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Reaching HIV epidemic control in Nigeria using a lower HIV viral load suppression cut-off

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Abstract

Background: Virologic suppression has been defined using a HIV viral load of less than 1000 copies/ml. Low-level viremia (51–999 copies/ml) is associated with an increased risk of virologic failure and HIV drug resistance.

Methods: Retrospective data from persons with HIV (PWH) who initiated ART between January 2016 and September 2022 in Nigeria were analyzed for virologic suppression at cut-off values less than 1000 copies/ml.

Results: In 2022, virologic suppression at less than 1000 copies/ml was 95.7%. Using cut-off values of less than 400, less than 200 and less than 50 copies/ml, virologic suppression was 94.2%, 92.5%, and 87%, respectively.

Discussion: Monitoring virologic suppression using lower cut-off values, alongside differentiated management of low-level viremia, may help Nigeria achieve HIV epidemic control targets.

Keywords

HIV-1; viral load; virologic suppression

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Authors' contributions: H.M.C. and K.M. conceptualized the study. H.M.C., K.M. and E.D. developed the methodology. K.M. accessed, verified, and curated the data. H.M.C. and K.M. conducted the formal analysis. H.M.C., K.M., A.A., and E.D. drafted the manuscript. All authors critically reviewed and revised the final manuscript.

Conflicts of interest

There are no conflicts of interest.

Disclaimer: the findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the funding agencies. Applicable federal law for ethical review include: 45C.F.R. part 46.102(l)(2), 21C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S. C. §552a; 44 U.S.C. §3501 et seq.

Introduction

Effective HIV antiretroviral therapy (ART) decreases patient morbidity and mortality [1], and prevents sexual transmission when viral load is less than 200 copies/ml [2,3]. Expanding ART coverage and viral load monitoring are key components of the UNAIDS global strategy to achieve HIV epidemic control by 2030 [4]. Nigeria has a generalized HIV epidemic, with an estimated 1.9 million persons with HIV (PWH) in 2021 and 90% ART coverage, with over 1.73 million PWH on ART (https://www.unaids.org/en/regionscountries/countries/nigeria). By the end of September 2022, US President's Emergency Plan for AIDS Relief (PEPFAR) supported 89.1% of all sites providing ART (n = 1,928) and 96.4% of the 1.96 million PWH on ART nationally (MOH program data). UNAIDS 95–95–95 Fast-Track targets require as part of the third 95 target that 86% of PWH achieve virologic suppression. The WHO has defined virologic suppression as less than 1000 HIV RNA copies/ml [5]. However, patients with low-level viremia (51–999 copies/mL) are at increased risk of virologic nonsuppression (≥1000 copies/ml) and failure (≥two consecutive virological nonsuppression results) [6], and HIV drug resistance [7–9], threatening Nigeria's progress to reach HIV epidemic control by 2030.

Methods

We used retrospective longitudinal data of PWH who initiated and received at least 24 weeks of ART between January 2016 and September 2022 through support from PEPFAR in Nigeria to assess the status of virologic suppression at less than 1000 copies/ml compared with virologic suppression at lower cut-off values of less than 400 copies/ml, less than 200 copies/ml, and less than 50 copies/ml. We estimated the proportion of PWH on ARTwith virologic suppression using the latest viral load result per calendar year.

We analyzed differences in virologic suppression estimates across the cut-off values by sex and age. PWH who received PEPFAR-supported ART from 17 Nigerian states and who had at least one viral load result after at least 24 weeks on ART were included. When patients had more than one viral load in the year, we used the last viral load result per year. Key available demographic, clinical, and program-related variables were extracted from the Nigerian National Data Repository, a centralized data warehouse of regularly reported data from facility electronic medical record systems.

Ethical statement

The study received ethical approval from the Nigeria National Health Research Ethics Committee (NHREC/01/01/2007–13/11/2020). This project was reviewed in accordance with the US Centers for Disease Control and Prevention (CDC) human research protection procedures and was determined to be nonresearch.

Results

Data from 753 142 patients were abstracted, of whom 668 138 (88.7%) were included in the virologic suppression analysis (see Supplementary Table 1, http://links.lww.com/QAD/C940).

In 2022, virologic suppression rates at a cut-off of less than 1000 copies/ml were 95.7% compared with 72.3% in 2016. Similarly, virologic suppression rates at a cut-off of less than 50, less than 200, and less than 400 copies/ml were 87%, 92.5%, and 94.2%, respectively, in 2022 compared with 46.7%, 61.3%, and 67.1%, respectively, in 2016 (Fig. 1).

Virologic suppression rates at all cut-off values improved over time by sex (Fig. 2a) and age (Fig. 2b). In 2022, virologic suppression at less than 50 copies/ml was observed in 86.5% and 87.8% of female and male individuals, respectively, and 74.2% and 87.5% in those less than 15 years and at least 15 years of age, respectively.

Discussion

Given the increased risk of virologic nonsuppression, virologic failure, HIV drug resistance, immune activation, inflammation, noncommunicable diseases, and serious non-AIDS events [10] associated with low-level viremia, monitoring virologic suppression at lower viral load cut-off values is important for understanding progress towards HIV epidemic control. As of 2022, the Nigeria program has not only achieved the third 95 of 95–95–95 at the less than 1000 copies/ml cut off value but has also achieved rates of virologic suppression at even lower cut off values of less than 50 copies/ml in 87% of PWH on ART with potential implications toward reduced morbidity, mortality, and transmission. Differences in virologic suppression rates by sex have lessened over time; however, children less than 15 years still lag behind with lower virologic suppression rates at all cut off values. For example, in 2022, 84.4% of PWH less than 15 years and 91.1% of PWH at least 15 years with viral load less than 1000 copies/ml also had viral load less than 50 copies/ml. This proportion of PWH at the lowest viral load cut off has increased over time; however, consistently remains lower for less than 15 years. This highlights the utility of reviewing data for action to identify ways to narrow the differences observed to ensure durable virologic suppression equity is achieved among all populations.

The Nigerian Federal Ministry of Health adopted into their HIV treatment guidelines [11] the expanded ART ‘Treat All’ approach at the end of 2016 with concomitant expansion of viral load monitoring to monitor treatment effectiveness with the scale-up of viral load testing laboratories and sample collection, primarily using plasma sample type, which has the limit of detection of less than 50 copies/ml. Since the launch of an ART surge in 2019 to rapidly increase the number of PWH diagnosed and receiving ARTand improve ARTadherence and retention, tremendous gains in the number of PWH receiving ART and viral load monitoring have been observed [12]. Monitoring progress towards virologic suppression using the cut off value of less than 50 copies/ml for all populations (sex, age), and identifying and addressing root causes for these disparities may help Nigeria achieve and sustain successful HIV epidemic control by 2030.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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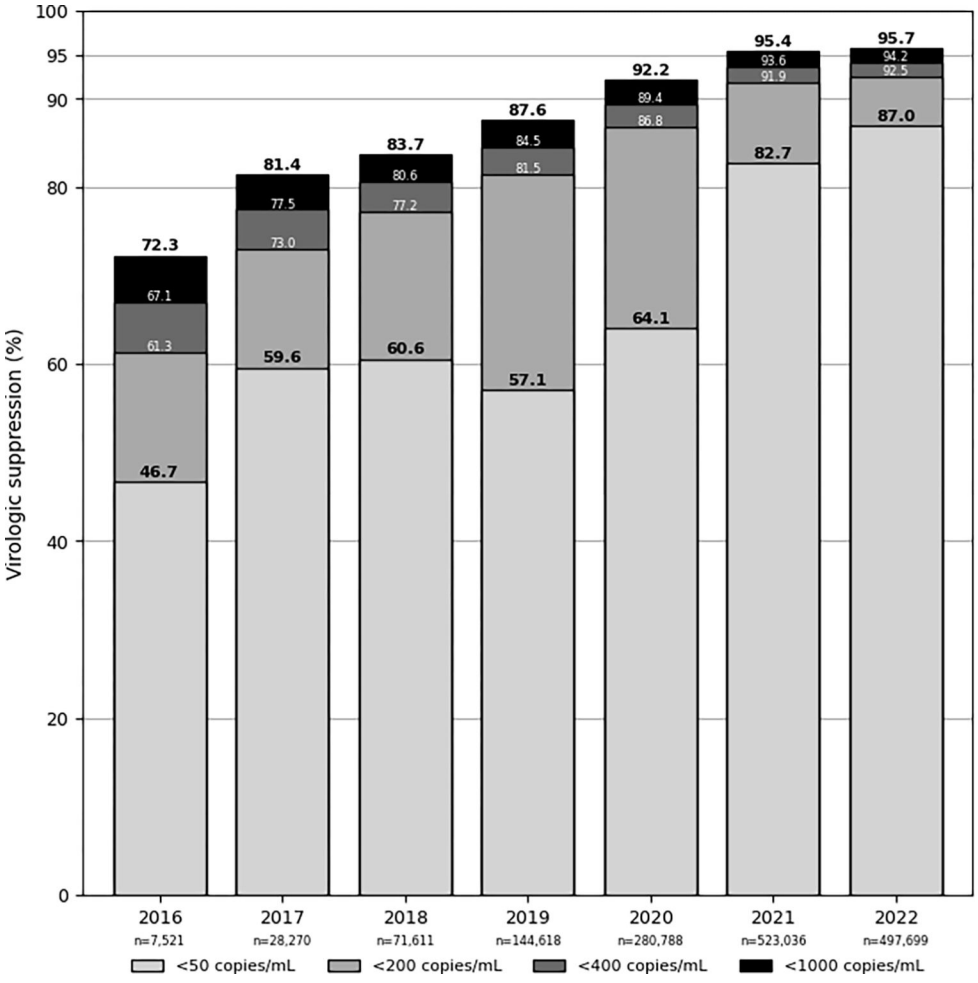

Fig. 1.

Virologic suppression prevalence estimates in relation to the third 95 of the 95–95–95 UNAIDS Fast-Track Targets by different viral load cut-off values.

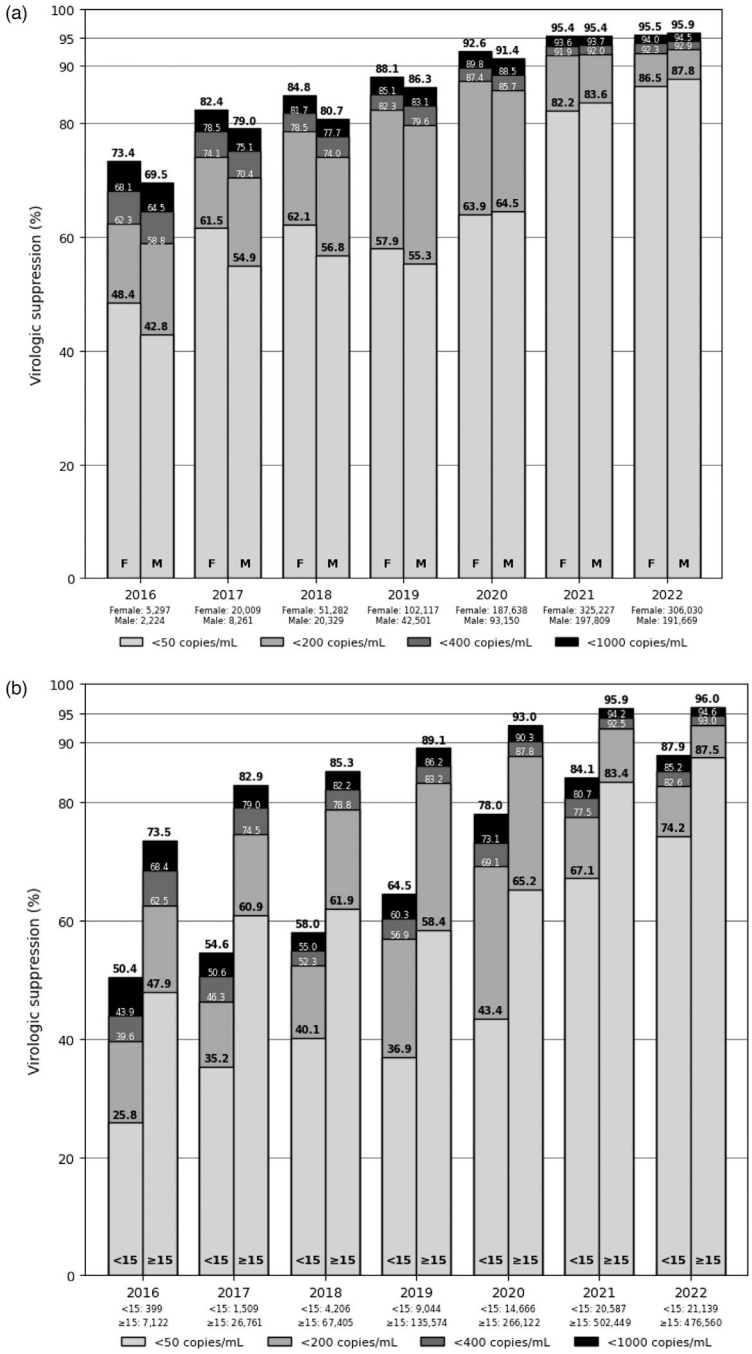

Fig. 2.

Virologic suppression prevalence and distribution by calendar year using different viral load cut-off values among persons with HIV on antiretroviral therapy by sex (a) and age (b), 2016–2022.