

Supplement to “The effects of COVID-19 pandemic on HIV service provision in Ukraine”

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Supplementary Table 1. HIV service provision indicators included in the analysis

Indicator	Calculation
A. Number of HIV tests at NGOs	Sum of the number of HIV tests conducted at NGOs funded by three Principal Recipients of the GF and PEPFAR grants, by month
B. Proportion of positive HIV tests at NGOs	Number of positive HIV tests divided by the number of HIV tests conducted at NGOs, by month
C. Number of HIV tests at health facilities	Number of HIV tests conducted at public health facilities, by quarter
D. Proportion of positive HIV tests at health facilities	Number of positive HIV tests divided by the number of HIV tests conducted at health facilities, by month
E. Number of PLWH initiating ART	Number of PLWH newly initiating ART at health facilities by month
F. Total number of PLWH on ART	Total number of PLWH on ART at health facilities at the end of each month
G. Number of HIV-1 viral load (VL) tests	Number of VL tests performed at health facilities by quarter
H. Proportion of VL tests <1,000 copies/mL	Number of VL tests with <1000 copies/mL result, divided by the number of VL tests performed at health facilities, by quarter

GF, the Global Fund to Fight AIDS, Tuberculosis, and Malaria; NGOs, non-governmental organizations; PEPFAR, the United States President's Emergency Plan for AIDS Relief; PLWH, people living with HIV; VL, HIV-1 viral load

Supplementary Table 2. HIV treatment cascade indicators in Ukraine, 2019-2021

Year	Quarter	Month	Number of HIV tests at NGO (all combined)	Proportion of HIV positive tests at NGO	Number of HIV tests at health facilities	Proportion of HIV positive tests at health facilities	Number of PLWH initiating ART	Total number of PLWH on ART	Number of VL tests	Proportion of VL load tests <1,000 copies/mL	Approximate proportion of PLWH on ART covered by VL testing
2019	1	1	40,793	2.5%			1,662	102,745			
		2	49,458	2.1%			1,804	103,928			
		3	49,461	2.2%	664,907	0.9%	1,778	104,841	72,116	94.0%	68.8%
	2	4	56,159	1.9%			1,785	105,819			
		5	56,300	2.0%			1,644	106,409			
		6	47,158	1.7%	608,227	0.9%	1,547	107,197	78,155	94.2%	72.9%
	3	7	52,835	2.0%			1,872	107,837			
		8	54,308	1.7%			1,612	108,945			
		9	49,344	1.5%	598,391	0.7%	1,645	109,759	82,108	94.6%	74.8%
	4	10	50,590	1.8%			1,793	110,293			
		11	57,085	1.5%			1,800	111,687			
		12	55,659	1.3%	657,819	0.9%	1,822	113,046	85,670	94.7%	75.8%
2020	1	1	40,617	2.1%			1,594	113,962			
		2	35,682	2.2%			1,760	115,300			
		3	27,008	2.6%	574,687	1.0%	1,628	116,381	84,877	94.8%	72.9%
	2	4	54,277	1.2%			1,351	116,757			
		5	70,705	1.0%			1,313	117,541			
		6	87,010	1.0%	406,890	1.0%	1,610	118,499	81,972	94.8%	69.2%
	3	7	84,447	1.1%			1,687	119,718			
		8	78,434	0.9%			1,506	119,958			
		9	80,893	0.9%	505,350	1.2%	1,752	120,983	82,856	94.7%	68.5%
	4	10	77,856	0.7%			1,268	121,089			
		11	78,962	0.7%			1,309	121,569			
		12	100,036	1.3%	473,842	1.2%	1,304	121,949	86,836	94.8%	71.2%

Supplementary Table 2. HIV treatment cascade indicators in Ukraine, 2019-2021 (cont.).

Year	Quarter	Month	Number of HIV tests at NGO (all combined)	Proportion of HIV positive tests at NGO	Number of HIV tests at health facilities	Proportion of HIV positive tests at health facilities	Number of PLWH initiating ART	Total number of PLWH on ART	Number of viral load tests	Proportion of VL tests <1,000 copies/mL	Approximate proportion of PLWH on ART covered by VL testing
2021	1	1	54,482	2.3%			1,150	122,271			
		2	60,758	2.5%			1,483	123,025			
		3	49,595	3.4%	507,738	1.0%	1,511	123,799	92,134	95.1%	74.4%
	2	4	88,547	1.8%			1,498	125,056			
		5	81,266	1.8%			1,361	125,722			
		6	85,135	1.8%	468,145	1.0%	1,472	126,527	97,176	95.2%	76.8%
	3	7	86,373	1.9%			1,609	127,403			
		8	83,324	1.8%			1,416	128,405			
		9	92,012	1.7%	460,172	1.0%	1,395	129,022	93,981	95.6%	72.8%
	4	10	95,459	1.4%			1,100	129,370			
		11	102,319	1.4%			1,256	129,938			
		12	77,690	1.8%	487,413	0.9%	1,226	130,219	91,243	95.9%	70.1%

ART, antiretroviral therapy; NGOs, non-governmental organizations; PLWH, people living with HIV; VL, HIV-1 viral load

Supplementary Table 3. Joinpoint regression model selection

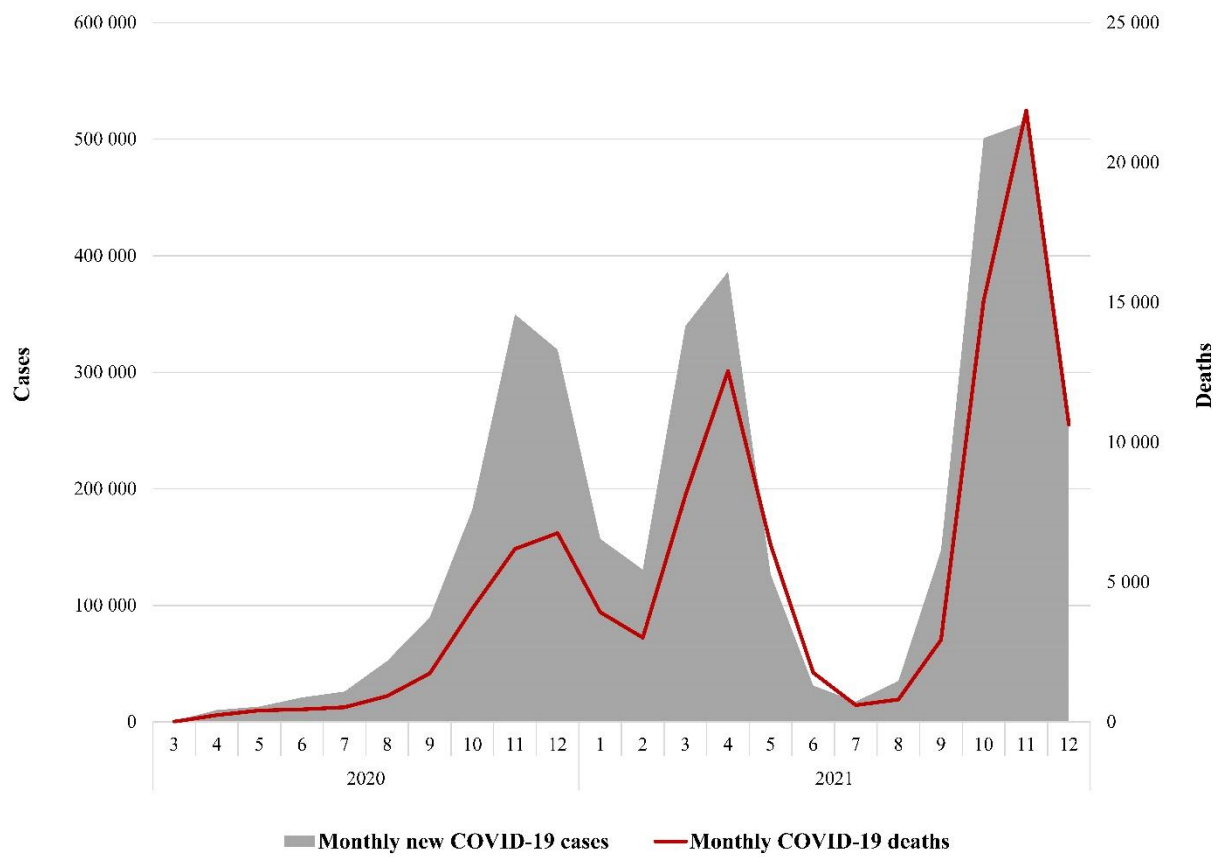
Model	# Joinpoints	# Observations	# Parameters	D. F.	BIC	BIC3	Weight	WBIC	Selected model
Number of HIV tests at NGO (all combined) by month									
1	0	36	2	34	-2.76	-2.76	0.00	-2.76	
2	1	36	4	32	-2.62	-2.52	0.06	-2.62	
3	2	36	6	30	-2.87	-2.67	0.54	-2.76	
4	3	36	8	28	-2.96	-2.66	0.84	-2.71	
5	4	36	10	26	-3.13	-2.74	0.84	-2.80	*
6	5	36	12	24	-3.10	-2.60	0.84	-2.68	
7	6	36	14	22	-2.97	-2.37	0.84	-2.47	
Proportion of HIV positive tests at NGO									
1	0	36	2	34	-1.85	-1.85	0.00	-1.85	
2	1	36	4	32	-1.97	-1.87	0.28	-1.94	
3	2	36	6	30	-2.55	-2.35	0.59	-2.43	*
4	3	36	8	28	-2.63	-2.33	0.90	-2.36	
5	4	36	10	26	-2.61	-2.21	0.77	-2.30	
6	5	36	12	24	-2.68	-2.19	0.88	-2.24	
7	6	36	14	22	-2.68	-2.08	0.88	-2.15	
Number of HIV tests at health facilities by quarter									
1	0	12	2	10	-4.23	-4.23	0.00	-4.23	*
2	1	12	4	8	-4.19	-3.98	0.31	-4.12	
3	2	12	6	6	-3.96	-3.54	0.72	-3.66	
4	3	12	8	4	-3.58	-2.95	0.81	-3.07	
Proportion of HIV positive tests at health facilities									
1	0	12	2	10	-4.00	-4.00	0.00	-4.00	
2	1	12	4	8	-4.08	-3.87	0.39	-4.00	
3	2	12	6	6	-4.72	-4.30	0.77	-4.40	*
4	3	12	8	4	-4.32	-3.70	0.78	-3.84	

Supplementary Table 3. Joinpoint regression model selection (cont.)

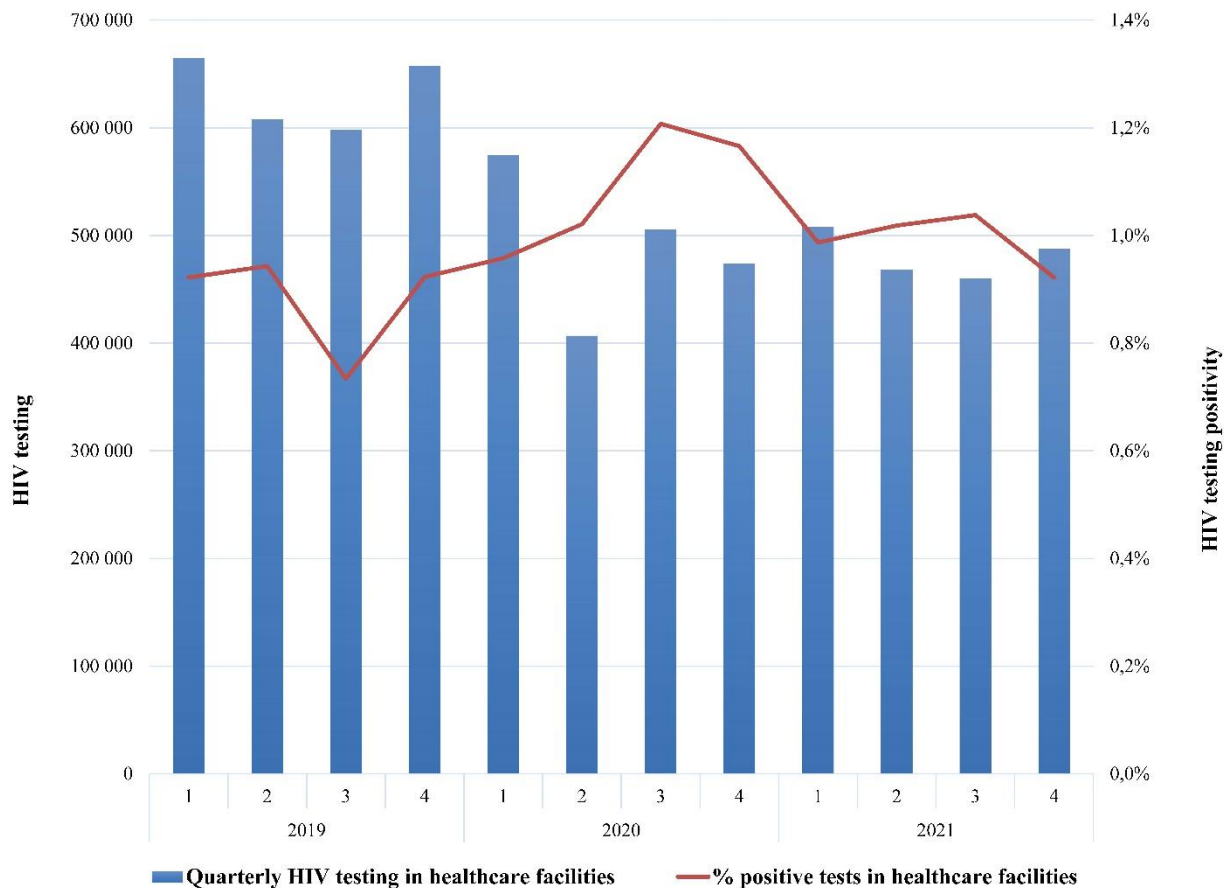
Model	# Joinpoints	# Observations	# Parameters	D.F.	BIC	BIC3	Weight	WBIC	Selected model
Number of PLWH initiating ART by month									
1	0	36	2	34	-4.45	-4.45	0.00	-4.45	*
2	1	36	4	32	-4.30	-4.20	0.05	-4.30	
3	2	36	6	30	-4.24	-4.04	0.30	-4.18	
4	3	36	8	28	-4.20	-3.90	0.52	-4.05	
5	4	36	10	26	-4.10	-3.70	0.61	-3.86	
6	5	36	12	24	-4.07	-3.57	0.58	-3.78	
7	6	36	14	22	-3.99	-3.39	0.61	-3.62	
Total number of PLWH on ART by month									
1	0	36	2	34	-9.33	-9.33	0.00	-9.33	
2	1	36	4	32	-11.14	-11.04	0.87	-11.05	
3	2	36	6	30	-11.28	-11.08	0.85	-11.11	
4	3	36	8	28	-11.49	-11.19	0.88	-11.23	
5	4	36	10	26	-11.42	-11.02	0.89	-11.07	
6	5	36	12	24	-12.00	-11.50	0.91	-11.55	
7	6	36	14	22	-12.14	-11.54	0.91	-11.59	*
Number of VL tests by quarter									
1	0	12	2	10	-6.17	-6.17	0.00	-6.17	
2	1	12	4	8	-6.10	-5.89	0.29	-6.04	
3	2	12	6	6	-5.91	-5.49	0.81	-5.58	
4	3	12	8	4	-7.95	-7.33	1.00	-7.33	*
Proportion of VL tests <1,000 copies/mL									
1	0	12	2	10	-12.23	-12.23	0.00	-12.23	
2	1	12	4	8	-12.52	-12.31	0.51	-12.42	
3	2	12	6	6	-14.01	-13.59	0.97	-13.61	*
4	3	12	8	4	-13.22	-12.60	0.85	-12.70	

Abbreviations: D.F., degrees of freedom; BIC, Bayesian Information Criterion; WBIC, Weightned Bayesian Information Criterion; NGOs, non-governmental organizations; PLWH, people living with HIV; VL, HIV-1 viral load; WBIC is calculated as $((1 - \text{Weight}) * \text{BIC} + (\text{BIC3} * \text{Weight}))$. Weight not applicable for the 0 joinpoint model

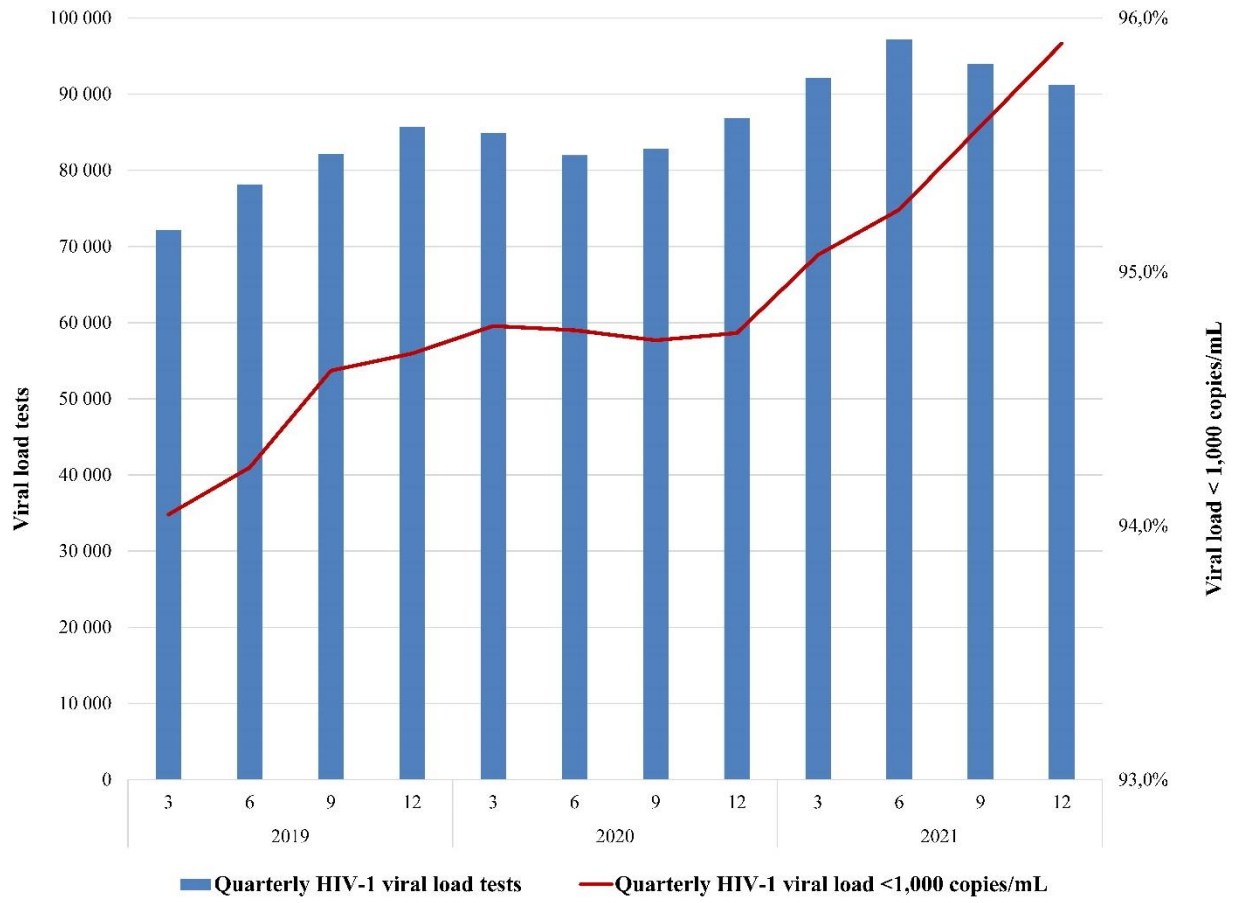
Supplementary Figure 1 Monthly number of COVID-19 cases and COVID-19 deaths in Ukraine, 2020-2021



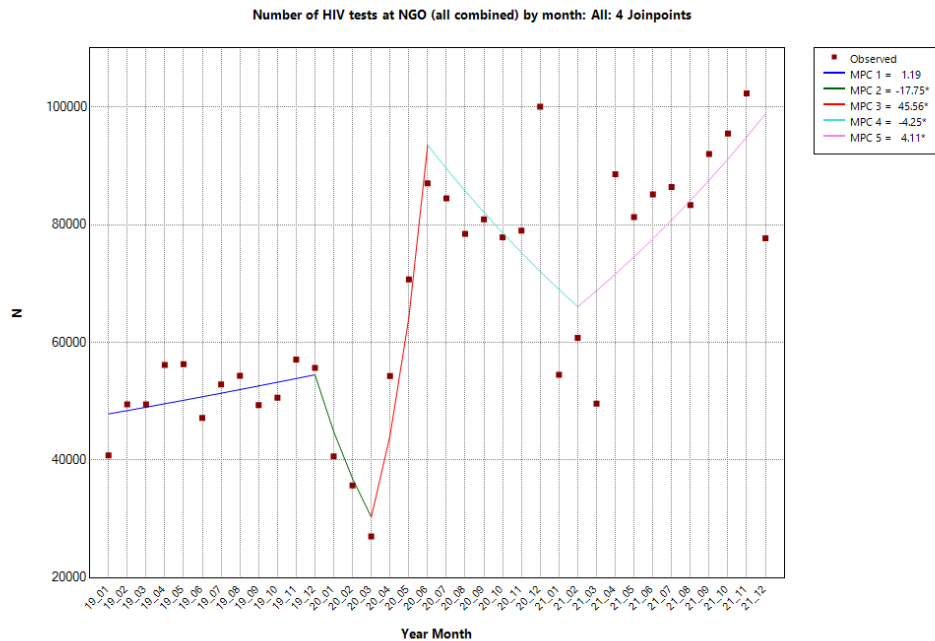
Supplementary Figure 2 Number of HIV tests and proportion of positive results in healthcare facilities, 2019-2021



Supplementary Figure 3 VL testing volume and percentage with VL below 1,000 copies/mL, 2019-2021

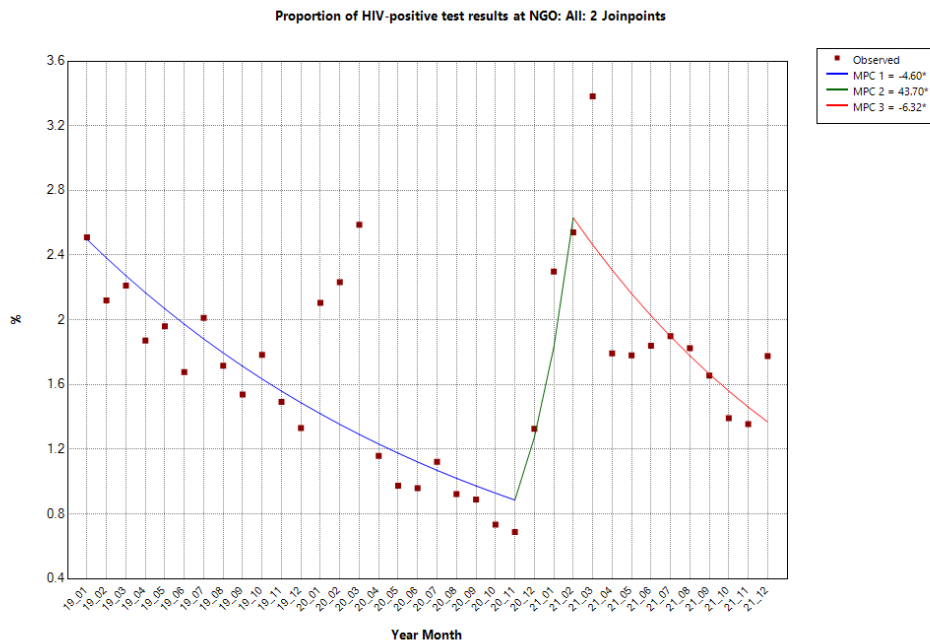


Supplementary Figure 4. Number of HIV tests conducted at community settings (all combined), by month, across all 4 joinpoints



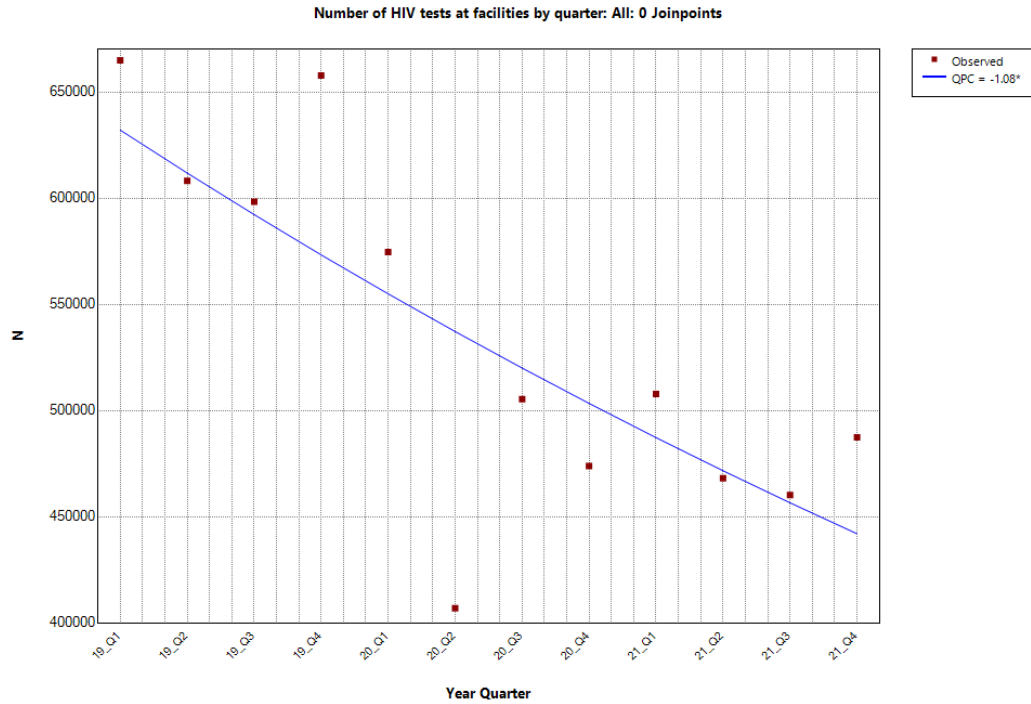
* Indicates that the Monthly Percent Change (MPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 4 Joinpoints.

Supplementary Figure 5. Proportion of HIV positive test results at community settings (all combined), 2 joinpoints



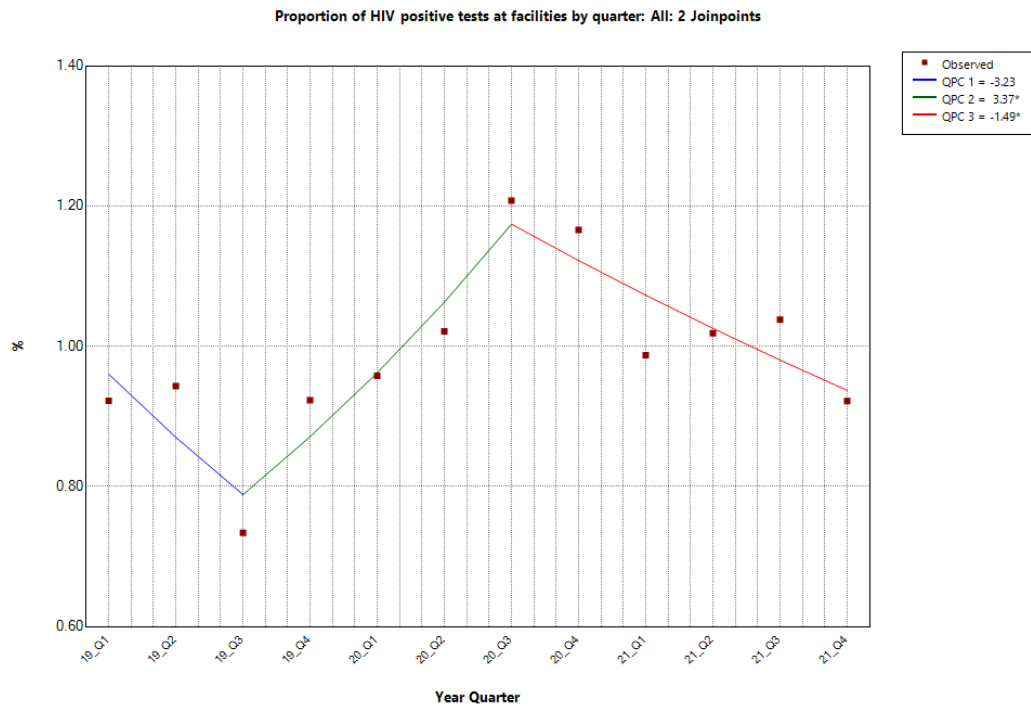
* Indicates that the Monthly Percent Change (MPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 2 Joinpoints.

Supplementary Figure 6. Number of HIV tests at healthcare facilities, by quarter, 0 joinpoints



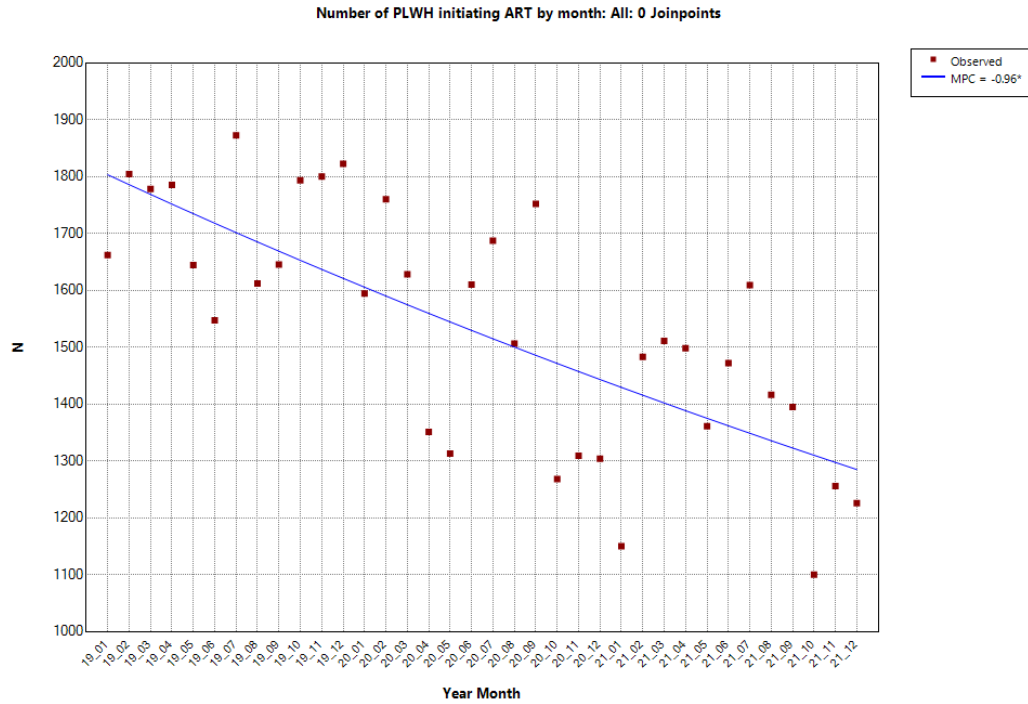
* Indicates that the Quarterly Percent Change (QPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 0 Joinpoints.

Supplementary Figure 7. Proportion of HIV positive test results at healthcare facilities, by quarter, 2 joinpoints



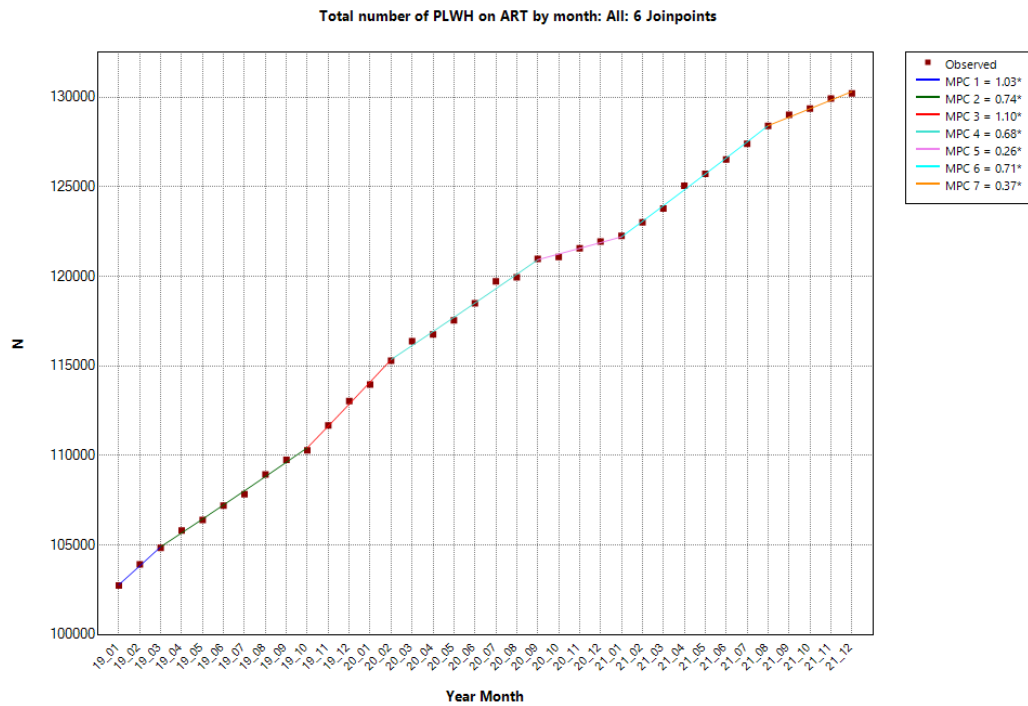
* Indicates that the Quarterly Percent Change (QPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 2 Joinpoints.

Supplementary Figure 8. Number of PLWH initiating ART, by month, 0 joinpoints



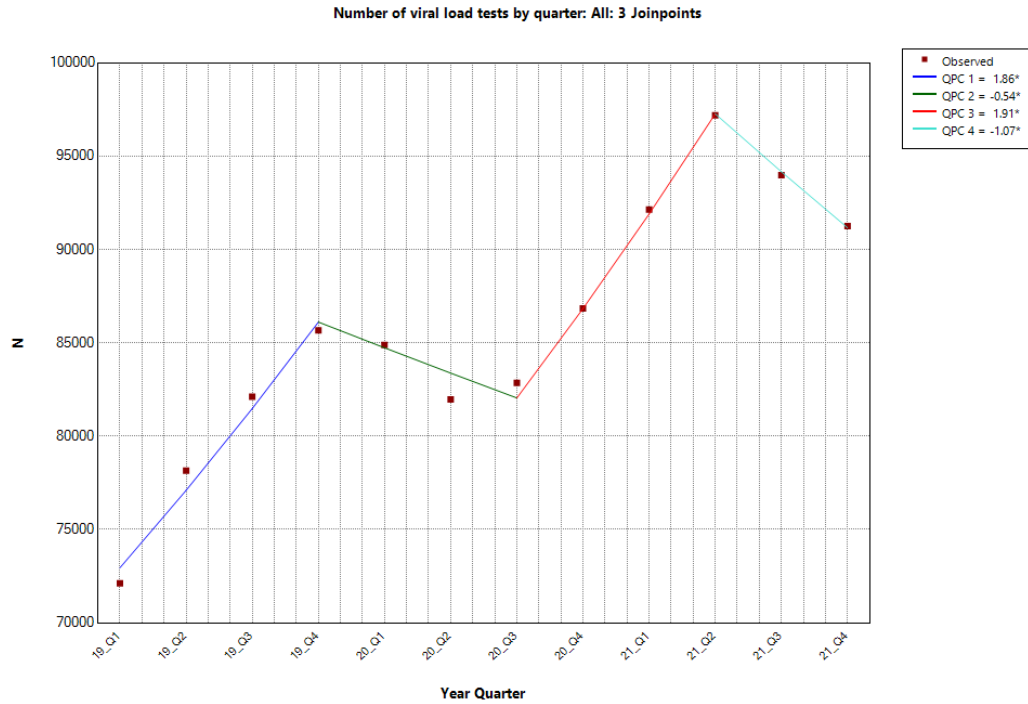
* Indicates that the Monthly Percent Change (MPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 0 Joinpoints.

Supplementary Figure 9. Total number of PLWH on ART, by month, 6 joinpoints



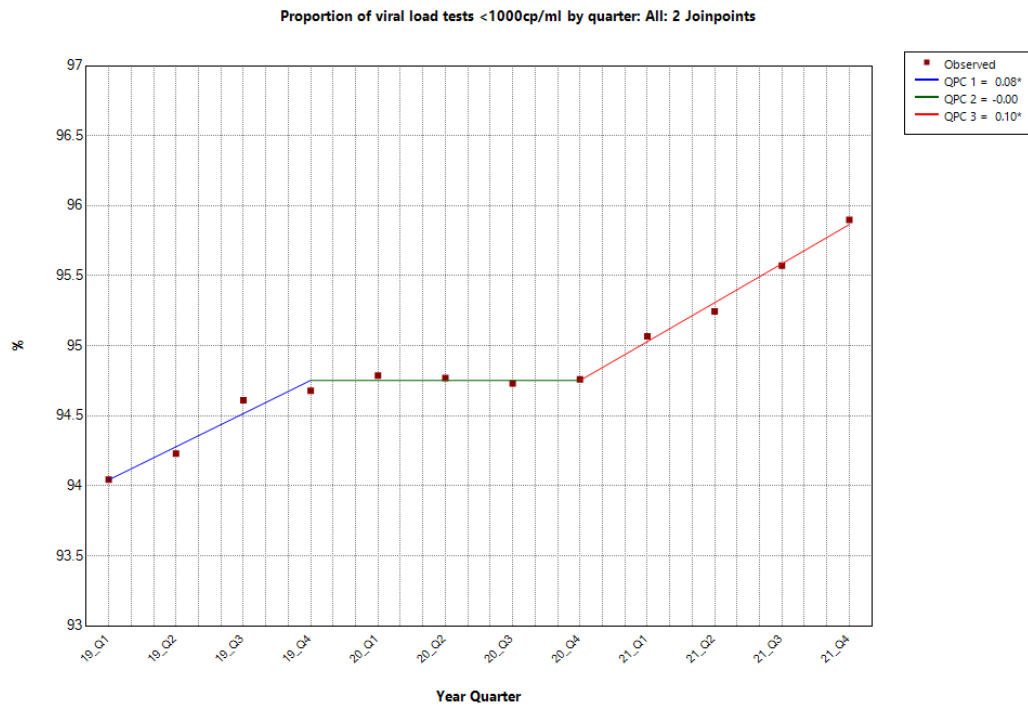
* Indicates that the Monthly Percent Change (MPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 6 Joinpoints.

Supplementary Figure 10. Number of VL tests, by quarter, 3 joinpoints



* Indicates that the Quarterly Percent Change (QPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 3 Joinpoints.

Supplementary Figure 11. Proportion of VL tests < 1,000 copies/mL, by quarter, 2 joinpoints



* Indicates that the Quarterly Percent Change (QPC) is significantly different from zero at the alpha = 0.05 level.
 -- Test Statistic and P-Value not available for the Empirical Quantile method.
 Final Selected Model: 2 Joinpoints.