

[10.1071/SH23134](https://doi.org/10.1071/SH23134)

Sexual Health

Supplementary Material

Rates of sexual partner acquisition from nationally representative surveys: variation between countries and by age, sex, wealth, partner and HIV status

Clara Calvert^{A,B}, Rachel Scott^A, Melissa Palmer^A, Albert Dube^C, Milly Marston^A, Kaye Wellings^D, and Emma Slaymaker^{A,}*

^AFaculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, UK.

^BUsher Institute, University of Edinburgh, Edinburgh, UK.

^CMalawi Epidemiological and Intervention Research Unit, Lilongwe, Malawi.

^DFaculty of Public Health and Policy, London School of Hygiene and Tropical Medicine, London, UK.

*Correspondence to: Emma Slaymaker London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK Email: emma.slaymaker@lshtm.ac.uk

Supplementary Material

Supplementary Results

Considerations around censoring for incomplete observations

Supplementary Table S2 shows data for people who reported more than three partners in the last year from the most recent survey in each country. The table describes three aspects of the data: the amount of person time for which partnerships were not observed for respondents with more than three partners in the last year, the number of partners that were omitted from the partner history as a result of the three partner limit and the extent of overlaps in the partnerships reported.

For many of these respondents, the date of sex with the third last partner was in the recent past so that the amount of person time prior to that date is substantial: 74% of the person time (3,793 out of 5,139 years) for the 5,365 people with 3+ partners was 'unobserved'. The gap between the total number of respondents and the total person time available for analysis is due to inconsistencies in the partner history. We included those person years in our analysis which will have led to an underestimate of the partner acquisition rates (PAR) due to unobserved acquisitions in this time.

Based on the total number of partners reported, there were 24,025 partners for whom no data was collected in the partner history. Not all of those will have been acquired in the past year. For the partners that were included in the partner history, 10,679 out of 16,095 were acquired in the last year. As we go further back in time a smaller proportion will have been acquired in the year before the survey. An upper limit for the unobserved acquisitions would therefore be around 15,000 acquisitions. In total, we have observed 204,196 acquisitions. Simply removing 3,793 person years from the denominator changes the overall acquisition rate from 18.32 per 100 person years to 18.38/100py. Adding in 15,000 acquisitions to the numerator makes the rate 19.7/100py. This large increase suggests that the rate of partner acquisition in the observed time is not sufficient to achieve the reported high number of acquisitions in a 12-month period. This may be because the partner history missed some acquisitions in the observed period, either due to selective or random under reporting of partners. Alternatively, some of the highest reported partner totals for the year before the survey may be too high. Adding around 1000 acquisitions to the numerator would give a rate consistent with the change in the rates achieved by the removal of the person years. This suggests that, across all the surveys, the limit in the partner history has led to the omission from the numerator of between one to two thousand acquisitions which is a very small proportion of the total number observed.

A more appropriate censoring strategy could be used if the partnerships were reported in the order in which they were acquired. However, only 16% of the respondents with more than three partners reported partnerships where there was no overlap. With no overlap, the order of reporting was the same as the order in which partners were acquired. Limiting the number of partners that can be reported, whilst also collecting in reverse chronological order of last sex, precludes proper analysis. The questionnaire is designed this way to recall for respondents and the design was initially established for paper-based enquiries. With computerised data collection improvements might be possible. Simply collecting data on all partners in the past year is problematic, because people cannot remember and the quality of information is likely to decline with a larger number of partners. For people with more than three partners it would be better to attempt to enumerate all the partners in a much shorter timeframe and allowing that time frame to vary according to the timing of the third most recent partner such that the recall period is shortest for the respondents who report three partners in the few weeks before the survey.

Supplementary Tables

Supplementary Table S1: Categorisation of countries into regions for analyses

Region	Countries	Data available on HIV from DHS
East and Southern Africa	Burundi	Yes
	Comoros	No
	Ethiopia	Yes
	Kenya	No
	Lesotho	Yes
	Madagascar	No
	Malawi	No
	Mozambique	Yes
	Namibia	No
	Rwanda	Yes
	South Africa	No
	Uganda	Yes
	Zambia	No
	Zimbabwe	No
West and Central Africa	Angola	Yes
	Benin	No
	Burkina Faso	Yes
	Cameroon	Yes
	Chad	Yes
	Côte d'Ivoire	Yes
	Congo	No
	DR Congo	Yes
	Gabon	Yes
	Gambia	Yes
	Ghana	No
	Guinea	Yes
	Liberia	Yes
	Mali	Yes
	Niger	No
	Nigeria	No
	Senegal	Yes
Sierra Leone	Yes	
Togo	No	
Elsewhere	Albania	No
	Armenia	No
	Cambodia	No
	Colombia	No
	Dominican Republic	Yes
	East Timor	No
	Guatemala	No
	Haiti	Yes
	India	Yes
	Kyrgyzstan	No
	Nepal	No
	Papua New Guinea	No
	Philippines	No
Tajikistan	No	

Supplementary Table S2: Information on partnership reporting among respondents who reported having more than three partners by survey

Survey	Person years	Person years prior to last sex with 3rd partner	Acquisitions observed in 12 months prior to survey	Number of respondents	Total number of partners in last year	Proportion of people with no overlapping partnerships
Angola 2015	116	89	212	116	725	0.31
Armenia 2016	2	0	6	2	17	0.00
Benin 2018	158	123	228	158	944	0.22
Burkina Faso 2010	33	25	44	33	178	0.27
Burundi 2016	6	5	13	6	33	0.17
Cambodia 2014	11	7	27	11	76	0.09
Cameroon 2018	264	183	519	264	1703	0.18
Chad 2015	30	25	28	30	190	0.40
Colombia 2015	1044	842	2398	1264	9387	0.11
Comoros 2012	12	10	21	13	115	0.15
Congo 2011	162	114	336	162	1124	0.19
Côte d'Ivoire 2012	207	147	413	207	1422	0.18
DR Congo 2013	254	169	501	254	1830	0.19
Dominican Rep 2013	529	381	1136	529	4366	0.13
East Timor 2016	9	7	17	9	238	0.11
Ethiopia 2016	16	13	32	16	127	0.25
Gabon 2012	183	128	396	186	1387	0.18
Gambia 2020	13	10	31	13	75	0.08
Ghana 2014	39	26	85	39	218	0.10
Guatemala 2015	106	72	199	106	827	0.12
Guinea 2018	17	13	24	17	120	0.18
Haiti 2017	436	333	897	436	3580	0.20
India 2019	26	20	72	26	214	0.19
Kenya 2014	76	50	160	76	612	0.04
Kyrgyzstan 2012	38	23	103	38	239	0.00
Lesotho 2014	86	61	174	87	873	0.17
Liberia 2019	106	75	213	106	765	0.18
Madagascar 2021	273	190	672	273	2184	0.11
Malawi 2015	84	60	202	84	707	0.14
Mali 2012	20	15	29	20	132	0.35
Mozambique 2015	48	38	91	48	290	0.25
Namibia 2013	20	14	45	20	144	0.10
Nepal 2016	9	6	21	9	69	0.00
Niger 2012	7	7	10	7	36	0.29
Nigeria 2018	115	83	222	115	834	0.16
Papua New Guinea 2016	40	25	80	40	238	0.15
Rwanda 2020	35	24	74	35	313	0.11
Senegal 2016	6	4	9	6	43	0.00
Sierra Leone 2013	133	112	169	133	747	0.31
South Africa 2016	46	31	97	46	392	0.15
Togo 2014	50	38	90	50	313	0.24
Uganda 2016	101	75	205	101	703	0.20

Zambia 2018	113	82	233	113	976	0.14
Zimbabwe 2010	52	33	122	52	431	0.27
Zimbabwe 2015	9	6	23	9	183	0.00
Total	5139	3793	10679	5365	40120	0.16

Supplementary Table S3: Age-adjusted hazard ratios for partner acquisitions rates in men, comparing the poorest, poor, rich and richest men to men in the middle wealth quintile

	Poorest			Poor			Middle Hazard Ratio (baseline)	Rich			Richest		
	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound		Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound
Albania 2017	1.00	0.76	1.30	1.15	0.92	1.44	1	1.08	0.84	1.37	1.46	1.15	1.87
Angola 2015	0.71	0.60	0.84	0.88	0.75	1.03	1	1.04	0.85	1.27	0.91	0.75	1.09
Armenia 2016	0.69	0.48	0.98	0.65	0.47	0.90	1	0.94	0.68	1.31	0.96	0.68	1.34
Benin 2018	0.75	0.61	0.91	0.80	0.68	0.94	1	1.07	0.92	1.24	1.27	1.08	1.49
Burkina Faso 2010	0.80	0.61	1.03	0.95	0.76	1.19	1	1.24	0.99	1.54	1.80	1.47	2.20
Burundi 2016	1.23	0.82	1.83	1.31	0.90	1.90	1	1.47	0.99	2.17	1.75	1.22	2.51
Cambodia 2014	0.93	0.56	1.52	0.63	0.38	1.03	1	1.22	0.79	1.89	2.21	1.50	3.26
Cameroon 2018	0.31	0.24	0.42	0.78	0.65	0.93	1	1.07	0.93	1.22	1.21	1.07	1.36
Chad 2015	1.47	1.04	2.06	1.56	1.14	2.14	1	1.68	1.21	2.33	2.73	2.05	3.62
Colombia 2015	0.81	0.75	0.88	0.99	0.91	1.08	1	0.88	0.78	0.99	0.90	0.81	1.01
Comoros 2012	0.97	0.65	1.46	0.91	0.66	1.25	1	1.07	0.80	1.42	1.25	0.93	1.68
Congo 2011	0.86	0.74	1.01	1.01	0.87	1.19	1	0.93	0.78	1.11	0.93	0.78	1.10
Côte d'Ivoire 2012	0.88	0.68	1.15	0.92	0.76	1.12	1	1.08	0.92	1.26	1.46	1.23	1.73
DR Congo 2013	0.90	0.77	1.05	0.85	0.71	1.01	1	1.04	0.88	1.23	0.89	0.75	1.06
Dominican Rep 2013	1.04	0.95	1.14	0.99	0.88	1.11	1	1.01	0.91	1.13	0.98	0.85	1.13
East Timor 2016	0.72	0.53	0.96	0.95	0.74	1.23	1	1.14	0.91	1.41	1.43	1.10	1.85
Ethiopia 2016	1.01	0.72	1.42	1.37	1.02	1.85	1	1.57	1.14	2.15	2.09	1.60	2.73
Gabon 2012	0.98	0.85	1.12	1.04	0.88	1.22	1	0.90	0.77	1.06	1.04	0.88	1.22
Gambia 2020	0.71	0.51	0.99	0.82	0.60	1.12	1	1.11	0.87	1.42	1.29	0.97	1.72
Ghana 2014	0.42	0.32	0.56	0.77	0.61	0.96	1	0.93	0.74	1.17	0.92	0.72	1.18
Guatemala 2015	0.53	0.43	0.66	0.81	0.67	0.98	1	1.04	0.88	1.23	1.28	1.08	1.51
Guinea 2018	1.08	0.80	1.46	1.13	0.86	1.49	1	1.31	0.99	1.73	1.45	1.11	1.90
Haiti 2017	0.64	0.55	0.73	0.82	0.72	0.92	1	1.11	1.00	1.23	1.21	1.09	1.35
India 2019	1.18	1.10	1.26	1.09	1.02	1.16	1	1.03	0.96	1.11	0.93	0.86	1.01
Kenya 2014	0.90	0.78	1.04	0.96	0.84	1.10	1	1.02	0.88	1.18	1.01	0.86	1.18
Kyrgyzstan 2012	1.14	0.81	1.61	1.38	1.00	1.90	1	1.60	1.18	2.16	1.55	1.06	2.28
Lesotho 2014	0.82	0.68	1.00	0.96	0.79	1.16	1	1.15	0.96	1.37	1.19	0.98	1.43
Liberia 2019	0.91	0.77	1.07	0.91	0.75	1.09	1	0.98	0.78	1.24	0.82	0.64	1.04
Madagascar 2021	1.27	1.10	1.46	1.17	1.03	1.32	1	1.00	0.88	1.13	0.97	0.84	1.12
Malawi 2015	0.99	0.84	1.16	0.94	0.81	1.10	1	1.08	0.93	1.26	1.02	0.88	1.17

	Poorest			Poor			Middle Hazard Ratio (baseline)	Rich			Richest		
	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound		Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound
Mali 2012	0.82	0.60	1.11	0.77	0.59	1.01	1	1.01	0.74	1.38	1.23	0.95	1.58
Mozambique 2015	0.90	0.74	1.11	0.96	0.82	1.12	1	0.95	0.80	1.12	1.19	1.00	1.42
Namibia 2013	0.93	0.75	1.15	0.92	0.78	1.09	1	1.00	0.85	1.18	1.06	0.87	1.28
Nepal 2016	0.86	0.65	1.14	0.78	0.57	1.05	1	0.94	0.71	1.24	0.90	0.67	1.20
Niger 2012	0.51	0.23	1.14	1.14	0.56	2.34	1	1.18	0.64	2.18	2.46	1.47	4.13
Nigeria 2018	0.95	0.81	1.12	1.03	0.89	1.20	1	1.09	0.96	1.24	1.06	0.92	1.23
Papua New Guinea 2016	0.90	0.65	1.24	1.03	0.84	1.26	1	1.26	1.05	1.53	1.68	1.31	2.15
Rwanda 2020	0.99	0.77	1.28	0.76	0.59	0.98	1	1.18	0.93	1.50	1.28	1.02	1.60
Senegal 2016	0.78	0.54	1.11	0.81	0.57	1.15	1	0.83	0.58	1.19	1.08	0.69	1.68
Sierra Leone 2013	0.95	0.79	1.14	0.92	0.79	1.08	1	1.27	1.08	1.51	1.38	1.16	1.63
South Africa 2016	0.90	0.77	1.07	0.95	0.81	1.13	1	1.03	0.88	1.22	0.89	0.70	1.13
Togo 2014	0.75	0.60	0.93	0.86	0.68	1.09	1	0.93	0.75	1.15	1.29	1.05	1.57
Uganda 2016	0.76	0.63	0.91	0.84	0.71	0.99	1	1.01	0.85	1.20	1.04	0.89	1.22
Zambia 2018	0.87	0.77	0.99	1.03	0.92	1.16	1	0.85	0.75	0.97	0.73	0.65	0.83
Zimbabwe 2010	0.89	0.72	1.09	0.88	0.73	1.06	1	0.95	0.76	1.18	0.99	0.82	1.19

Supplementary Table S4: Age-adjusted hazard ratios for partner acquisitions rates in women, comparing the poorest, poor, rich and richest women to women in the middle wealth quintile

	Poorest			Poor			Middle Hazard Ratio (baseline)	Rich			Richest		
	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound		Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound
Albania 2017	0.98	0.71	1.36	1.06	0.75	1.51	1	0.74	0.52	1.05	0.84	0.53	1.33
Angola 2015	0.68	0.58	0.79	0.99	0.86	1.14	1	0.76	0.63	0.90	0.83	0.69	0.99
Armenia 2016	0.68	0.44	1.05	0.77	0.54	1.11	1	0.96	0.66	1.40	0.70	0.44	1.12
Benin 2018	0.83	0.69	0.98	0.94	0.82	1.09	1	0.97	0.83	1.14	1.14	0.98	1.32
Burkina Faso 2010	0.70	0.52	0.94	1.07	0.84	1.36	1	1.32	1.05	1.66	2.04	1.64	2.55
Burundi 2016	1.53	1.20	1.95	1.14	0.88	1.48	1	1.12	0.84	1.49	1.47	1.17	1.84
Cambodia 2014	0.84	0.61	1.15	0.91	0.67	1.22	1	0.90	0.65	1.24	0.90	0.69	1.19
Cameroon 2018	0.59	0.48	0.73	0.85	0.73	0.99	1	1.12	0.98	1.29	1.15	0.98	1.35
Chad 2015	1.54	1.08	2.18	1.23	0.88	1.71	1	1.28	0.91	1.80	2.63	1.97	3.51
Colombia 2015	0.69	0.62	0.77	1.01	0.91	1.12	1	0.92	0.83	1.03	0.98	0.85	1.14
Comoros 2012	0.65	0.44	0.96	0.87	0.62	1.22	1	0.86	0.62	1.20	0.60	0.44	0.80
Congo 2011	0.85	0.70	1.03	1.15	0.93	1.42	1	0.89	0.71	1.11	0.91	0.73	1.14
Côte d'Ivoire 2012	0.64	0.49	0.85	0.76	0.61	0.95	1	1.00	0.79	1.27	1.38	1.14	1.66
DR Congo 2013	1.35	1.11	1.63	1.03	0.87	1.22	1	1.13	0.95	1.35	0.97	0.82	1.14
Dominican Rep 2013	1.14	0.93	1.41	0.88	0.71	1.08	1	0.98	0.80	1.21	0.77	0.63	0.95
East Timor 2016	0.63	0.47	0.85	0.94	0.79	1.11	1	1.14	0.96	1.35	1.29	1.06	1.57
Ethiopia 2016	1.01	0.76	1.34	0.90	0.69	1.18	1	1.10	0.86	1.42	1.18	0.92	1.52
Gabon 2012	0.94	0.79	1.12	1.03	0.86	1.23	1	0.78	0.64	0.96	0.92	0.73	1.15
Gambia 2020	0.89	0.70	1.13	0.87	0.67	1.12	1	0.81	0.62	1.05	0.95	0.74	1.22
Ghana 2014	0.40	0.31	0.52	0.73	0.59	0.89	1	0.88	0.73	1.07	0.76	0.63	0.92
Guatemala 2015	0.72	0.59	0.90	0.98	0.81	1.17	1	1.13	0.93	1.37	1.43	1.19	1.71
Guinea 2018	0.80	0.63	1.00	0.73	0.60	0.90	1	0.99	0.80	1.23	1.11	0.89	1.38
Haiti 2017	0.69	0.56	0.84	0.85	0.71	1.00	1	1.14	0.97	1.34	1.20	1.02	1.42
India 2019	1.10	1.01	1.20	1.08	1.00	1.18	1	0.87	0.79	0.97	0.76	0.67	0.85
Kenya 2014	0.69	0.55	0.86	0.82	0.66	1.01	1	1.19	0.97	1.45	1.28	1.05	1.57
Kyrgyzstan 2012	1.28	0.86	1.92	0.88	0.56	1.36	1	1.30	0.86	1.94	1.85	1.24	2.76

	Poorest			Poor			Middle	Rich			Richest		
	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio (baseline)	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound
Lesotho 2014	0.90	0.74	1.10	1.08	0.90	1.29	1	1.16	0.98	1.38	1.17	0.97	1.42
Liberia 2019	0.89	0.73	1.10	0.93	0.77	1.13	1	1.15	0.94	1.40	1.01	0.83	1.21
Madagascar 2021	1.09	0.96	1.24	0.97	0.86	1.08	1	0.88	0.78	1.00	0.75	0.65	0.87
Malawi 2015	1.26	1.09	1.45	1.17	1.02	1.33	1	1.04	0.92	1.19	1.06	0.93	1.21
Mali 2012	0.78	0.60	1.03	0.87	0.64	1.18	1	1.24	0.90	1.70	1.17	0.88	1.56
Mozambique 2015	1.55	1.21	1.99	1.11	0.89	1.39	1	1.46	1.15	1.87	1.49	1.20	1.86
Namibia 2013	0.78	0.65	0.93	0.91	0.77	1.07	1	1.27	1.07	1.50	1.13	0.97	1.33
Nepal 2016	1.02	0.81	1.28	0.98	0.78	1.23	1	0.92	0.73	1.16	0.83	0.66	1.05
Niger 2012	0.90	0.60	1.36	0.91	0.60	1.36	1	1.32	0.94	1.85	1.56	1.14	2.15
Nigeria 2018	0.61	0.53	0.70	0.85	0.76	0.95	1	1.16	1.04	1.31	1.05	0.92	1.20
Papua New Guinea 2016	1.38	1.04	1.84	1.03	0.81	1.33	1	1.42	1.12	1.79	1.60	1.19	2.16
Philippines 2017	0.77	0.63	0.95	0.88	0.71	1.10	1	0.73	0.57	0.93	0.54	0.42	0.71
Rwanda 2020	1.13	0.94	1.36	1.08	0.89	1.32	1	1.05	0.87	1.28	1.02	0.82	1.26
Senegal 2016	1.05	0.80	1.38	0.95	0.73	1.23	1	0.89	0.66	1.21	0.80	0.56	1.15
Sierra Leone 2013	1.03	0.88	1.21	0.94	0.80	1.10	1	1.23	1.07	1.40	1.44	1.16	1.79
South Africa 2016	1.05	0.89	1.24	0.97	0.83	1.14	1	0.97	0.83	1.14	0.84	0.69	1.03
Tajikistan 2017	0.78	0.61	0.99	1.02	0.85	1.23	1	1.15	0.94	1.39	0.94	0.76	1.17
Togo 2014	0.57	0.45	0.73	0.86	0.69	1.08	1	1.25	1.01	1.56	1.26	1.02	1.55
Uganda 2016	0.88	0.77	1.01	0.90	0.78	1.03	1	1.06	0.93	1.21	0.90	0.78	1.03
Zambia 2018	0.86	0.74	1.01	0.87	0.74	1.02	1	0.99	0.80	1.23	0.89	0.76	1.04
Zimbabwe 2015	0.79	0.61	1.01	0.99	0.79	1.25	1	1.04	0.83	1.31	0.81	0.64	1.04

Supplementary Table S5: Age-adjusted hazard ratios for partner acquisition rates in men, comparing men cohabiting with a partner and men with a non-cohabiting partner to men without a partner. Empty cells indicate there were too few acquisitions to estimate the hazard ratio.

	No partner	Non-cohabiting partner only			Cohabiting partner only			Both cohabiting and non-cohabiting partners		
	Hazard Ratio (baseline)	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound
Albania 2017	1	-	-	-	0.11	0.07	0.17	0.01	0.01	0.03
Angola 2015	1	0.21	0.14	0.31	0.46	0.40	0.52	0.17	0.14	0.21
Armenia 2016	1	0.03	0.00	0.23	0.23	0.16	0.34	0.04	0.03	0.06
Benin 2018	1	0.17	0.12	0.23	0.46	0.40	0.54	0.20	0.17	0.23
Burkina Faso 2010	1	0.20	0.10	0.40	0.76	0.62	0.92	0.26	0.21	0.32
Burundi 2016	1	0.41	0.18	0.92	1.00	0.69	1.46	0.06	0.05	0.09
Cambodia 2014	1	1.87	0.70	5.04	3.13	1.87	5.23	0.44	0.29	0.67
Cameroon 2018	1	0.29	0.21	0.39	0.72	0.64	0.82	0.21	0.18	0.24
Chad 2015	1	0.37	0.13	1.05	0.72	0.52	0.99	0.41	0.32	0.53
Colombia 2015	1	0.12	0.10	0.16	0.37	0.35	0.40	0.07	0.06	0.08
Comoros 2012	1	0.24	0.08	0.74	0.49	0.36	0.68	0.25	0.18	0.35
Congo 2011	1	0.13	0.09	0.18	0.42	0.37	0.48	0.25	0.21	0.29
Côte d'Ivoire 2012	1	0.40	0.29	0.55	0.81	0.69	0.95	0.31	0.24	0.39
Dominican Rep 2013	1	0.25	0.20	0.30	0.61	0.56	0.66	0.20	0.17	0.22
DR Congo 2013	1	0.39	0.28	0.53	0.59	0.51	0.70	0.26	0.22	0.30
East Timor 2016	1	0.18	0.03	1.05	0.66	0.47	0.92	0.03	0.02	0.05
Ethiopia 2016	1	0.71	0.17	2.93	0.58	0.43	0.78	0.02	0.01	0.03
Gabon 2012	1	0.21	0.15	0.30	0.44	0.37	0.53	0.23	0.19	0.28
Gambia 2020	1	0.27	0.09	0.82	0.78	0.60	1.00	0.12	0.09	0.17
Ghana 2014	1	0.32	0.20	0.53	0.51	0.40	0.64	0.22	0.17	0.28
Guatemala 2015	1	0.41	0.25	0.66	0.80	0.69	0.93	0.14	0.12	0.18
Guinea 2018	1	0.20	0.08	0.50	0.76	0.60	0.96	0.19	0.14	0.25
Haiti 2017	1	0.28	0.22	0.34	0.60	0.54	0.66	0.22	0.19	0.25
India 2019	1	0.38	0.11	1.28	1.72	1.33	2.21	0.05	0.04	0.06
Kenya 2014	1	0.21	0.14	0.31	0.44	0.39	0.51	0.11	0.10	0.13
Kyrgyzstan 2012	1	0.48	0.13	1.85	0.74	0.55	0.98	0.09	0.05	0.14
Lesotho 2014	1	0.17	0.10	0.27	0.52	0.46	0.60	0.25	0.20	0.32

	No partner	Non-cohabiting partner only			Cohabiting partner only			Both cohabiting and non-cohabiting partners		
	Hazard Ratio (baseline)	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound	Hazard Ratio	95% CI: Lower bound	95% CI: Upper bound
Liberia 2019	1	0.15	0.11	0.22	0.33	0.25	0.42	0.19	0.15	0.24
Madagascar 2021	1	0.18	0.14	0.24	0.59	0.52	0.66	0.17	0.15	0.19
Malawi 2015	1	0.11	0.07	0.19	0.54	0.46	0.63	0.12	0.10	0.14
Mali 2012	1	0.12	0.03	0.41	0.56	0.42	0.75	0.10	0.08	0.14
Mozambique 2015	1	0.11	0.07	0.18	0.43	0.37	0.50	0.18	0.15	0.21
Namibia 2013	1	0.26	0.12	0.57	0.28	0.24	0.32	0.06	0.05	0.09
Nepal 2016	1	0.27	0.10	0.72	0.54	0.35	0.81	0.06	0.04	0.09
Niger 2012	1	0.22	0.03	1.80	3.91	2.36	6.48	0.60	0.41	0.88
Nigeria 2018	1	0.23	0.17	0.33	0.69	0.58	0.81	0.14	0.12	0.15
Papua New Guinea 2016	1	0.36	0.18	0.69	1.02	0.81	1.30	0.08	0.06	0.12
Rwanda 2020	1	0.16	0.07	0.35	0.80	0.63	1.02	0.09	0.07	0.11
Senegal 2016	1	0.21	0.03	1.51	1.04	0.68	1.60	0.19	0.12	0.30
Sierra Leone 2013	1	0.11	0.08	0.16	0.35	0.31	0.41	0.15	0.13	0.18
South Africa 2016	1	0.16	0.07	0.36	0.34	0.28	0.40	0.05	0.03	0.08
Togo 2014	1	0.19	0.11	0.33	0.53	0.42	0.65	0.19	0.15	0.23
Uganda 2016	1	0.19	0.12	0.28	0.61	0.52	0.71	0.22	0.19	0.25
Zambia 2018	1	0.14	0.10	0.20	0.47	0.42	0.54	0.16	0.14	0.19
Zimbabwe 2010	1	0.19	0.11	0.32	0.47	0.40	0.56	0.13	0.11	0.16

Supplementary Table S6: Age-adjusted hazard ratios for partner acquisition rates in women, comparing women cohabiting with a partner and women with a non-cohabiting partner to women without a partner. Empty cells indicate there were too few acquisitions to estimate the hazard ratio.

	No partner	Non-cohabiting partner only			Cohabiting partner only			Both cohabiting and non-co-habiting partners		
	Hazard Ratio (baseline)	Hazard Ratio	95% CI:	95% CI:	Hazard Ratio	95% CI:	95% CI:	Hazard Ratio	95% CI:	95% CI:
			Lower bound	Upper bound		Lower bound	Upper bound		Lower bound	Upper bound
Albania 2017	1	-	-	-	0.143	0.062	0.332	0.003	0.001	0.010
Angola 2015	1	-	-	-	0.096	0.074	0.126	0.011	0.008	0.016
Armenia 2016	1	-	-	-				0.001	0.000	0.009
Benin 2018	1	0.166	0.045	0.621	0.225	0.181	0.278	0.005	0.002	0.010
Burkina Faso 2010	1	-	-	-	0.362	0.256	0.513	0.012	0.006	0.023
Burundi 2016	1	1.099	0.146	8.285	0.517	0.318	0.842	0.012	0.006	0.023
Cambodia 2014	1	-	-	-	1.408	0.393	5.046	0.002	0.001	0.008
Cameroon 2018	1	0.105	0.030	0.365	0.266	0.233	0.305	0.019	0.014	0.025
Chad 2015	1	0.756	0.176	3.247	0.592	0.410	0.856	0.012	0.007	0.019
Colombia 2015	1	0.122	0.067	0.221	0.158	0.137	0.182	0.021	0.018	0.026
Comoros 2012	1	0.242	0.048	1.227	0.213	0.105	0.433	0.043	0.026	0.070
Congo 2011	1	0.020	0.003	0.142	0.112	0.089	0.142	0.018	0.014	0.025
Côte d'Ivoire 2012	1	0.078	0.011	0.539	0.214	0.171	0.269	0.011	0.007	0.018
Dominican Rep 2013	1	0.190	0.076	0.474	0.305	0.240	0.387	0.041	0.032	0.053
DR Congo 2013	1	0.798	0.488	1.307	0.333	0.267	0.415	0.039	0.031	0.050
East Timor 2016	1	-	-	-	0.210	0.083	0.534	0.008	0.005	0.013
Ethiopia 2016	1	-	-	-	0.366	0.159	0.844	0.009	0.004	0.019
Gabon 2012	1	0.097	0.042	0.221	0.205	0.169	0.250	0.055	0.041	0.072
Gambia 2020	1	-	-	-	0.282	0.155	0.514	0.011	0.005	0.024
Ghana 2014	1	-	-	-	0.120	0.085	0.168	0.005	0.002	0.014
Guatemala 2015	1	0.109	0.015	0.796	0.451	0.338	0.602	0.020	0.014	0.029
Guinea 2018	1	-	-	-	0.251	0.181	0.348	0.022	0.015	0.032
Haiti 2017	1	0.212	0.073	0.616	0.170	0.135	0.215	0.030	0.023	0.038
India 2019	1	-	-	-	0.467	0.257	0.849	0.007	0.005	0.009
Kenya 2014	1	0.125	0.020	0.767	0.126	0.090	0.176	0.015	0.010	0.024
Kyrgyzstan 2012	1	-	-	-	0.934	0.532	1.639	0.002	0.001	0.009

	No partner	Non-cohabiting partner only			Cohabiting partner only			Both cohabiting and non-co-habiting partners		
	Hazard Ratio (baseline)		95% CI: Lower bound	95% CI: Upper bound		95% CI: Lower bound	95% CI: Upper bound		95% CI: Lower bound	95% CI: Upper bound
		Hazard Ratio				Hazard Ratio			Hazard Ratio	
Lesotho 2014	1	0.039	0.010	0.155	0.201	0.158	0.255	0.071	0.056	0.090
Liberia 2019	1	0.057	0.020	0.162	0.185	0.144	0.236	0.043	0.031	0.061
Madagascar 2021	1	0.077	0.026	0.233	0.226	0.195	0.262	0.009	0.007	0.012
Malawi 2015	1	0.198	0.070	0.559	0.160	0.124	0.206	0.015	0.012	0.019
Mali 2012	1	-	-	-	0.133	0.081	0.219	0.005	0.003	0.009
Mozambique 2015	1	0.013	0.002	0.096	0.196	0.149	0.257	0.015	0.009	0.023
Namibia 2013	1	0.076	0.021	0.278	0.063	0.050	0.079	0.016	0.009	0.028
Nepal 2016	1	-	-	-				0.006	0.002	0.022
Niger 2012	1	-	-	0.000	0.150	0.035	0.640	0.007	0.004	0.013
Nigeria 2018	1	0.033	0.005	0.242	0.329	0.284	0.381	0.004	0.003	0.006
Papua New Guinea 2016	1	0.008	0.001	0.067	0.640	0.403	1.016	0.028	0.018	0.042
Philippines 2017	1	0.047	0.020	0.113						
Rwanda 2020	1	-	-	-	0.547	0.425	0.705	0.019	0.013	0.028
Senegal 2016	1	-	-	-	0.228	0.073	0.705	0.002	0.001	0.007
Sierra Leone 2013	1	0.038	0.017	0.084	0.263	0.222	0.311	0.054	0.044	0.067
South Africa 2016	1	-	-	-	0.111	0.094	0.130	0.015	0.010	0.025
Tajikistan 2017	1	-	-	-	0.307	0.071	1.332	0.001	0.000	0.003
Togo 2014	1	-	-	-	0.112	0.076	0.165	0.005	0.002	0.010
Uganda 2016	1	0.054	0.017	0.171	0.183	0.148	0.225	0.028	0.023	0.035
Zambia 2018	1	-	-	-	0.116	0.094	0.142	0.010	0.006	0.015
Zimbabwe 2015	1	0.234	0.064	0.847	0.238	0.175	0.323	0.008	0.004	0.013

Supplementary Table S7: Age-adjusted hazard ratios for partner acquisition rates in men, comparing men living with HIV to HIV-negative men

Country and year	Hazard ratio	95% CI		Person years	Acquisitions	PAR	
						HIV-	HIV+
Angola 2015	0.77	0.47	1.25	5136	2300	44.9	30.8
Burkina Faso 2010	1.73	0.69	4.36	6219	1277	20.5	28.6
Burundi 2016	1.86	0.69	5.03	6541	551	8.4	11.9
Cameroon 2011*	1.26	1.00	1.59	6235	3039	48.5	55.2
Chad 2015	0.94	0.43	2.02	4522	772	17.1	15.0
DR Congo 2013	0.93	0.46	1.86	7478	3196	42.8	38.4
Dominican Republic 2013	1.26	0.98	1.62	8630	5323	61.7	63.1
Ethiopia 2016	0.93	0.24	3.55	10046	1216	12.1	10.6
Gabon 2012	0.87	0.63	1.21	4824	3115	65.0	47.3
Gambia 2013*	0.93	0.27	3.28	3343	482	14.5	10.4
Guinea 2012*	0.84	0.44	1.60	3287	1045	31.9	21.8
Haiti 2012*	1.11	0.83	1.47	8210	4621	56.4	49.6
India 2015	1.25	1.0	1.56	95565	27775	29.0	41.7
Cote d'Ivoire 2012	1.07	0.67	1.71	4032	1946	48.6	36.3
Lesotho 2014	1.14	0.95	1.37	2608	1459	57.1	51.0
Liberia 2013*	0.71	0.24	2.10	3775	1544	41.2	25.9
Mali 2012	1.31	0.64	2.70	3240	759	23.4	28.7
Mozambique 2015	1.05	0.89	1.24	4214	1931	46.6	39.2
Rwanda 2015*	1.92	1.19	3.11	5538	721	12.8	20.8
Senegal 2011*	4.26	2.51	7.23	4092	695	16.7	70.5
Sierra Leone 2013	1.16	0.69	1.96	6159	2154	34.9	39.1
Zambia 2018	1.20	1.03	1.40	10881	3770	34.9	31.8
Zimbabwe 2010	1.33	1.15	1.53	6191	1797	29.1	28.5

*Surveys used only in analyses including HIV status.

Supplementary Table S8: Age-adjusted hazard ratios for partner acquisition rates in women, comparing women living with HIV to HIV-negative women

Country and year	Hazard ratio	95% CI		Person years Acquisitions		PAR	
						HIV-	HIV+
Angola 2015	1.57	1.09	2.26	6379	1132	17.6	23.1
Burkina Faso 2010	2.86	1.29	6.34	8246	474	5.7	7.6
Burundi 2016	4.91	3.03	7.97	8468	454	5.3	14.4
Cameroon 2011*	1.93	1.55	2.41	7178	1258	17.0	26.6
Chad 2015	2.34	0.98	5.61	5619	236	4.1	8.4
DR Congo 2013	1.40	0.73	2.67	9251	1307	14.1	15.7
Dominican Republic 2013	1.81	1.03	3.18	8755	1819	20.7	30.9
Ethiopia 2016	1.39	0.71	2.71	12090	993	8.2	8.0
Gabon 2012	1.22	0.93	1.59	5199	1589	30.6	29.2
Gambia 2013*	1.63	0.70	3.81	4072	174	4.2	5.1
Guinea 2012*	1.54	0.75	3.15	4610	440	9.5	12.2
Haiti 2012*	1.79	1.26	2.55	9240	1377	14.7	23.2
India 2015	0.85	0.50	1.46	104588	13597	13.0	12.0
Cote d'Ivoire 2012	1.97	1.31	2.98	4492	778	17.0	22.9
Lesotho 2014	1.90	1.61	2.26	3108	657	19.2	25.9
Liberia 2013*	1.85	1.07	3.19	4374	955	21.7	27.8
Mali 2012	2.65	1.70	4.14	4242	455	10.5	27.3
Mozambique 2015	1.52	1.27	1.81	5790	1162	19.2	24.7
Rwanda 2015*	3.19	2.30	4.41	6735	494	6.9	17.9
Senegal 2011*	1.93	0.85	4.41	5326	276	5.2	8.1
Sierra Leone 2013	1.27	0.74	2.16	7483	1170	15.6	19.1
Zambia 2018	1.74	1.48	2.04	12727	2172	16.4	21.1
Zimbabwe 2015	2.27	1.96	2.62	8625	1197	12.6	20.2

*Surveys used only in analyses including HIV status.

Supplementary Table S9: Linear regression of national level summary measures of sexual behaviour on national HIV incidence for men and women in two regions: East and Southern Africa and West and Central Africa.

Aspect of sexual behaviour	Sex	Region	Coefficient	95% CI	p-value
PAR	Men	East and Southern Africa	0.18	0.11-0.24	0.000
		West and Central Africa	0.05	-0.01-0.11	0.109
	Women	East and Southern Africa	0.56	0.42-0.70	0.000
		West and Central Africa	0.15	0.02-0.29	0.029
PAR among HIV-	Men	East and Southern Africa	0.26	0.17-0.34	0.000
		West and Central Africa	0.06	-0.01-0.13	0.095
	Women	East and Southern Africa	0.90	0.68-1.11	0.000
		West and Central Africa	0.19	0.02-0.37	0.032
Proportion with a new partner	Men	East and Southern Africa	0.22	0.14-0.29	0.000
		West and Central Africa	0.07	-0.00-0.15	0.052
	Women	East and Southern Africa	0.61	0.46-0.76	0.000
		West and Central Africa	0.20	0.04-0.35	0.013
Proportion with more than one partner	Men	East and Southern Africa	0.29	0.18-0.40	0.000
		West and Central Africa	0.02	-0.06-0.10	0.640
	Women	East and Southern Africa	3.07	2.47-3.67	0.000
		West and Central Africa	0.26	-0.14-0.65	0.196
Proportion sexually active in the last year	Men	East and Southern Africa	0.16	0.05-0.26	0.004
		West and Central Africa	0.11	-0.00-0.21	0.052
	Women	East and Southern Africa	0.20	0.09-0.31	0.001
		West and Central Africa	0.11	0.01-0.21	0.037
Proportion who had sex with a spouse in the last year	Men	East and Southern Africa	-0.11	-0.23-0.01	0.062
		West and Central Africa	-0.18	-0.29- -0.06	0.003
	Women	East and Southern Africa	-0.05	-0.16-0.05	0.317
		West and Central Africa	-0.13	-0.22- -0.04	0.005

Proportion whose first sex was before age 15	Men	East and Southern Africa	0.19	-0.04-0.42	0.110
		West and Central Africa	-0.10	-0.31-0.11	0.333
	Women	East and Southern Africa	0.26	0.05-0.48	0.015
		West and Central Africa	-0.06	-0.20-0.08	0.426
