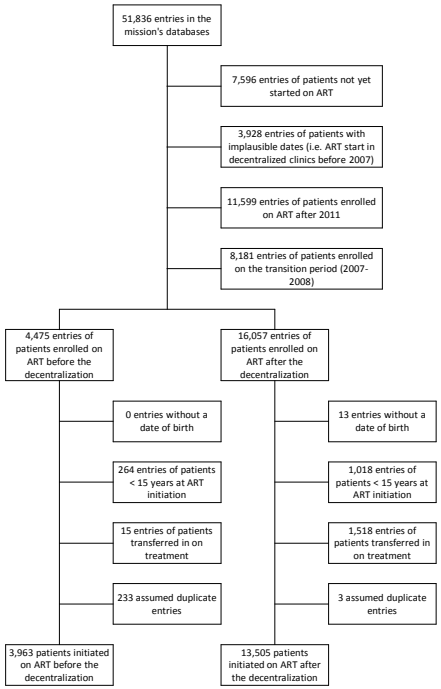
Treatment Outcomes Before and After the Decentralization of ART in an Urban Setting in Mozambique

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Background: There are few data on the effect of decentralization, task shifting and scale-up on the treatment outcomes of antiretroviral treatment (ART) in Mozambique. We hypothesized that decentralization, task shifting, and scale-up of ART to primary health care centers in an urban setting in Maputo did not affect the quality of care provided.

Methodology: We compared treatment outcomes and evolution of CD4 cell counts of HIV-infected adults initiated on ART before (2003 to July 2006) with those initiated on ART after (2009-2011) the decentralization of ART to primary health care centers in the Chamanculo District of Maputo, using routine data. To avoid bias due to changes in referral criteria we included patients from an ambulatory referral site in the district, which was created during the decentralization process.

Figure 1: Selection of the study cohort



Results:

Table 1: Baseline characteristics

	Before decentralization	After decentralization	p-value
N	3,963	13,505	
Female (%)	2,531 (64)	8,600 (64)	0.83
Median age (IQR)	33 (28, 41)	35 (29, 43)	<0.001
15-24 years	340 (9)	765 (6)	<0.001
25-29 years	1,040 (26)	2,950 (22)	
30-39 years	1,473 (37)	5,372 (40)	
40-49 years	805 (20)	2,881 (21)	
50-59 years	247 (6)	1,199 (9)	
≥ 60 years	58 (1)	338 (3)	
Missing WHO stage	204 (5)	2,506 (19)	<0.001
WHO stage			
I	524 (14)	5,195 (47)	<0.001
II	632 (17)	3,148 (29)	
III	1,305 (35)	1,862 (17)	
IV	1,298 (35)	794 (7)	
Missing CD4 cell count	795 (20)	4,765 (35)	<0.001
Median CD4 cell count (IQR)	120 (48, 185)	175 (93, 227)	<0.001
<200 (%)	2,583 (82)	5,423 (62)	<0.001
200-350 (%)	497 (16)	2,865 (33)	
>350 (%)	88 (3)	452 (5)	
Median person years followed (IQR)	1.6 (0.9, 2.2)	1.4 (0.7, 2.3)	<0.001

IQR= inter quartile range

The overall attrition rate was slightly higher in the decentralized than in the centralized cohort while the reported mortality rate was higher in the centralized than in the decentralized cohort, as was the rate of transferals. The rate of loss to follow-up (LTF) was lower in the centralized than the decentralized cohort (Table 2).

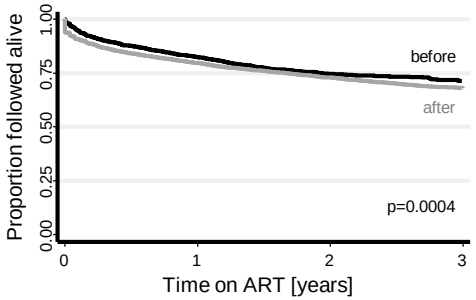
Table 2: Attrition rates before and after the decentralization

	Before decentralization		After decentralization		p-value
	n	Rate per 100 py (95% CI)	n	Rate per 100 py (95% CI)	
Death	224	3.6 (3.1, 4.1)	256	1.3 (1.1, 1.4)	<0.001
LTF	710	11.3 (10.5, 12.2)	3,213	15.8 (15.3, 16,4)	<0.001
Death or LTF	934	14.9 (14.0, 15.9)	3,469	17.1 (16.5, 17.7)	<0.001
Transferred out	257	4.1 (3.6, 4.6)	928	3.3 (3.1, 3.6)	0.003
Death, LTF or transferred out	1,191	19.0 (17.9, 20.1)	4,140	20.4 (19.8, 21.0)	0.03

CI= confidence interval

The slightly higher attrition rate (death or LTF combined) in the decentralized cohort is explained by the loss of patients directly after the initiation of ART (Figure 2).

Figure 2: Kaplan-Meier plot showing the retention in care before and after the decentralization (RIC=retention in care)



	1 year		2 years		3 years	
	Before	After	Before	After	Before	After
n at risk	2,776	8,647	1,407	4499	185	1115
n died	185	206	33	37	4	11
n LTF	495	2466	190	548	23	183
RIC	82	80	75	73	71	68
(95%CI)	(81, 84)	(79, 80)	(73, 76)	(72, 74)	(69, 73)	(67, 69)

This is also shown by Poisson regression (Table 3). While there is a slightly increased risk for attrition before three months on ART, there is none thereafter.

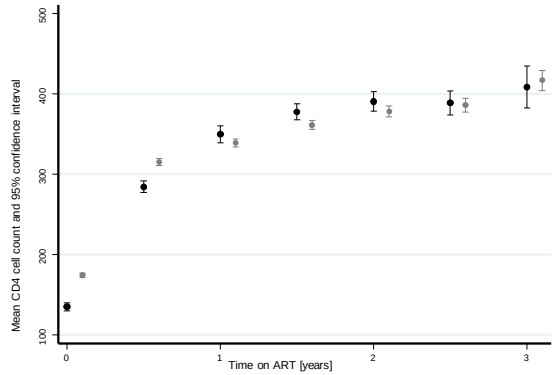
Table 3: Poisson regression modeling of attrition. The adjusted model includes sex, category of at ART initiation, missing CD4 cell count, missing WHO stage, CD4 cell count, WHO stage as covariates.

	≤3 months after ART start (N=17,468)		>3 months after ART start (n=15,356)	
	Unadjusted IRR (95% CI)	Adjusted IRR (95% CI)	Unadjusted IRR (95% CI)	Adjusted IRR (95% CI)
Decentralized vs centralized	1.1 (1.1, 1.2)	1.2 (1.1, 1.3)	1.0 (0.9, 1.1)	1.1 (1.0, 1.2)

IRR = incidence rate ratio, CI = confidence interval

Among patients with available CD4 cell counts, CD4 cell recovery was slightly slower in the decentralized as compared to the centralized cohort, but reached similar values at 2.5 years after treatment start (Fig. 3).

Figure 3: Evolution of CD4 cell counts before and after the decentralization of ART



Time on ART	Initiation		0.5 years		1 year		1.5 years		2 years		2.5 years		3 years	
Period	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
N in follow-up	3,963	13,505	3,446	11,243	2,775	8,644	2,167	6,467	1,400	4,485	662	2,538	184	1,105
n (%) with CD4 counts *	3,168 (80)	8,737 (65)	2,542 (74)	5,859 (52)	2,114 (76)	5,160 (60)	1,601 (74)	4,110 (64)	1,146 (82)	3,201 (71)	682 (103)	2,076 (82)	221 (120)	1,232 (111)
Median (IQR)	120 (48, 184)	175 (94, 227)	245 (157, 375)	292 (197, 399)	311 (204, 451)	312 (215, 428)	348 (231, 484)	334 (235, 456)	362 (245, 499)	350 (244, 480)	364 (253, 494)	360 (254, 495)	384 (272, 511)	382 (269, 519)
Mean (SE)	135 (2.6)	174 (1.3)	284 (3.7)	315 (2.3)	350 (5.4)	339 (2.5)	378 (5.1)	361 (2.9)	391 (6.1)	378 (3.5)	389 (4.3)	386 (4.2)	409 (13)	416 (6)
Suspected failure (%)	-	-	230 (9)	472 (8)	203 (10)	533 (10)	116 (7)	376 (9)	57 (5)	294 (9)	39 (6)	194 (9)	9 (4)	94 (7)

SE: standard error, IQR: inter quartile range, * values above 100% are explained by the inclusion of CD4 cell counts up to 3 months before the time point shown

Discussion: Our analysis indicates that decentralization, task shifting and scale-up of ART to primary health care centers in the Chamanculo District of Maputo, Mozambique, did not strongly impact the quality of care provided. Additional measures are however needed to improve the retention in care directly after ART initiation. Further analysis is required to better understand the delayed recovery of CD4 cell counts in the decentralized cohort.

Acknowledgements: We thank the Ministry of Health and MSF staff for their work as well as MSF donors for funding these activities in Mozambique.

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