

HIV viral suppression and drug resistance patterns among adults and children in the era of dolutegravir use: Findings from the national representative cross-sectional survey in Tanzania

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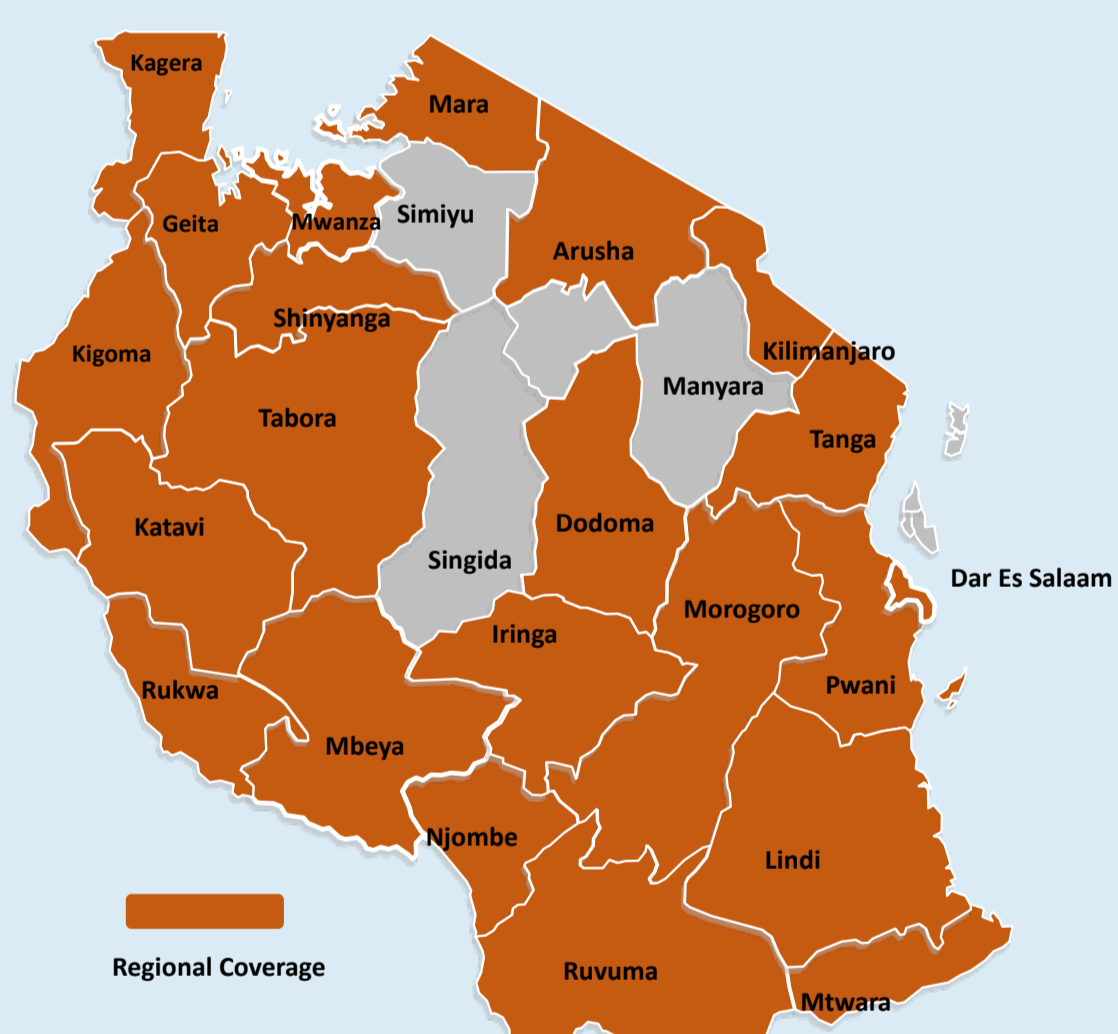
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A. Background

- Tanzania is among the countries in Sub-Saharan Africa (SSA) that has made a significant progress in improving access to Antiretroviral therapy (ART).
- However, treatment success among people living with HIV (PLHIV) has not been fully realized due to several factors including programmatic factors.
- In 2019 March, Tanzania introduced a WHO-recommended dolutegravir (DTG)-based regimen as the default first-line regimen.
- We investigated HIV viral suppression rates, associated factors, and the burden of HIV drug resistance (HIVDR) among PLHIV a year after the introduction of DTG in Tanzania.

B. Methods

- A national representative cross-sectional survey was conducted from September to December 2020 in Tanzania.
- Eligibility criteria was being on ART for at least 9-15 months (early) and >36 and >48 months (late time points) for children and adults respectively.
- Eligible Adults and children PLHIV from 36 HIV care and treatment centres in 22 regions of Tanzania were recruited.



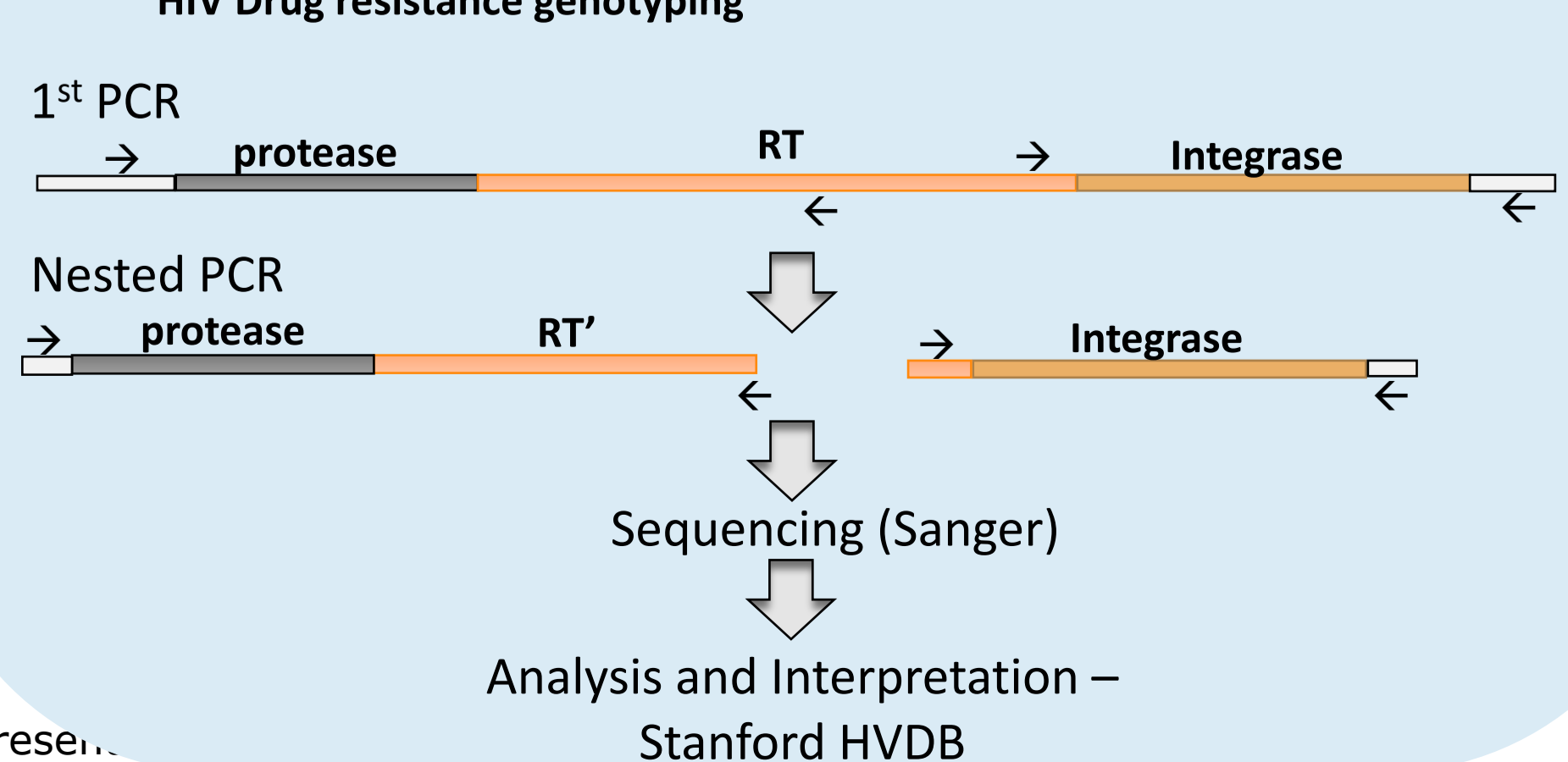
Blood samples, demographic and clinical information were obtained from all eligible participants.

HIV viral load (HVL) was estimated using the COBAS 8800 TaqMan (Roche Molecular system).

Identified participants with Viral suppression defined at HVL < 1000 copies/mL.

Independent factors associated with lack of viral suppression were identified using regression analyses (p < 0.05).

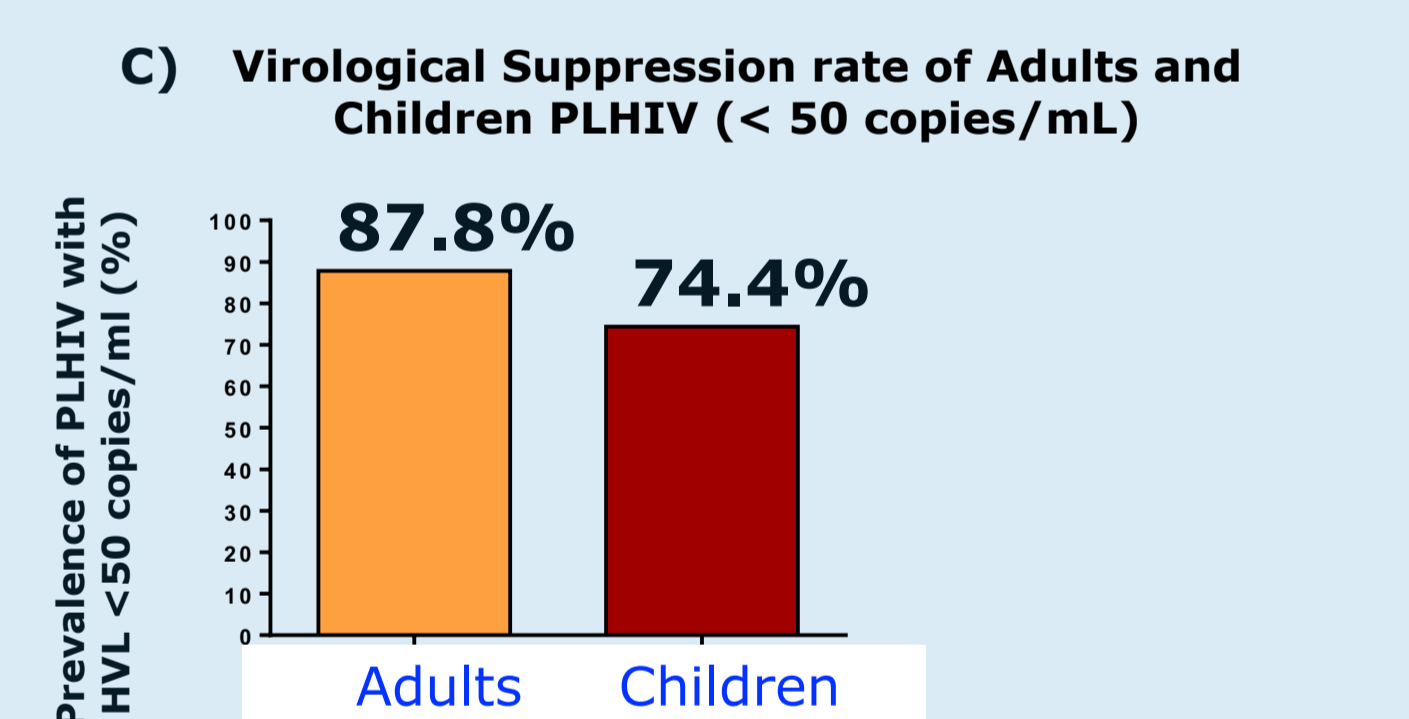
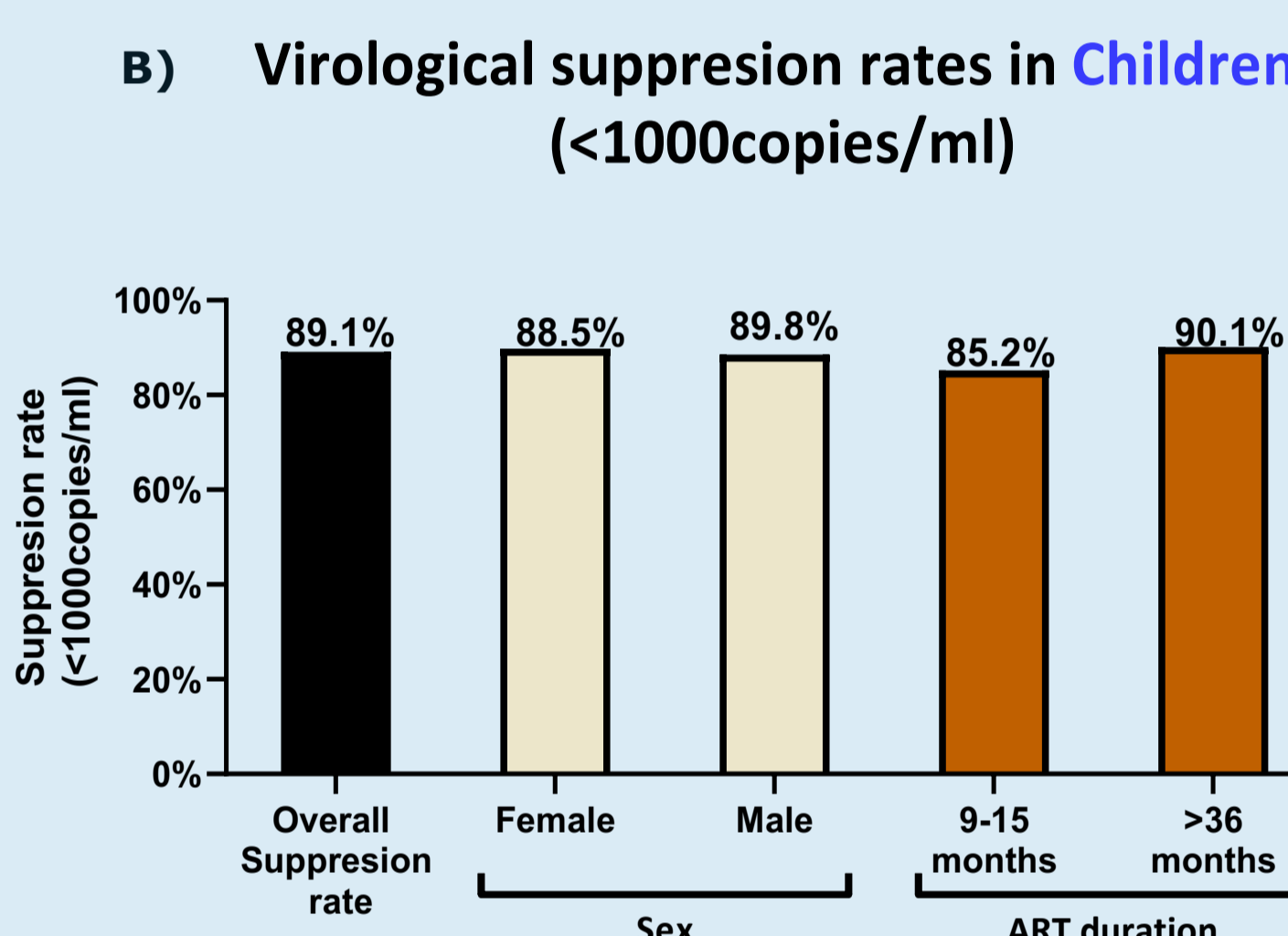
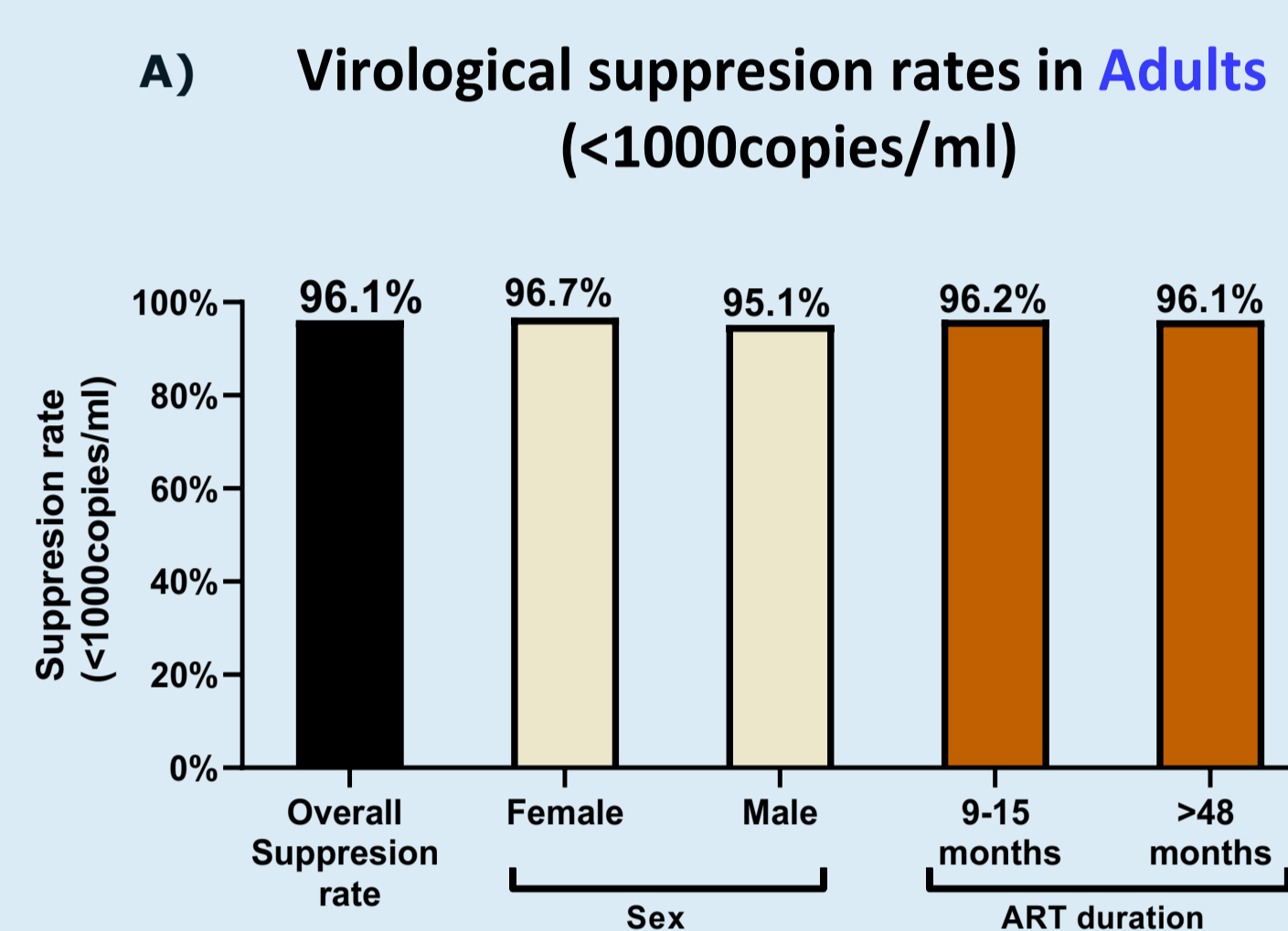
HIVDR genotyping was performed from samples with HVL ≥ 1000 copies/mL.



C. Results

1.1 HIV viral suppression rates among Adults & Children in Tanzania

- A total of 2,039 eligible PLHIV in Tanzania were recruited.
- 57.5% were adults and 64.7% of them were females. Children contributed 42.5% and 53.5% were females.
- Viral suppression was defined at a cut-off < 1000 copies/mL (Tanzania National Guidelines at the time of data collection).



1.2 Description of viral suppression rates vs ART regimen

Current ART regimen	Adults n (%)	Children n (%)
VL < 1000 copies/ml	VL < 1000 copies/ml	VL < 1000 copies/ml
1st NNRTI_Based	33 (97.1)	29 (96.7)
1st INSTI_Based	995 (96.4)	470 (91.3)
2nd PI_Based	26 (78.8)	205 (85.4)
Others *	6 (85.7)	11 (78.6)

* indicates a combination of all ARV classes NNRTI or NRTI+ INSTI+PI

1.3 Factors associated with lack of HIV viral suppression

Variable	HVL ≥ 1000 copies/mL n (%)	cOR	95% CI	p-value	aOR	95% CI	p-value
Adults							
Marital Status							
Single (never married)	13 (3.2)	Ref			Ref		
Married/cohabiting	22 (3.3)	1.04	0.52-2.09	0.909	1.92	0.78-4.77	0.117
Divorced/Separated/widowed	10 (9)	2.99	1.27-7.01	0.012	6.90	2.23-21.37	0.001
*Initial HVL (copies/mL)							
<1000	19 (2.0)	Ref			Ref		
≥1000	15 (18.5)	15.72	8.04-30.72	<0.001	12.89	5.92-28.08	<0.001
Initial ART regimen							
Adherence							
High	26 (2.6)	Ref			Ref		
Moderate	10 (9.2)	4.11	1.97-8.57	<0.001	3.69	1.49-9.17	0.005
Low	9 (11.5)	4.29	1.87-9.83	0.001	4.05	1.48-11.10	0.006
Children							
Initial HVL (copies/mL)							
<1000	40 (7.2)	Ref			Ref		
≥1000	30 (15.9)	2.44	1.47-4.05	0.001	2.28	1.34-3.88	0.002
Adherence							
High	69 (9.1)	Ref			Ref		
Moderate	13 (31.0)	2.42	1.02-5.74	0.044	3.19	1.23-8.30	0.017
Low	10 (16.4)	1.77	0.84-3.75	0.135	1.90	0.84-4.29	0.121

C. Results

2.1 HIVDR among Adults & Children with high viremia in Tanzania

- HIVDR genotyping was done from n=137 DBS and Plasma samples of eligible participants (HVL ≥ 1000 copies/mL).
- HIVDR was detected in 71.5% of PLHIV with high viremia.
- 5.8 % of participants had DTG resistance mutations, including the major drug resistance mutations; Q148K, E138K, G118R, G140A, T66A, and R263K.

2.2 Profile of patients with INSTI DRMs

S/N	Age (years)	Duration on ART (months)	ART regimen	Major INSTI DRM	Accessory INSTI DRM	NRTI DRMs	NNRTI DRMs
1	10	36	1 st line:TDF +3TC+DTG	None	T97A	M41L, D67N, K70R, M184V, T215F, K219E	Y181C
2	11	36	1 st line:TDF +3TC+DTG	R263K	None	M41ML, L210 W, T215Y	A98AG, K103N, V108I, Y181C, H221HY
3	11	36	1 st line:TDF +3TC+DTG	T66A, G118R, E138K	None	M41L, M184V, T215F	K103N, V179, Y318F
4	14	36	1 st line:DTG +3TC+DTG	E138K, G140A, Q148K	Q950K	D67N, K70R, M184V, T215F, K219Q	K101KE, E138A, G190A
5	8	9-15	1 st line:TDF +3TC+DTG	None	T97A	None	K103N
6	41	48	1 st line:TDF +3TC+DTG	None	T97A	None	E138A

2.3 Genotypic prediction of INSTI, PI, NRTI and NNRTI drugs susceptibility among participants with INSTI DRMs

S/N	DTG	EVG	RAL	DOR	EFV	ETV	NVP	RPV	ABC	ZDV	d4T	DDI	FTC	3TC	TDF	ATV/r	DRV/r	LPV/r	
1	0	1	1	1	3	3	4	3	4	4	4	4	4	4	4	3	0	0	0
2	3	3	2	4	4	3	4	4	4	4	4	4	4	2	2	3	0	0	0
3	4	4	4	3	4	0	4	0	3	3	3	4	4	4	2	0	0	0	0
4	4	4	4	2	4	3	4	4	4	4	4	4	4	4	4	3	0	0	0
5	0	1	1	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0
6	0	1	1	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0

DTG- Dolutegravir, EVG-efavirenz, RAL-raltegravir, CAB-cabotegravir, BIC-bictegravir, DOR-doravirine, EFV-efavirenz, ETV-etravirine, NVP-nevirapine, RPV-rilpivirine, ABC-abacavir, ZDV-zidovudine, d4T-stavudine, DDI-didanosine, FTC-emtricitabine, 3TC-lamivudine, TDF-tenofovir, ATV/r-atazanavir/ritonavir, DRV/r-darunavir/ritonavir, LPV/r-lopinavir/ritonavir. 0 (green) - Susceptible, 1 (blue) - Potential to Low resistance, 2 (yellow)-Low resistance, 3 (orange) -Intermediate resistance and 4 (red) - High-level resistance

D. Conclusion

- HIV viral suppression rate among adults in Tanzania is above 95 % achieving the third 95 of the 95-95-95 UNAIDS goal.
- A large proportion 71.5% of participants with high viremia in Tanzania have drug resistance mutations.
- These findings indicate that DTG resistance (although rare) should be suspected in clients experiencing high viremia after being switched to DTG based regimen.
- Therefore, routine HVL monitoring and HIV drug resistance surveillance, are necessary to inform the HIV treatment programmes.

Acknowledgment

