

Table S2: Estimated hazard ratios from a multivariate multi-state model, aHR (95% CI)

	Sex	Age at ART start (years)			Year of ART start			CD4 cell count at ART start			Post-partum	TB
	Male	5-≤15	>25-≤40	>40	2007-2009	2010-2012	2013-2017	51-200	201-500	>500		
reference	female		>15-≤25			2004-2006			0-50			
Early Gap to												
AHD on ART	1.06 (0.95-1.19)	0.82 (0.45-1.52)	0.87 (0.75-1.01)	0.68 (0.56-0.83)	1.15 (0.93-1.41)	1.87 (1.54-2.26)	2.04 (1.66-2.5)	1.29 (1.09-1.51)	0.67 (0.56-0.81)	0.12 (0.06-0.24)	0.2 (0.12-0.32)	0.88 (0.78-1)
Stable	0.7 (0.6-0.81)	1.05 (0.68-1.61)	0.84 (0.73-0.97)	0.65 (0.53-0.81)	0.83 (0.62-1.1)	1.21 (0.93-1.58)	1.76 (1.36-2.29)	1.59 (1.14-2.21)	3.6 (2.61-4.97)	4.94 (3.46-7.05)	0.15 (0.1-0.24)	0.56 (0.47-0.67)
Death	1.27 (0.87-1.85)	1.69 (0.22-12.95)	1.9 (0.9-4)	3.05 (1.39-6.71)	0.86 (0.49-1.49)	0.92 (0.53-1.59)	1.11 (0.62-2.01)	0.54 (0.35-0.85)	0.53 (0.32-0.9)	0.01 (0-8.23)	0.16 (0.02-1.67)	1.09 (0.74-1.62)
AHD on ART to												
Stable	0.75 (0.72-0.79)	0.82 (0.65-1.04)	1.12 (1.04-1.2)	1.28 (1.18-1.39)	0.92 (0.87-0.97)	0.74 (0.7-0.79)	0.56 (0.52-0.6)	1.17 (1.12-1.23)	1.44 (1.34-1.55)	2 (1.54-2.61)	1.12 (0.99-1.27)	0.92 (0.88-0.96)
Late Gap	1.15 (1.04-1.27)	0.8 (0.49-1.3)	0.78 (0.67-0.9)	0.66 (0.55-0.78)	1.2 (1.06-1.37)	1.22 (1.08-1.39)	0.65 (0.54-0.78)	1.46 (1.3-1.64)	2.03 (1.72-2.39)	1.53 (0.71-3.27)	0.9 (0.66-1.22)	1.11 (1-1.22)
Death	1 (0.9-1.12)	0.37 (0.16-0.86)	0.82 (0.69-0.97)	0.95 (0.78-1.16)	1.08 (0.92-1.26)	1.32 (1.13-1.54)	1.67 (1.42-1.96)	0.81 (0.73-0.91)	0.98 (0.82-1.18)	0.84 (0.37-1.89)	0.75 (0.5-1.12)	1.46 (1.31-1.63)
Stable to												
AHD on ART	1.33 (1.25-1.41)	0.73 (0.56-0.95)	0.71 (0.65-0.77)	0.74 (0.66-0.82)	0.97 (0.9-1.04)	0.84 (0.78-0.91)	0.71 (0.63-0.79)	0.86 (0.8-0.93)	0.39 (0.35-0.43)	0.22 (0.15-0.32)	1.19 (1.02-1.38)	1.28 (1.21-1.36)
Late Gap	1.21 (1.14-1.29)	0.83 (0.68-1.02)	0.71 (0.65-0.77)	0.64 (0.58-0.71)	1.19 (1.1-1.29)	1.35 (1.25-1.46)	1.26 (1.14-1.39)	1.2 (1.09-1.31)	1.33 (1.2-1.47)	1.49 (1.24-1.77)	1.09 (0.96-1.23)	1.11 (1.05-1.18)
Death	1.46 (1.29-1.67)	0.24 (0.08-0.75)	1.11 (0.84-1.45)	2.82 (2.14-3.71)	0.85 (0.71-1.01)	0.91 (0.76-1.09)	1.23 (1.01-1.51)	1.05 (0.87-1.28)	1.12 (0.9-1.39)	1.51 (1.02-2.25)	0.53 (0.32-0.88)	1.4 (1.23-1.6)
Late Gap to												
AHD on ART	1.03 (0.92-1.16)	0.83 (0.52-1.31)	0.79 (0.69-0.92)	0.48 (0.39-0.58)	1.48 (1.3-1.69)	1.76 (1.53-2.03)	1.75 (1.4-2.17)	1 (0.87-1.15)	0.56 (0.47-0.67)	0.41 (0.23-0.71)	1 (1-1)	1.15 (1.03-1.28)
Stable	0.75 (0.63-0.89)	1.81 (1.22-2.69)	0.87 (0.72-1.05)	0.76 (0.58-0.98)	1.41 (1.13-1.76)	2.02 (1.62-2.53)	2.34 (1.78-3.08)	2.32 (1.62-3.32)	4.18 (2.89-6.04)	5.37 (3.34-8.64)	1 (1-1)	0.92 (0.78-1.08)
Death	1.26 (0.97-1.65)	1.22 (0.35-4.2)	1.36 (0.84-2.21)	1.87 (1.11-3.15)	1.41 (1-1.98)	1.96 (1.38-2.78)	1.54 (0.87-2.71)	0.84 (0.6-1.17)	0.59 (0.38-0.9)	0.69 (0.24-1.97)	1 (1-1)	1.23 (0.94-1.61)

Bold indicates that the confidence interval excludes the null

TB: Tuberculosis
 AHD: Advanced HIV disease
 Early Gap: gap in care (no recorded visit for ≥18 months) starting ≤18 months of ART start
 Late Gap: gap in care (no recorded visit for ≥18 months) starting >18 months since ART start
 Stable: CD4 ≥200 cells/mm³ or if no CD4 count available in 12 month period, having viral load (VL) (VL <1000 copies/ml)
 Post-partum period defined as between 9 months and 2 years after the first antenatal date

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Table S3 Estimated hazard ratios from multivariate multi-state models stratified by CD4 cell count at ART start, aHR (95% CI)

Year of ART start	From Early Gap to			From AHD on ART to			
	AHD on ART	Stable	Death	Stable	Late Gap	Death	
2007-2009	0.66 (0.36-1.2)	1.17 (0.53-2.58)	1.83 (0.24-14.06)	1.03 (0.81-1.31)	0.64 (0.42-0.97)	1.05 (0.51-2.14)	
201-500	2010-2012	0.9 (0.52-1.55)	2.35 (1.12-4.95)	1.12 (0.15-8.39)	0.78 (0.62-0.99)	0.76 (0.52-1.13)	1.27 (0.64-2.49)
	2013-2017	0.78 (0.45-1.36)	3.72 (1.77-7.82)	1.61 (0.22-12.03)	0.64 (0.5-0.82)	0.29 (0.17-0.49)	1.62 (0.82-3.22)
51-200	2007-2009	1.07 (0.84-1.38)	0.93 (0.65-1.34)	0.73 (0.34-1.58)	0.93 (0.87-1.00)	1.21 (1.03-1.41)	1.06 (0.86-1.31)
	2010-2012	1.79 (1.42-2.26)	1.2 (0.84-1.71)	0.8 (0.37-1.72)	0.75 (0.7-0.81)	1.27 (1.08-1.5)	1.23 (1.00-1.52)
	2013-2017	2.26 (1.76-2.9)	1.41 (0.95-2.09)	0.94 (0.39-2.29)	0.54 (0.49-0.59)	0.71 (0.56-0.9)	1.66 (1.33-2.07)
0-50	2007-2009	1.47 (0.91-2.39)	1.11 (0.57-2.17)	0.61 (0.22-1.69)	0.88 (0.8-0.97)	1.37 (1.07-1.75)	1.1 (0.85-1.42)
	2010-2012	2.34 (1.47-3.7)	0.9 (0.41-1.96)	1.27 (0.53-3.07)	0.73 (0.65-0.81)	1.2 (0.92-1.57)	1.47 (1.15-1.88)
	2013-2017	3.14 (1.95-5.05)	0.68 (0.28-1.69)	1.38 (0.5-3.82)	0.53 (0.46-0.61)	0.77 (0.54-1.11)	1.7 (1.3-2.21)
Female vs Male							
201-500		1 (0.79-1.28)	0.85 (0.7-1.03)	1.05 (0.51-2.15)	0.88 (0.76-1.02)	1.17 (0.88-1.54)	1.19 (0.86-1.65)
51-200		1.06 (0.91-1.22)	0.42 (0.3-0.57)	1.43 (0.81-2.54)	0.78 (0.74-0.83)	1.13 (0.99-1.28)	1.06 (0.9-1.23)
0-50		1.46 (1.07-2)	0.61 (0.31-1.17)	1.26 (0.6-2.61)	0.66 (0.61-0.72)	1.19 (0.97-1.46)	0.9 (0.75-1.09)
Age at ART start (years) vs >15-≤25							
201-500	5-≤15	0.38 (0.09-1.7)	1.64 (0.91-2.97)	0.55 (0-21000.29)	0.87 (0.49-1.53)	2.65 (1.21-5.82)	0.57 (0.08-4.33)
	>25-≤40	0.91 (0.7-1.19)	0.85 (0.71-1.02)	6.8 (0.76-61.21)	0.98 (0.84-1.16)	1.22 (0.84-1.77)	0.88 (0.56-1.38)
	>40	0.75 (0.52-1.09)	0.63 (0.47-0.83)	17.01 (1.82-158.5)	1.06 (0.87-1.3)	0.87 (0.54-1.43)	1.62 (0.98-2.66)
51-200	5-≤15	0.55 (0.21-1.43)	1.08 (0.4-2.95)	3.34 (0.41-26.99)	0.99 (0.72-1.35)	0.45 (0.2-1.02)	0.47 (0.17-1.31)
	>25-≤40	0.79 (0.64-0.97)	0.61 (0.45-0.82)	1.56 (0.53-4.59)	1.1 (1.01-1.21)	0.71 (0.59-0.85)	0.77 (0.6-0.97)
	>40	0.62 (0.48-0.8)	0.53 (0.36-0.8)	1.59 (0.5-5.1)	1.31 (1.18-1.45)	0.61 (0.49-0.75)	0.86 (0.65-1.12)
0-50	5-≤15	2.77 (0.59-13.04)	2.71 (0.13-56.43)	0.25 (0-5246.86)	0.61 (0.33-1.13)	0.65 (0.19-2.23)	0.21 (0.03-1.57)
	>25-≤40	1.1 (0.65-1.86)	0.92 (0.43-1.99)	0.94 (0.27-3.33)	1.32 (1.14-1.54)	0.71 (0.52-0.97)	0.81 (0.6-1.09)
	>40	0.82 (0.44-1.55)	1.15 (0.45-2.91)	1.93 (0.5-7.4)	1.42 (1.2-1.67)	0.63 (0.44-0.91)	0.86 (0.61-1.2)
Post-partum during follow-up							
201-500		0.19 (0.09-0.43)	0.15 (0.08-0.29)	0.54 (0.07-4.15)	1.19 (0.87-1.63)	1.37 (0.72-2.62)	0.9 (0.33-2.49)
51-200		0.15 (0.07-0.32)	0.11 (0.03-0.36)	0.04 (0-18.51)	1.2 (1.04-1.39)	0.79 (0.54-1.16)	0.54 (0.29-0.97)
0-50		1.38 (0.44-4.37)	0.08 (0-1072.72)	0.13 (0-1610.38)	0.84 (0.59-1.19)	1.04 (0.43-2.52)	1.42 (0.73-2.78)
Tuberculosis during follow-up							
201-500		0.93 (0.71-1.22)	0.63 (0.49-0.8)	1.25 (0.57-2.72)	0.82 (0.72-0.95)	1.3 (1-1.69)	1.82 (1.33-2.48)
51-200		0.86 (0.74-1)	0.5 (0.37-0.68)	0.83 (0.46-1.49)	0.92 (0.87-0.97)	1.08 (0.95-1.21)	1.42 (1.22-1.64)
0-50		0.98 (0.72-1.34)	0.21 (0.1-0.42)	1.51 (0.71-3.2)	0.98 (0.91-1.07)	1.11 (0.9-1.37)	1.4 (1.15-1.69)

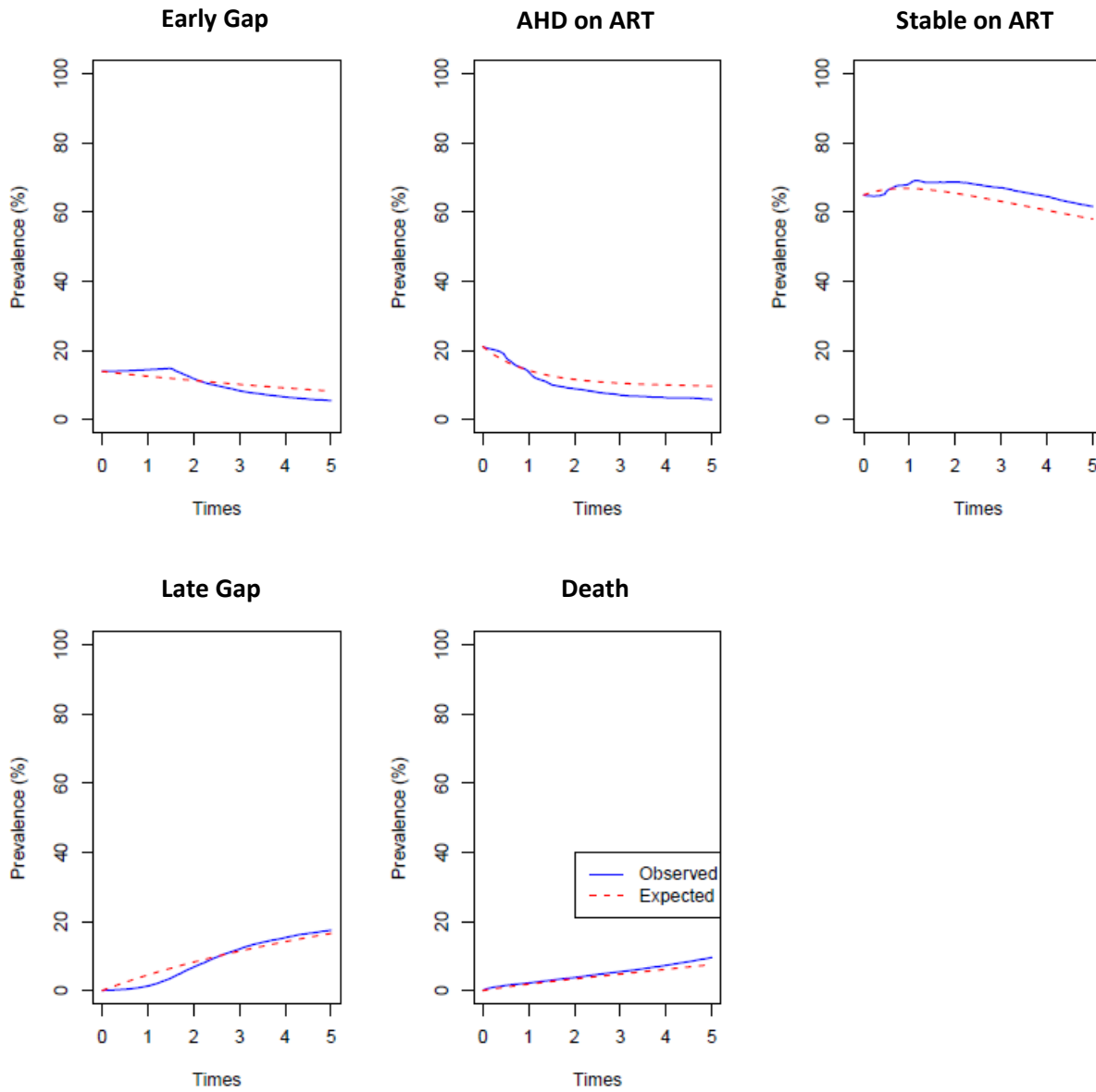
AHD: Advanced HIV disease, Gap: no recorded visit for ≥18 months, Early Gap: gap in care starting ≤18 months of ART start
 Late Gap: gap in care starting >18 months since ART start, Stable: CD4 ≥200 cells/μL or if no CD4 count available in 12 month period,
 having viral load <1000 copies/ml, Post-partum period defined as between 9 months and 2 years after the first antenatal date

Table S3 (Cont) Estimated hazard ratios from multivariate multi-state models stratified by CD4 cell count at ART start, aHR (95% CI)

Year of ART start	From Stable to			From Late Gap to			
	AHD on ART	Late Gap	Death	AHD on ART	Stable	Death	
2007-2009	0.99 (0.76-1.3)	1.19 (0.96-1.47)	0.98 (0.58-1.66)	1.34 (0.83-2.14)	1.35 (0.83-2.21)	0.64 (0.23-1.74)	
201-500	2010-2012	0.61 (0.47-0.8)	1.39 (1.13-1.71)	1.06 (0.64-1.75)	1.5 (0.95-2.35)	2.18 (1.37-3.46)	1.03 (0.42-2.54)
	2013-2017	0.46 (0.34-0.62)	1.33 (1.07-1.65)	1.52 (0.91-2.52)	1.17 (0.68-2.02)	2.8 (1.71-4.6)	0.93 (0.3-2.81)
51-200	2007-2009	0.93 (0.85-1.01)	1.23 (1.12-1.35)	0.87 (0.7-1.07)	1.42 (1.22-1.67)	1.45 (1.1-1.92)	1.53 (1.00-2.34)
	2010-2012	0.87 (0.79-0.96)	1.36 (1.23-1.51)	0.88 (0.7-1.11)	1.66 (1.4-1.97)	1.98 (1.48-2.65)	2.04 (1.31-3.18)
	2013-2017	0.84 (0.72-0.96)	1.29 (1.1-1.5)	1.21 (0.9-1.62)	2.14 (1.63-2.81)	1.55 (0.9-2.68)	1.64 (0.73-3.71)
0-50	2007-2009	0.98 (0.84-1.13)	1.07 (0.88-1.3)	0.71 (0.45-1.11)	1.54 (1.15-2.06)	2.21 (1.03-4.72)	1.58 (0.78-3.2)
	2010-2012	0.93 (0.78-1.11)	1.21 (0.96-1.52)	0.98 (0.62-1.56)	2.22 (1.62-3.05)	1.38 (0.49-3.89)	2.52 (1.21-5.26)
	2013-2017	0.84 (0.65-1.1)	0.9 (0.6-1.35)	1.56 (0.9-2.71)	2.35 (1.36-4.07)	0.06 (0-945.81)	1.8 (0.41-7.96)
Female vs Male							
201-500		1.46 (1.23-1.72)	1.23 (1.1-1.37)	1.34 (1.06-1.69)	0.96 (0.72-1.27)	0.8 (0.62-1.03)	1.62 (0.91-2.89)
51-200		1.32 (1.22-1.42)	1.22 (1.12-1.33)	1.55 (1.29-1.85)	0.99 (0.86-1.14)	0.7 (0.54-0.9)	1.36 (0.96-1.94)
0-50		1.34 (1.17-1.52)	1.09 (0.91-1.31)	1.22 (0.85-1.75)	1.24 (0.96-1.59)	0.56 (0.24-1.31)	0.78 (0.42-1.43)
Age at ART start (years) vs >15-≤25							
201-500	5-≤15	0.5 (0.28-0.87)	1.03 (0.77-1.38)	0.33 (0.04-2.53)	0.94 (0.44-1.99)	2.1 (1.25-3.55)	4.12 (0.28-59.78)
	>25-≤40	0.57 (0.46-0.7)	0.7 (0.62-0.8)	1.49 (0.91-2.47)	0.91 (0.66-1.26)	0.99 (0.75-1.3)	5.61 (0.89-35.37)
	>40	0.49 (0.38-0.64)	0.53 (0.45-0.63)	4.04 (2.43-6.71)	0.66 (0.41-1.06)	0.82 (0.55-1.21)	8.41 (1.26-56.17)
51-200	5-≤15	1.13 (0.81-1.57)	1.05 (0.72-1.52)	0.65 (0.15-2.8)	0.53 (0.22-1.28)	3.82 (1.98-7.36)	0.62 (0.07-5.34)
	>25-≤40	0.73 (0.65-0.82)	0.73 (0.65-0.82)	1.12 (0.75-1.67)	0.78 (0.65-0.93)	0.8 (0.58-1.09)	0.74 (0.43-1.26)
	>40	0.76 (0.66-0.86)	0.71 (0.62-0.82)	2.78 (1.85-4.19)	0.39 (0.31-0.5)	0.76 (0.52-1.11)	1.04 (0.58-1.88)
0-50	5-≤15	0.24 (0.1-0.55)	0.68 (0.31-1.51)	0.02 (0-698.38)	1.16 (0.36-3.79)	0.55 (0-3221.67)	10.38 (0.68-157.74)
	>25-≤40	0.73 (0.59-0.9)	0.79 (0.59-1.06)	0.73 (0.38-1.42)	0.7 (0.49-1.01)	0.82 (0.33-2.03)	4.7 (0.73-30.29)
	>40	0.84 (0.66-1.07)	0.81 (0.58-1.14)	1.58 (0.8-3.15)	0.66 (0.43-1.01)	0.4 (0.09-1.71)	5.56 (0.81-38.13)
Post-partum during follow-up							
201-500		0.88 (0.59-1.31)	1.15 (0.96-1.38)	0.79 (0.4-1.55)	1 (1-1)	1 (1-1)	1 (1-1)
51-200		1.38 (1.16-1.65)	1.07 (0.88-1.29)	0.43 (0.18-1.03)	1 (1-1)	1 (1-1)	1 (1-1)
0-50		1.03 (0.66-1.6)	1.09 (0.63-1.89)	0.69 (0.12-3.91)	1 (1-1)	1 (1-1)	1 (1-1)
Tuberculosis during follow-up							
201-500		1.91 (1.62-2.24)	1.26 (1.13-1.41)	1.83 (1.43-2.33)	1.36 (1.05-1.77)	1.01 (0.79-1.29)	1.82 (1.02-3.26)
51-200		1.33 (1.23-1.43)	1.06 (0.98-1.14)	1.33 (1.12-1.58)	1.1 (0.96-1.25)	0.89 (0.7-1.12)	1.21 (0.86-1.7)
0-50		0.86 (0.76-0.98)	0.96 (0.81-1.15)	0.88 (0.62-1.26)	1.16 (0.89-1.52)	0.62 (0.3-1.3)	0.9 (0.49-1.65)

AHD: Advanced HIV disease, Gap: no recorded visit for ≥18 months, Early Gap: gap in care starting ≤18 months of ART start
 Late Gap: gap in care starting >18 months since ART start, Stable: CD4 ≥200 cells/μL or if no CD4 count available in 12 month period,
 having viral load <1000 copies/ml, Post-partum period defined as between 9 months and 2 years after the first antenatal date

Figure S2: Comparison of observed and modelled prevalence of states



AHD: Advanced HIV disease, Gap: no recorded visit for ≥ 18 months, Early Gap: gap in care starting ≤ 18 months of ART start, Late Gap: gap in care starting > 18 months since ART start, Stable on ART: $CD4 \geq 200$ cells/ μL or if no $CD4$ count available in 12 month period, having viral load < 1000 copies/ml

Table S1 Characteristics of patients excluded and included in the study, and patients linked and not linked to the national population registry

Characteristic	Excluded			Linkage with NPR (n=32452)		
	Total	No CD4 cell count at ART start	No subsequent CD4 cell count after ART start	Included	Linked	Not linked
	N=44819 (100%)	n=4079 (9%)	n=8288 (19%)	n=32452 (72%)	20323 (63%)	12129 (37%)
Females	31726 (71%)	2961 (73%)	6190 (75%)	22575 (70%)	14671 (72%)	7904 (65%)
Age at ART start (years)						
Median (IQR)	32,6 (27,6-39,0)	31,8 (26,8-38,3)	31,8 (26,9-38,8)	32,9 (27,9-39,2)	32,4 (27,6-38,6)	33,7 (28,4-40,3)
5-≤15	564 (1%)	105 (3%)	55 (1%)	404 (1%)	107 (1%)	297 (2%)
>15-≤25	5450 (12%)	559 (14%)	1273 (15%)	3618 (11%)	2445 (12%)	1173 (10%)
>25-≤40	28771 (64%)	2591 (64%)	5132 (62%)	21048 (65%)	13529 (67%)	7519 (62%)
>40	10034 (22%)	824 (20%)	1828 (22%)	7382 (23%)	4242 (21%)	3140 (26%)
CD4 cell count at ART start						
Median (IQR)	191 (104-303)	-	296 (178-433)	175 (94-267)	184 (101-282)	162 (83-240)
0-50	4695 (11%)	0	503 (6%)	4192 (13%)	2381 (12%)	1811 (15%)
51-200	16674 (37%)	0	1881 (23%)	14793 (46%)	8860 (44%)	5933 (49%)
201-500	16678 (37%)	0	4643 (56%)	12035 (37%)	8102 (40%)	3933 (32%)
>500	2693 (6%)	0	1261 (15%)	1432 (4%)	980 (5%)	452 (4%)
Missing	4079 (9%)	4079 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Year of ART start						
2004 - 2006	5385 (12%)	683 (17%)	189 (2%)	4513 (14%)	2064 (10%)	2449 (20%)
2007 - 2009	8275 (19%)	903 (22%)	416 (5%)	6956 (21%)	3745 (18%)	3211 (26%)
2010 - 2012	11838 (26%)	922 (23%)	967 (12%)	9949 (31%)	6413 (32%)	3536 (29%)
2013 +	19321 (43%)	1571 (39%)	6716 (81%)	11034 (34%)	8101 (40%)	2933 (24%)
Follow-up time in years*						
	4,3 (2,0-7,5)	4,9 (2,5-8,8)	1,3 (0,3-2,5)	5,3 (3,0-8,2)	5,1 (3,0-7,8)	5,8 (3,0-8,9)
Deaths	2859 (6%)	0	0	2859 (9%)	2428 (12%)	431 (4%)
Post-partum during follow-up						
	7965 (18%)	635 (16%)	1339 (16%)	5804 (18%)	4072 (20%)	1732 (14%)
Tuberculosis at ART start or after						
	12990 (29%)	963 (24%)	1366 (16%)	10657 (33%)	6036 (30%)	4621 (38%)

ART: Antiretroviral treatment

NPR: National population registry

IQR: Inter-quartile range

*Follow-up time from ART start to last visit, transfer or death date

Figure S1: Five year probability of re-engagement in care following late gap and proportion re-engaging with advanced HIV disease (AHD), by year of ART start, CD4 cell count at ART start, Age at ART start, and sex

AHD: Advanced HIV disease

Age at ART Start:

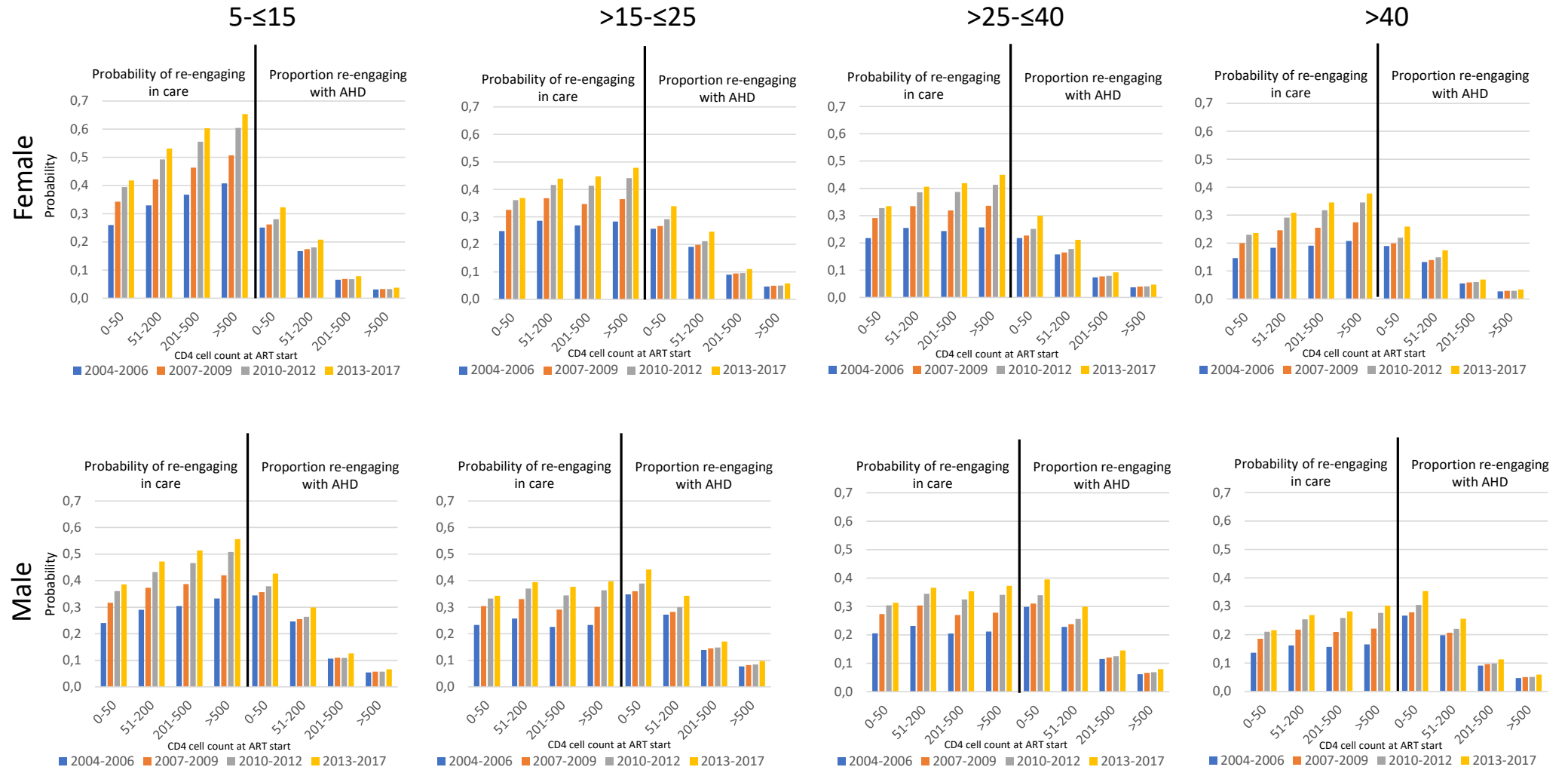


Table S4 Estimated hazard ratios from multivariate multi-state model using data restricted to each patient's first 5 years on ART, aHR (95% CI)

	Sex	Age at ART start (years)			Year of ART start			CD4 cell count at ART start			Post-partum	Tuberculosis
	Male	5-≤15	>25-≤40	>40	2007-2009	2010-2012	2013+	51-200	201-500	>500		
<i>reference</i>	<i>female</i>	>15-≤25			2004-2006			0-50				
Early Gap to												
AHD on ART	1.1 (0.97-1.24)	0.59 (0.28-1.22)	0.91 (0.77-1.07)	0.74 (0.6-0.92)	1.07 (0.85-1.35)	1.46 (1.18-1.81)	1.56 (1.24-1.95)	1.21 (1.02-1.44)	0.61 (0.5-0.75)	0.11 (0.05-0.23)	0.26 (0.16-0.44)	1.02 (0.9-1.16)
Stable	0.71 (0.61-0.83)	0.95 (0.59-1.52)	0.87 (0.75-1.01)	0.71 (0.57-0.89)	0.83 (0.59-1.17)	1.12 (0.82-1.54)	1.57 (1.15-2.14)	1.46 (1.02-2.07)	3.5 (2.48-4.94)	4.73 (3.25-6.88)	0.19 (0.12-0.3)	0.65 (0.54-0.78)
Death	1.58 (0.97-2.56)	0.02 (0-956215.8)	1.24 (0.55-2.79)	1.94 (0.81-4.64)	0.65 (0.31-1.37)	0.76 (0.38-1.51)	0.92 (0.45-1.88)	0.46 (0.27-0.8)	0.4 (0.21-0.76)	0 (0-19375990000)	0.47 (0.07-3.34)	1.38 (0.85-2.23)
AHD on ART to												
Stable	0.75 (0.71-0.79)	1.32 (0.99-1.76)	1.11 (1.03-1.21)	1.18 (1.07-1.29)	0.87 (0.82-0.93)	0.65 (0.61-0.69)	0.44 (0.41-0.47)	1.28 (1.22-1.35)	1.76 (1.62-1.91)	2.91 (2.11-4)	1 (0.88-1.14)	0.98 (0.93-1.03)
Late Gap	1.17 (1.03-1.32)	0.36 (0.12-1.1)	0.69 (0.58-0.82)	0.53 (0.43-0.65)	1.3 (1.09-1.55)	1.63 (1.37-1.94)	0.76 (0.61-0.94)	1.62 (1.41-1.86)	2.53 (2.07-3.09)	1.24 (0.32-4.79)	1.08 (0.79-1.48)	1.22 (1.08-1.38)
Death	1.05 (0.92-1.2)	0.16 (0.02-1.17)	0.87 (0.7-1.08)	1.02 (0.8-1.29)	0.98 (0.81-1.2)	1.16 (0.96-1.41)	1.46 (1.21-1.77)	0.75 (0.65-0.85)	1.07 (0.87-1.32)	0.88 (0.32-2.38)	0.69 (0.43-1.12)	1.59 (1.4-1.82)
Stable to												
AHD on ART	1.31 (1.22-1.41)	0.63 (0.44-0.91)	0.76 (0.68-0.85)	0.79 (0.7-0.89)	0.88 (0.81-0.96)	0.61 (0.56-0.67)	0.45 (0.4-0.5)	0.81 (0.74-0.88)	0.33 (0.29-0.37)	0.2 (0.13-0.32)	0.94 (0.8-1.11)	1.25 (1.16-1.34)
Late Gap	1.2 (1.11-1.29)	0.68 (0.52-0.9)	0.69 (0.63-0.76)	0.57 (0.51-0.64)	1.27 (1.14-1.42)	1.57 (1.41-1.75)	1.23 (1.09-1.39)	1.17 (1.04-1.33)	1.29 (1.14-1.47)	1.47 (1.21-1.8)	1.08 (0.95-1.23)	1.17 (1.08-1.26)
Death	1.37 (1.16-1.61)	0.15 (0.02-1.1)	1.36 (0.95-1.95)	3.31 (2.3-4.78)	0.7 (0.55-0.88)	0.68 (0.54-0.85)	0.79 (0.62-1.01)	0.96 (0.75-1.24)	1.05 (0.79-1.38)	1.36 (0.85-2.17)	0.46 (0.26-0.83)	1.41 (1.19-1.66)
Late Gap to												
AHD on ART	0.97 (0.78-1.19)	1.3 (0.54-3.11)	0.93 (0.71-1.22)	0.58 (0.41-0.84)	1.18 (0.88-1.59)	1.13 (0.85-1.52)	1.42 (1.02-1.96)	1.05 (0.81-1.37)	0.44 (0.31-0.61)	0.07 (0.01-0.51)	1 (1-1)	1.15 (0.95-1.41)
Stable	0.62 (0.45-0.87)	1.2 (0.41-3.49)	1.12 (0.8-1.58)	1.19 (0.75-1.87)	1.26 (0.68-2.36)	1.32 (0.73-2.39)	2.08 (1.14-3.78)	4.84 (1.43-16.4)	12.08 (3.58-40.73)	14.74 (4.1-52.98)	1 (1-1)	0.84 (0.61-1.16)
Death	0.76 (0.36-1.59)	0.15 (0-43352.54)	2.04 (0.61-6.78)	1.17 (0.27-5.06)	1.78 (0.48-6.66)	2.58 (0.74-9.05)	2.53 (0.64-9.98)	0.59 (0.26-1.34)	0.21 (0.07-0.61)	0.32 (0.04-2.84)	1 (1-1)	0.89 (0.43-1.81)

Bold results are those that are statistically significant, Highlighted in red: Confidence interval crosses 1, but in full dataset result was significant,

Highlighted in blue: confidence intervals do not cross 1, but in full dataset confidence interval crossed 1

AHD: Advanced HIV disease, Gap: no recorded visit for ≥18 months, Early Gap: gap in care starting ≤18 months of ART start

Late Gap: gap in care starting >18 months since ART start, Stable: CD4 ≥200 cells/μL or if no CD4 count available in 12 month period, having viral load <1000 copies/ml, Post-partum period defined as between 9 months and 2 years after the first antenatal date

Table S5: Estimated hazard ratios from a multivariate multi-state model assuming time in censored state as Stable, aHR (95% CI)

	Sex	Age at ART start (years)			Year of ART start			CD4 cell count at ART start			Post-partum	TB
	Male	5-≤15	>25-≤40	>40	2007-2009	2010-2012	2013-2017	51-200	201-500	>500		
reference	female	>15-≤25			2004-2006			0-50				
Early Gap to												
AHD on ART	1.07 (0.93-1.22)	0.8 (0.40-1.62)	0.93 (0.78-1.11)	0.66 (0.53-0.83)	1.18 (0.92-1.51)	1.98 (1.57-2.49)	2.45 (1.93-3.12)	1.38 (1.14-1.68)	0.74 (0.59-0.92)	0.12 (0.06-0.26)	0.22 (0.13-0.38)	0.91 (0.79-1.04)
Stable	0.79 (0.7-0.89)	0.98 (0.68-1.41)	0.81 (0.72-0.91)	0.68 (0.57-0.80)	0.92 (0.75-1.12)	1.35 (1.12-1.63)	1.73 (1.42-2.10)	1.32 (1.09-1.61)	2.02 (1.66-2.47)	2.61 (2.04-3.33)	0.15 (0.10-0.23)	0.65 (0.57-0.74)
Death	1.27 (0.87-1.85)	1.62 (0.21-12.49)	1.85 (0.88-3.86)	2.97 (1.36-6.47)	0.85 (0.49-1.48)	0.91 (0.53-1.58)	1.11 (0.61-2.00)	0.55 (0.35-0.86)	0.54 (0.32-0.91)	0.01 (0.00-5.06)	0.16 (0.02-1.66)	1.09 (0.74-1.61)
AHD on ART to												
Stable	0.81 (0.78-0.85)	0.87 (0.71-1.08)	1.10 (1.03-1.17)	1.18 (1.09-1.27)	0.94 (0.89-0.99)	0.80 (0.76-0.85)	0.65 (0.61-0.69)	1.15 (1.10-1.20)	1.28 (1.19-1.37)	1.35 (1.01-1.80)	1.14 (1.02-1.28)	0.95 (0.92-0.99)
Late Gap	1.18 (1.06-1.31)	0.80 (0.49-1.32)	0.73 (0.63-0.85)	0.58 (0.49-0.70)	1.22 (1.07-1.39)	1.28 (1.12-1.46)	0.79 (0.65-0.95)	1.49 (1.32-1.68)	2.08 (1.76-2.47)	1.55 (0.69-3.45)	0.97 (0.71-1.32)	1.11 (1.01-1.23)
Death	1.01 (0.90-1.14)	0.34 (0.14-0.85)	0.80 (0.67-0.95)	0.92 (0.76-1.13)	1.11 (0.95-1.31)	1.39 (1.19-1.63)	1.88 (1.59-2.22)	0.83 (0.74-0.94)	1.08 (0.9-1.29)	1.16 (0.52-2.62)	0.68 (0.44-1.05)	1.49 (1.33-1.67)
Stable to												
AHD on ART	1.47 (1.39-1.55)	0.67 (0.54-0.84)	0.69 (0.64-0.74)	0.63 (0.58-0.69)	1.01 (0.95-1.08)	0.97 (0.91-1.04)	1.00 (0.92-1.09)	0.80 (0.75-0.85)	0.30 (0.27-0.32)	0.13 (0.09-0.18)	1.09 (0.95-1.25)	1.33 (1.27-1.40)
Late Gap	1.23 (1.16-1.30)	0.82 (0.67-1.00)	0.71 (0.66-0.77)	0.65 (0.59-0.71)	1.2 (1.12-1.29)	1.36 (1.26-1.47)	1.24 (1.12-1.37)	1.17 (1.07-1.27)	1.26 (1.15-1.39)	1.42 (1.19-1.69)	1.07 (0.94-1.21)	1.12 (1.06-1.19)
Death	1.45 (1.28-1.64)	0.28 (0.10-0.75)	1.06 (0.83-1.36)	2.55 (1.98-3.28)	0.86 (0.73-1.01)	0.95 (0.80-1.12)	1.25 (1.03-1.51)	0.93 (0.79-1.11)	0.93 (0.76-1.14)	1.21 (0.82-1.78)	0.61 (0.39-0.95)	1.40 (1.24-1.59)
Late Gap to												
AHD on ART	1.08 (0.94-1.23)	0.92 (0.56-1.51)	0.75 (0.64-0.88)	0.39 (0.31-0.49)	1.46 (1.25-1.71)	1.91 (1.62-2.26)	2.01 (1.56-2.57)	1.01 (0.85-1.19)	0.57 (0.47-0.71)	0.32 (0.17-0.61)	1 (1-1)	1.09 (0.96-1.24)
Stable	0.82 (0.73-0.93)	1.41 (1.00-2.00)	0.88 (0.76-1.02)	0.73 (0.60-0.88)	1.45 (1.25-1.69)	1.80 (1.54-2.10)	1.98 (1.61-2.44)	1.39 (1.16-1.68)	1.77 (1.44-2.16)	2.31 (1.66-3.21)	1 (1-1)	1.05 (0.94-1.18)
Death	1.26 (0.97-1.65)	1.24 (0.36-4.23)	1.36 (0.84-2.20)	1.87 (1.10-3.15)	1.41 (1.00-1.98)	1.95 (1.37-2.77)	1.53 (0.87-2.70)	0.84 (0.60-1.18)	0.59 (0.39-0.91)	0.69 (0.24-1.98)	1 (1-1)	1.23 (0.94-1.61)

Bold results are those that are statistically significant, Highlighted in red: Confidence interval crosses 1, but in full dataset result was significant, Highlighted in blue: confidence intervals do not cross 1, but in full dataset confidence interval crossed 1

TB: Tuberculosis, AHD: Advanced HIV disease

Early Gap: gap in care (no recorded visit for ≥18 months) starting ≤18 months of ART start

Late Gap: gap in care (no recorded visit for ≥18 months) starting >18 months since ART start

Stable: CD4 ≥200 cells/mm³ or if no CD4 count available in 12 month period, having viral load (VL) (VL <1000 copies/ml))

Post-partum period defined as between 9 months and 2 years after the first antenatal date

Table S6: Estimated hazard ratios from a multivariate multi-state model assuming time in censored state as AHD on ART, aHR (95% CI)

	Sex	Age at ART start (years)			Year of ART start			CD4 cell count at ART start			Post-partum	TB
	Male	5-≤15	>25-≤40	>40	2007-2009	2010-2012	2013-2017	51-200	201-500	>500		
reference	female	>15-≤25			2004-2006			0-50				
Early Gap to												
AHD on ART	1.02 (0.92-1.12)	1.10 (0.74-1.63)	0.84 (0.74-0.95)	0.68 (0.58-0.80)	1.13 (0.95-1.35)	1.77 (1.50-2.09)	1.84 (1.54-2.19)	1.25 (1.08-1.45)	0.86 (0.73-1.01)	0.48 (0.35-0.67)	0.20 (0.13-0.30)	0.79 (0.71-0.88)
Stable	0.66 (0.55-0.79)	0.75 (0.42-1.35)	0.88 (0.75-1.04)	0.63 (0.49-0.81)	0.74 (0.52-1.06)	1.21 (0.88-1.66)	2.11 (1.54-2.90)	2.01 (1.34-3.03)	4.82 (3.23-7.21)	6.69 (4.32-10.35)	0.14 (0.08-0.25)	0.65 (0.54-0.79)
Death	1.28 (0.87-1.87)	1.53 (0.20-11.89)	1.76 (0.85-3.64)	2.81 (1.30-6.07)	0.86 (0.49-1.49)	0.92 (0.53-1.59)	1.11 (0.62-2.01)	0.54 (0.34-0.85)	0.53 (0.31-0.89)	0.02 (0.00-2.46)	0.16 (0.02-1.67)	1.09 (0.74-1.61)
AHD on ART to												
Stable	0.72 (0.70-0.74)	0.92 (0.83-1.02)	1.17 (1.13-1.22)	1.30 (1.24-1.36)	0.96 (0.93-0.99)	0.78 (0.76-0.81)	0.55 (0.52-0.57)	1.50 (1.45-1.55)	2.79 (2.69-2.90)	3.51 (3.24-3.80)	1.11 (1.04-1.18)	0.82 (0.80-0.84)
Late Gap	1.19 (1.09-1.30)	0.65 (0.42-0.99)	0.78 (0.69-0.89)	0.66 (0.57-0.77)	1.13 (1.01-1.27)	1.17 (1.04-1.31)	0.80 (0.68-0.94)	1.31 (1.18-1.46)	1.30 (1.13-1.49)	1.01 (0.63-1.61)	0.81 (0.62-1.07)	1.18 (1.08-1.28)
Death	1.13 (1.02-1.26)	0.31 (0.14-0.69)	0.76 (0.64-0.90)	0.91 (0.76-1.10)	1.00 (0.86-1.16)	1.24 (1.07-1.43)	1.74 (1.49-2.04)	0.73 (0.65-0.81)	0.52 (0.44-0.62)	0.35 (0.19-0.65)	0.72 (0.48-1.06)	1.53 (1.37-1.70)
Stable to												
AHD on ART	1.00 (0.97-1.03)	0.91 (0.82-1.02)	0.94 (0.90-0.98)	1.00 (0.96-1.05)	1.23 (1.18-1.28)	1.25 (1.20-1.30)	1.05 (1.00-1.09)	1.06 (1.02-1.10)	1.13 (1.08-1.18)	1.11 (1.02-1.22)	1.12 (1.04-1.19)	1.01 (0.98-1.03)
Late Gap	1.23 (1.16-1.31)	0.85 (0.69-1.04)	0.69 (0.63-0.75)	0.62 (0.56-0.68)	1.20 (1.11-1.30)	1.36 (1.25-1.47)	1.36 (1.23-1.51)	1.23 (1.12-1.35)	1.38 (1.25-1.54)	1.55 (1.29-1.86)	1.12 (0.99-1.27)	1.09 (1.03-1.16)
Death	1.47 (1.29-1.68)	0.23 (0.07-0.77)	1.12 (0.85-1.47)	2.78 (2.10-3.68)	0.88 (0.74-1.05)	0.92 (0.77-1.11)	1.28 (1.04-1.57)	1.07 (0.88-1.30)	1.14 (0.91-1.43)	1.49 (0.99-2.25)	0.52 (0.31-0.88)	1.41 (1.23-1.62)
Late Gap to												
AHD on ART	0.97 (0.88-1.07)	1.01 (0.70-1.45)	0.85 (0.74-0.97)	0.59 (0.50-0.70)	1.49 (1.32-1.68)	1.81 (1.59-2.05)	1.75 (1.44-2.12)	1.05 (0.92-1.20)	0.72 (0.62-0.85)	0.78 (0.55-1.12)	1 (1-1)	1.13 (1.03-1.24)
Stable	0.81 (0.66-0.98)	1.64 (1.05-2.57)	0.76 (0.62-0.94)	0.48 (0.35-0.65)	1.32 (1.03-1.70)	1.89 (1.47-2.43)	2.41 (1.78-3.28)	2.46 (1.64-3.69)	4.64 (3.07-7.02)	4.89 (2.82-8.49)	1 (1-1)	0.88 (0.73-1.05)
Death	1.25 (0.96-1.64)	1.33 (0.40-4.44)	1.38 (0.85-2.25)	1.89 (1.12-3.20)	1.42 (1.01-1.99)	1.96 (1.38-2.78)	1.54 (0.87-2.72)	0.83 (0.59-1.16)	0.58 (0.38-0.89)	0.67 (0.23-1.92)	1 (1-1)	1.23 (0.94-1.60)

Bold results are those that are statistically significant, Highlighted in red: Confidence interval crosses 1, but in full dataset result was significant,

Highlighted in blue: confidence intervals do not cross 1, but in full dataset confidence interval crossed 1

Highlighted in green: direction of association in full dataset was reversed

TB: Tuberculosis, AHD: Advanced HIV disease

Early Gap: gap in care (no recorded visit for ≥18 months) starting ≤18 months of ART start

Late Gap: gap in care (no recorded visit for ≥18 months) starting >18 months since ART start

Stable: CD4 ≥200 cells/mm³ or if no CD4 count available in 12 month period, having viral load (VL) (VL <1000 copies/ml))

Post-partum period defined as between 9 months and 2 years after the first antenatal date

Table S7: Estimated hazard ratios from a multivariate multi-state model restricted to data from patients linked to the national population registry (n=20323), aHR (95% CI)

	Sex	Age at ART start (years)			Year of ART start			CD4 cell count at ART start			Post-partum	TB
	Male	5-≤15	>25-≤40	>40	2007-2009	2010-2012	2013-2017	51-200	201-500	>500		
reference	female	>15-≤25			2004-2006			0-50				
Early Gap to												
AHD on ART	1.07 (0.93-1.24)	0.89 (0.42-1.88)	0.85 (0.71-1.01)	0.73 (0.58-0.92)	0.93 (0.70-1.23)	1.37 (1.05-1.77)	1.35 (1.03-1.76)	1.12 (0.91-1.37)	0.51 (0.41-0.65)	0.06 (0.02-0.18)	0.24 (0.14-0.41)	1.08 (0.93-1.25)
Stable	0.70 (0.58-0.84)	0.72 (0.33-1.57)	0.90 (0.76-1.05)	0.77 (0.60-0.99)	0.63 (0.43-0.92)	0.81 (0.57-1.14)	1.06 (0.75-1.50)	1.40 (0.95-2.07)	2.76 (1.88-4.07)	4.05 (2.65-6.19)	0.15 (0.10-0.25)	0.68 (0.55-0.84)
Death	1.33 (0.89-1.98)	2.08 (0.28-15.28)	1.81 (0.86-3.82)	3.32 (1.49-7.38)	0.61 (0.34-1.07)	0.49 (0.28-0.86)	0.51 (0.28-0.93)	0.54 (0.34-0.86)	0.51 (0.30-0.89)	0.00 (0.00-426.79)	0.24 (0.03-1.63)	1.49 (0.99-2.22)
AHD on ART to												
Stable	0.74 (0.70-0.78)	0.66 (0.45-0.98)	1.09 (1.00-1.18)	1.21 (1.10-1.34)	0.97 (0.89-1.04)	0.78 (0.72-0.84)	0.59 (0.54-0.64)	1.16 (1.09-1.24)	1.37 (1.25-1.51)	2.12 (1.54-2.93)	1.17 (1.01-1.36)	0.96 (0.91-1.02)
Late Gap	1.13 (0.97-1.31)	0.32 (0.08-1.26)	0.83 (0.68-1.01)	0.63 (0.49-0.82)	1.25 (1.02-1.54)	1.49 (1.22-1.81)	0.74 (0.58-0.96)	1.55 (1.31-1.84)	2.04 (1.61-2.59)	1.17 (0.30-4.57)	1.12(0.76-1.65)	1.05 (0.91-1.21)
Death	1.05 (0.93-1.19)	0.55 (0.22-1.36)	0.82 (0.68-0.99)	0.96 (0.78-1.19)	1.08 (0.90-1.30)	1.24 (1.04-1.48)	1.58 (1.31-1.89)	0.83 (0.73-0.94)	0.97 (0.79-1.17)	0.82 (0.33-2.00)	0.77 (0.50-1.19)	1.49 (1.32-1.68)
Stable to												
AHD on ART	1.37 (1.26-1.49)	1.02 (0.66-1.57)	0.72 (0.64-0.81)	0.71 (0.62-0.81)	1.02 (0.93-1.13)	0.92 (0.83-1.02)	0.77 (0.67-0.88)	0.79 (0.71-0.87)	0.33 (0.29-0.37)	0.21 (0.13-0.34)	1.13 (0.94-1.38)	1.33 (1.23-1.45)
Late Gap	1.22 (1.12-1.33)	1.22 (0.87-1.72)	0.74 (0.67-0.82)	0.63 (0.55-0.72)	1.29 (1.15-1.44)	1.55 (1.38-1.74)	1.34 (1.17-1.54)	1.17 (1.03-1.34)	1.36 (1.18-1.56)	1.68 (1.34-2.11)	1.04 (0.89-1.22)	1.09 (1.01-1.19)
Death	1.64 (1.42-1.89)	0.24 (0.03-1.74)	1.04 (0.78-1.39)	3.01 (2.24-4.03)	0.92 (0.75-1.12)	0.95 (0.77-1.16)	1.16 (0.93-1.46)	1.18 (0.94-1.48)	1.27 (0.98-1.63)	1.75 (1.15-2.69)	0.44 (0.25-0.79)	1.42 (1.23-1.65)
Late Gap to												
AHD on ART	1.23 (1.07-1.42)	0.48 (0.20-1.15)	0.76 (0.64-0.91)	0.50 (0.40-0.64)	1.11 (0.94-1.32)	1.19 (1.00-1.41)	1.10 (0.85-1.43)	0.94 (0.79-1.11)	0.50 (0.40-0.63)	0.24 (0.11-0.53)	1 (1-1)	1.28 (1.12-1.46)
Stable	0.82 (0.66-1.02)	1.58 (0.88-2.83)	0.81 (0.64-1.01)	0.73 (0.53-1.01)	1.15 (0.85-1.55)	1.44 (1.07-1.94)	1.52 (1.07-2.15)	2.17 (1.35-3.51)	3.93 (2.42-6.38)	5.46 (3.03-9.84)	1 (1-1)	0.92 (0.75-1.13)
Death	1.48 (1.13-1.94)	2.11 (0.62-7.12)	1.29 (0.79-2.09)	2.06 (1.22-3.48)	1.02 (0.73-1.44)	1.02 (0.72-1.45)	0.76 (0.43-1.34)	0.77 (0.55-1.07)	0.50 (0.32-0.77)	0.57 (0.20-1.65)	1 (1-1)	1.32 (1.01-1.72)

Bold results are those that are statistically significant, Highlighted in red: Confidence interval crosses 1, but in full dataset result was significant,

Highlighted in blue: confidence intervals do not cross 1, but in full dataset confidence interval crossed 1

TB: Tuberculosis, AHD: Advanced HIV disease

Early Gap: gap in care (no recorded visit for ≥18 months) starting ≤18 months of ART start

Late Gap: gap in care (no recorded visit for ≥18 months) starting >18 months since ART start

Stable: CD4 ≥200 cells/mm³ or if no CD4 count available in 12 month period, having viral load (VL) (VL <1000 copies/ml)

Post-partum period defined as between 9 months and 2 years after the first antenatal date