

Supplementary Table 1 Demographics and clinical characteristics by liver stiffness measurement

	Entire Cohort, (n=1005)	LSM <8 kPa, (n=870)	LSM ≥8 kPa, (n=135)	<i>P</i> value
Age, Mean (SD)	55 (12.3)	55 (12.3)	55 (12.0)	0.8
Gender				0.07
Male	683 (68%)	586 (67.4%)	97 (71.9%)	
Female	274 (27%)	242 (27.8%)	32 (23.7%)	
Transgender/Gender diverse	48 (5.1%)	42 (4.9%)	6 (3.1%)	
Race & Ethnicity				0.01
Non-Hispanic White	351 (35%)	304 (34.9%)	47 (34.8%)	
Non-Hispanic Black	527 (52%)	466 (53.6%)	61 (45.2%)	
Hispanic	127 (13%)	100 (11.5%)	27 (20.0%)	
Education: High School or Above	844 (84%)	725 (83.3%)	119 (88.2%)	0.3
Married/Long-term partner	216 (21.5%)	190 (21.83%)	26 (19.25%)	0.9
Food Insecurity	333 (33%)	286 (32.9%)	47 (34.8%)	0.7
Area Deprivation Index	55.8 (30.5)	55.72 ± 30.85	56.28 ± 28.06	0.8
Body Mass Index (kg/m ²)				0.005
<25	232 (23%)	213 (24.5%)	19 (14.1%)	
25-29.9	357 (36%)	312 (35.9%)	45 (33.3%)	
≥30	416 (41%)	345 (39.7%)	71 (52.6%)	
Waist Circumference (cm), Mean (SD)	99.5 (16)	98.1 (15.0)	108.05 (18.4)	<0.01
Elevated waist circumference	589 (59%)	496 (57.0%)	93 (68.9%)	0.01
Hypertension	751 (74.7%)	632 (72.64%)	119 (88.15%)	<0.001
Dysglycemia	581 (57.8%)	482 (55.47%)	99 (73.33%)	<0.001
Dyslipidemia	710 (71%)	600 (69%)	110 (82%)	0.004
Current Smoker	226 (23%)	203 (23%)	23 (17%)	0.2
Obstructive Sleep Apnea				0.02
Never	779 (78%)	681 (78.28%)	98 (72.59%)	

Treated	142 (14%)	113 (12.99%)	29 (21.48%)	
Symptomatic, not treated	84 (8%)	76 (8.74%)	8 (5.93%)	
HIV-related characteristics				
Years Living with HIV, Mean (SD)	20.6 (10.5)	21.1 (10.4)	24.4 (10.6)	<0.001
CD4+ T-Cell Count, Median (IQR)	675 (516, 917)	679 (524, 915)	660 (415, 937)	0.2
Antiretroviral Therapy				
NRTI	885 (88%)	762 (87.59%)	123 (91.11%)	0.3
NNRTI	201 (20%)	180 (20.69%)	21 (15.56%)	0.2
Efavirenz	23 (2%)	21 (2.41%)	2 (1.48%)	0.7
PI	124 (12%)	103 (11.84%)	21 (15.56%)	0.3
INSTI	867 (86%)	748 (85.98%)	119 (88.15%)	0.6
Laboratory (mean $\pm$ SD)				
Total Cholesterol (mmol/L)	4.5 (1.1)	4.5 (1.0)	4.4 (1.1)	0.2
Triglycerides (mmol/L)	1.56 (1.4)	1.49 (1.1)	1.93 (2.6)	0.06
LDL Cholesterol (mmol/L)	2.6 (0.9)	2.6 (0.9)	2.5 (0.9)	0.3
HDL Cholesterol (mmol/L)	1.3 (0.4)	1.3 (0.4)	1.2 (0.3)	<0.001
ALT (U/L)	27 (22)	26 (20)	35 (29)	0.001
AST (U/L)	27 (17)	256 (17)	32 (18)	<0.001
Alkaline Phosphatase (U/L)	79 (29)	78 (27)	84 (37)	0.07
Bilirubin, Direct (μ mol/L)	3.1 (1.7)	3.1 (1.7)	3.1 (1.7)	0.9
Bilirubin, Total (μ mol/L)	10.4 (8.6)	10.1 (8.6)	11.9 (8.6)	0.02
Albumin (mmol/L)	0.65 (0.06)	0.65 (0.06)	0.63 (0.06)	0.02
Platelet count/ μ L	242901 (71174)	245805 (71092)	224367 (69129)	0.001
Creatinine (μ mol/L)	105.2 (79.6)	99.0 (70.7)	115.8 (141.5)	0.2
Serum Glucose (mmol/L)	5.66 (1.9)	5.55 (1.7)	6.27 (2.8)	0.004
HbA1c (mmol/mol)	40 (1)	40 (1)	44 (1)	0.003
Vibration-controlled transient elastography				
CAP (dB/m), Median (IQR)	253 (214, 298)	250 (211, 292)	291 (237, 346)	<0.01

CAP >263 dB/m	443 (44.08%)	357 (41.03%)	86 (63.70%)	<0.01
LSM (kPa), Median (IQR)	5.0 (4.1-6.5)	4.7 (4.0-5.8)	9.8 (8.5-12.5)	<0.01
LSM ≥12 kPa	38 (3.78%)	0 (0%)	38 (28.15%)	*

ALT: Alanine aminotransferase; AST: Aspartate aminotransferase; CAP: Controlled attenuation parameter; FAST: FibroScan-AST; HbA1c: Hemoglobin A1c; HDL: High-density lipoprotein; INSTI: Integrase strand transfer inhibitor; IQR: Interquartile Range; LDL: Low-density lipoprotein; LSM: Liver stiffness measurement; MASLD: Metabolic dysfunction-associated steatotic liver disease; NNRTI: non-NRTI; NRTI: Nucleoside reverse transcriptase inhibitor; PI: Protease inhibitor.

Supplementary Table 2 Demographics and clinical characteristics of the analysis population by sleep quality

	Whole cohort, PSQI <5, (n=1005)	PSQI ≥5, (n=639)	<i>P</i> value
Age, Mean (SD)	55 (12)	55 (12)	0.6
Gender			0.1
Male	683 (68.0%)	422 (65.2%)	
Female	274 (27.3%)	193 (29.8%)	
Transgender/Gender diverse	48 (4.8%)	32 (5%)	
Race & Ethnicity			0.8
Non-Hispanic White	351 (34.9%)	226 (34.9%)	
Non-Hispanic Black	527 (52.4%)	342 (52.9%)	
Hispanic	127 (12.6%)	79 (12.2%)	
Education: High School or Above	844 (84%)	551 (85%)	0.2
Married/Long-term partner	216 (21.5%)	122 (18.9%)	0.007
Food Insecurity	333 (33%)	244 (38%)	<0.01
Area Deprivation Index	55.80 (30.5)	55.47 (28.9)	0.8
Body Mass Index (kg/m ²)			0.1
<25	227 (22.5%)	146 (22.9%)	
25-29.9	359 (35.7%)	215 (33.7%)	
≥30	419 (41.7%)	278 (43.5%)	
Waist Circumference (cm), Mean (SD)	99.5 (15.9)	100.2 (16.1)	0.03
Elevated waist circumference	589 (58.6%)	362 (56.7%)	0.003
Hypertension	751 (74.7%)	472 (73.9%)	0.4
Dysglycemia	581 (57.8%)	370 (58.0%)	0.9
Dyslipidemia	710 (71%)	456 (71%)	0.9
Current Smoker	226 (22.5%)	145 (22.7%)	0.03

Obstructive Sleep Apnea				0.004
Never	779 (77.5%)	298 (83.2%)	475 (74.3%)	
Treated	142 (14.1%)	40 (11.2%)	100 (15.7%)	
Symptomatic, not treated	84 (8.4%)	20 (5.6%)	64 (10.0%)	
HIV-related characteristics				
Years Living with HIV, Mean (SD)	21.6 (10.5)	20.74 (10.0)	22.1 (10.7)	0.04
CD4+ T-Cell Count, Median (IQR)	728 (335)	727 (337)	731 (335)	0.9
Antiretroviral Therapy				
NRTI	885 (88.1%)	318 (88.8%)	560 (87.6%)	0.6
NNRTI	201 (20.0%)	77 (21.5%)	123 (19.3%)	0.4
Efavirenz	23 (2.3%)	10 (2.7%)	13 (2.0%)	0.6
PI	124 (12.3%)	38 (10.6%)	86 (13.5%)	0.2
INSTI	867 (86.3%)	299 (83.5%)	561 (87.8%)	0.08
Laboratory (mean $\pm$ SD)				
Total Cholesterol (mmol/L)	4.6 (1.1)	4.4 (1.1)	4.5 (1.0)	0.3
Triglycerides (mmol/L)	1.56 (1.4)	1.48 (0.9)	1.59 (1.5)	0.2
LDL Cholesterol (mmol/L)	2.6 (0.9)	2.6 (0.9)	2.6 (1.0)	0.7
HDL Cholesterol (mmol/L)	1.3 (0.4)	1.2 (0.4)	1.3 (0.5)	0.02
ALT (U/L)	27 (22)	28 (21)	27 (22)	0.6
AST (U/L)	27 (17)	27 (19)	26 (17)	0.4
Alkaline Phosphatase (U/L)	79 (29)	79 (28)	80 (29)	0.6
Bilirubin, Direct (μ mol/L)	3.1 (1.7)	3.1 (1.7)	3.1 (1.7)	0.9
Bilirubin, Total (μ mol/L)	10.4 (0.5)	11.6 (0.7)	9.6 (0.3)	0.003
Albumin (mmol/L)	0.65 (0.06)	0.65 (0.06)	0.65 (0.06)	0.3
Platelet count/ μ L	242902 (71174)	236161 (65189)	246989 (74335)	0.02
Creatinine (μ mol/L)	100.8 (79.6)	103.4 (97.3)	99.0 (79.6)	0.5
Serum Glucose (mg/dL)	5.66 (1.9)	5.55 (1.8)	5.71 (1.9)	0.3

HbA1c mmol/mol)	40 (1.05)	40 (1)	40 (1)	0.8
Vibration-controlled transient elastography				
CAP (dB/m), Median (IQR)	253 (214, 298)	256 (216, 295)	252 (212, 300)	0.5
CAP >263 dB/m	443 (44.1%)	164 (45.8%)	275 (43.0%)	0.4
LSM (kPa), Median (IQR)	5.0 (4.1-6.5)	5.1 (4.3-6.57)	5.0 (4.0-6.5)	0.2
LSM ≥8 kPa	135 (13.4%)	47 (13.1%)	85 (13.3%)	0.9
LSM ≥12 kPa	38 (3.8%)	13 (3.6%)	24 (3.8%)	1.0

ALT: Alanine aminotransferase; AST: Aspartate aminotransferase; CAP: Controlled attenuation parameter; FAST: FibroScan-AST; HbA1c: Hemoglobin A1c; HDL: High-density lipoprotein; INSTI: Integrase strand transfer inhibitor; IQR: Interquartile Range; LDL: Low-density lipoprotein; LSM: Liver stiffness measurement; MASLD: Metabolic dysfunction-associated steatotic liver disease; NNRTI: Non-NRTI; NRTI: Nucleoside reverse transcriptase inhibitor; PI: Protease inhibitor.

Supplementary Table 3 Factors associated with sleep quality and health-related quality of life summary scores based on independent univariate logistic regression models

Model	Sleep Quality		Health-related Quality of Life			
	β estimate	<i>P</i> value	PCS		MCS	
			β estimate	<i>P</i> value	β estimate	<i>P</i> value
Age	0.02	0.06	-0.01	0.6	-0.03	0.3
Gender. Ref: Male						
Female	1.3	<0.01	-5.7	<0.01	-2.21	<0.01
Transgender/Gender diverse	-0.22	0.7	5.56	<0.001	3.42	0.04
Race/Ethnicity. Ref: Non-Hispanic White						
Black	0.07	0.8	0.33	0.6	-0.64	0.4
Hispanic	-0.67	0.2	2.39	0.07	0.25	0.9
No Long-term Partner	1.08	<0.001	-2.15	<0.01	-3.12	<0.001
Education above High School	0.19	0.6	3.59	<0.001	0.33	0.7
Waist Circumference (by 5cm)	0.09	0.01	-0.86	<0.01	-0.18	0.1
Obstructive Sleep Apnea. Ref: No Sleep Apnea						
Not treated	1.54	<0.001	-2.78	0.03	-1.93	0.1
Treated	1.51	<0.01	-4.33	<0.01	-2.19	0.03
Current Smoker	0.78	0.01	-1.94	0.02	-1.40	0.1
Low Food Security	1.69	<0.01	-5.05	<0.01	-6.01	<0.01
Area Deprivation Index	0.002	0.6	-0.02	0.04	0.02	0.09
MASLD. Ref: Non-SLD						
MASLD and LSM $\geq$ 8 kPa	1.23	0.01	-5.24	<0.01	-0.51	0.7
MASLD and LSM <8 kPa	-0.19	0.5	-1.17	0.1	1.57	0.04
Health-related Quality of Life						
PCS	-0.15	<0.01				
MCS	-0.16	<0.01				
PSQI Score			-1.05	<0.01	-1.27	<0.01

LSM: Liver stiffness measurement; MASLD: Metabolic dysfunction-associated steatotic liver disease; MCS: Mental component summary score; PCS: Physical component summary score; PSQI: Pittsburgh Sleep Quality Index.

Supplementary Table 4 Health related quality of life in PWH with poor sleep by MASLD status

	Entire subgroup, (n=639)	Non-SLD, (n=354)	MASLD & LSM <8, (n=234)	MASLD LSM ≥8, (n=51)	& P value
Physical component summary score	45.0 (11.5)	46.3 (11.3)	44.4 (11.2)	38.6 (11.8)	<0.001
Physical functioning	71.7 (29.4)	74.8 (28.2)	70.3 (29.3)	57.3 (33.7)	<0.001
Role limitations due to physical health	62.5 (42.3)	63.3 (42.2)	63.8 (41.8)	51.5 (44.8)	0.1
Pain	67.3 (28.9)	68.9 (28.5)	66.5 (29.3)	60.0 (29.4)	0.1
General Health	60.6 (22.5)	62.2 (21.8)	61.3 (22.5)	46.0 (22.6)	<0.001
Mental component summary score	46.0 (12.2)	44.8 (13.0)	47.7 (11.1)	47.0 (10.7)	0.02
Role limitations due to emotional health	61.7 (43.0)	61.1 (43.4)	63.5 (41.9)	57.5 (44.8)	0.6
Energy/fatigue	54.6 (23.2)	54.1 (23.3)	56.5 (22.7)	49.2 (24.4)	0.1
Emotional well-being	68.8 (21.4)	67.0 (22.5)	71.6 (19.4)	68.6 (21.2)	0.03
Social functioning	71.7 (27.6)	70.1 (28.8)	74.3 (25.5)	70.8 (28.6)	0.2

Mean (SD) presented.