform.

METHODS

Members of randomly selected households from the PBIDS platform provided informed consent, and blood specimens were collected every 3 months. The first round was conducted between 27th November and 5th December 2020 (December survey), the second round between 22nd February and March 2021 (March survey), and the third round between 4th June to 4th July 2021 (June survey) yielding 511, 861, and 750 serum specimens, respectively (Table 1, Figure 1). The specimens were tested by the

CDC-supported laboratory at KEMRI Centre for Global Health Research (CGHR) in Nairobi. Individual seroprevalence of SARS-CoV-2 antibodies was expressed as a percentage of the seropositive persons among those tested. Seroprevalence estimates were weighted by the age and sex distribution of the general PBIDS population and accounted for household clustering of participants. Household seroprevalence was defined as the percentage of households with at least one seropositive member.

RESULTS

The overall weighted individual seroprevalence increased from 43.3% (95% confidence intervals (CI), 37.4 – 49.5%) in December 2020, to 56.2% (95% CI, 52.1 – 60.2%) in March 2021, and to 63.9% (95% CI, 59.5 – 68.0%) in June 2021. For each of the three rounds, the seroprevalence did not vary by sex, but was lower in children compared to adults (Figure 2). An appreciable increase in individual seroprevalence over the rounds was observed, with marked increase noted among children less than 10 years of age.

Samples tested were from 175, 285, and 252 households for the respective survey rounds. Among sampled households, 122 (69.7%; 95% CI, 62.3 – 76.4%), 230 (80.6%; 95% CI, 75.6 – 85.0%) and 220 (87.3%; 95% CI, 82.5 – 91.1%) had at least one seropositive participant in the December, March, and June surveys, respectively.

CONCLUSION

In densely populated informal urban settings where the implementation of mitigation measures – such as case identification and isolation, contact tracing and quarantine, and social distancing – remain very challenging, exposure to SARS-CoV-2 has increased rapidly in the 16 months of the COVID-19 pandemic in Kenya. CDC has supported various WASH interventions and continues to provide testing for SARS-COV 2 among the residents of Kibera. It might be, however, important to prioritize additional mitigation measures such as COVID-19 vaccine distribution, in crowded, low socioeconomic settings.

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SUMMARY TABLE

Table 1: Households and participants enrolled, and serum collection during the three survey rounds in Kibera informal settlement, Nairobi, Kenya

Number of:	December 2020	March 2021	June 2021
Households	175	299	275
Individuals	523	882	809
Serum collections tested	511*	861**	750**

Note: *Tested for total immunoglobulins (IgM and IgG) antibodies using the Wantai SARS-CoV-2 two-step antigen sandwich enzyme immunoassay (ELISA) kit; ** tested using InBios IgG SARS-CoV-2 ELISA kit

FIGURES

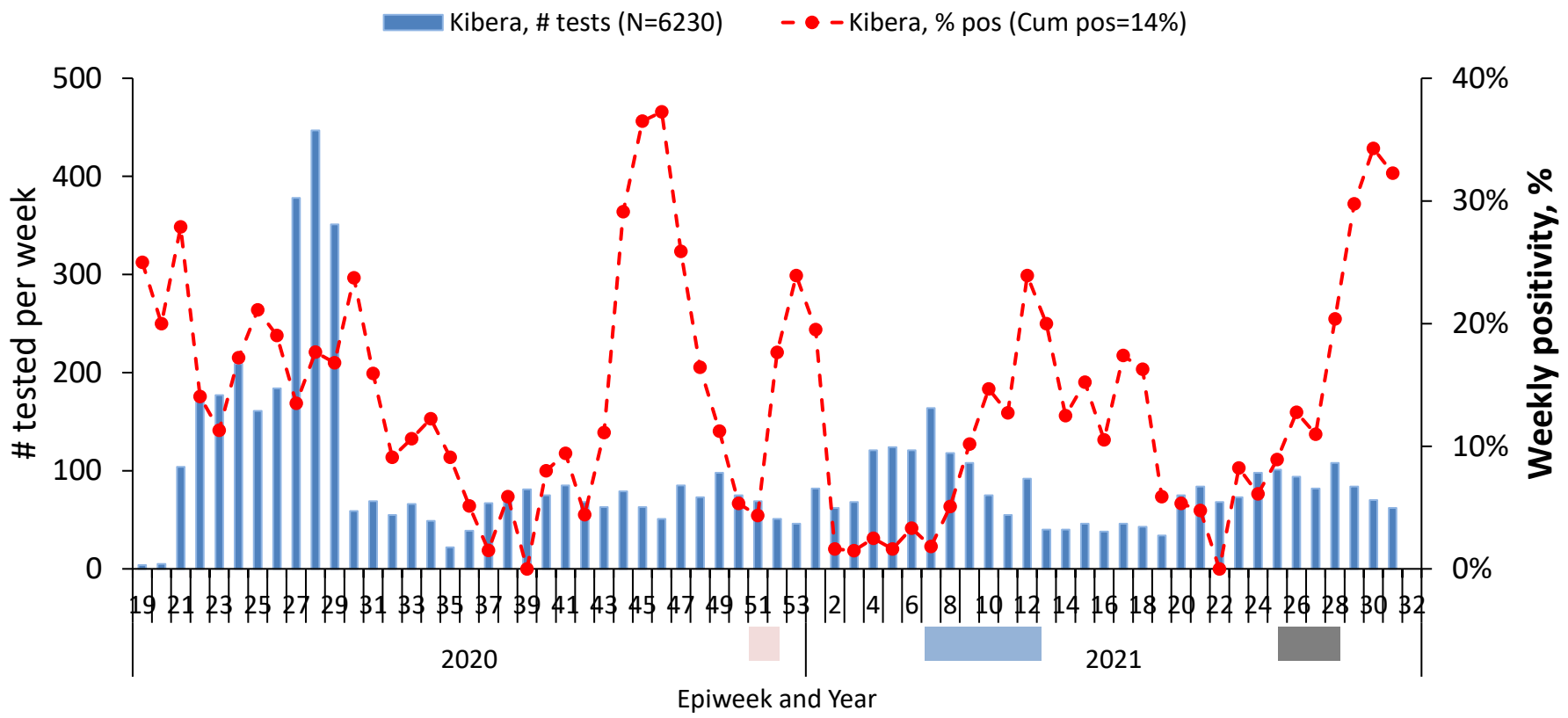

Figure 1: Weekly tests and SARS-CoV-2 positivity in Kibera by epidemiological weeks (epiweek) and year highlighting the timing of the serosurveys in December 2020 (light pink), March (light blue) and June (grey) 2021

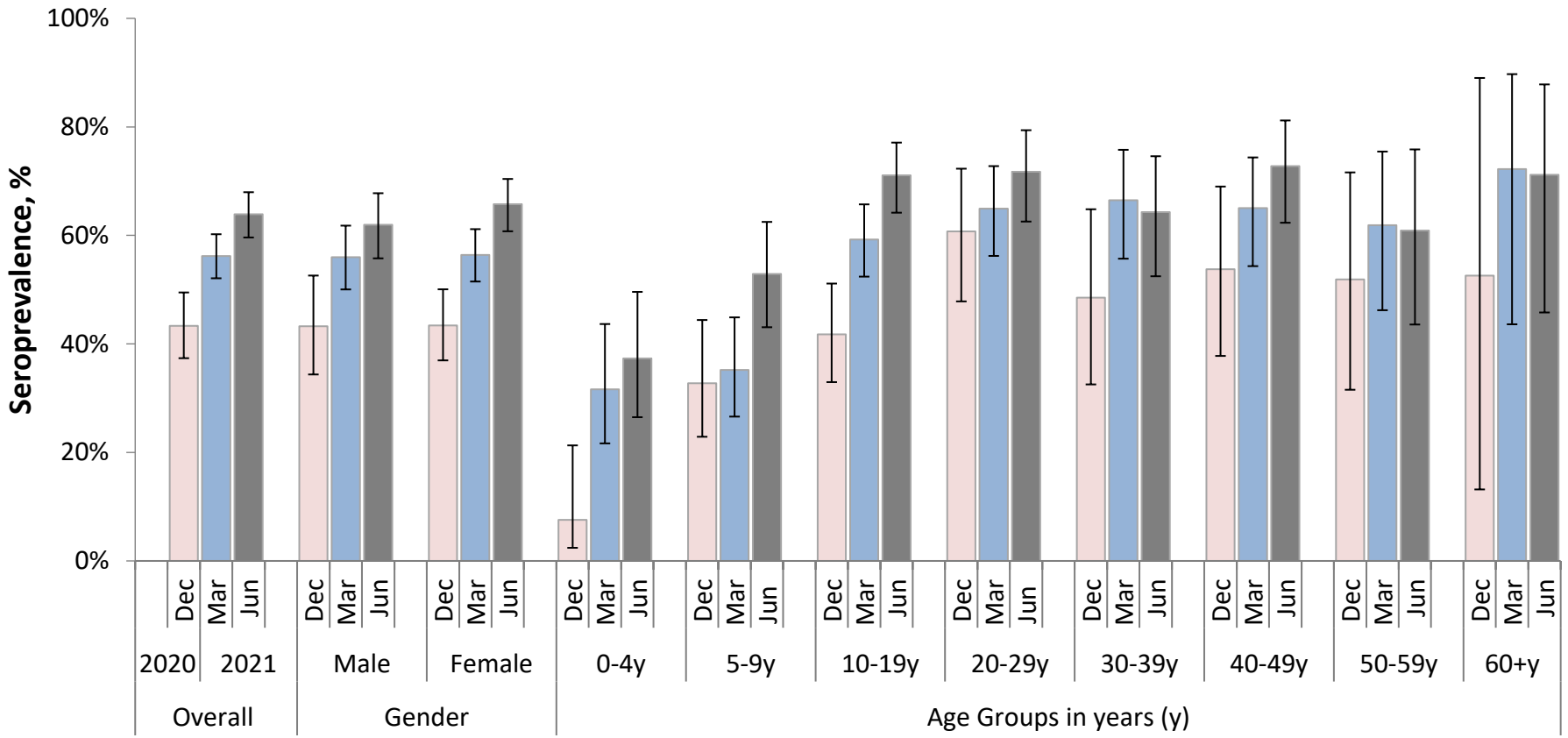

Figure 2: Overall, gender and age disaggregated individual seroprevalence of SARS-CoV-2 antibodies in December 2020, March, and June 2021 survey rounds in Kibera urban informal settlement, Nairobi Kenya. Sampling weights and household clustering was factored in estimating the seroprevalence