Title

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Journal

AIDS, 34(9)

ISSN

0269-9370

Authors

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Publication Date

2020-07-15

DOI

10.1097/qad.0000000000002564

Peer reviewed

Published in final edited form as:

AIDS. 2020 July 15; 34(9): 1407–1415. doi:10.1097/QAD.0000000000002564.

Population-level Viral Suppression among Pregnant and Post-partum Women in a Universal Test and Treat Trial

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Abstract

Objective(s): We sought to determine whether universal “test and treat” (UTT) can achieve gains in viral suppression (VS) beyond universal antiretroviral treatment (ART) eligibility during pregnancy and post-partum, among women living with HIV.

Design: Community cluster randomized trial.

Methods: The SEARCH UTT trial compared an intervention of annual population testing and universal ART to a control of baseline population testing with ART by country standard, including ART eligibility for all pregnant/post-partum women, in 32 communities in Kenya and Uganda. When testing, women were asked about current pregnancy and live births over the prior year and, if HIV-infected, had their viral load measured. Between arms, we compared population-level VS (HIV RNA <500 copies/mL) among all pregnant/post-partum HIV-infected women at study close (year 3). We also compared year-3 population-level VS and predictors of VS among all 15-45-year-old women by arm.

Results: At baseline, 92% and 93% of 15-45-year-old women tested for HIV: HIV prevalence was 12.6% and 12.3%, in intervention and control communities, respectively. Among HIV-infected women self-reporting pregnancy/live birth, prevalence of VS was 42% and 44% at baseline, and 81% and 76% (p=0.02) at year 3, respectively. Among all 15-45-year-old HIV-infected women, year-3 population-level VS was higher in intervention (77%) vs. control (68%;

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Author Contributions: JK, LBB, and GC contributed to the study design, data analysis and interpretation, literature search, tables, figures, and writing (first draft and revising) of the manuscript. HS, JA, DK, MA, EDC, TDC, CAK, TR, EAB, CRC, PM, MLP, DVH and MRK contributed to the study design, data interpretation, literature search, and writing (revising) of the manuscript.

Conflicts of Interest: The authors have no competing interests.

p<0.001). Pregnancy/live birth was a predictor of year-3 VS in control (p=0.016) but not intervention (p=0.43). Younger age was a risk factor for non-suppression in both arms.

Conclusions: The SEARCH intervention resulted in higher population VS among pregnant/post-partum women compared to a control of baseline universal testing with ART eligibility for pregnant/post-partum women.

Keywords

Universal test and treat; pregnant women; postpartum; population viral suppression; Kenya; Uganda

Introduction

Antiretroviral therapy (ART) is critical to reducing morbidity and mortality in people living with HIV (PLHIV),[1, 2] and preventing mother-to-child HIV transmission (MTCT) during pregnancy, delivery and breastfeeding.[3, 4] With increasing ART access in sub-Saharan Africa (SSA) since the early 2000s, the proportion of pregnant and post-partum women receiving ART has markedly increased, with subsequent declines in perinatal infections.[5] HIV treatment guidelines in Kenya and Uganda have recommended lifelong ART for all pregnant and post-partum women ("Option B+") since 2012[6, 7] – pre-dating current guidelines that recommend ART for all PLHIV. Despite this progress, MTCT rates remain above global targets in SSA, with over half of HIV infections among children in East Africa in 2018 occurring during breastfeeding and approximately one-third of infections attributable to women stopping or being unable to access ART during pregnancy.[5]

Pregnant and post-partum women living with HIV (WLHIV) in SSA face multiple barriers to achieving viral suppression (VS). Inadequate access to antenatal care (ANC) due to distance, cost or lack of education regarding benefits of ANC results in missed opportunities for HIV testing and early diagnosis.[8] Many women who access ANC only attend one ANC visit during pregnancy, resulting in missed opportunities to identify women who seroconvert after an initial antenatal visit.[9] Once diagnosed with HIV, pregnant/postpartum women face challenges with ART access and adherence distinct from other PLHIV. For some, these barriers include fear and stigma when coping with a new HIV diagnosis alongside a new awareness of pregnancy – particularly if unintended – creating the challenge of dual disclosure to partners and family members.[10] Once on ART, adherence may be limited by symptoms during pregnancy, side effects associated with antiretrovirals, and fear of stigma, particularly in situations where women have not disclosed their HIV status or are facing interpersonal violence or lack of support from partners.[8, 11] Post-partum, transitioning from antenatal to HIV clinics can be stigmatizing and has been associated with loss to follow-up.[12] Competing priorities, including caring for a new child, and reduced concern regarding MTCT following an initial negative infant test, may contribute to increased ART non-adherence during breastfeeding compared to pregnancy.[13] These distinct barriers occur in addition to those faced by PLHIV in SSA, such as long distances to and waiting times at clinics, low perceived HIV risk, and costs in accessing services.[14, 15]

Several recent universal HIV "test and treat" (UTT) trials in SSA have tested the effects of population-wide HIV testing with universal ART on HIV care cascade outcomes, morbidity, mortality, and incidence.[16–19] The Sustainable East Africa Research in Community Health (SEARCH) UTT trial compared an intervention of annual population-wide HIV testing with universal ART to a control of baseline population-wide HIV testing with ART by country standard, including ART eligibility for pregnant/post-partum women, in communities in Kenya and Uganda.[17] SEARCH's universal testing intervention was designed to increase knowledge of HIV status for all and re-engage PLHIV who knew their status but were out of care.[20] SEARCH's universal treatment intervention was designed to increase VS among all PLHIV by reducing barriers to ART.[21] As such, the SEARCH intervention, in addition to increasing VS among high-$CD4^+$ count individuals, offered the potential to improve the prevalence of VS among pregnant/post-partum women, through frequent, community-based testing and re-engagement, and by reducing barriers to ART for all women of reproductive age. The trial's primary results have been published.[17] In this secondary analysis, we sought to determine whether the SEARCH intervention increased population-level VS among pregnant/post-partum women, above and beyond baseline population-wide testing and the "Option B+" strategy of universal ART eligibility for pregnant /post-partum women offered in control communities throughout the trial.

Methods

The SEARCH UTT trial (NCT:01864603) was a community cluster randomized trial that compared annual population-wide, HIV testing at multi-disease health fairs with universal ART eligibility via patient-centered care (intervention) to baseline population-wide HIV testing at multi-disease health fairs with national-guideline based ART eligibility (control), in 32 rural communities in Kenya and Uganda over three years. The trial was conducted from 2013 to 2017, and the trial methods and primary outcome results have been published.[17] In brief, study communities underwent pair-matched randomization at baseline (2013-2014), with 16 communities randomized to intervention and 16 to control. We conducted door-to-door census enumeration of community residents at baseline, followed by two-week health fairs that offered universal HIV testing integrated with multi-disease services. Adult (≥15 years) residents who did not attend fairs were offered HIV testing at home, or locations of their choice.[20]

In SEARCH intervention communities, population-wide testing occurred annually, and all PLHIV were given appointments to link to care for ART within seven days of testing HIV positive, or within 48 hours if pregnant or breastfeeding by self-report. All PLHIV were offered ART regardless of $CD4^+$ count, using a patient-centered, streamlined approach that included three-month visit intervals for stable patients, reduced waiting time and welcoming staff, mobile phone access to providers and flexible hours for accessing care.[21] This approach also included clinician-guided transitions between HIV clinics and ANC for pregnant WLHIV, and the option to continue receiving ART at HIV clinics while attending ANC for women already engaged in HIV care. In control communities, population-wide HIV testing was performed at baseline and after 3 years, and PLHIV were offered ART according to country guidelines, which changed over the course of the study, ultimately expanding to ART for all PLHIV in Kenya and Uganda.[17] However, Kenya and Uganda

Ministry of Health guidelines recommended lifelong ART initiation for all HIV-infected pregnant women (Option B+) throughout the trial.[6, 7] Therefore, in both intervention and control communities, we offered rapid referral with ART initiation within 48 hours of HIV diagnosis for all pregnant/breastfeeding women during population-wide testing. During each round of population-level testing, all women aged 15-45 years were asked about current pregnancy (at time of testing) or any live births over the prior year, and WLHIV had plasma HIV viral load measured. We defined HIV testing coverage at baseline and at year 3 of the trial as the proportion of women of reproductive age who participated in HIV testing services provided by SEARCH (i.e. health fairs and home-based testing) at baseline and year 3, respectively.

In this *post hoc* analysis, we first sought to determine whether the SEARCH UTT intervention resulted in increased prevalence of VS compared to control among WLHIV of reproductive age who reported current pregnancy or live birth over the prior year at trial completion (year 3). Although these women were ART eligible in both trial arms, we hypothesized that VS would be higher among pregnant/post-partum women in intervention compared to control due to annual, population-wide testing with rapid linkage to streamlined care. Second, we compared population-VS at year 3 among all women of reproductive age (15-45 years) with HIV in intervention and control communities and third, evaluated predictors of VS among these women by arm. For this latter analysis, we hypothesized that pregnancy or live birth over prior year would increase the probability of VS in control communities, but not intervention communities where all HIV-infected women were ART eligible, regardless of current or prior pregnancy.

Statistical Analyses

Our primary outcome was the population-level proportion of pregnant or postpartum WLHIV who were virally suppressed (HIV RNA <500 copies/mL) at trial completion. In each community separately, we first estimated the following HIV care cascade outcomes among female residents (inclusive of in-migrants), aged 15-45 years who reported a current pregnancy or live birth in the last year: proportion of PLHIV who knew their status, proportion of PLHIV with known status who had initiated ART, proportion of PLHIV with ART use who were virally suppressed and proportion of all PLHIV who were virally suppressed.[22] Targeted maximum likelihood estimation (TMLE) was used to adjust for differences in the characteristics of women with known versus unknown HIV status, and known versus missing VS status, as previously described;[17, 23] TMLE incorporates machine learning to avoid model misspecification bias and offers efficiency gains over alternative approaches, such as inverse-weighting.[24] In secondary analyses, we calculated unadjusted cascade estimates among women with known HIV status and measured viral load. We obtained estimates of cascade outcomes and population-level suppression at baseline and year 3 in both arms, and at years 1 and 2 in the intervention arm. Universal testing was not conducted at years 1 and 2 in the control arm.

We compared year 3 estimates by arm with community-level TMLE, accounting for the matched design and with data-adaptive selection of adjustment variables, as previously described;[17, 25] pre-specified candidates were limited to baseline suppression and

proportion of young women (age 15-24 years) to avoid over-fitting in analyses with 16 matched pairs of communities. We repeated these analyses among all women of reproductive age (15-45 years). Finally, we used TMLE to assess arm-specific predictors of VS among all women of reproductive age living with HIV at year 3. Further details are available in the Supplementary Materials.

Ethical considerations

We obtained approval from the ethics committee of the University of California, San Francisco Committee on Human Research, Kenya Medical Research Institute Ethical Review Committee, Ugandan National Council on Science and Technology and Makerere University School of Medicine Research and Ethics Committee in Uganda. Verbal consent was obtained at enrollment; written consent was obtained for persons in the intervention arm receiving ART not yet indicated by country guidelines.

Results

Testing, HIV prevalence, and pregnancy/live birth at trial baseline

Of 150,395 adult (≥15 years) residents enumerated in 32 communities at baseline, 62,066 (41%) were women of reproductive age (15-45 years): 32,954 women in intervention and 29,112 women in control communities. Among enumerated women of reproductive age at baseline, SEARCH achieved 91% (30,074/32,954) and 92% (26,895/29,112) HIV testing coverage in intervention and control communities, respectively. Baseline HIV prevalence among women who tested varied by region: 23.8% in Western Kenya, 7.7% in Western Uganda, and 3.7% in Eastern Uganda, with an overall baseline HIV prevalence of 12.4% (7,047/56,969) among women who tested. At the time of baseline HIV testing, 93% (57,813/62,066) of all women of reproductive age and 99% (6,995/7,047) of HIV-positive women responded to the following pregnancy/live birth questions: “are you pregnant now?” and “how many live births have you had in the past year?” Among HIV-positive women aged 15-45 years, 33% (1,252/3,741) in intervention communities and 33% (1,081/3,254) in control communities reported a current pregnancy or at least one live birth in the prior year at baseline.

Testing, HIV prevalence, and pregnancy/live birth at year 3 of the trial

During year 3 of the trial, there were 77,862 women age 15-45 years enumerated in the 32 study communities, inclusive of in-migrants and young women (12-14 years old at baseline) who turned 15 years during follow up and excluding women who had aged out, died, or out-migrated: 41,598 women in intervention and 36,264 women in control communities. Among these women, SEARCH achieved 80% (33,326/41,598) and 84% (30,282/36,264) HIV testing coverage in intervention and control communities, respectively, at year 3 of the trial. Year 3 HIV prevalence among women age 15-45 years who tested was 10.6% (3,540/33,326) and 10.2% (3,086/30,282) in intervention and control communities, respectively. At the time of year 3 testing, 81% (63,413/77,862) of all women of reproductive age and 99% (6,557/6,626) of HIV-positive women responded to the pregnancy/live birth questions. Among HIV-positive women, 14% (481/3,505) reported a

current pregnancy or a live birth in the prior year at year 3 of the trial in intervention communities, compared to 16% (487/3,052) in control communities.

Prevalence of Viral Suppression among pregnant/post-partum women

Among 15-45-year-old WLHIV who reported current pregnancy or live birth in the prior year at baseline, HIV viral suppression was 42% (95% confidence interval (CI): 36-47%) in intervention, and 44% (95% CI: 41-47%) in control communities, after adjusting for missingness in HIV status and viral load (Figure 1). During subsequent annual rounds of offering universal HIV testing in intervention communities only, VS estimates among pregnant/postpartum women were 77% (95% CI: 73-80%) and 80% (95% CI: 77-84%) in follow-up years 1 and 2, respectively.

Among 15-45-year-old WLHIV reporting a current pregnancy or live birth in the prior year during year 3 of the trial, 95% (95% CI: 92-98%) and 91% (95% CI: 89-93) knew their HIV status in intervention and control communities, respectively. Of those with a prior diagnosis of HIV, 98% (95% CI: 97-99%) and 95% (95% CI: 94-97) were on ART in intervention and control communities, respectively. Of those on ART, 88% (95% CI: 85-91) and 87% (95% CI: 84-91) were virally suppressed, respectively. At year 3, overall population-level prevalence of VS among 15-45-year-old women reporting a current pregnancy or live birth in the prior year had increased to 81% (95% CI: 78-84%) in intervention compared to 76% (95% CI: 72-80%) in control communities (Figure 1). At year 3, population-level prevalence of VS among women reporting current pregnancy or live birth in the prior year was 6% higher in intervention versus control communities (adjusted relative prevalence: 1.06, 95% CI: 1.01-1.12; p=0.02).

Prevalence of Viral Suppression among women of Reproductive Age

In comparison, population-level VS estimates for all 15-45-year-old WLHIV (regardless of reported pregnancy or live birth) at year 3 was 77% (95% CI: 74-80%) in intervention versus 68% (95% CI: 66-70%) in control communities (adjusted relative prevalence: 1.13, 95% CI: 1.08-1.19; p<0.001).

Comparison of predictors of viral suppression by SEARCH trial arm

When determining predictors of VS at year 3 among 15-45-year-old WLHIV, VS at year 3 was not associated with self-reported current pregnancy or live birth in the prior year in intervention communities (aRR: 1.01, ref: no pregnancy/live birth, 95%CI: 0.98-1.05, p=0.43), whereas in control communities, women with a current pregnancy or live birth in the prior year were more likely to have VS at year 3 than women without current pregnancy or live birth in prior year (aRR: 1.06, 95%CI: 1.01-1.12, p=0.016). In both intervention and control communities, older age consistently predicted VS at year 3 compared to age 15-19 years (Figure 2).

Discussion

The SEARCH UTT intervention resulted in a significantly higher prevalence of HIV viral suppression after three years among HIV-infected pregnant and recently post-partum women

in intervention communities that offered repeat out-of-facility testing with rapid linkage to streamlined HIV care compared to standard clinical care in control communities, following baseline universal HIV testing in all communities. Though the absolute difference in prevalence of VS in intervention versus control was relatively modest (6%), these gains occurred at a population level, in a group of PLHIV (pregnant/post-partum women) who were ART-eligible throughout the trial, and in communities (in both arms) that achieved prevalence of VS in pregnant/post-partum women beyond the “73%” threshold of the UNAIDS “90-90-90” targets for 2020.[22] The “90-90-90” targets aim to have 90% of PLHIV know their HIV status, 90% of PLHIV who know their status receive ART, and 90% of those on ART achieve VS: resulting in a goal that at least 73% of all PLHIV are virally suppressed. In a post-90-90-90 context, modest absolute gains in VS will likely require testing and treating some of the hardest-to-reach sub-groups and optimizing each “90”. Our results provide one of the first estimates of population-level prevalence of VS among pregnant/post-partum women, independent of ANC access, in Kenya and Uganda. These findings add to the evidence demonstrating population-level health benefits conferred by UTT interventions, including reductions in HIV-associated mortality, tuberculosis and incidence.[16, 17, 19]

There are several potential explanations for how the SEARCH intervention achieved a higher prevalence of VS among peripartum women than control. First, annual, out-of-facility, population-wide HIV testing provided a platform to diagnose new infections that had occurred over the prior year, identify new in-migrants to the community who had not been diagnosed previously, and re-engage PLHIV who had stopped ART. Community-based testing can also reach women who do not access ANC, deliver at home, or do not engage in HIV testing while pregnant/postpartum. Thus, the proportion of peripartum women in year 3 of the trial who knew their HIV status was higher in intervention (95%) than control (91%) communities – even though in both, knowledge of HIV status exceeded 90%. Second, referrals to HIV care following annual testing prioritized pregnant and breastfeeding women by making appointments and starting ART within 48 hours of testing positive, introducing women to clinic staff at testing sites, and closely following up women who missed appointments. As a result, the proportion of pregnant/post-partum women on ART was higher in intervention than control, even though in both arms this proportion was very high (98% and 95%, respectively). Third, the SEARCH intervention’s streamlined model of care sought to reduce barriers to care, by reducing frequency of clinic visits and waiting times, providing a welcoming environment with flexible appointment scheduling and mobile phone access to clinicians, and actively tracking those lost to follow-up. For pregnant/post-partum women, particularly those caring for an infant, reducing these barriers to care and easing transitions between ANC and HIV clinics may explain the higher proportion of women on ART and suppressed in intervention communities. Finally, universal ART eligibility in intervention communities resulted in higher prevalence of suppression among women of reproductive age, providing an opportunity for VS pre-conception, which also likely contributed to the higher prevalence of VS in pregnant/post-partum women compared to control.

At present, as universal ART eligibility is the global standard and differentiated models of care are being widely adopted across SSA, the need for rapid, universal (i.e. non-targeted)

testing initiatives and how often such initiatives may be needed remains under discussion. The higher knowledge of HIV status and higher levels of VS achieved in pregnant/post-partum women may be potential benefits to implementing intermittent, large-scale HIV testing initiatives, in medium to high-prevalence settings such as rural Uganda and Western Kenya. Even as SEARCH control communities exceeded the UNAIDS “90-90-90” target of 73% among pregnant/breastfeeding women – with 76% VS in this sub-group eligible for ART throughout the trial in control – the SEARCH intervention was able to achieve significantly higher levels of suppression (81%). It remains unclear whether efforts to push VS further among the remaining 20-25% of unsuppressed PLHIV in communities that have surpassed “90-90-90” in SSA will require targeted outreach versus intermittent, non-targeted, population testing, or combination approaches. The higher levels of suppression achieved among pregnant/post-partum women in intervention communities suggests that non-targeted, population testing can “move the needle” in knowledge of HIV status and ART access, even among a group that was eligible for ART and targeted for HIV testing at ANCs throughout the trial.

Our results provide a population-level prevalence of VS among pregnant/post-partum women, and all women of reproductive age, including measures of each step of the HIV care cascade. One advantage of population measures, compared to clinic-based measures, is that they are not conditional on accessing antenatal or post-partum HIV care. Published data on the prevalence of VS in pregnant/post-partum women in SSA are sparse, and largely limited to clinic-based cohorts, with a large range of suppression estimates (30-98%) reported.[26] Our findings highlight ongoing challenges in adherence, even after exceeding the first two “90s”, with 88% of pregnant/post-partum women on ART achieving VS in intervention communities. In a recent study from South Africa, the vast majority (>90%) of instances of non-suppression during pregnancy among women on ART were attributable to non-adherence rather than pre-treatment drug resistance,[27] demonstrating the need for adherence support interventions in pregnant/post-partum women. In addition, our finding of lower prevalence of VS in younger women is consistent with prior literature,[13, 28] and emphasizes the need for specific, and integrated, interventions to support young women with both HIV and reproductive health care.

Our study has several limitations. First, classification of current pregnancy/live birth over the prior year was based on self-report. This may have resulted in some misclassification, though it seems unlikely that self-report would be inaccurate for pregnancy (particularly in second and third trimester) or the birth of a child, or that misclassification would have differed by trial arm. Second, incomplete viral load measures among PLHIV may have resulted in over-estimates of population VS. However, both HIV testing coverage and viral load measures among PLHIV were high (>80%), and we adjusted for differences between persons with and without viral load measures. Third, this analysis did not include measures of neonatal and childhood HIV incidence; analyses are ongoing to determine whether changes in maternal VS resulted in reduced vertical transmission. However, maternal viral load during pregnancy, delivery and breastfeeding is clearly associated with likelihood of vertical transmission and increasing ART access for pregnant women has resulted in significant declines in the number of new child infections in multiple settings, including Kenya and Uganda.[5]

In conclusion, the SEARCH UTT intervention resulted in significant gains in the prevalence of VS among pregnant and post-partum women, compared to an active control that offered one-time universal testing and ART eligibility for all pregnant/post-partum women. The intervention also increased VS among all women of reproductive age, extending the promise of ART to improve maternal health and further reduce new childhood HIV infections. As countries seek to eliminate MTCT and improve VS among WLHIV, our findings provide insights into how to move closer towards achieving these important goals.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

We thank the residents of the 32 SEARCH Trial communities for their generous participation in our study. We also thank the Ministries of Health of Uganda and Kenya, our research and administrative teams in San Francisco, Uganda, and Kenya, and collaborators and advisory boards.

Sources of support: This work was supported by grants from the Division of AIDS, NIAID of the National Institutes of Health (NIH) (UM1AI068636 and U01AI099959; D.V.H.), Fogarty International Center of the National Institutes of Health (D43 TW010037; to M.K.) and in part by the President's Emergency Plan For AIDS Relief and Gilead Sciences.

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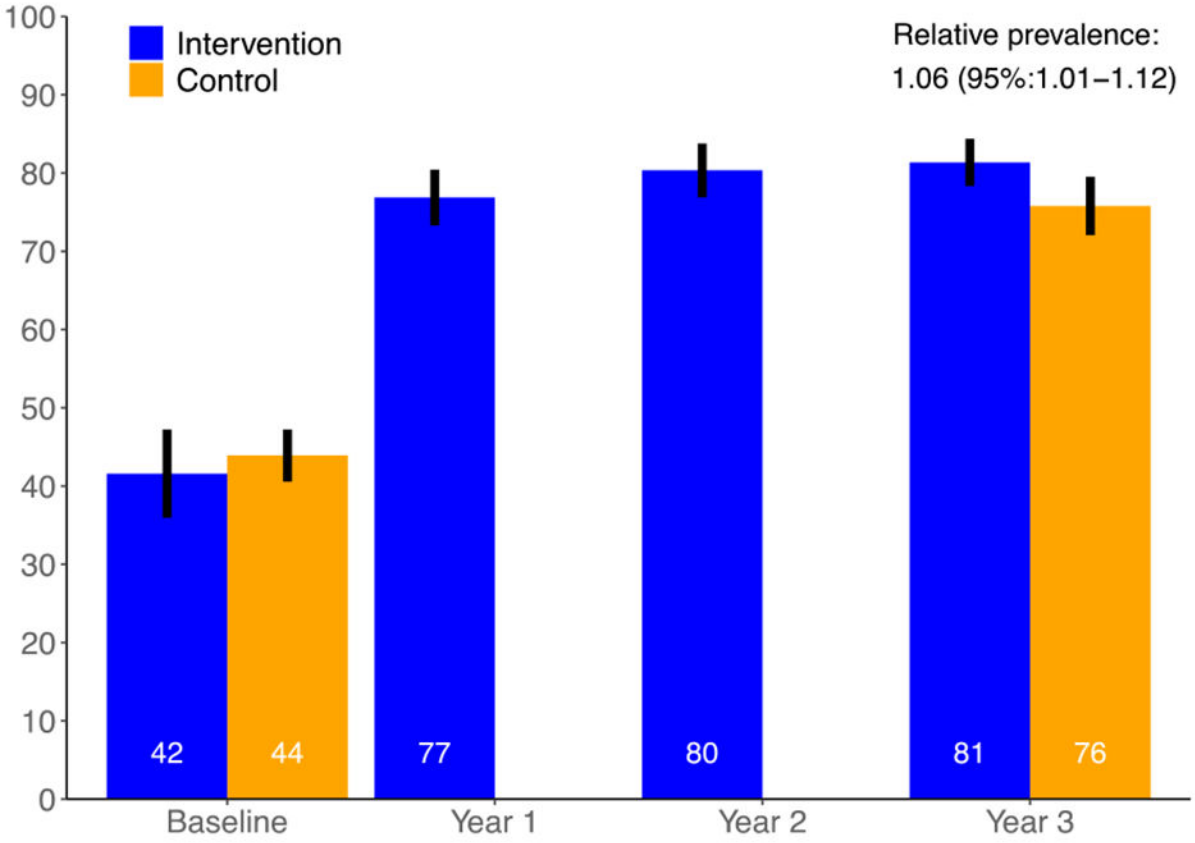

	Intervention		Control	
	Adjusted*	Unadjusted**	Adjusted*	Unadjusted**
Baseline	536/1290 (42%)	417/952 (44%)	489/1113 (44%)	357/718 (50%)
Year 1	590/765 (77%)	568/724 (78%)		
Year 2	497/621 (80%)	480/586 (82%)		
Year 3	393/483 (81%)	384/464 (83%)	373/491 (76%)	366/476 (77%)

*Adjusted for missing measures on HIV status and viral suppression with TMLE for community, age group and mobility

**Unadjusted: Number measured viral suppression divided by number known to be HIV-positive with HIV RNA level measured.

Figure 1:

Estimates of population-level HIV viral suppression among women aged 15-45 years and reporting a current pregnancy or live birth over the prior year by study year in the SEARCH trial. Adjusted for incomplete measurement of HIV status and viral load measurement with targeted maximum likelihood estimation (TMLE); 95% confidence intervals indicated with black vertical lines. Absolute numbers given in the corresponding table.

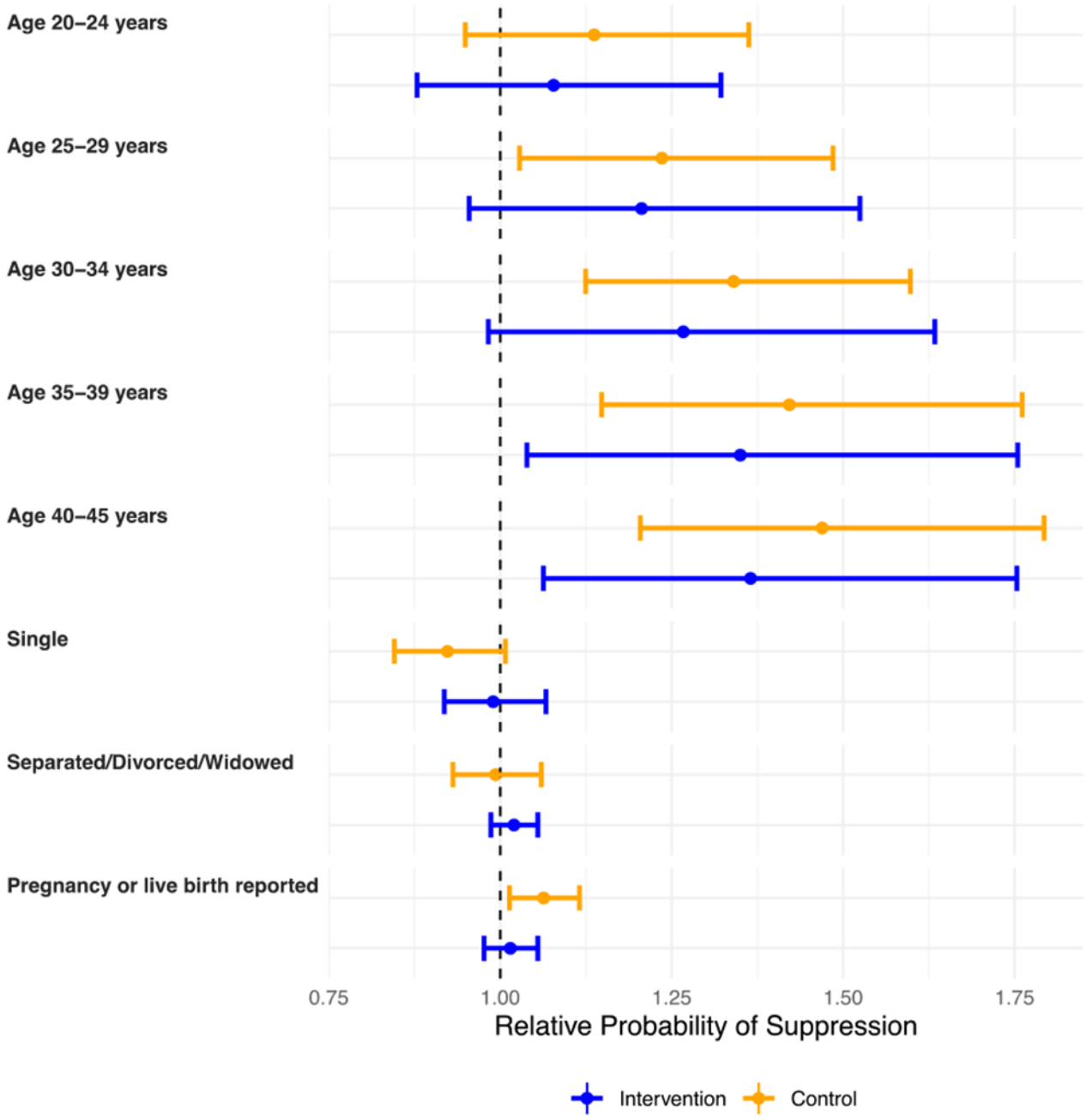

Figure 2:

Adjusted predictors of HIV viral suppression (HIV RNA<500 copies/mL) among HIV-positive women aged 15-45 years, as assessed during Year 3 of the SEARCH Study using targeted maximum likelihood estimation (TMLE) treating the community as the independent unit. Each relative probability is adjusted for the other predictors and region. Reference categories are age 15-19 years, marital status of married, and not reporting a pregnancy or live birth in the prior year.

Table 1.

Characteristics of 15-45-year-old women residents of SEARCH Communities in rural Uganda and Kenya, stratified by SEARCH trial arm, at baseline and year three of the trial.

	Intervention		Control	
	Baseline N (%)	**Year 3 N (%)**	**Baseline N (%)**	**Year 3 N (%)**
	N = 32,954	N = 41,598	N = 29,112	N = 36,264
Age in years, median (interquartile range)	25 (19-34)	24 (19-33)	26 (20-34)	25 (19-33)
Region				
Kenya	11,568 (35.1)	13,529 (32.5)	10,352 (35.6)	11,934 (32.9)
Uganda-West	10,453 (31.7)	13,992 (33.6)	9,304 (32)	12,129 (33.4)
Uganda-East	10,933 (33.2)	14,077 (33.8)	9,456 (32.5)	12,201 (33.6)
Educational attainment[a]				
Less than primary	20,627 (62.6)	28,013 (67.3)	18,653 (64.1)	24,126 (66.5)
Primary	5,188 (15.7)	5,723 (13.8)	4,702 (16.2)	5,268 (14.5)
Secondary or higher	7,139 (21.7)	7,862 (18.9)	5,757 (19.8)	6,870 (18.9)
Occupation[b]				
Formal sector	8,493 (25.8)	7,260 (17.5)	6,612 (22.7)	6,446 (17.8)
High-risk informal	744 (2.3)	660 (1.6)	1,245 (4.3)	1,076 (3)
Low-risk informal	21,177 (64.3)	21,456 (51.6)	18,847 (64.7)	19,215 (53)
Other	1,035 (3.1)	1,259 (3.9)	913 (3.1)	1,160 (4)
No job or disabled	1,424 (4.3)	1,506 (4.7)	1,435 (4.9)	1,401 (4.8)
Marital status[c]				
Single	9,587 (29.2)	8,204 (25.5)	7,645 (26.3)	7,483 (25.5)
Married	20,399 (62)	21,531 (67)	18,757 (64.6)	19,477 (66.5)
Widowed, divorced, or separated	2,890 (8.8)	2,404 (7.5)	2,649 (9.1)	2,341 (8)
Household wealth index quintile[d]				
First (lowest)	5,161 (15.7)	5,562 (14.4)	5,057 (17.4)	5,266 (16)
Second	5,890 (17.9)	6,720 (17.4)	5,554 (19.2)	6,093 (18.5)
Third	6,602 (20.1)	7,940 (20.5)	6,084 (21)	7,126 (21.6)
Fourth	7,147 (21.7)	8,610 (22.3)	6,314 (21.8)	7,402 (22.5)
Fifth (highest)	8,062 (24.5)	9,856 (25.5)	5,975 (20.6)	7,078 (21.5)
Alcohol use[e]	1,712 (6.1)	1,219 (3.6)	1,469 (5.9)	984 (3.2)
Mobile[f]	4,702 (14.3)	1,483 (3.6)	3,910 (13.4)	1,300 (3.6)
Pregnancy or live birth[g]				
Reported current pregnancy	2,776 (9.1)	2,496 (7.5)	2,528 (9.3)	2,506 (8.3)
Reported live birth in prior year	8,448 (27.6)	4,431 (13.3)	7,579 (27.7)	4,038 (13.3)

[a]Education missing on 82 (0.1%) and 16,444 (21.1%) at baseline and year 3, respectively.

[b]Occupation missing on 141 (0.2%) and 16,423 (21.1%) at baseline and year 3, respectively.

[c]Marital status missing on 139 (0.2%) and 16,422 (21.1%) at baseline and year 3, respectively.

[d]Household wealth index, defined from principal component analysis of household item survey, missing on 220 (0.4%) and 6,209 (8%) at baseline and year 3, respectively.

[e]Alcohol use missing on 8,915 (14.4%) and 14,104 (18.1%) at baseline and year 3, respectively.

[f]Mobile, defined as spending one or more month away from the community in the past year, missing on 13,896 (17.8%) at year 3.

[g]Pregnancy or live birth status missing on 4,253 (6.9%) and 14,449 (18.6%) at baseline and year 3, respectively.