

# Trends in CD4 cell count at diagnosis of HIV and initiation of ART in Haiti (2004-2016)

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## Background

- World Health Organization (WHO) guidelines have progressively changed over the past 15 years, to recommend earlier initiation of antiretroviral therapy (ART) for people living with HIV (PLWH)
- In 2006, 2009, and 2013, ART was recommended for PLWH with CD4 count <200 cells/mm<sup>3</sup>, ≤350 cells/mm<sup>3</sup>, and ≤500 cells/mm<sup>3</sup>, respectively. In 2015, universal ART was recommended<sup>1-4</sup>
- Despite these changes in guidelines, a substantial proportion of patients continue to present with advanced disease<sup>5,6</sup>

### Study Objectives:

- To analyze temporal trends and predictors of late presentation and late initiation of ART at GHESKIO (Haitian Study Group for Kaposi's Sarcoma and Opportunistic Infections) in Port-au-Prince, Haiti
- To evaluate mortality in the first 24 months after ART initiation between 2004 and 2016

## Methods

### Study Design and Population:

- Retrospective cohort study of patients >17 years of age who were diagnosed with HIV at GHESKIO between 2004 and 2016

### Statistical Analysis:

- Median CD4 cell count, and the proportion of patients with CD4 cell count <200 cell/mm<sup>3</sup> at HIV diagnosis and ART initiation were summarized descriptively from 2004 and 2016
- Multivariable logistic regressions were performed to determine predictors of CD4 cell count <200 cell/mm<sup>3</sup> at HIV diagnosis and ART initiation in 2004 and 2016. Age, gender, income, marital status, education level, and residence zone were included as predictors in the model
- Kaplan-Meier analyses and log-rank tests were conducted to estimate and compare 24-month mortality rates among patients who initiated ART in 2004 and 2016

## Results

### Patient Demographic Characteristics (Table 1):

- 32,751 patients tested positive for GHESKIO from January 1, 2004 to December 31, 2016
- Of these, 19,320 (59%) patients had blood drawn for CD4 count within 6 months of HIV diagnosis or ART initiation, and were included in the analysis

Table 1: Patient Demographic Characteristics (N = 19,320)

Age, Mean ± SD	36.2 ± 10.8
Male, N (%)	8,061 (41.7%)
Income, N (%)	
Less than \$1/day	15,594 (80.7%)
Greater than \$1/day	3,511 (18.2%)
Other/Missing	215 (1.1%)
Marital Status, N (%)	
Married/Living together	9,984 (51.7%)
Formerly Married	4,120 (21.3%)
Single	5,012 (25.9%)
Other/Missing	204 (1.1%)
Education Level, N (%)	
None-Primary	9,421 (48.8%)
Secondary and above	9,678 (50.1%)
Other/Missing	221 (1.1%)
Residence Zone, N (%)	
Lives in a residence zone that includes a slum	9,962 (51.6%)
Lives in a residence zone that does not include a slum	6,419 (33.2%)
Lives outside Port-au-Prince	2,234 (11.6%)
Other/Missing	705 (3.7%)

### Median CD4 Cell Count Over Time (Figure 1):

- The median CD4 count at HIV diagnosis increased over time, from 172 cell/mm<sup>3</sup> (interquartile range [IQR]: 44, 387) in 2004 to 347 cell/mm<sup>3</sup> (IQR: 176, 551) in 2016 (p <0.01)
- The median CD4 count at ART initiation increased from 2004 to 2016, with the lowest median CD4 count of 63 cell/mm<sup>3</sup> (IQR: 21, 152) observed in 2005, and the highest median CD4 count of 402 cell/mm<sup>3</sup> (IQR: 212, 634) observed in 2016 (p <0.01)

## Acknowledgements

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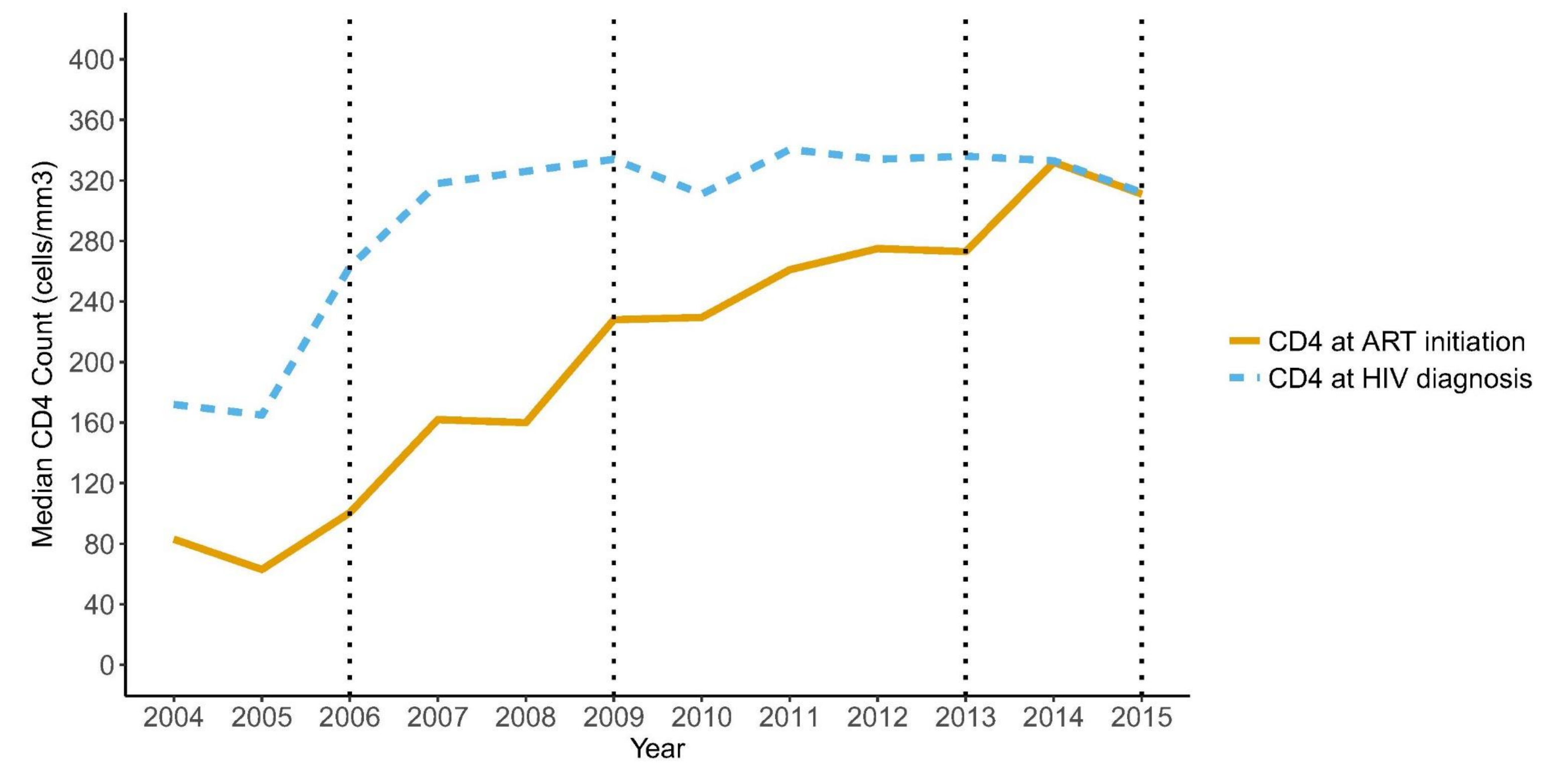


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## Results (continued)

Figure 1. Median CD4 Cell Counts (2004-2015)



Note: Dashed lines indicated change in WHO guidelines for ART initiation.

### Predictors of CD4 Cell Count <200 cell/mm<sup>3</sup> at HIV Diagnosis:

#### 2004:

- Male patients were more likely to be diagnosed with HIV with CD4 count <200 cell/mm<sup>3</sup> (Odds Ratio [95% Confidence Interval]: 2.25 [1.62, 3.13])

#### 2016:

- Patients of older age (by decade) were more likely to be diagnosed with HIV with CD4 cell count <200 cell/mm<sup>3</sup> (OR [95% CI]: 1.25 [1.05, 1.50])

### Predictors of CD4 Cell Count <200 cell/mm<sup>3</sup> at ART Initiation:

#### 2004:

- Male patients were more likely to initiate ART with CD4 cell count <200 cell/mm<sup>3</sup> (OR [95% CI]: 1.75 [1.03, 2.95])

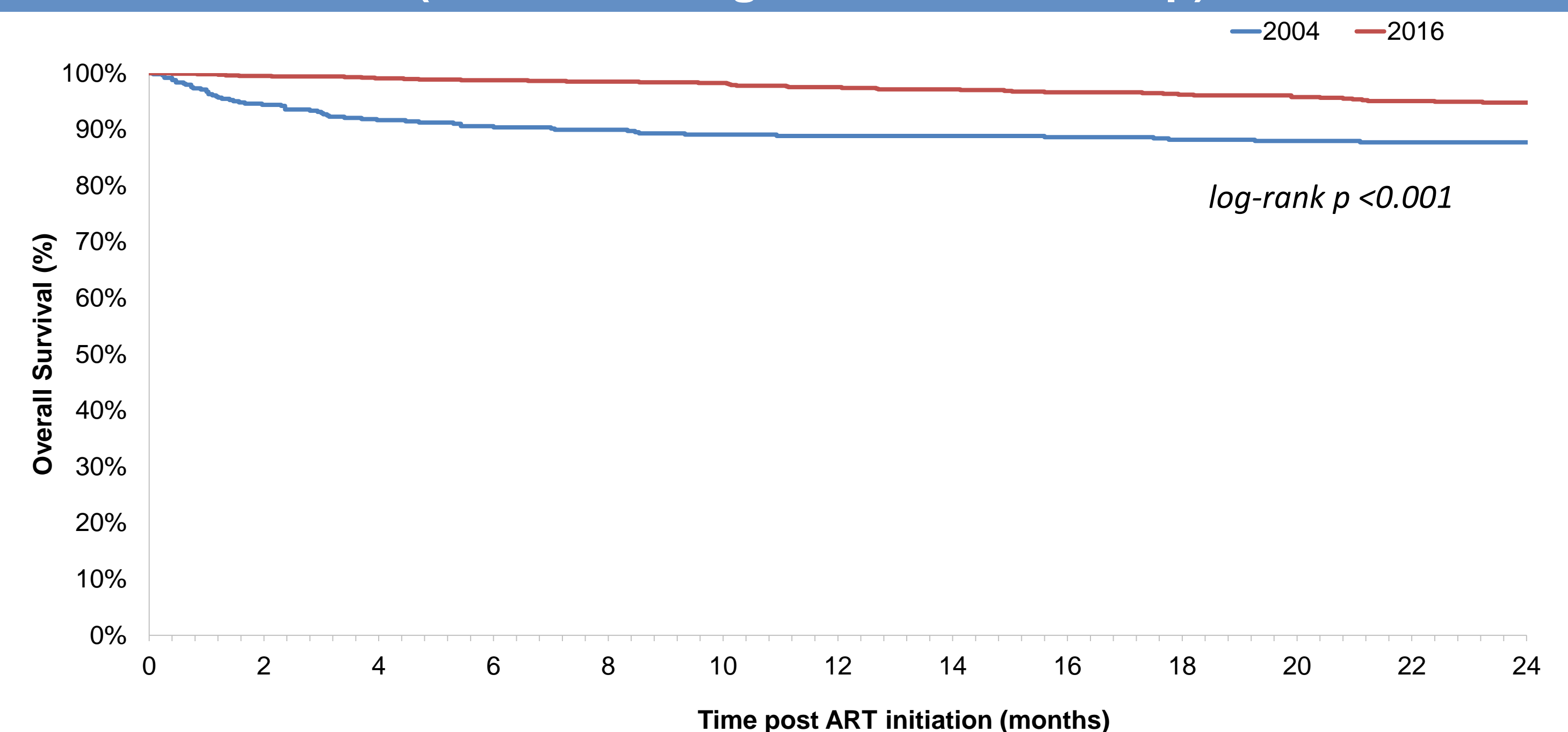
#### 2016:

- Higher education status was significantly associated with initiating ART with CD4 count <200 cell/mm<sup>3</sup> (OR [95% CI]: 0.72 [0.52, 0.99])

### Trends in Mortality Over Time Within 24 months of ART Initiation (Figure 2)

- The 24-month mortality rates among patients who initiated ART in 2004 and 2016 and were censored at lost to follow up were 12.3% and 5.3%, respectively.
- For patients that initiated ART in 2004, the increase in mortality rate was greatest in the first 6 months following ART initiation (month 1: 3.3%; month 6: 9.7%), compared with patients that initiated ART in 2016 (month 1: 0.2%; month 6: 1.3%)

Figure 2. Overall survival for patients who initiated ART in 2004 vs. 2016 (with censoring at loss to follow up)



Year	Total N	Total number of events	Mean time to death (months)	Mortality rate					
				1 month	3 months	6 months	12 months	18 months	24 months
2004	482	58	19.0	3.3%	7.1%	9.7%	11.2%	11.8%	12.3%
2016	1021	42	22.7	0.2%	0.6%	1.3%	2.5%	3.8%	5.3%

Note: Patients were censored at earliest event between 24 months post-ART initiation, last visit, last date of follow-up, and death.

## Discussion and Conclusion

- Over the past 15 years, the median CD4 count at HIV diagnosis and ART initiation has significantly increased at GHESKIO
- Mortality has significantly decreased over time, particularly during the first 4 months after ART initiation, which we attribute to a sharp decline in the proportion of patients initiating treatment with advanced AIDS
- Predictors of late presentation have shifted over time, from male gender to older age and higher education status

## References

- Rapid Advice—Antiretroviral therapy for HIV infection in adults and adolescents, November 2009. Geneva, Switzerland, World Health Organization 2009.
- Antiretroviral therapy for HIV infection in adults and adolescents: Recommendations for a public health approach; 2006 revision. Geneva, Switzerland: World Health Organization, 2006.
- Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection. Recommendations for a Public Health Approach. June 2013. Geneva, Switzerland: World Health Organization, 2013.
- Guidelines on When to Start Antiretroviral Therapy and on Pre-Exposure Prophylaxis for HIV. September 2015. Geneva, Switzerland: World Health Organization, 2015.
- Nacher, M, Huber, F, Adriouch, L, Djossou, F, Adenis, A, & Couppié, P. Temporal trend of the proportion of patients presenting with advanced HIV in French Guiana: stuck on the asymptote?. *BMC research notes* 2018, 11(1), 831.
- Siedner MJ, Ng CK, Bassett IV, Katz IT, Bangsberg DR, Tsai AC. Trends in CD4 count at presentation to care and treatment initiation in sub-Saharan Africa, 2002–2013: a meta-analysis. *Clinical infectious diseases*. 2014 Dec 16;60(7):1120-7.