

# Retention in Care At 36 Months of Children Living with Hiv Followed up at The Chantal Biya Foundation Mother and Child Centre, Yaounde, Cameroon

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## Abstract

**Background:** Retaining children in care still remains a real challenge in Africa. In Cameroon, the retention rate among children under 15 years of age remains low. Some reported factors found to be associated with low retention rates were late initiation of antiretroviral therapy (ART) and poor adherence. Our objective was therefore to assess retention at 36 months of paediatric patients on antiretroviral treatment at the day unit of the Mother and Child centre of the Chantal Biya Foundation.

**Methodology:** We conducted a cross-sectional study with a case-control component targeting children aged 0-15 years. Data were collected exhaustively from the 2017 and 2018 cohort follow-up registers, diagnosed positive after the first PCR. Children who had died, been lost to follow-up and transferred to an outpatient department were considered as cases, and any child who was on treatment at the end of the study period was considered as a control. Patient follow-up and the association between independent variables and the occurrence of attrition were estimated.

**Results:** Data were collected from 260 children (117 from 2017 and 143 from 2018). The prevalence of retention varied according to the relationship with the nursing and patient characteristics. Orphans [OR=9.75 IC95%=(4.06-10.37) P=0.01], mothers poor adherence with therapeutic education [2.52, IC95%=(1.78-3.37) P=0.001] and immunosuppression [OR=9.10 IC95%=(4.06-10.37); P=0.03] were found to be significantly associated with poor retention of the children. The main reasons given by caregiver for poor adherence to therapeutic education were discrimination 10 (27.78%), the child's schooling 8 (22.22%), puberty 9 (25%) and self-transfers 9 (25%).

**Conclusion:** The retention rate of children put on ARV remains worrying, at more than a third of patients. The factors associated with poor retention were mothers poor adherence with therapeutic education, immunosuppression and orphanhood.

**Keywords:** Retention; Children 0-15 years; Mother and Child Centre; Chantal Biya Foundation; Yaounde

## Introduction

Retention in care is a real public health problem for chronic diseases such as HIV. After missing follow-up appointments, patients may be absent, lost to follow-up, transferred or dead [1]. In 2019, according to UNAIDS global statistics, 1.8 million children aged 0-14 were living with HIV, and only 53% were on ART [2]. The number of children receiving antiretroviral treatment at two years has been estimated at an average of 60% [3]. Factors reported to be associated with poor retention among children were: late initiation of antiretroviral treatment, therapeutic failure after 6 months of treatment, Loss to follow up, poor therapeutic compliance, mother's low educational level, mother's occupation, stigmatization, accessibility to health facilities, long waiting times at care sites, sub-optimal quality of psychosocial counseling [3, 4].

In 2020 in Cameroon, among children under 15 years old, according to epidemiological bulletin number 4, the retention rate was 82.3% at 24 months.

Retention in care at two years of antiretroviral treatment among children aged 0-5 years, 6-9 years and adolescents aged 10-15 years was estimated at 64%, 75% and 63% respectively [5, 6]. Which is bad. In this context, factors associated with children's non-retention to care include poor caregiver-patient relationships, complex patient flow through the care site, pejorative perception of the disease, economic and social constraints, stigmatization, side effects of antiretroviral drugs, poor therapeutic education.

It is clear, therefore, that most studies of retention in care by children living with HIV are limited to the first two years of treatment. It would also be interesting to study the factors associated with retention in care beyond the first two years of treatment in children living with HIV. The present study therefore aimed to assess retention in care at 36 months of antiretroviral treatment in children aged 0-15 years living with HIV and followed at the Chantal Biya Foundation, mother and child centre at Yaounde, Cameroon (CME-FCB).

## Methods

### Study design

This was a cross-sectional, case-control study of routine data from paediatric patient admissions. Data collected from the TARV registers for monitoring patients and supplemented by a telephone call to the caregiver in order to identify the causes of loss to follow up (child absent 90 days after the last appointment) and the missing data in the monitoring cohort registers.

### Study period

We collected data from patients who initiated treatment from the 1st of October 2017 to the 31st of December 2018 and followed them until the 31st of December 2020. We chose 2017 and 2018 because we wanted to have the data after the implementation of the retention psychosocial agent retained by the partners in the site.

### Study site

Our research was carried out at the Mother and Child Centre of the Chantal Biya Foundation (CME/FCB), which is justified by the fact that this hospital is a reference structure in Cameroon for paediatric HIV care, with an active file of 1238 patients in March 2021. This centre is a paediatric referral health facility.

**Study population and eligibility criteria**

We used data from HIV-positive children followed at the CTA, aged 0-15 years who were initiated on treatment from the 1st of October 2017 to the 31st of December 2018 in the CTA.

**Exclusion criteria**

All Patients aged 0-15 years from the 1st October 2017 to 31st December 2018 cohort with incomplete data for our variable of interest.

**Data collection procedure**

Data collection consisted of a document review of individual medical records and ART registers for monitoring patients on antiretroviral treatment arranged at the centre.

Our data were collected using a data collection grid and a questionnaire completed by telephone call to the mothers of children lost to follow-up. The following data were collected: patient identification (mother's education, area of residence, marital status, orphan or not), biological, clinical and therapeutic characteristics, patient outcome, and information on compliance. Our dependent variable was attrition (categorised as yes and no).

**Definitions of cases and controls**

- *Cases* were patients who were no longer being followed up. Patients under attrition were those lost to follow-up, deceased or transferred.
- *Controls* were patients who were still being monitored.
- *Exposure* was discharge from care.

**Calculation of performance indicators**

The retention formula is not a standard, it's an ideal that we aim to achieve and maintain. It varies according to a given situation and the ideal is a 95% retention rate. To calculate the retention rate over the different periods, we used the WHO calculation method for strategic information guidelines.

- *N*: number of patients on ART alive and on ART 12 months (or 24, 36, etc.) after the start of treatment.
- *D*: number of patients for whom ART was started up to 12 months (or 24, 36 months, etc.) before the start of the year in question.
- *Retention rate*: number of patients still present or maintained in treatment / Number of patients initiated to care at a given time.
- *LTFU proportion*: Number of LTFU patients during the month / Total number of patients at risk.
- *Death proportion*: Number of Death patients during the month / Total number of patients at risk.

**Sampling method**

For both components, sampling was exhaustive. All HIV-positive children aged 0-15 years initiated in 1st October 2017 to 31st December 2018 were included except children with incomplete data for our variable of interest.

**Data analysis**

Data verification, coding and analysis were performed using EXCEL 2016 and SPSS version 25 software. Descriptive analyses were conducted to describe the study population according to their characteristics and independent variables. The distribution of attrition cases according to the same variables was carried out. Pearson's Chi-square was used to determine the existence of significant differences between the different groups. The association between attrition and the independent variables was studied using crude and adjusted Odds ratios. For the adjustment model, age, sex and mother's employment status were considered as confounding factors. The

statistically significant association was set at a maximum of  $p=0.05$  for the multiple regression model.

**Ethical Considerations** The study had received a favorable opinion from the Regional Ethics Committee of the Centre Region in Yaounde. The ethical framework of this hospital-based study aims primarily to ensure the protection of those involved in the research, the protection of the principal investigator and compliance with ethical standards applicable to health research.

## Results

### *Distribution by Socio-demographic and clinical Characteristics*

Table 1 below shows the socio-demographic and clinical distribution of patients on initiation of antiretroviral treatment. It shows that around 3/4 of the children were aged 0-4 years, more than 2/4 were female, children co-infected with tuberculosis accounted for around 6%, and clinical stage I was around 67%.

<b>Variables</b>	<b>Frequency (N=260)</b>	<b>Proportion (%)</b>
<b>Age</b>		
0-4	147	<b>56,54%</b>
[5-9]	76	29,23%
[10-15]	37	14,23%
<b>Sex</b>		
Female	161	<b>61,92%</b>
Male	99	38,08%
<b>Duration on Treatment</b>		
<1 yr	29	11,15%
1-3yrs	97	37,31%
>3 yrs	134	<b>51,54%</b>
<b>WHO Stage</b>		
I	174	<b>66,92%</b>
II	27	10,38%
III	44	16,92%
IV	15	5,76%
<b>Health facility home</b>		
≤ 5 km	70	26,92%
≥ 5 Km	190	<b>73,07%</b>
<b>Co-infection with Tuberculosis</b>		
Yes	15	5,76%
No	245	<b>94,23%</b>
<b>Orphan</b>		
Yes	94	36,15%
No	166	<b>63,85%</b>
<b>Mother Professional activity</b>		
Yes	67	25.7%
No	193	<b>74.2%</b>

**Table 1:** Sociodemographic and clinical characteristics of the children at the start of treatment (N=260).

### Description of patient retention in care

Table 2 below shows the outcome of children who initiated treatment in 2017 and 2018 and followed up until 2020. From this table, we see that the proportion of patients lost to follow-up decreased in 2018 (15.38%) compared with 2017 (24.78%). Overall, the proportion of patients lost to follow-up is around 20%, which is the acceptable threshold recommended by the Ministry of Health. Alongside this, we have patients who have died (4%) and those who have been transferred.

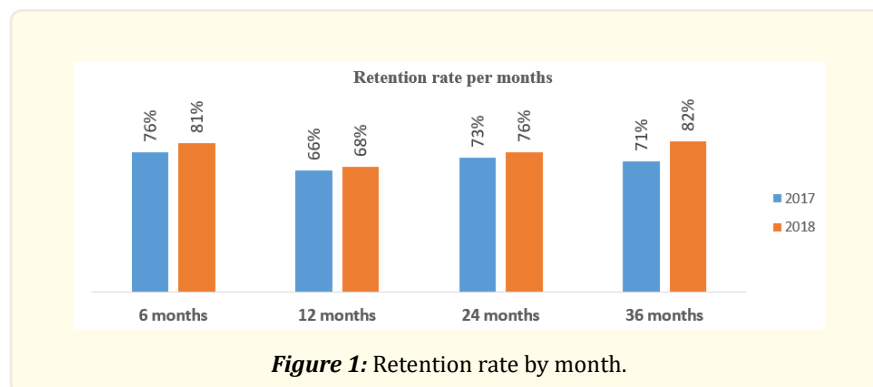
Variables	Oct.- Dec.2017	Oct.- Dec.2017	TOTAL
Absents	9	7	16 (6,1%)
Death	5	4	9 (3,5%)
Lost to Follow up	29	22	51 (19,6%)
On treatment	69	106	<b>175 (67,3%)</b>
Transferred out	5	4	9 (3,5%)
TOTAL	117	143	260 (100,0%)

**Table 2:** Outcome of patients initiated to treatment in 2017 and 2018 and followed up until 2020 (N=260).

### Retention rate by sex and age

Female children had a higher retention rate (68%) than male children (65%). Retention rates were also high among 0-4 year olds (77%), followed by 5-9 year olds (70%) and 10-15 year olds (64%). Retention rates were moderately higher among 0-4 year olds (77%) than among the rest of the population.

### Retention rate per months



The above graph (figure 1) shows that the retention rate in 2018 was better than in 2017. But we note in particular that at 12 months, this rate is below the minimum expected (75%) by the targets set by UNAIDS. At 36 months, retention is better than at 24 months in both study cohorts. This result could be explained by the fact that some children may have been orphaned by their mother, which could influence their follow-up. The main reasons given for loss of sight during data collection were the child's schooling, distance and stock-outs.

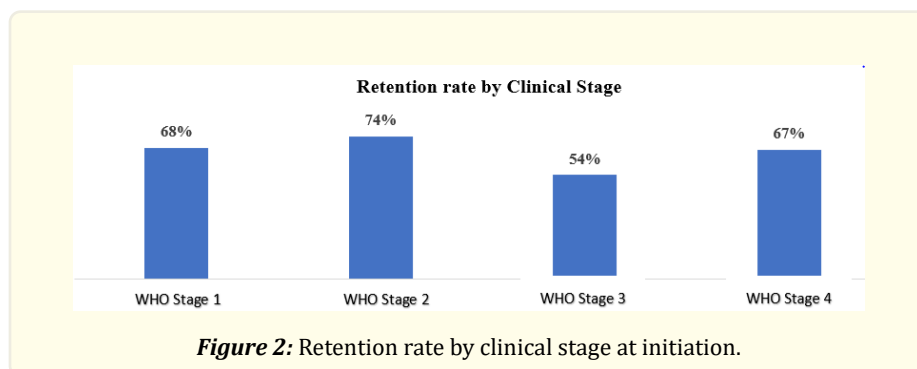
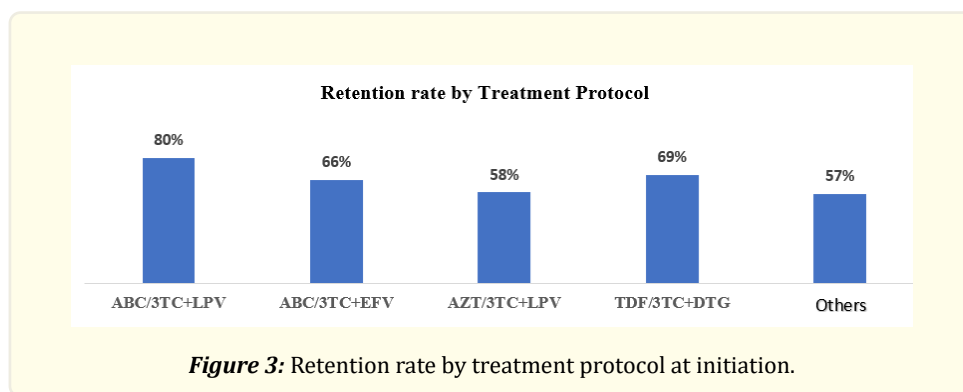
**Retention rate by clinical stage at initiation**

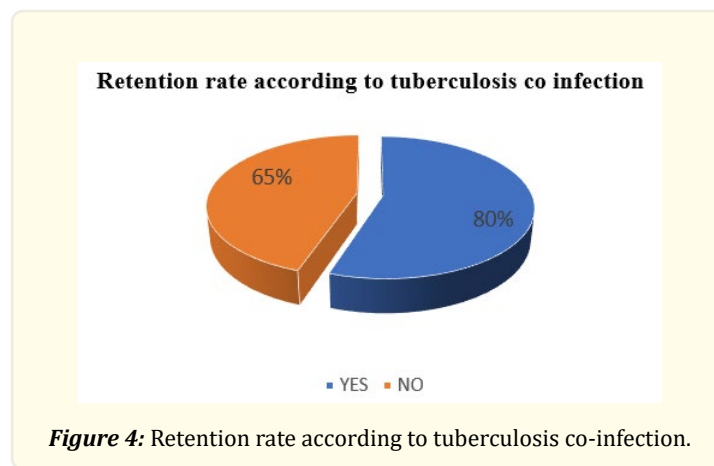
Figure 2 shows the distribution of retention rates by clinical stage at initiation for the 2017 cohort. We have chosen to describe only 2017 because it has the lowest retention rate (70.94%). Retention rates are poor in all stages, but nonetheless. WHO stage 3 has the lowest retention rate (54.13%).

**Retention rate according to protocol change**

Children who had changed protocols had a retention rate of 70%, higher than those who had not, which was 61%. The main reasons identified for patients having to change protocol were: breaking of the previous treatment regimen, introduction of a new protocol and tuberculosis co-infection.

**Retention rate by treatment protocol at initiation**

Retention rates were good for patients treated with ABC/3TC+LPV and poorer for patients treated with the other protocols.

**Retention rate according to tuberculosis co infection**

Overall, more Co-infected children remain on treatment 36 months after initiation. In fact, 80% of co-infected patients are still on ARVs 36 months after initiation, compared with 65% of the others.

**Factors associated with attrition (non-retention)**

In the multivariate analysis, we included confounding factors such as mother's occupation, mother's marital status and place of residence. From this analysis, we find that orphaned children [OR= 4.10 IC95%=(3.04-7.26);  $p < 0.005$ ], caregiver poor adherence with therapeutic education [1.62 IC95%=(1.78-3.37);  $P < 0.005$ ] and severe immunodepression [1.28 IC95%=(1.31-1.47);  $P = 0.003$ ] were statistically associated with poor retention. In contrast, gender, age, clinical stage and tuberculosis co-infection were not statistically associated with patient attrition.

Variables	Attrition		Bivariate		Multivariate	
	Case (n, %)	Control (n, %)	OR (IC 95%)	P-Value	OR (IC 95%)	P-Value
<b>Sex</b>						
Male	41(58,57)	34(48,57)	1,49(0,76-2,91)	0,03	0,6(0,31-1,32)	0,04
Female	29(41,43)	36(51,43)				
<b>Age</b>						
[10-15]	11(15,71)	9(12,86)	1,28(0,49-3,32)	0,30	1,39(0,52-3,71)	0,51
Others	58(82,86)	61(87,14)				
<b>Immunodepression</b>						
No	54(77,14)	49(70,00)	1,44(1,67-2,08)	0,002	1,28(1,31-1,47)	<b>0,003</b>
Yes	16(22,86)	21(30,00)				
<b>Caregiver poor adherence with therapeutic education</b>						
Yes	46(65,71)	39(55,71)	2,52(2,76-3,01)	0,002	1,62(1,78-3,37)	<b>0,001</b>
No	24(34,29)	31(44,29)				

**Table 3:** Factors associated with attrition of children aged 0-15 on antiretroviral treatment.

From this analysis, we find that caregiver poor adherence with therapeutic education [1.62(1.78-3.37);  $P=0.001$ ], and immunosuppression [1.28(1.31-1.47);  $P=0.003$ ] are risk factors for poor retention (attrition).

Variables	Attrition		Bivariate		Multivariate	
	Case (n, %)	Control (n, %)	OR (IC 95%)	P-Value	aOR (IC 95%)	P-Value
<b>Orphan</b>						
Yes	39 (55,71)	8(11,43)	9,75(4,06-10,37)	0,003	4,10(3,04-7,26)	<b>0,001</b>
No	31(44,29)	62(88,57)				
<b>Clinical Stage</b>						
III	5(7,14)	6(8,57)	0,82(0,23-2,82)	0,09	1,26(0,30-5,34)	0,74
Others	65(92,86)	64(91,43)				
<b>Therapeutic scheme</b>						
First ligne	32(45,71)	19(27,14)	2,03(0,96-4,31)	0,06	0,32(0,14-1,71)	0,05
Second line	38(54,29)	51(72,86)				
<b>Co-infection TB</b>						
No	4(5,71)	2(2,86)	2,06(1,36-3,13)	0,07	1,83(1,12-5,64)	0,05
Yes	66(94,29)	68(97,14)				

**Table 4:** Multivariate analysis of factors associated with poor retention.

From this table, we can see that the variable statistically associated with attrition is being an orphan [4,10(3,04-7,26) ;  $P=0.001$ ].

## Discussion

This study aimed to present the distribution of retention and to investigate the factors associated with the non-retention of patients aged 0-15 years on ART at the Mother and Child Centre of the Chantal Biya Foundation. We studied the profile of 260 children at the start of antiretroviral treatment. The prevalence of retention varied according to month and patient characteristics. The loss to follow up rate was 51(19.62%) and the death rate 9(3.46%). Orphans [OR=9.75 IC95%=(4.06-10.37) ;  $P=0.01$ ], caregiver poor adherence with therapeutic education [1.62(1.78-3.37);  $P=0.001$ ] and immunodepression [OR=9.10 IC95%=(4.06-10.37) ;  $P=0.03$ ] were found to be significantly associated with poor retention status.

In our study, we demonstrated that the retention rate improves over time. 70.94% of patients were retained after initiation in 2017 and 81.81% in 2018. In 2015, a systematic review study [4] showed that after 36 months of treatment, 71-95% of patients were retained which is within the range, but below the recommended minimum of 75% [4]. Similarly, a study carried out in Cameroon in 2011 by Bigna et al found that [5] retention rates after 6, 12, 24 and 36 months of treatment were 66%, 58%, 47% and 35% respectively [6]. Compared with our study, we found a higher retention rate compared to Mosoko et al in Limbe [6] and a clear improvement in the retention rate at 36 months compared with 24 months. This difference can be explained by the fact that we conducted our study after the introduction of the test and treat policy in 2016. Also, our results are similar to those of a study conducted in Cameroon in 2015, which showed that approximately 71% of patients were retained in a cohort of children born to HIV-positive mothers after 36 months of treatment [7]. These differences in retention rates observed can be explained by the level of availability of ART and the commitment of each psychosocial agent and doctor to keeping patients in the care circuit.

Concerning loss to follow up, our study showed of around 20%. This result is much lower than that of a study carried out in Cameroon by Nguéack et al [8] which found a rate of around 37%, but our result matches that found in 2019 in Kenya. This difference with the first study can be explained by the fact that the first author had worked with a different target than ours and in several sites [9].



Our results show that female children (68%) were more retained in care than male children. This result is similar to that found by Sofeu et al in 2017, who demonstrated that the female gender was predominant in the health facility. Our results show that at 36 months, retention is better compared to 24 months in both study cohorts. This result corroborates that of a study conducted in Myanmar [10]. Our results show that being an orphan child was associated with poor retention. This result is similar to another study [11] but different from that conducted by Sibanda et al [12]. This can be explained by the fact that orphans are a little bit abandoned, which could influence their follow-up. Immunosuppression was also statistically associated with poor retention. This may be explained by the fact that a patient with a cell count of  $<500$  cells/mm<sup>3</sup> and a high viral load at initiation is likely to rapidly develop opportunistic diseases such as tuberculosis and cerebral meningitis, which can contribute to death. This result is similar to that of Poka et al in Cameroon [3]. Which showed that factors associated with low retention in children aged 36-59 months ( $P < 0.001$ ), CD4 cell count ( $P < 0.001$ ), severe immunosuppression ( $P < 0.001$ ), WHO clinical stages III and IV and growth retardation ( $P < 0.001$ ). This result is also similar to that of a study by Gabillard et al. [13] in Gabon, in 2015 which demonstrated that the factors influencing the loss of sight of children were the absence of taking ART ( $p < 0.001$ ) and any other treatment such as cotrimoxazole ( $p < 0.001$ ) but also to a CD4 rate  $> 500$  cells/mm<sup>3</sup> at inclusion ( $p < 0.001$ ). A retrospective cohort study aimed at describing the factors determining retention and survival in HIV-infected children and adolescents in two treatment centres (TC) [14] examined records of children aged 0-15 initiated and followed up from 20013 to 2016, and found that factors associated with low retention were age 36-59 months ( $P < 0.001$ ), CD4 cell count ( $P < 0.001$ ), severe immunosuppression ( $P < 0.001$ ), WHO clinical stages III and IV and growth retardation.

Caregiver poor adherence in therapeutic education statically associated with poor retention in our study. This result corroborates with that found by Luma al [15] which showed that caregiver poor adherence in therapeutic education influence retention in care of children [16]. In Thailand, a study conducted in 2019 showed that the main factors associated with non-retention were: age  $\geq 13$  years ( $p < 0.001$ ), growth retardation ( $p = 0.001$ ), interruption of antiretroviral treatment ( $p = 0.003$ ). The rate of loss to follow up was 2.9%, 7.3% and 22.2% respectively at one, five and ten years after the last contact (9 months). This study showed that immunosuppression (adjusted OR: 1.78; P value  $< 0.05$ ), Caregiver poor adherence in therapeutic education (adjusted OR: 2.06; P value  $< 0.05$ ) and orphanhood (adjusted OR: 2.32; P value  $< 0.05$ ) were significantly and positively associated with non-retention of paediatric patients on antiretroviral therapy. immunocompromised patients are 1.78 times more likely to be non-retained. Those Caregiver poor adherence in therapeutic education are 2.06 times more likely to be non-retained, and orphans are 2.32 times more likely to be non-retained in the CTA of the Chantal Biya Foundation mother and child center. These results are in line with those found by studies conducted in Mozambique in June 2014, Mozambique in March 2019 and Uganda in April 2019, indicating a P value  $< 0.05$  for immunodepression as a factor positively associated with non-retention to ART [9]. Similarly, a study conducted in Haiti in 2017 showed a positive association between Caregiver poor adherence in therapeutic education and non-retention similar to the results of our study [15]. We have also seen an improvement in the retention rate over time.

### **Potential limitations of our study**

The results of this study were only collected at a single site, which will make it difficult to infer results at the level of the general population. In addition, as with any case-control study, we may also be subject to information bias from registries and mothers' memories. Nevertheless, our results have been rigorously collected to increase their internal validity.

### **Consent**

It is not applicable.

### **Ethical Approval**

The study had received a favorable opinion from the Regional Ethics Committee of the Centre Region in Yaounde.

### **Competing Interests**

Authors have declared that no competing interests exist.

## Conclusion

Despite clinical data showing that many patients had missed their monthly appointments or were lost to follow-up, we found that a significant number of these patients were in fact managed and on ART. Analysis of the factors explaining the attrition of certain patients revealed that orphans, those caregiver poor adherence with therapeutic education and severely immunocompromised patients are at greater risk of attrition and need to be particularly closely monitored. In order to increase retention rates and reduce attrition and mortality rates, we recommend reinforcing the follow-up of mothers. In fact, psychosocial agents must ensure that mothers receive good therapeutic education, so that they are not surprised by the consequences of taking ARV treatment. We also recommend involving NGO specializing in the follow-up of orphans, and more thorough monitoring of patients with severe immunodepression.

## Authors' contributions

This work was carried out in collaboration among all authors. Author Antoinette AOB helped in conceptualization, collected data, analysed and wrote the draft of the manuscript. Author Charles K designed the study, performed data interpretation of results and drafted of the manuscript. Authors Gabriel TM, Alain DC, Francis AN and Bitia AIG did the correction and drafting of the manuscript. Author Gabriel TM helped in data analysis, performed interpretation and wrote the draft of the manuscript. Author Antoinette AOB designed and drafted the manuscript. All the authors read and approved the final draft for publication.

## References

1. Kouanfack C., et al. "Retention in HIV/AIDS Management Services: is it Really Poor? The Case of Yaounde Central Hospital in Cameroon". *Int J MCH AIDS* 9 (2020): 207-12.
2. Fettig J., et al. "Global Epidemiology of HIV". *Infect Dis Clin North Am* 28 (2014): 323-37.
3. Poka-Mayap V., et al. "Mortality and its determinants among patients infected with HIV-1 on antiretroviral therapy in a referral centre in Yaounde, Cameroon: a retrospective cohort study". *BMJ Open* 3.7 (2013).
4. Abuogi LL, Smith C and McFarland EJ. "Retention of HIV-Infected Children in the First 12 Months of Anti-Retroviral Therapy and Predictors of Attrition in Resource Limited Settings: A Systematic Review". *PLoS ONE* 11 (2016).
5. Bigna JJR., et al. "Factors associated with non-adherence to scheduled medical follow-up appointments among Cameroonian children requiring HIV care: a case-control analysis of the usual-care group in the MORE CARE trial". *Infect Dis Poverty* 3 (2014): 44.
6. Mosoko JJ., et al. "Retention in an antiretroviral therapy programme during an era of decreasing drug cost in Limbe, Cameroon". *J Int AIDS Soc* 14 (2011): 32.
7. Ndongo FA. Early antiretroviral treatment of infants infected with HIV-1: evaluation of the short and medium term virological response in a sub-Saharan African country (Cameroon) :147.
8. Nguéfack F, et al. "Frequency of severe anemia in children aged 2 months to 15 years at the Mother and Child Center of the Chantal Biya Foundation, Yaoundé, Cameroon". *Pan Afr Med J* 12 (2012).
9. Saumu WM., et al. "Predictors of loss to follow-up among children attending HIV clinic in a hospital in rural Kenya". *Pan Afr Med J* 32 (2019).
10. Htet KM., et al. "Early Success with Retention in Care Among People Living with HIV at Decentralized ART Satellite Sites in Yangon, Myanmar, 2015-2016". *Front Public Health* 7 (2019): 124.
11. Prevalence and factors associated with non-retention in care of people living with HIV (PLHIV) followed in a decentralized care site. *Medicine Mal Infect* 50 (2020): S187.
12. Sibanda EL., et al. "The magnitude of loss to follow-up of HIV-exposed infants along the prevention of mother-to-child HIV transmission continuum of care: a systematic review and meta-analysis". *AIDS Lond Engl* 27 (2013): 2787-97.
13. Gabillard D., et al. "Mortality, AIDS-morbidity and loss to follow-up by current CD4 cell count among HIV-1 infected adults receiving antiretroviral therapy in Africa and Asia: data from the ANRS 12222 collaboration". *J Acquir Immune Defic Syndr* 1999 62 (2013): 555-61.

14. Massavon W, et al. "Factors Determining Survival and Retention among HIV-Infected Children and Adolescents in a Community Home-Based Care and a Facility-Based Family-Centred Approach in Kampala, Uganda: A Cohort Study". *Isrn Aids* (2014): 852489.
15. Luma HN, et al. "Late presentation to HIV/AIDS care at the Douala general hospital, Cameroon: its associated factors, and consequences". *BMC Infect Dis* 18 (2018).
16. Kyaw Myo Htet, et al. "Early Success with Retention in Care Among People Living with HIV at Decentralized ART Satellite Sites in Yangon, Myanmar, 2015-2016". *Front Public Health* 7 (2019): 124.