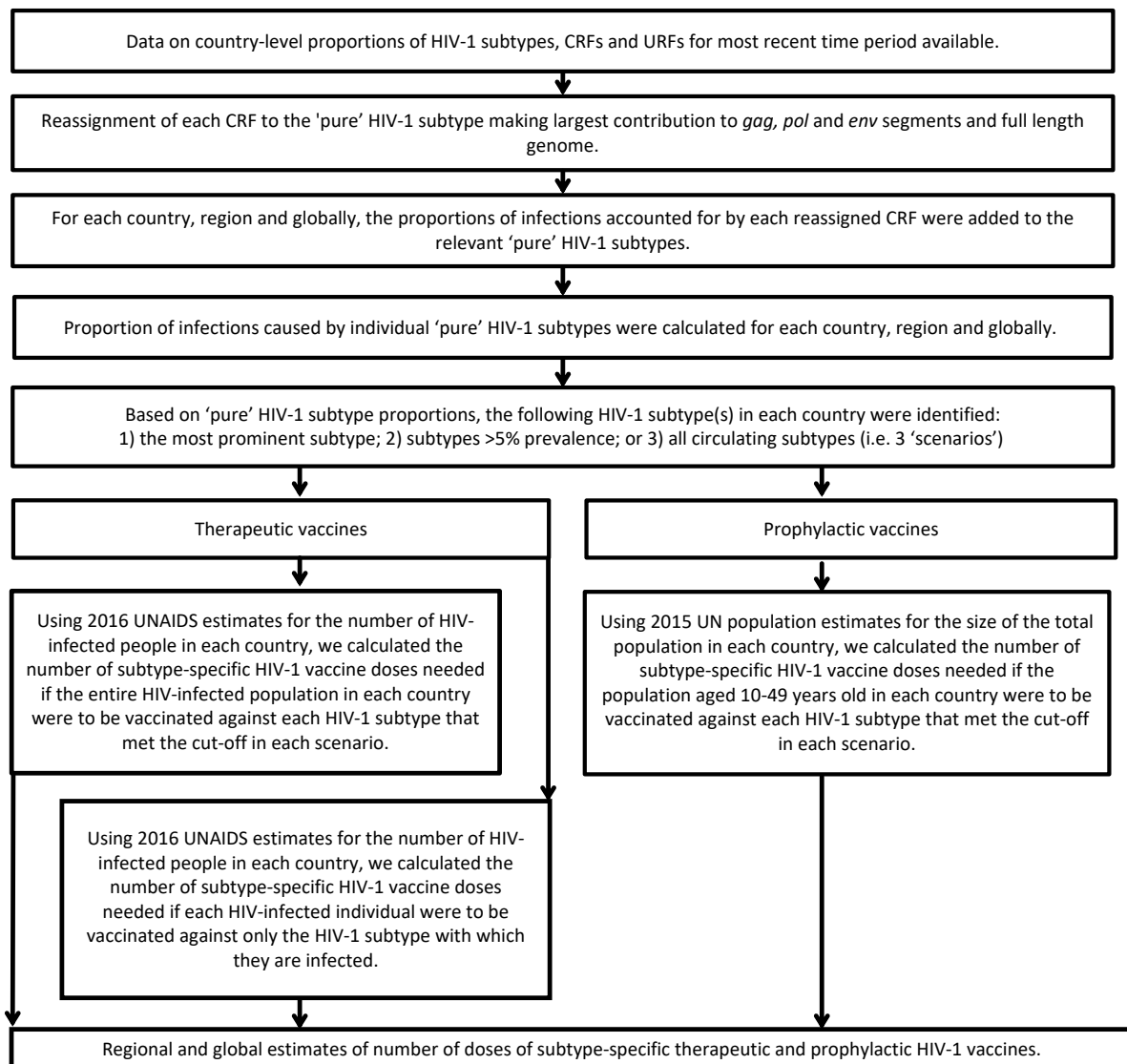


# **Global and regional estimates for subtype-specific therapeutic and prophylactic HIV-1 vaccines.**

## **Appendix**

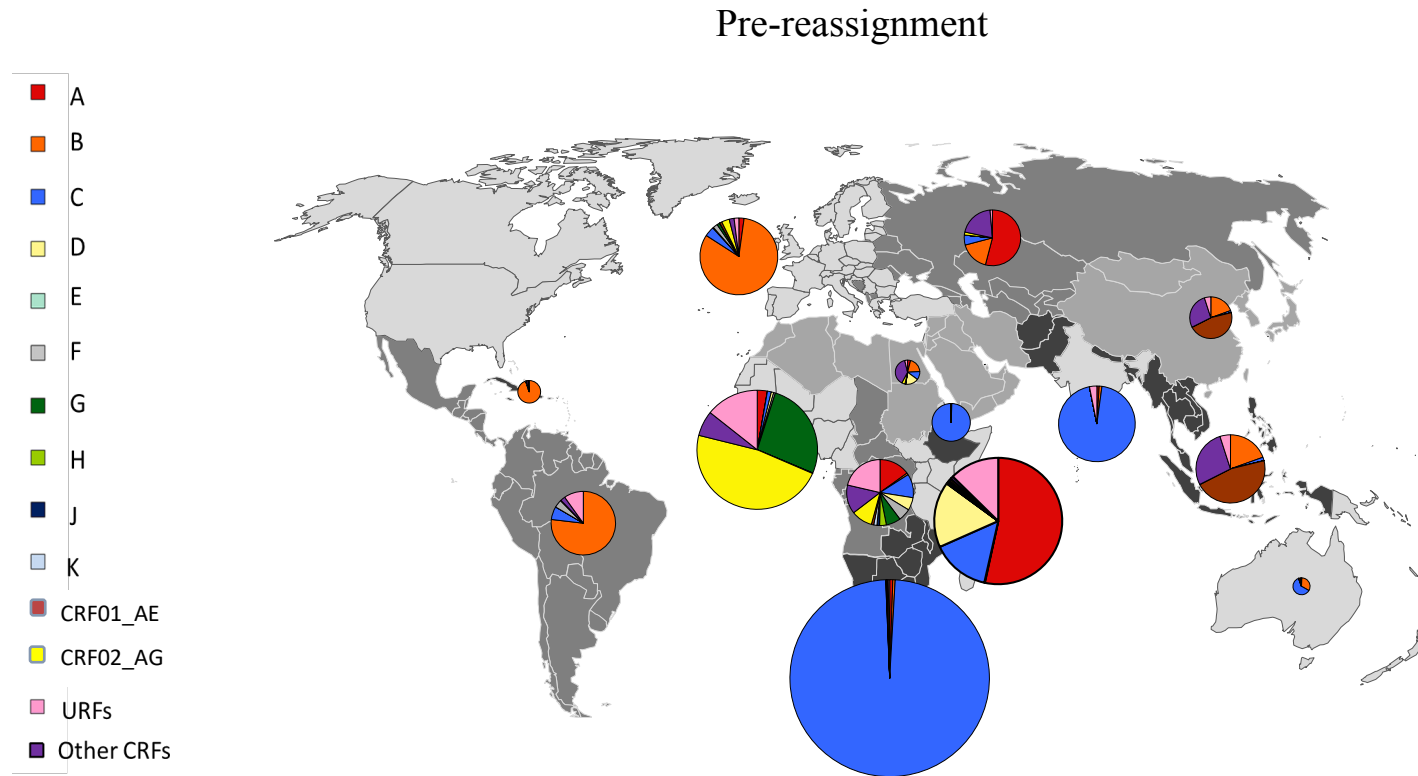
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**Supplementary Figure 1.**



**Supplementary Figure 1: Study flow diagram**

Supplementary Figure 2.



Supplementary Figure 2: Regional distribution of HIV-1 variants before reassignment of CRFs to 'pure' HIV-1 subtypes.

Supplementary Table 1.

	<i>gag</i>	<i>pol</i>	<i>env</i>	full-length
CRF01_AE	A	A	E	A
CRF02_AG	A	G	A	A
CRF03_AB	A	B	B	B
CRF04_cpx (1)	A	K	A	A
CRF05_DF	D	D	F	F
CRF06_cpx	A	G	G	G
CRF07_BC	C	C	C	C
CRF08_BC	C	C	C	C
CRF09_cpx (2)	A	G	A	A
CRF10_CD	D	D	D	D
CRF11_cpx	A	J	J	A
CRF12_BF	F	F	F	F
CRF13_cpx	G	G	A	G
CRF14_BG	G	G	B	G
CRF15_01B	CRF01_AE	CRF01_AE	B	CRF01_AE
CRF16_A2D	A2	A2	A2	A2
CRF17_BF	F	F	F	F
CRF18_cpx	A	G	H	A
CRF19_cpx	D	D	A	D
CRF20_BG	G	G	G	G
CRF21_A2D (3)	D	D	D	D
CRF22_01A1	CRF01_AE	A1	A1	A1
CRF23_BG	G	G	G	G
CRF24_BG	G	G	G	G
CRF25_cpx (4)	G	g	G	G
CRF26_AU	A	A	A	A
CRF27_cpx	G	J	CRF01_AE	G
CRF28_BF	F	B	B	B
CRF29_BF	F	F	B	B
CRF30_0206	n/a	n/a	n/a	n/a
CRF31_BC	C	C	C	C
CRF32_06A1	A	CRF06_cpx	CRF06_cpx	CRF06_cpx
CRF33_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF34_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF35_AD	A	A	A	A
CRF36_cpx	CRF01_AE	CRF02_AG	A	CRF02_AG
CRF37_cpx	A	A	A1	A
CRF38_BF1	F	F	F	F
CRF39_BF	B	B	F	B

CRF40_BF	F	F	F	F
CRF41_CD	D	D	D	D
CRF42_BF	F	B	B	B
CRF43_02G	G	CRF02_AG	G	G
CRF44_BF	F	F	F	F
CRF45_AKU	A	A	A	A
CRF46_BF1	F	F	F	F
CRF47_BF (5)	F	B	B	B
CRF48_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF49_cpx	A	C	J	J
CRF50_A1D (6)	D	A	D	A
CRF51_01B	B	B	CRF01_AE	B
CRF52_01B	CRF01_AE	CRF01_AE	B	CRF01_AE
CRF53_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF54_01B	B	B	CRF01_AE	B
CRF55_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF56_cpx	CRF02_AG	CRF02_AG	CRF02_AG	CRF02_AG
CRF57_BC	C	C	C	C
CRF58_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF59_01B	CRF01_AE	CRF01_AE	B	CRF01_AE
CRF60_BC	C	C	C	C
CRF61_BC	C	C	C	C
CRF62_BC	C	C	C	C
CRF63_02A1	CRF02_AG	CRF02_AG	CRF02_AG	CRF02_AG
CRF64_BC	C	C	C	C
CRF65_cpx	C	C	C	C
CRF67_01B	CRF01_AE	B	CRF01_AE	CRF01_AE
CRF68_01B	CRF01_AE	B	CRF01_AE	CRF01_AE
CRF69_01B	CRF01_AE	B	CRF01_AE	CRF01_AE
CRF70_BF	F	F	B	B
CRF71_BF	F	F	B	B
CRF72_BF	F	F	F	F
CRF73_BG	G	G	B	G
CRF74_01B	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF75_01B	n/a	n/a	n/a	n/a
CRF76_01B	B	B	CRF1	B
CRF77_cpx	n/a	n/a	n/a	n/a
CRF78_cpx	CRF01_AE	CRF01_AE	CRF01_AE	CRF01_AE
CRF79_0107	n/a	n/a	n/a	n/a
CRF80_0107	n/a	n/a	n/a	n/a
CRF81_cpx	n/a	n/a	n/a	n/a
CRF82_cpx	C	C	C	C

CRF83_cpx	C	C	CRF01_AE	C
CRF84_A1D	n/a	n/a	n/a	n/a
CRF85_BC	C	C	C	C
CRF86_BC	C	B	C	C
CRF87_cpx	C	C	C	C
CRF88_BC	C	C	C	C

**Supplementary Table 1: Reassignment of CRFs to ‘pure’ HIV-1 subtypes.**

CRFs were reassigned to ‘pure’ HIV-1 subtypes based on the subtype which made the largest contribution to each genome segment (*gag*, *pol*, *env*) or the whole genome. Reassignment was performed using genome data in the Los Alamos National Laboratory database (LANL) (<https://www.hiv.lanl.gov/content/sequence/HIV/CRFs/CRFs.html>) or based on primary literature where indicated by references.

“n/a” indicates CRFs for which there was no sequencing/subtype data available in the LANL database or in the literature.

**Supplementary Table 2.**

<b>Country</b>	<b>Time Period</b>	<b>Country</b>	<b>Time Period</b>
Lebanon	1990-1999	Cape Verde	2005-2009
Moldova (Republic of)	1990-1999	Chile	2005-2009
Norway	1990-1999	Djibouti	2005-2009
Sudan	1990-1999	Fiji	2005-2009
Belarus	2000-2004	Gabon	2005-2009
Denmark	2000-2004	Georgia	2005-2009
Ecuador	2000-2004	Ghana	2005-2009
Luxembourg	2000-2004	Japan	2005-2009
New Zealand	2000-2004	Latvia	2005-2009
Oman	2000-2004	Lesotho	2005-2009
Papua New Guinea	2000-2004	Madagascar	2005-2009
Paraguay	2000-2004	Mongolia	2005-2009
Uzbekistan	2000-2004	Pakistan	2005-2009
Azerbaijan	2000-2004	Singapore	2005-2009
Austria	2005-2009	Slovakia	2005-2009
Bangladesh	2005-2009	Uruguay	2005-2009
Bolivia	2005-2009	Zambia	2005-2009

**Supplementary Table 2. Time periods of country HIV-1 subtyping data.**

The time periods from which HIV-1 subtyping data was used for each country are displayed. For all countries not listed, data from the most recent time period (2010-2015) was used.

Supplementary Table 3.

A. Pre-reassignment

Region	Proportion (%) of HIV-1 infections attributed to HIV-1 variants													
	A	B	C	D	E	F	G	H	J	K	URFs	CRF01_AE	CRF02_AG	Other CRFs
Caribbean	0.34	94.41	0.40	0.18	n/a	0.01	0.43	0.07	0.01	0.00	1.64	0.02	0.07	2.42
Latin America	0.09	76.78	6.64	0.02	n/a	4.13	0.00	0.02	0.00	0.00	9.81	0.00	0.10	2.42
Western and Central Europe and North America	2.16	82.02	4.11	0.35	n/a	1.92	1.18	0.03	0.01	0.03	1.98	0.96	3.23	2.03
Eastern Europe & Central Asia	54.03	16.80	5.79	0.01	n/a	0.00	0.01	0.00	0.00	0.00	1.36	0.00	1.72	20.28
South Asia	0.96	1.18	94.76	0.00	n/a	0.00	0.00	0.00	0.00	0.00	3.11	0.00	0.00	0.00
South-East Asia	6.26	17.68	1.77	0.23	n/a	0.00	0.14	0.00	0.00	0.00	5.55	66.37	0.23	1.76
East Asia	0.04	19.40	1.64	0.01	n/a	0.01	0.04	0.00	0.00	0.00	4.92	46.25	0.12	27.57
Oceania	0.63	32.71	61.15	0.10	n/a	0.15	0.19	0.00	0.00	0.00	0.60	3.68	0.56	0.23
Middle East & North Africa	3.98	20.17	11.03	17.18	n/a	0.19	0.32	0.00	0.00	0.00	3.74	0.66	4.31	38.43
West Africa	2.69	0.02	1.05	0.66	n/a	0.46	26.51	0.05	0.00	0.00	14.26	0.09	47.40	6.83
East Africa	53.59	0.25	14.32	16.58	n/a	0.08	0.49	0.00	0.50	0.00	12.64	0.61	0.17	0.78
Ethiopia	0.57	0.00	99.43	0.00	n/a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central Africa	14.97	0.91	11.64	6.26	n/a	6.11	7.06	3.26	1.27	1.59	21.33	1.11	10.34	14.14
Southern Africa	0.50	0.38	98.47	0.06	n/a	0.04	0.10	0.00	0.01	0.00	0.23	0.00	0.09	0.10
Global	11.18	11.97	47.03	2.69	n/a	0.59	4.25	0.11	0.11	0.05	5.78	5.00	7.57	5.78

B. Full-length reassignment

Region	Proportion (%) of HIV-1 infections attributed to HIV-1 variants													
	A	B	C	D	E	F	G	H	J	K	URFs	Un-reassigned CRFs		
Caribbean	0.89	94.41	0.40	1.26	0.00	0.03	1.18	0.07	0.01	0.00	1.64	0.11		
Latin America	0.20	77.33	7.62	0.02	0.00	4.98	0.03	0.02	0.00	0.00	9.81	0.00		
Western and Central Europe and North America	6.60	82.37	4.19	0.38	0.00	2.21	2.04	0.03	0.01	0.03	1.98	0.16		
Eastern Europe & Central Asia	76.00	16.83	5.80	0.01	0.00	0.00	0.01	0.00	0.00	0.00	1.36	0.00		
South Asia	0.96	1.18	94.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.11	0.00		
South-East Asia	74.40	17.72	1.94	0.24	0.00	0.00	0.15	0.00	0.00	0.00	5.55	0.00		
East Asia	47.02	19.40	28.60	0.01	0.00	0.01	0.04	0.00	0.00	0.00	4.92	0.00		
Oceania	4.98	32.72	61.21	0.10	0.00	0.18	0.22	0.00	0.00	0.00	0.60	0.00		
Middle East & North Africa	41.55	20.29	11.09	17.18	0.00	0.19	5.94	0.00	0.00	0.00	3.74	0.00		
West Africa	52.61	0.02	1.05	0.67	0.00	0.63	30.71	0.05	0.01	0.00	14.26	0.00		
East Africa	54.51	0.25	14.34	17.13	0.00	0.08	0.56	0.00	0.50	0.00	12.64	0.00		
Ethiopia	0.57	0.00	99.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Central Africa	35.09	1.11	11.69	6.61	0.00	6.19	11.85	3.26	1.27	1.59	21.33	0.00		
Southern Africa	0.64	0.38	98.47	0.12	0.00	0.04	0.10	0.00	0.01	0.00	0.23	0.00		
Global	24.79	12.02	49.06	2.54	0.00	0.67	5.05	0.11	0.09	0.05	5.62	0.01		



C. *gag* reassignment

Region	Proportion (%) of HIV-1 infections attributed to HIV-1 variants											URFs	Un-reassigned CRFs
	A	B	C	D	E	F	G	H	J	K			
Caribbean	0.89	94.41	0.40	1.28	0.00	0.01	1.18	0.07	0.01	0.00	1.64	0.11	
Latin America	0.49	76.87	7.62	0.06	0.00	5.14	0.00	0.02	0.00	0.00	9.81	0.00	
Western and Central Europe and North America	7.13	82.02	4.19	0.38	0.00	2.49	1.57	0.03	0.01	0.03	1.98	0.16	
Eastern Europe & Central Asia	76.02	16.80	5.80	0.01	0.00	0.00	0.01	0.00	0.00	0.00	1.36	0.00	
South Asia	0.96	1.18	94.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.11	0.00	
South-East Asia	74.41	17.72	1.94	0.24	0.00	0.00	0.15	0.00	0.00	0.00	5.55	0.00	
East Asia	47.02	19.40	28.60	0.01	0.00	0.01	0.04	0.00	0.00	0.00	4.92	0.00	
Oceania	5.00	32.71	61.21	0.10	0.00	0.18	0.20	0.00	0.00	0.00	0.60	0.00	
Middle East & North Africa	47.16	20.17	11.09	17.18	0.00	0.32	0.34	0.00	0.00	0.00	3.74	0.00	
West Africa	56.56	0.02	1.05	0.75	0.00	0.56	26.77	0.05	0.00	0.00	14.26	0.00	
East Africa	54.48	0.25	14.34	17.22	0.00	0.08	0.49	0.00	0.50	0.00	12.64	0.00	
Ethiopia	0.57	0.00	99.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Central Africa	35.46	0.91	11.69	6.70	0.00	6.11	11.69	3.26	1.27	1.59	21.33	0.00	
Southern Africa	0.64	0.38	98.47	0.12	0.00	0.04	0.10	0.00	0.01	0.00	0.23	0.00	
Global	25.44	11.97	49.06	2.57	0.00	0.68	4.41	0.11	0.09	0.05	5.62	0.01	

D. *pol* reassignment

Region	Proportion (%) of HIV-1 infections attributed to HIV-1 variants											URFs	Un-reassigned CRFs
	A	B	C	D	E	F	G	H	J	K			
Caribbean	0.36	94.41	0.40	1.28	0.00	0.01	1.71	0.07	0.01	0.00	1.64	0.11	
Latin America	0.10	77.33	7.62	0.06	0.00	4.94	0.14	0.02	0.00	0.00	9.81	0.00	
Western and Central Europe and North America	3.24	82.37	4.19	0.38	0.00	2.20	5.36	0.03	0.05	0.04	1.98	0.16	
Eastern Europe & Central Asia	74.27	16.83	5.80	0.01	0.00	0.00	1.73	0.00	0.00	0.00	1.36	0.00	
South Asia	0.96	1.18	94.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.11	0.00	
South-East Asia	74.16	17.72	1.94	0.24	0.00	0.00	0.39	0.00	0.00	0.00	5.55	0.00	
East Asia	46.73	19.57	28.60	0.01	0.00	0.01	0.17	0.00	0.00	0.00	4.92	0.00	
Oceania	4.42	32.72	61.21	0.10	0.00	0.18	0.77	0.00	0.00	0.00	0.60	0.00	
Middle East & North Africa	37.25	20.17	11.09	17.18	0.00	0.32	10.25	0.00	0.00	0.00	3.74	0.00	
West Africa	3.77	0.02	1.05	0.75	0.00	0.56	78.69	0.05	0.86	0.00	14.26	0.00	
East Africa	54.34	0.25	14.34	17.13	0.00	0.08	0.73	0.00	0.50	0.00	12.64	0.00	
Ethiopia	0.57	0.00	99.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Central Africa	19.29	1.11	11.69	6.70	0.00	6.11	24.76	3.26	4.16	1.59	21.33	0.00	
Southern Africa	0.52	0.38	98.47	0.12	0.00	0.04	0.22	0.00	0.01	0.00	0.23	0.00	
Global	16.88	12.03	49.07	2.55	0.00	0.66	12.74	0.11	0.30	0.05	5.62	0.01	

E. *env* reassignment

Region	Proportion (%) of HIV-1 infections attributed to HIV-1 variants											URFs	Un-reassigned CRFs
	A	B	C	D	E	F	G	H	J	K			
Caribbean	1.50	94.41	0.40	0.18	0.02	0.03	1.18	0.53	0.01	0.00	1.64	0.11	
Latin America	0.19	77.25	7.62	0.02	0.00	5.07	0.03	0.02	0.00	0.00	9.81	0.00	
Western and Central Europe and North America	5.56	82.74	4.19	0.35	0.97	2.21	1.70	0.06	0.04	0.03	1.98	0.16	
Eastern Europe & Central Asia	76.00	16.83	5.80	0.01	0.00	0.00	0.01	0.00	0.00	0.00	1.36	0.00	
South Asia	0.96	1.18	94.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.11	0.00	
South-East Asia	6.55	17.83	1.94	0.24	67.75	0.00	0.14	0.00	0.00	0.00	5.55	0.00	
East Asia	0.16	19.42	28.60	0.01	46.83	0.01	0.04	0.01	0.00	0.00	4.92	0.00	
Oceania	1.19	32.83	61.21	0.10	3.68	0.18	0.22	0.00	0.00	0.00	0.60	0.00	
Middle East & North Africa	40.91	20.29	11.09	17.18	0.66	0.19	5.94	0.00	0.00	0.00	3.74	0.00	
West Africa	51.65	0.07	1.05	0.66	0.09	0.63	30.55	0.18	0.86	0.00	14.26	0.00	
East Africa	53.80	0.25	14.34	17.22	0.61	0.08	0.56	0.00	0.50	0.00	12.64	0.00	
Ethiopia	0.57	0.00	99.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Central Africa	30.92	1.16	11.69	6.37	1.16	6.19	9.90	5.52	4.16	1.59	21.33	0.00	
Southern Africa	0.63	0.38	98.47	0.12	0.00	0.04	0.10	0.00	0.01	0.00	0.23	0.00	
Global	19.24	12.06	49.06	2.53	5.31	0.68	4.95	0.20	0.30	0.05	5.62	0.01	

**Supplementary Table 3. Global and regional HIV-1 subtype distributions before and after reassignment of CRFs to ‘pure’ HIV-1 subtypes.**

Proportions of HIV-1 subtypes in each region and globally, based on the most recent available data for each country, before reassignment (A) or after reassignment of CRFs to ‘pure’ HIV-1 subtypes based on full-length sequence (B) or genome regions *gag* (C), *pol* (D), and *env* (E). Un-reassigned CRFs are CRFs for which reassignment was not possible as no relevant data was available (see Supplementary Table 1). This data underlies Figures 1 and 2 and Supplementary Figure 2.

Supplementary Table 4.

		Subtype-specific doses per region or globally (millions)										
Type of vaccine	Region	A	B	C	D	E	F	G	H	J	K	Total
Therapeutic	Caribbean	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29
	Latin America	0.00	1.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.73
	Western and Central Europe and North America	0.02	2.04	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	2.12
	Eastern Europe & Central Asia	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.51
	South Asia	0.00	0.00	1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.74
	South-East Asia	1.86	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92
	East Asia	0.88	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92
	Oceania	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
	Middle East & North Africa	0.07	0.03	0.00	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.16
	West Africa	4.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.44
	East Africa	4.82	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.91
	Ethiopia	0.00	0.00	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71
	Central Africa	0.66	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.94
	Southern Africa	0.00	0.00	13.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.61
Global	14.25	4.22	16.50	0.06	0.00	0.02	0.06	0.00	0.00	0.00	0.00	35.10
Prophylactic	Caribbean	0.00	22.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.17
	Latin America	0.00	364.37	0.00	0.00	0.00	1.50	0.00	0.00	0.00	0.00	365.87
	Western and Central Europe and North America	38.99	419.36	0.00	0.00	0.00	1.48	40.41	0.00	0.00	0.00	500.24
	Eastern Europe & Central Asia	144.33	4.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	148.57
	South Asia	0.00	0.00	828.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	828.76
	South-East Asia	447.18	63.81	106.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	617.52
	East Asia	850.66	90.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	940.69
	Oceania	0.00	15.32	5.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.80
	Middle East & North Africa	56.34	31.20	0.00	23.24	0.00	0.00	24.56	0.00	0.00	0.00	135.33
	West Africa	173.71	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00	0.00	174.06
	East Africa	111.05	0.00	6.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	117.31
	Ethiopia	0.00	0.00	61.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.29
	Central Africa	76.20	0.00	21.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.72
	Southern Africa	0.00	0.00	87.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	87.05
Global	1898.45	1010.52	1116.87	23.24	0.00	2.97	65.31	0.00	0.00	0.00	0.00	4,117.36

Supplementary Table 4. Regional and global estimates of number of doses of subtype-specific therapeutic and prophylactic HIV-1 vaccines.

Estimates are based on the ‘most common subtype’ scenario and CRFs reassigned based on the full-length genome. This data underlies Figure 4.

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