

# THE LANCET

## Global Health

### Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Birdthistle I, Tanton C, Tomita A, et al. Recent levels and trends in HIV incidence rates among adolescent girls and young women in ten high-prevalence African countries: a systematic review and meta-analysis. *Lancet Glob Health* 2019; **7**: e1521–40.

# Supplementary Material

## Contents

*Table S1. Studies that met the inclusion criteria but do not report HIV incidence disaggregated by sex and/or young age groups* ..... 2

*Table S2. General population-based study characteristics and data extracted for review and pooled analyses* ..... 5

Table S1. Studies that met the inclusion criteria but do not report HIV incidence disaggregated by sex and/or young age groups

<b>Country</b>	<b>Author, year of publication</b>	<b>Period of data collection</b>	<b>Location, region, setting</b>	<b>Population</b>	<b>Study Design (measure of HIV incidence)</b>
<b>Kenya</b>	Otieno, et al. (2015) <sup>1</sup>	2007-2009	Kisumu (KiCOS)	Adults aged 18-34 years	Cohort (direct)
	Gumbe, et al. (2015) <sup>2</sup>	2007-2009	Kisumu (KiCOS)	Adults aged 16-34 years	Cohort (direct)
<b>Malawi</b>	Keating, et al. (2012) <sup>3</sup>		Lilongwe (Bwaila hospital)	Pregnant women	Retrospective cohort (direct)
<b>Mozambique</b>	Perez-Hoyos, et al. (2011) <sup>4</sup>	1999-2008	Manhica (Antenatal Clinic)	Women aged 15-45 years	Incidence estimated from prevalence data
	Mocumbi, et al (2017) <sup>10</sup>	2007-2009	Urban Mavalane & rural Manhica	Sexually active, HIV negative woman aged 18+ yrs	Cohort, clinical (direct)
<b>Uganda</b>	Guwatudde, et al. (2009) <sup>5</sup>	2006	Kayunga District	Adults aged 15-49 years	Cohort (direct)
	Kiwanuka, et al. (2014) <sup>6</sup>	2011-2013	8 fishing communities (Community-based)	Adults aged 18-49	Cohort (direct)
	Kouyoumdijian, et al. (2013) <sup>7</sup>	2000-2009	Rakai	Adults aged 15-49	Cohort (direct)
<b>South Africa</b>	Huerga, et al. (2017) <sup>11</sup>	2013	KwaZulu-Natal (Mbongolwane & Eshowe)	Adults aged 15-59	Recent HIV incidence (Lag-Avidity testing)
	Nel, et al. (2012) <sup>8</sup>	2007-2010	KwaZulu-Natal (Ladysmith, Edendale & Pinetown)	Women aged 18-35 years	Cohort (direct)

Abdool Karim, et al (2011) <sup>12</sup>	2005-2008	Malawi (Blantyre & Lilongwe), South Africa (Durban & Hlabisa), Zambia (Lusaka), Zimbabwe (Harare & Chitungwiza)	Women aged 17-56 years and HIV-negative, non-pregnant, sexually active (vaginal intercourse $\geq 1$ in past 3 months)	Cohort (direct) analysis from trial data
Ramjee, et al. (2012) <sup>9</sup>	2004-2009	Durban	Women	Cohort (direct) analysis from two trials

## References:

1. Otieno FO, Ndivo R, Oswago S, Pals S, Chen R, Thomas T, et al. Correlates of prevalent sexually transmitted infections among participants screened for an HIV incidence cohort study in Kisumu, Kenya. *Int J STD AIDS*. 2015; 26(4): 225-37.
2. Gumbe A, McLellan-Lemal E, Gust DA, Pals SL, Gray KM, Ndivo R, et al. Correlates of prevalent HIV infection among adults and adolescents in the Kisumu incidence cohort study, Kisumu, Kenya. *International Journal of STD and AIDS*. 2015; 26(13): 929-40.
3. Keating MA, Hamela G, Miller WC, Moses A, Hoffman IF, Hosseinipour MC. High HIV incidence and sexual behavior change among pregnant women in Lilongwe, Malawi: implications for the risk of HIV acquisition. *PLoS ONE [Electronic Resource]*. 2012; 7(6): e39109.
4. Perez-Hoyos S, Nanche D, Macete E, Aponte J, Sacarlal J, Sigauque B, et al. Stabilization of HIV incidence in women of reproductive age in southern Mozambique. *HIV Med*. 2011; 12(8): 500-5 6p.
5. Guwatudde D, Wabwire-Mangen F, Eller LA, Eller M, McCutchan F, Kibuuka H, et al. Relatively low HIV infection rates in rural Uganda, but with high potential for a rise: A cohort study in Kayunga District, Uganda. *PLoS ONE*. 2009; 4 (1):e4145).
6. Kiwanuka N, Mpendo J, Nalutaaya A, Wambuzi M, Nanvubya A, Kitandwe PK, et al. An assessment of fishing communities around Lake Victoria, Uganda, as potential populations for future HIV vaccine efficacy studies: an observational cohort study. *BMC Public Health*. 2014; 14(1): 986- 1p.
7. Kouyoumdjian FG, Calzavara LM, Bondy SJ, O'Campo P, Serwadda D, Nalugoda F, et al. Intimate partner violence is associated with incident HIV infection in women in Uganda. *AIDS*. 2013; 27(8): 1331-8.
8. Nel A, Mabude Z, Smit J, Kotze P, Arbuckle D, Wu J, et al. HIV incidence remains high in KwaZulu-Natal, South Africa: evidence from three districts. *PLoS ONE [Electronic Resource]*. 2012; 7(4): e35278.
9. Ramjee G, Wand H. Population-level impact of hormonal contraception on incidence of HIV infection and pregnancy in women in Durban, South Africa. *Bull World Health Organ*. 2012; 90(10): 748-55.
10. Mocumbi S, Gafos M, Munguambe K, Goodall R, McCormack S. High HIV prevalence and incidence among women in Southern Mozambique: Evidence from the MDP microbicide feasibility study. *PLoS One*. 2017; 12(3):e0173243.
11. Huerga H, Shiferie F, Grebe E, Giuliani R, Farhat JB, Van-Cutsem G, Cohen K. A comparison of self-report and antiretroviral detection to inform estimates of antiretroviral therapy coverage, viral load suppression and HIV incidence in Kwazulu-Natal, South Africa. *BMC Infectious Diseases*. 2017; 17(1): 653.
12. Abdool Karim Q, Kharsany AB, Frohlich, JA, Werner L, Mashego M, Mlotshwa M, Madlala BT, Ntombela F, Abdool Karim SS. Stabilizing HIV prevalence masks high HIV incidence rates amongst rural and urban women in KwaZulu-Natal, South Africa. *Intl J of Epidemiology*. 2011; 40(4): 922-30.

Table S2. General population-based study characteristics and data extracted for review and pooled analyses

ID	Country	Region	Study	Year	Sex	Age Group	Incidence	Lower Bound	Upper Bound	Quality appraisal for non-assay-based studies
1	Malawi	SADC	National	2015–16	Female subgroup	15–24	0.40	0.04	0.77	
2	Malawi	SADC	National	2015–16	Male subgroup	15–24	0.05	0.00	0.19	
3	Malawi	SADC	National	2015–16	Female subgroup	25–34	0.87	0.11	1.63	
4	Malawi	SADC	National	2015–16	Male subgroup	25–34	0.40	0.00	0.91	
5	South Africa	SADC	KZN, uMkhanyakude district	2004–12	Female subgroup	15–19	4.91	4.48	5.39	100
6	South Africa	SADC	KZN, uMkhanyakude district	2004–12	Male subgroup	15–19	0.90	0.71	1.12	100
7	South Africa	SADC	KZN, uMkhanyakude district	2004–12	Female subgroup	20–24	7.80	7.19	8.46	100
8	South Africa	SADC	KZN, uMkhanyakude district	2004–12	Male subgroup	20–24	3.28	2.85	3.78	100
9	South Africa	SADC	KZN, uMkhanyakude district	2004–12	Female subgroup	25–29	6.50	5.66	7.45	100
10	South Africa	SADC	KZN, uMkhanyakude district	2004–12	Male subgroup	25–29	4.66	3.82	5.68	100
11	South Africa	SADC	KZN, uMkhanyakude district	2003–12	Female subgroup	15–29				90
12	South Africa	SADC	KZN, uMkhanyakude district	2003–12	Female subgroup	15–19	7.79	6.59	9.22	90
13	South Africa	SADC	KZN, uMkhanyakude district	2003–12	Female subgroup	20–24	8.63	7.63	9.77	90
14	South Africa	SADC	KZN, uMkhanyakude district	2003–12	Female subgroup	25–29	5.63	4.46	7.11	90
15	South Africa	SADC	KZN, uMkhanyakude district	2006–11	Female subgroup	15–24	4.37	3.79	5.04	80
16	South Africa	SADC	KZN, uMkhanyakude district	2006–11	Male subgroup	15–24	1.38	1.07	1.79	80
17	South Africa	SADC	KZN, uMkhanyakude district	2004–09	Female subgroup	15–19	5.10	4.58	5.67	100

18	South Africa	SADC	KZN, uMkhanyakude district	2004–09	Female subgroup	20–24	7.47	6.33	8.76	100
19	South Africa	SADC	KZN, uMkhanyakude district	2004–09	Female subgroup	25–29	5.18	3.88	6.77	100
20	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Female subgroup	15–19	4.43	3.96	4.95	90
21	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Male subgroup	15–19	0.74	0.56	0.99	90
22	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Female subgroup	20–24	6.49	5.86	7.18	90
23	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Male subgroup	20–24	2.53	2.10	3.05	90
24	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Female subgroup	25–29	5.51	4.64	6.54	90
25	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Male subgroup	25–29	4.43	3.50	5.61	90
26	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Female subgroup	15–19	5.10	4.61	5.6	90
27	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Male subgroup	15–19	0.91	0.7	1.12	90
28	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Female subgroup	20–24	9.11	8.4	9.82	90
29	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Male subgroup	20–24	3.69	3.19	4.19	90
30	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Female subgroup	25–29	7.03	6.07	7.99	90
31	South Africa	SADC	KZN, uMkhanyakude district	2004–11	Male subgroup	25–29	5.79	4.79	6.80	90
32	South Africa	SADC	KZN, uMkhanyakude district	2003–07	Female subgroup	15–19	3.9	2.9	5.3	90
33	South Africa	SADC	KZN, uMkhanyakude district	2003–07	Male subgroup	15–19	1.0	0.5	1.8	90
34	South Africa	SADC	KZN, uMkhanyakude district	2003–07	Female subgroup	20–24	5.6	4.0	8.0	90
35	South Africa	SADC	KZN, uMkhanyakude district	2003–07	Male subgroup	20–24	2.8	1.6	4.8	90
36	South Africa	SADC	KZN, uMkhanyakude district	2003–07	Female subgroup	25–29	8.0	4.9	13.0	90

37	South Africa	SADC	KZN, uMkhanyakude district	2003–07	Male subgroup	25–29	8.7	4.8	15.8	90
38	South Africa	SADC	KZN, uMkhanyakude district	2004–15	Female subgroup	15–24	5.6	5.3	5.9	90
39	South Africa	SADC	KZN, uMkhanyakude district	2004–15	Male subgroup	15–24	1.7	1.5	1.9	90
40	South Africa	SADC	KZN, uMkhanyakude district	2004–15	Female subgroup	25–49	3.1	2.9	3.4	90
41	South Africa	SADC	KZN, uMkhanyakude district	2004–15	Male subgroup	25–49	3.6	3.1	4.2	90
42	South Africa	SADC	KZN, uMkhanyakude district	2006–10	Female subgroup	15–19	4.71	4.10	5.41	90
43	South Africa	SADC	KZN, uMkhanyakude district	2011–15	Female subgroup	15–19	4.54	3.89	5.30	90
44	South Africa	SADC	KZN, uMkhanyakude district	2006–10	Female subgroup	20–24	7.62	6.71	8.65	90
45	South Africa	SADC	KZN, uMkhanyakude district	2011–15	Female subgroup	20–24	7.45	6.51	8.51	90
46	South Africa	SADC	KZN, uMkhanyakude district	2006–10	Male subgroup	20–24	3.08	2.49	3.82	90
47	South Africa	SADC	KZN, uMkhanyakude district	2011–15	Male subgroup	20–24	2.58	2.00	3.32	90
48	South Africa	SADC	KZN, uMkhanyakude district	2006–10	Male subgroup	25–29	4.43	3.34	5.87	90
49	South Africa	SADC	KZN, uMkhanyakude district	2011–15	Male subgroup	25–29	4.04	3.07	5.31	90
50	South Africa	SADC	KZN, uMkhanyakude district	2012–15	Female subgroup	16–19	5.54	4.64	6.45	70
51	South Africa	SADC	KZN, uMkhanyakude district	2012–15	Male subgroup	16–19	0.61	0.28	0.94	70
52	South Africa	SADC	KZN, uMkhanyakude district	2012–15	Female subgroup	20–24	6.93	5.75	8.11	70
53	South Africa	SADC	KZN, uMkhanyakude district	2012–15	Male subgroup	20–24	2.02	1.19	2.84	70
54	South Africa	SADC	KZN, uMkhanyakude district	2012–15	Female subgroup	25–29	6.34	4.77	7.90	70
55	South Africa	SADC	KZN, uMkhanyakude district	2012–15	Male subgroup	25–29	1.06	0.21	1.90	70



56	South Africa	SADC	National	2005–05	Female subgroup	15–24	6.5	2.3	10.7	100
57	South Africa	SADC	National	2005–05	Male subgroup	15–24	0.8	0	3.4	100
58	South Africa	SADC	National	2012–12	Female subgroup	15–24	2.54	2.04	3.04	100
59	South Africa	SADC	National	2012–12	Male subgroup	15–24	0.55	0.45	0.65	100
60	South Africa	SADC	National	2012–12	Female subgroup	25+	1.62	1.30	1.94	100
61	South Africa	SADC	National	2012–12	Male subgroup	25+	1.29	0.91	1.67	100
62	Swaziland	SADC	National	2010–11	Female subgroup	18–19	3.8	2.6	5.6	100
63	Swaziland	SADC	National	2010–11	Male subgroup	18–19	0.8	0.4	1.9	100
64	Swaziland	SADC	National	2010–11	Female subgroup	20–24	4.3	3.3	5.6	100
65	Swaziland	SADC	National	2010–11	Male subgroup	20–24	1.6	1.1	2.5	100
66	Swaziland	SADC	National	2010–11	Female subgroup	25–29	2.0	1.2	3.2	100
67	Swaziland	SADC	National	2010–11	Male subgroup	25–29	2.6	1.7	4.0	100
68	Tanzania	EAC	Mbeya	2005–06	Female subgroup	20–24	2.60	1.51	4.47	70
69	Tanzania	EAC	Mbeya	2005–06	Male subgroup	20–24	1.36	0.57	3.27	70
70	Tanzania	EAC	Mbeya	2005–06	Female subgroup	25–29	0.26	0.04	1.84	70
71	Tanzania	EAC	Mbeya	2005–06	Male subgroup	25–29	0.72	0.18	2.88	70
72	Uganda	EAC	Masaka	1990–2007	Female subgroup	13–19	0.57	0.44	0.74	90
73	Uganda	EAC	Masaka	1990–2007	Male subgroup	13–19	0.09	0.04	0.16	90
74	Uganda	EAC	Masaka	1990–2007	Female subgroup	20–24	1.19	0.91	1.53	90
75	Uganda	EAC	Masaka	1990–2007	Male subgroup	20–24	0.79	0.55	1.09	90
76	Uganda	EAC	Masaka	1990–2007	Female subgroup	25–29	0.95	0.68	1.3	90
77	Uganda	EAC	Masaka	1990–2007	Male subgroup	25–29	1.35	0.99	1.8	90

78	Uganda	EAC	Masaka	2005–11	Female subgroup	15–19	1.03	0.64	1.57	90
79	Uganda	EAC	Masaka	2011–16	Female subgroup	15–19	0.59	0.31	1.01	90
80	Uganda	EAC	Masaka	2005–11	Male subgroup	15–19	0.30	0.12	0.6	90
81	Uganda	EAC	Masaka	2011–16	Male subgroup	15–19	0.16	0.05	0.38	90
82	Uganda	EAC	Masaka	2005–11	Female subgroup	20–24	1.47	1.12	1.9	90
83	Uganda	EAC	Masaka	2011–16	Female subgroup	20–24	1.53	1.13	2.01	90
84	Uganda	EAC	Masaka	2005–11	Male subgroup	20–24	0.9	0.61	1.28	90
85	Uganda	EAC	Masaka	2011–16	Male subgroup	20–24	0.4	0.21	0.68	90
86	Uganda	EAC	Masaka	2005–11	Female subgroup	25–29	1.47	1.15	1.84	90
87	Uganda	EAC	Masaka	2011–16	Female subgroup	25–29	1.12	0.81	1.5	90
88	Uganda	EAC	Masaka	2005–11	Male subgroup	25–29	1.73	1.31	2.23	90
89	Uganda	EAC	Masaka	2011–16	Male subgroup	25–29	1.26	0.89	1.72	90
90	Uganda	EAC	Kumi district	2006–08	Female subgroup	13–24	0.38	0.19	0.66	70
91	Uganda	EAC	Kumi district	2006–08	Male subgroup	13–24	0.26	0.07	0.66	70
92	Uganda	EAC	Kumi district	2006–08	Female subgroup	25–34	0.68	0.44	1.01	70
93	Uganda	EAC	Kumi district	2006–08	Male subgroup	25–34	0.28	0.09	0.65	70
94	Uganda	EAC	Rakai	1998–2008	Female subgroup	15–19	1.49	1.06	2.04	90
95	Uganda	EAC	Rakai	1998–2008	Male subgroup	15–19	0.36	0.14	0.73	90
96	Uganda	EAC	Rakai	1998–2008	Female subgroup	20–24	1.38	1.13	1.66	90
97	Uganda	EAC	Rakai	1998–2008	Male subgroup	20–24	1.02	0.76	1.35	90
98	Uganda	EAC	Rakai	2006–09	Female subgroup	15–19	0.63	0.20	1.47	90
99	Uganda	EAC	Rakai	2006–09	Male subgroup	15–19	0.22	0.03	0.79	90

100	Uganda	EAC	Rakai	2006–09	Female subgroup	20–24	1.31	0.82	1.98	90
101	Uganda	EAC	Rakai	2006–09	Male subgroup	20–24	0.79	0.38	1.45	90
102	Uganda	EAC	Rakai	2008–11	Female subgroup	15–19	0.23	0.03	0.83	90
103	Uganda	EAC	Rakai	2008–11	Male subgroup	15–19	0.19	0.02	0.69	90
104	Uganda	EAC	Rakai	2008–11	Female subgroup	20–24	1.55	0.95	2.39	90
105	Uganda	EAC	Rakai	2008–11	Male subgroup	20–24	1.23	0.69	2.03	90
106	Uganda	EAC	Masaka	2004–07	Female subgroup	15–19	0			70
107	Uganda	EAC	Masaka	2004–07	Male subgroup	15–19	0			70
108	Uganda	EAC	Masaka	2004–07	Female subgroup	20–24	0			70
109	Uganda	EAC	Masaka	2004–07	Male subgroup	20–24	2.5	0.8	7.7	70
110	Uganda	EAC	Masaka	2004–07	Female subgroup	25–29	2.0	0.8	4.8	70
111	Uganda	EAC	Masaka	2004–07	Male subgroup	25–29	2.2	0.7	6.8	70
112	Zambia	SADC	National	2015–16	Female subgroup	15–24	1.07	0.52	1.62	
113	Zambia	SADC	National	2015–16	Male subgroup	15–24	0.08	0.00	0.25	
114	Zambia	SADC	National	2015–16	Female subgroup	25–34	1.16	0.46	1.86	
115	Zambia	SADC	National	2015–16	Male subgroup	25–34	0.25	0.00	0.63	
116	Kenya	EAC	Gem, Siaya County	2011–16	Female subgroup	15–19	0.43	2.96	5.91	90
117	Kenya	EAC	Gem, Siaya County	2011–16	Female subgroup	20–24	1.12	0.8	1.52	90
118	Kenya	EAC	Gem, Siaya County	2011–16	Male subgroup	15–24	0.32	0.19	0.51	90
119	Kenya	EAC	Gem, Siaya County	2011–16	Female subgroup	25–34	0.96	0.73	1.25	90
120	Kenya	EAC	Gem, Siaya County	2011–16	Male subgroup	25–34	1.07	0.71	1.57	90

121	Kenya	EAC	Ndhiwaza sub-county	2012	Female subgroup	15–24	2.07	0.85	3.29	
122	Kenya	EAC	Ndhiwaza sub-county	2012	Female subgroup	15–24	2.5	1.1	4.5	
123	Kenya	EAC	Ndhiwaza sub-county	2012	Male subgroup	15–24	0.25	0.00	0.73	
124	Kenya	EAC	Ndhiwaza sub-county	2012	Male subgroup	15–24	0.3	0.00	2.7	
125	Kenya	EAC	Ndhiwaza sub-county	2012	Female subgroup	25–34	1.9	0.00	3.9	
126	Kenya	EAC	Ndhiwaza sub-county	2012	Female subgroup	25–34	2.4	0.2	5.1	
127	Kenya	EAC	Ndhiwaza sub-county	2012	Male subgroup	25–34	2.5	0.2	4.6	
128	Kenya	EAC	Ndhiwaza sub-county	2012	Male subgroup	25–34	0.96	0.00	2.79	
129	Zimbabwe	SADC	Manicaland	2003–13	Female subgroup	15–19	0.99	0.71	1.38	90
130	Zimbabwe	SADC	Manicaland	2004–08	Female subgroup	15–24	1.94	1.50	2.51	90
131	Zimbabwe	SADC	Manicaland	2006–11	Female subgroup	15–24	0.72	0.46	1.14	90
132	Zimbabwe	SADC	Manicaland	2009–13	Female subgroup	15–24	1.12	0.72	1.76	90
133	Zimbabwe	SADC	Manicaland	2003–13	Female subgroup	20–24	1.62	1.26	2.08	90
134	Zimbabwe	SADC	Manicaland	2003–13	Male subgroup	15–19	0.26	0.15	0.46	90
135	Zimbabwe	SADC	Manicaland	2004–08	Male subgroup	15–24	0.93	0.64	1.36	90
136	Zimbabwe	SADC	Manicaland	2006–11	Male subgroup	15–24	0.15	0.06	0.39	90
137	Zimbabwe	SADC	Manicaland	2009–13	Male subgroup	15–24	0.19	0.06	0.60	90
138	Zimbabwe	SADC	Manicaland	2003–13	Male subgroup	20–24	0.83	0.55	1.26	90
139	Zimbabwe	SADC	Manicaland	2003–13	Female subgroup	25–29	1.45	1.12	1.88	90
140	Zimbabwe	SADC	Manicaland	2003–13	Male subgroup	25–29	1.47	1.04	2.06	90
141	Zimbabwe	SADC	National	2015–16	Female subgroup	15–24	0.53	0.13	0.93	
142	Zimbabwe	SADC	National	2015–16	Male subgroup	15–24	0.14	0.00	0.37	

143	Zimbabwe	SADC	National	2015–16	Female subgroup	25–34	1.11	0.41	1.80
144	Zimbabwe	SADC	National	2015–16	Male subgroup	25–34	0.48	0.00	1.05