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DOI: 10.21106/ijma.631**ORIGINAL ARTICLE | HIV AND PREGNANT WOMEN****From Option B+ to Universal “Test and Treat” in Cameroon: Identification and Evaluation of District-level Factors Associated with Retention in Care**Joel M. Njah, MD, MPH, PhD^{1,5}✉; Gregory E. Halle-Ekane, MD, FWACS^{2,5}; Sylvester N. Atanga, MPH, PhD^{3,5}; Edouard K. Tshimwanga, MD⁴; Felix Desembuin, BTe⁴; Pius T. Muffih, MPH, PhD⁴¹ICAP Global Health at Columbia University's Mailman School of Public Health, 722 W. 168th St. New York, USA; ²Faculty of Health Sciences, University of Buea, Cameroon; ³School of Health and Human Sciences, Saint Monica University Higher Institute, Buea, Cameroon; ⁴AIDS Care and Prevention Program, Cameroon Baptist Convention Health Services, Bamenda, Cameroon; ⁵The Afya Bora Consortium, Seattle, WA, USA✉ **Corresponding author email:** jzmany@yahoo.com**ABSTRACT****Background and Objective:** Retaining women in Option B+ services is crucial for eliminating new pediatric HIV infections. However, there are few studies on factors influencing retention at the district level. This study evaluates the factors associated with retention in two health districts of Cameroon.**Methods:** From September 1, 2015, to February 29, 2016, we reviewed the records of pregnant and breastfeeding women initiating Option B+, a lifelong approach to preventing mother-to-child transmission (PMTCT) of HIV, between October 2013 and July 2014. We abstracted sociodemographic and clinical data from registers in 22 health facilities in the Bamenda urban and Kumba rural districts into spreadsheets. Cox regression age-adjusted survival curves were used to compare retention probabilities at 6 and 12 months post-antiretroviral therapy (ART) initiation. Multivariable modified Poisson regressions were run to estimate adjusted relative risk (aRR) of factors associated with retention in PMTCT care at 12 months post-ART initiation. STATA software was used for the analyses.**Results:** Of the 560 files reviewed, majority, 62.7% (n=351), were above 24 years of age and married, 68.9% (n=386). From the multivariable analysis, enrolling early in antenatal care (ANC) (aRR: 1.50, 95% CI: 1.17-1.93) and knowing the male partner's HIV-negative status (aRR: 1.16, 95% CI: 1.00-1.34) were significantly associated with higher retention in care, adjusting for maternal age, marital status, and distance from the health facility. By health district, knowing the male partner's HIV-negative status (aRR: 1.30, 95% CI: 1.13-1.50) in the Bamenda urban and enrolling early in ANC (aRR: 2.03, 95% CI: 1.21-3.41) in the Kumba rural district, had significantly higher retention rates after adjusting for the same covariates.**Conclusion and Global Health Implications:** Overall, factors influencing retention varied by urban or rural district. Therefore, tailored district-level interventions are needed to enhance early ANC enrollment in the rural and partner HIV status disclosure in the urban districts to improve retention in PMTCT care.**Keywords:** • PMTCT • ANC • Option B+ • Pregnant and Breastfeeding Women Living with HIV • Retention • sub-Saharan Africa • CameroonCopyright © 2023 Njah et al. Published by Global Health and Education Projects, Inc. This is an open-access article distributed under the terms of the Creative Commons Attribution License **CC BY 4.0**.

I. Introduction

The remarkable success of the global implementation of lifelong antiretroviral therapy (ART) to pregnant and breastfeeding women living with HIV (WLHIV) regardless of CD4 count and clinical stage (Option B+ or “test and treat” for pregnant and breastfeeding women), has raised prospects for the elimination of pediatric HIV infections.¹ The number of pregnant and breastfeeding women on lifelong ART has rapidly increased from 47% in 2010 to 93% in 2017.² Despite the success of Option B+ for the prevention of mother-to-child transmission of HIV (PMTCT), there are persistent concerns that poor retention of mothers and their infants in PMTCT services may compromise the gains made in eliminating mother-to-child transmission of HIV. The 2020 report by the Joint United Nations Programme on HIV/AIDS (UNAIDS) revealed that the interim milestones for achieving epidemic control by 2030 were not met.³ For example, the 2020 target of reducing the number of new HIV infections among children to fewer than 20,000 was missed. According to the UNAIDS and partners, 1.7 million children aged 0-14 years were living with HIV in 2020, among which were 150,000 new HIV infections.⁴ These data emphasize the need for a greater focus on key populations that are most at risk of HIV infection. This prompted UNAIDS, the United Nations Children’s Fund (UNICEF), and the World Health Organization (WHO) to launch a new Global Alliance to end AIDS in children by 2030, with Cameroon as one of the 12 starting members. One of the four focus areas for the Alliance is to reduce the treatment gap for pregnant and breastfeeding adolescent girls and WLHIV. Adolescent girls and young women in sub-Saharan Africa (SSA), the region with the highest global HIV burden, have been shown to be vulnerable to new HIV infections.^{5,6} It is likely that the poor retention of women in PMTCT services contributed to the missed 2020 targets. To support this claim, a systematic review of studies in Africa found an estimated retention rate of 76.4% among pregnant and breastfeeding women 12 months after initiating Option B+.⁷ Also, a cross-sectional survey of women in PMTCT care in four SSA countries, including Cameroon, showed that only 36.4% of

pregnant and breastfeeding women completed all steps of the cascade.⁸ Other studies have examined factors associated with retention in PMTCT care, but few comparative studies have been conducted at the district level.⁹⁻¹¹ Factors influencing retention in PMTCT services are reported to differ by the referral levels and settings of healthcare facilities, including urban and rural settings.⁹ In this study, we evaluated factors associated with retention in an urban and rural health district of Cameroon.

1.1. Background

Cameroon is one of the 21 Global Plan priority countries in SSA with a concentrated, generalized HIV epidemic and an estimated HIV prevalence of 2.7% in 2018.¹² According to ICAP’s Cameroon Population-based HIV Impact Assessment (CAMPHIA), there are variations in the HIV prevalence across the 10 regions of Cameroon. The HIV prevalence in the Northwest and Southwest regions was reported a 4.0% and 3.2%, respectively.¹³ Specifically, the prevalence among pregnant and postpartum women receiving Option B+ PMTCT services in Cameroon was higher than that of the general population at 4.6%.¹³ The first Option B+ program in Cameroon was a pilot program implemented from October 2013 through July 2014. The retention rates among pregnant and breastfeeding women in this early Option B+ program were found to be 79% at 12 months post-ART initiation.¹⁴

1.2. Objectives

The objectives of the study were to: (1) determine the sociodemographic and clinical characteristics of pregnant and breastfeeding women initiating lifelong ART in two health districts in Cameroon; (2) compare the retention rates in PMTCT services between the Bamenda urban and Kumba rural health districts; and (3) assess factors that are significantly associated with retention in care by health district.

1.3. Specific Aims and Hypothesis

Our study aims to assess the retention rates of pregnant and breastfeeding women in Option B+ PMTCT care. Factors associated with retention at 6 and 12 months after initiating ART will be assessed by an urban and a rural health district. We hypothesize

that retention rates in the urban health district, with easy access to health facilities, will be higher than in the rural district and that the factors influencing retention will vary by health district setting.

2. Methods

Study design, setting, and participants. This was a retrospective study of the early Option B+ program implemented in Cameroon from October 2013 through July 2014 in 22 health facilities. The health facilities included 12 in the Bamenda urban and 10 in the Kumba rural health districts of the Northwest and Southwest regions, respectively. This study used a convenience sample and a retrospective design that is prone to missing data, therefore limiting the generalizability of the results. The Option B+ pilot program and health facilities were described previously.¹⁴

Data collection. From September 1, 2015, to February 29, 2016, the first author collected longitudinal data from program and laboratory registers of mothers and their HIV-exposed infants. De-identified sociodemographic and clinical characteristics, ART initiation dates, and study exit dates when an infant attained 18 months were abstracted. The same abstractor abstracted data directly into a standardized Microsoft Excel spreadsheet, using client and facility-level identifiers for coding. The program data analyst cleaned the dataset and cross-examined it before further analysis.

We ensured the reliability (retest) of data collection by using the same abstractor to abstract data from uniform longitudinal program registers into a standardized spreadsheet.

Exclusion and inclusion criteria. All pregnant and breastfeeding WLHIV who were ART naïve prior to ART initiation were included in the study. We also included women transferred out, presumed to be receiving care in another facility.

2.1. Study Variables

The primary outcome was the retention rates of mothers in care at 6 and 12 months after ART initiation. We defined retention as the proportion of pregnant and breastfeeding women living with HIV

with no missed scheduled clinic visit or medication refill appointment period greater than 90 days at 6 and 12 months after ART initiation.¹⁴ The denominator included all pregnant and breastfeeding WLHIV who initiated ART at the beginning of the study, including those transferred out. Attrition from care were those declared to be dead, stopped treatment, or lost to health facility (LTHF).

The secondary outcomes were factors associated with retention in care, including socio-demographic (maternal age, distance from health facility), clinical (CD4 count, WHO clinical stage, gestational age), and setting (urban and rural). The assessment of infant determinants of retention included early infant diagnosis at 6-8 weeks and the turnaround time for receiving DNA polymerase chain reaction test results.

2.2. Statistical Analysis

A binary outcome (1, 0) variable was used to assess retention rates of participants through 6 and 12 months post-ART initiation. We summarized baseline characteristics with means, interquartile range (IQR), frequencies, and proportions for continuous and categorical variables, accordingly. For the measure of association between maternal characteristics or covariates and retention in PMTCT care, we used relative risk (RR) with a 95% confidence interval (CI). We also used bivariate and multivariable modified Poisson regression models for a follow-up period of 12 months post-ART initiation. To ensure the validity (construct) of the study, we used established Cox regression survival curves to adjust for confounders in comparing retention probabilities by health districts. All attrition cases were rightly censored with a Cox likelihood ratio test (LRT). The STATA statistical software was used to analyze all data with a p-value of < 0.05 for the statistical level of significance.¹⁵

We calculated distances from health facilities using the cash transfer amounts given to study participants to cover the cost of transportation: amounts less than 200 CFA francs (33¢) for distances of less than 5 km and over 200 CFA for distances more than 5km from health facilities.

2.3. Ethical Approval

We received administrative authorizations from the regional delegations of public health in the Northwest and Southwest regions of Cameroon prior to conducting this study. We did not seek a waiver of ethical approval for this study, since it involved secondary data analysis of anonymized patient records. Also, because it was conducted under approvals for the original pilot study from the Institutional Review Boards of the Cameroon Baptist Convention Health Services (CBCHS) in August 2013 and the U.S. Centers for Disease Control and Prevention (CDC) in July 2013.¹⁴

3. Results

Out of the 560 reviewed records of pregnant and breastfeeding women, 174 (31.1%) were not in care at 12 months post-ART initiation. Of these, 26 (4.6%) stopped treatment mostly due to ARV side effects, 19 (3.4%) died, and 129 (23.0%) were LTHF. The analytical sample included 35 women (6.3%) who were transferred out.

3.1. Sociodemographic Characteristics

Among 560 pregnant and breastfeeding women, the overall median age was 28 (IQR: 24-31) years; most of the women were older than 24 years of age, 62.7% (n=351), and married, 68.9% (n=386). A majority of the women enrolled in their third trimester, 79.1% (n=443), with a median gestational age of 21 (IQR: 17-26) weeks (Table 1).

3.2. Main Variable Results

Overall, the retention rates among the 560 women were 82.0% (95% CI: 0.79-0.85) and 68.9% (95% CI: 0.65-0.73) through 6 and 12 months post-ART initiation, respectively. The mean age-adjusted survival curves revealed higher, albeit non-significant (LRT test p-value = 0.187), retention rates among women in the Bamenda Urban Health District compared to the Kumba Rural Health District (Figure 1).

3.3. Bivariate and Multivariable Results

Unadjusted regression analysis of covariates of retention in PMTCT care. Overall, booking early in ANC before the third trimester (RR: 1.46, 95% CI: 1.17-1.81),

having knowledge of their male partner's negative HIV status (RR: 1.19, 95% CI: 1.05-1.36), and living less than 5 km from the health facility (RR: 1.16, 95% CI: 1.01-1.33), were significantly associated with increased retention in PMCTC care. However, being 24 years of age or older at a first ANC booking (RR: 1.14, 95% CI: 0.99-1.32), married (RR: 1.02, 95% CI: 0.91-1.16), and timely blood work for early infant diagnosis before the 8th week of age (RR: 1.01, 95% CI: 0.89-1.15), had no association with retention in care 12 months after ART initiation. By health district, blood work for early infant diagnosis, before the 8th week of age (RR: 1.35, 95% CI: 1.02-1.80), and having knowledge of male partner's negative HIV status (RR: 1.32, 95% CI: 1.14-1.52), showed significant association with improved retention in the Bamenda urban health district. In contrast, early booking in ANC before the third trimester (RR: 1.57, 95% CI: 1.12-2.21) was associated with improved retention in the Kumba rural health district (Table 2).

Adjusted regression analysis of covariates of retention in PMTCT care. Of the total sample, early gestational age at ANC enrollment (adjusted relative risk [aRR]: 1.50, 95% CI: 1.17-1.98); and having knowledge of male partner's negative (aRR: 1.16, 95% CI: 1.00-1.34) and positive (aRR: 1.20, 95% CI: 1.03-1.38) HIV status, respectively, remained significantly associated with higher retention in PMTCT care after adjusting for maternal age, marital status, CD4 counts, and distance from health facility. By health district, having knowledge of the male partner's negative HIV status (aRR: 1.30, 95% CI: 1.13-1.50) but not positive HIV status (aRR: 1.17, 95% CI: 0.98-1.39) in the Bamenda urban health district had significantly higher retention in PMTCT care. However, in the Kumba rural health district, only women enrolling early in ANC before their third trimester (aRR: 2.03, 95% CI: 1.21-3.41) had significantly higher retention in PMTCT care, adjusting for similar covariates (Table 3).

4. Discussion

Overview. Overall, we found retention rates among pregnant and breastfeeding women in PMTCT services of 82% and 70% through 6 and 12 months

Table 1: Sociodemographic and clinical characteristics of women initiating lifelong Antiretroviral Therapy (ART) by Health District (HD) in Cameroon

Characteristics	Bamenda HD (n=321), N (%)	Kumba HD (n=239), N (%)	Total (n=560), N (%)	p-value
Maternal age group (years)				
Median (IQR)	28 (24-31)	27 (23-31)	28 (24-31)	0.415 ^y
≥ 24	228 (71.0)	123 (51.5)	351 (62.7)	0.326
< 24	93 (29.0)	61 (25.5)	154 (27.5)	
Gestational age (weeks)				
Median (IQR)	21 (16-26)	22 (18-27)	21 (17-26)	0.036 ^y
≤ 28	41 (12.8)	41 (17.2)	82 (14.6)	0.191
> 28	256 (79.8)	187 (78.2)	443 (79.1)	
Marital status				
Single	93 (29.0)	81 (33.9)	173 (30.9)	0.213
Married	228 (71.0)	158 (66.1)	386 (68.9)	
Male partner's HIV status [‡]				
Negative	57 (17.8)	39 (16.3)	96 (17.1)	0.004
Positive	62 (19.3)	23 (9.6)	85 (15.2)	
Unknown	202 (62.9)	177 (74.1)	379 (67.7)	
Initial CD4 cell count (cells/μl)				
< 350	134 (41.7)	108 (45.2)	242 (43.2)	0.516
≥ 350	164 (51.1)	119 (49.8)	283 (50.5)	
WHO clinical stage				
I & II	308 (96.0)	231 (96.7)	539 (96.3)	0.665
III & IV	13 (4.0)	8 (3.3)	21 (3.7)	
Distance from health facility (km)				
> 5	49 (15.3)	106 (44.4)	154 (27.5)	<0.001
≤ 5	281 (87.5)	133 (55.6)	406 (72.5)	
EID (weeks)				
> 8	41 (12.8)	19 (7.9)	60 (10.7)	0.068
≤ 8	199 (62.0)	161 (67.4)	360 (64.3)	
6-8 weeks EID test results				
Unknown	15 (4.7)	3 (1.3)	18 (3.2)	0.058
Negative	228 (71.0)	175 (73.2)	403 (72.0)	
Positive	5 (1.6)	6 (2.5)	11 (2.0)	
EID results TAT (days)				
< 30	170 (53.0)	68 (28.5)	238 (42.5)	<0.001
≥ 30	52 (16.2)	104 (43.5)	156 (27.9)	

IQR: Interquartile range; EID: Early infant diagnosis; TAT: Turnaround time; ^y: Wilcoxon rank sum test p-values, all others are Chi-square test p-values by health district; [‡]: HIV status of male partners of participants. Missing data explain the less than a 100% total for some covariates

after ART initiation, respectively. However, reports from the same cohort of women in a prospective study found higher retention rates of 90% and 79% through 6 and 12 months after ART initiation,

respectively.¹⁴ In both studies, there was a progressive decline in rates over time from 6 to 12 months which is in line with reported attrition along the PMTCT cascade.¹⁶

Table 2: Unadjusted Poisson regression analysis of covariates of maternal retention at 12-months post-ART initiation by Health District (HD)

Covariates	Unadjusted		
	Bamenda HD	Kumba HD	Total
	RR (95% CI)	RR (95% CI)	RR (95% CI)
Maternal age (years)			
≥24	1.18 (0.99-1.41)	1.06 (0.83-1.36)	1.14 (0.99-1.32)
< 24 (ref)			
Marital status			
Married	1.01 (0.86-1.18)	1.03 (0.85-1.25)	1.02 (0.91-1.16)
Single (ref)			
Gestational age at ANC I (weeks)			
≤ 28	1.35 (1.02-1.80)	1.57 (1.12-2.21)	1.46 (1.17-1.81)
>28 (ref)			
Male partner's HIV status			
Negative	1.32 (1.14-1.52)	1.01 (0.79-1.30)	1.19 (1.05-1.36)
Positive	1.11 (0.92-1.33)	1.19 (0.94-1.52)	1.13 (0.98-1.31)
Unknown (ref)			
Initial CD4 cell count (cells/μl)			
≥350	1.00 (0.87-1.15)	1.04 (0.88-1.24)	1.02 (0.91-1.14)
< 350 (ref)			
Distance from health facility (km)			
≤5	1.11 (0.86-1.41)	1.20 (0.99-1.44)	1.16 (1.01-1.33)
> 5 (ref)			
EID (weeks)			
≤ 8	0.94 (0.83-1.05)	1.27 (0.89-1.81)	1.01 (0.89-1.15)
> 8 (ref)			
EID results TAT (days)			
≤ 30	0.96 (0.87-1.07)	1.04 (0.76-1.42)	0.95 (0.86-1.04)
> 30 (ref)			

RR: Relative risk; EID: Early infant diagnosis; ANC I: First antenatal care visit; TAT: Turnaround time; ¶: Participant's knowledge of male partner's HIV status; ref: Reference variable. In bold where p-values <0.05.

Comparison of retention rates and study design. The study design may partly explain the differences in retention rates between studies: retrospective studies are prone to missing data. This may have been the case, seeing our smaller analytical sample of 560 women compared to 669 in the prospective study. In addition, researchers may use different methods to calculate retention rates, which might give different values. For example, our denominator included women who transferred out; whereas, in the prospective study, the authors excluded women who transferred out from their analysis. Similarly, another

prospective study of the Option B+ approach in the Kumba health district of Cameroon reported a decline in retention rates from 88% to 81% at 6 and 12 months, respectively. This study examined a much smaller sample of 268 women.¹⁷ Attrition along the PMTCT cascade remains a major threat to achieving the elimination of MTCT of HIV in SSA, and LTHF appears to be the main attrition type.^{18,19} In our study, LTHF accounted for 23.0% of all cases of attrition. Our rate was lower than the 30.5% reported in Uganda at 18 months post-delivery among mother-baby pairs in PMTCT services.²⁰

Table 3: Adjusted Poisson regression analysis of covariates of maternal retention at 12 months post-ART initiation by Health District (HD)

	Bamenda HD	Adjusted Kumba HD	Total
Covariates	RR (95% CI)	RR (95% CI)	RR (95% CI)
Maternal age (years)			
≥ 25	1.12 (0.95-1.32)	1.04 (0.82-1.33)	1.10 (0.96-1.27)
< 25 (ref)			
Marital status			
Married	0.91 (0.78-1.07)	1.11 (0.86-1.44)	0.99 (0.86-1.23)
Single (ref)			
Gestational age at ANCI (weeks)			
≤ 28	1.28 (0.98-1.68)	2.03 (1.21-3.41)	1.50 (1.17-1.93)
>28 (ref)			
Male partner's HIV status			
Negative	1.30 (1.13-1.50)	0.90 (0.64-1.26)	1.16 (1.00-1.34)
Positive	1.17 (0.98-1.39)	1.31 (0.99-1.71)	1.20 (1.03-1.38)
Unknown (ref)			
Initial CD4 cell count (cells/ μ l)			
≥350	1.02 (0.89-1.17)	1.00 (0.81-1.25)	1.02 (0.91-1.15)
< 350 (ref)			
Distance from health facility (km)			
≤ 5	1.01 (0.84-1.22)	1.11 (0.89-1.38)	1.09 (0.95-1.25)
> 5 (ref)			

RR: Relative risk ref: Reference variable. ANCI: First antenatal care visit. In bold where p-values < 0.05

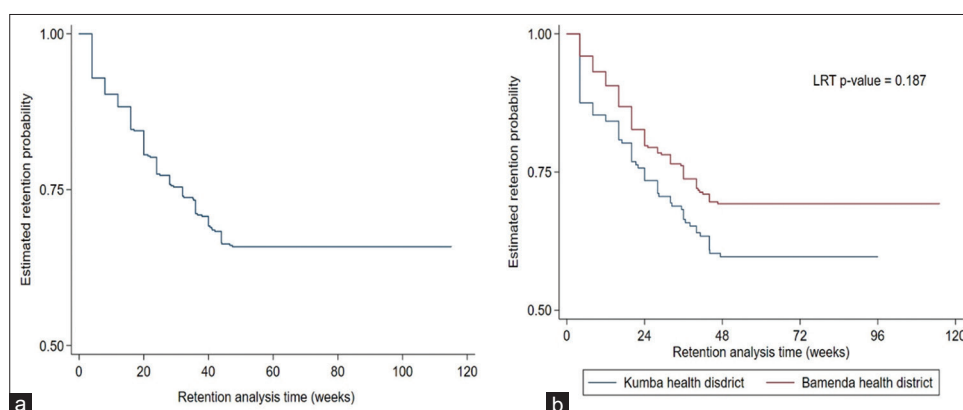


Figure 1: Cox Regression mean age-adjusted survival curves of retention probabilities; a. Overall estimated retention probability b. Estimated retention probabilities of women by health district.

Collectively, the extant literature highlights additional challenges in comparing retention rates between studies because of differences in the duration of follow-up and setting — urban or rural.

Some studies in Cameroon have shown differences in retention rates among women in PMTCT services between urban and rural settings.²¹ In this study, we report higher but non-significant statistical differences

in retention rates in the Bamenda urban compared to the Kumba rural health district. Other authors in Uganda found that the proportion of mother-infant pairs on lifelong Option B+ was five times greater in urban (20.3%) than in rural (4.5%) health facilities.²² In contrast, a study in Rwanda assessing retention rates and their associated individual- and facility-level factors showed that women receiving PMTCT services in rural facilities were more likely to be retained in care than those in urban facilities.⁹ Health district setting could, therefore, influence retention rates.

Factors associated with retention. In our adjusted regression model, two factors remained significantly associated with higher retention in PMTCT services: the participant's knowledge of their male partner's HIV-negative status and early gestational age at ANC enrollment. A study of factors associated with retention in PMTCT care in Cameroon found lack of knowledge of the male partners' HIV status among women as a barrier to retention in care.¹⁰ This is consistent with our findings of significantly higher retention of women who knew their male partners' HIV-negative status in the urban health district. Therefore, not knowing their male partners' HIV status may suggest a lack of engagement of male partners to facilitate disclosure of HIV status. Male partner involvement in ANC and PMTCT services has been widely recognized as crucial in strengthening PMTCT services; and yet, most reports show low male partner involvement in PMTCT services.^{23,24} Scaling up evidence-based interventions that enhance the involvement of male partners at ANC booking would be crucial to facilitating mutual HIV status disclosure and improving retention in PMTCT care.²⁵ Similarly, booking early for ANC was strongly associated with retention in PMTCT care. Consistent with our results in the rural health district, a systematic review of studies in Africa showed that booking in ANC at a later gestational age led to poor retention in PMTCT care.⁷ These findings suggest the need for granular subnational data to inform Cameroon's transition of PMTCT sites to universal lifelong HIV care centers.

Interestingly, our adjusted model (Table 3) did not find factors such as maternal age¹⁰ and distance from health facility,²⁶ which are commonly associated with retention in PMTCT care. Contrary to our findings,

a study in Uganda found that women above 30 years of age had a 39% higher retention rate in care at 18 months after delivery when compared to those below 30 years of age.²⁷ Another study in an urban setting in Cameroon showed that living far from the health facility was associated with poor retention in PMCTC care.¹⁰ Likewise, a study in Zambia found a 10% decrease in PMTCT uptake for every kilometer increase in distance from the health facility.²⁸

4.1. Strengths and Limitations

There are some limitations that should inform the interpretations of our findings. We abstracted our data from longitudinal registers of a structured pilot program in two conveniently selected regions of Cameroon that may hinder its generalizability. Nonetheless, we collected the data from a wide range of health facility types, including government, private, and faith-based institutions that should mitigate this limitation. Also, the study participants initiated ART at different gestational and postpartum stages which led to variations in the follow-up periods. However, all the participants had the minimum 12-month follow-up period for the assessment of factors associated with retention in care. Despite these limitations, the strength of this study comes from the diverse and large number of health facilities examined, using granular data at the district level.

Recommendations for Further Studies. The findings from this study suggest the need for more comparative prospective studies between urban and rural districts in other regions of Cameroon aimed at identifying district-specific factors influencing retention in HIV care.

5. Conclusion and Global Health Implications

Overall, retention rates substantially declined from above three-quarters to nearly two-thirds at 6 and 12 months after initiating ART, respectively. This decline underscores the need for improved strategies to address retention in PMTCT services, which have significant implications for global efforts to eliminate mother-to-child transmission of HIV. These findings demonstrate the need for tailored interventions at the district level to enhance retention in PMTCT care in

the era of universal “test and treat.” Identifying factors influencing retention at the district level is crucial for Cameroon and other countries with similar health systems and challenges, thereby contributing to more effective PMTCT services and policies worldwide.

Compliance with Ethical Standards

Conflicts of Interest: The authors declare no conflict of interest.

Financial Disclosure: Nothing to declare. **Funding/Support:** The National Institute of Allergy and Infectious Diseases of the National Institutes of Health supported JN in part under Award Number T32AI14398; and the Afya Bora Consortium fellowship, which is funded by the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) through funding to the University of Washington’s International AIDS Education and Training Center (IAETC) under cooperative agreement U91 HA06801 from the Health Resources and Services Administration (HRSA) Global HIV/AIDS Bureau. The content is solely the responsibility of the authors and does not represent the official views of the National Institutes of Health, PEPFAR, or HRSA. **Ethics Approval:** We received administrative clearance and conducted the study under the ethical approval guidelines issued for the original pilot study by the Institutional Review Boards of the Cameroon Baptist Convention Health Services in August 2013 and the Centers for Disease Control and Prevention in July 2013.¹⁴ Ethical approvals are generally waived for studies involving secondary data analysis of anonymized patient records, such as ours.

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Disclaimer: None.

Key Messages

- ▶ Poor retention in lifelong HIV care for pregnant and breastfeeding women remains a major challenge and shows variations by health districts of factors influencing retention in care.
- ▶ Enrolling in ANC at an early gestational age is a significant factor for retention in rural districts compared to knowing the male partners’ HIV-negative status in urban districts.
- ▶ Granular district-level knowledge of factors associated with retention in PMTCT care could inform targeted interventions to improve retention in HIV care in the era of universal “test and treat.”

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