Global burden of active smoking among people living with HIV on antiretroviral therapy

a systematic review and meta-analysis

APPENDIX

Supplementary Tables

Supplementary Figures

Supplementary References

Supplementary Table 1. Search strategy in EMBASE

	Search terms
#1	'human immunodeficiency virus infection':ab,ti OR hiv:ab,ti OR aids:ab,ti OR 'acquired immune deficiency syndrome':ab,ti
#2	'antiretrovirus agent':ab,ti OR 'antiretroviral therapy':ab,ti OR 'highly active antiretroviral therapy':ab,ti OR haart:ab,ti OR art:ab,ti OR 'combined antiretroviral therapy':ab,ti OR 'antiretroviral treatment':ab,ti
#3	#1 AND 2
#4	'tobacco'/exp OR tobacco OR 'smoking'/exp OR smoking OR smok* OR 'cigarette'/exp OR cigarette OR cigar* OR tabacum OR 'nicotine'/exp OR nicotine OR 'nicotiana'/exp OR nicotiana
#5	#3 AND #4

Supplementary Table 2. Characteristics of studies investigating the prevalence of active smoking in people living with HIV undergoing antiretroviral therapy

Variables	**N = 290 studies**
General characteristics	
Year of publication, range	2000-2019
Design, n (%)	
- Cross-sectional	125 (43.1)
- Cohort	115 (39.7)
- Case control	28 (9.7)
- Clinical trial	22 (7.6)
Setting, n (%)	
- Hospital-based	271 (93.5)
- Population-based	9 (3.0)
- Both	4 (1.4)
- Unclear	6 (2.1)
Methodological quality	
Sampling method, n (%)	
- Non-probabilistic	249 (85.9)
- Probabilistic	41 (14.1)
Precision, n (%)	
- Acceptable	119 (41.0)
- Low	171 (59.0)
Response rate, n (%)	
- 80% or more	133 (45.9)
- < 80%	14 (4.8)
- Unclear	143 (49.3)
Timing of data collection, n (%)	
- Prospectively	230 (79.3)
- Retrospectively	43 (14.8)
- Both	1 (0.3)
- Unclear	16 (5.5)
Data collection procedure, n (%)	
- Identical for all participants	286 (98.6)
- Not identical	1 (0.4)
- Unclear	3 (1.0)

Supplementary Table 3. Individual characteristics of studies investigating the prevalence of active smoking in people living with HIV undergoing antiretroviral therapy

Study	Sample	% on ART	Mean age, years	% of Males	Duration since HIV diagnosis, years	Duration on ART, years	Probabilistic Sampling	Timing	Precision acceptable	Response rate adequate	Identical procedure for data collection	Country
Aaron, 2012	183	100	28	0	NR	NR	No	Prospectively	No	Yes	Yes	USA
Abioye, 2015	2038	100	38.1	31.8	NR	NR	No	Retrospectively	Yes	No	Yes	Tanzania
Aboud, 2010	705	100	NR	72.2	NR	NR	No	Prospectively	Yes	Yes	Yes	UK
Acevedo, 2002	90	100	42	NR	NR	3	No	Prospectively	No	No	Yes	USA
Adefolalu, 2014	232	100	40	29.7	NR	NR	Yes	Prospectively	Yes	Yes	Yes	South Africa
Aderemi-Williams, 2017	248	100	40.4	40.3	NR	NR	No	Prospectively	Yes	Yes	Yes	Nigeria
Alemu, 2016	296	90.5	33	36.5	NR	NR	No	Prospectively	No	No	Yes	Ethiopia
Alemu, 2016	114	90.5	32	46	NR	NR	No	Prospectively	No	No	Yes	Ethiopia
Alencherry, 2019	100	100	55	38	12	11	No	Prospectively	No	Yes	Yes	Uganda
Alencherry, 2019	167	100	50	78	15	8.8	No	Prospectively	No	Yes	Yes	USA
Allavena, 2012	334	100	38.1	72.5	NR	NR	No	Prospectively	No	Yes	Yes	France
Allavena, 2012	2660	100	45.8	72.3	NR	NR	No	Prospectively	No	Yes	Yes	France
Almeida, 2009	110	100	37.2	50.9	2.33	NR	Yes	Retrospectively	No	No	Yes	Brazil
Amberbir, 2019	820	100	NR	28.2	NR	NR	No	Prospectively	Yes	No	Yes	Malawi
Anastos, 2005	573	100	40.3	NR	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Anastos, 2005	184	100	38	NR	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Anastos, 2005	204	100	37	0	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Anema, 2011	457	100	46	74.8	NR	NR	No	Retrospectively	Yes	Yes	Yes	Canada
Ansemant, 2013	263	91.6	47.7	71.5	13	NR	No	Prospectively	Yes	No	Yes	France
Arbune, 2017	102	95	NR	54	NR	NR	No	Unclear	Yes	No	Yes	Romania
Ayalew, 2016	340	100	34.4	39.7	NR	NR	No	Retrospectively	No	Yes	Yes	Ethiopia
Badie, 2017	170	100	41	63.5	5.5	NR	No	Prospectively	No	Yes	Yes	Iran
Bailey, 2014	100	98	29.5	NR	NR	NR	No	Prospectively	Yes	No	Yes	Ukraine
Baker, 2012	43	100	48	97	NR	NR	Yes	Prospectively	No	Yes	Yes	USA
Baker, 2016	178	100	33	69.7	1.2	NR	No	Prospectively	Yes	Yes	Yes	Global

Baker, 2016	154	100	46	70.1	1.3	NR	No	Prospectively	Yes	Yes	Yes	Global (35 countries)
Balasundaram, 2014	130	100	NR	61	NR	NR	No	Prospectively	No	Yes	Yes	India
Baranoski, 2014	65	100	49	0	13	NR	No	Retrospectively	No	No	Yes	USA
Barska, 2017	121	90.9	40	66	8	NR	No	Prospectively	No	No	Yes	Poland
Batista, 2014	1380	100	40.6	64.1	NR	NR	No	Prospectively	Yes	No	Yes	Brazil
Bednasz, 2016	90	100	NR	72.2	NR	NR	No	Retrospectively	No	No	Yes	USA
Begovac, 2015	254	100	49	76	NR	6	No	Prospectively	No	No	Yes	Croatia, Serbia
Bekolo, 2014	114	100	43	17.2	NR	3	No	Prospectively	No	No	Yes	Cameroon
Berg, 2007	495	100	40	90	4.8	NR	No	Prospectively	Yes	No	Yes	Germany
Bergersen, 2004	219	100	41.6	81	7.15	3.75	No	Prospectively	No	No	Yes	Norway
Bertisch, 2013	59	95	NR	85	5	NR	No	Prospectively	No	No	Yes	Switzerland
Besutti, 2016	1446	100	48.4	71.2	17.5	10.6	No	Unclear	Yes	No	Yes	Italy
Bhatta, 2018	132	100	36.1	47	NR	NR	Yes	Prospectively	Yes	Yes	Yes	Nepal
Bijker, 2019	3703	100	46	69	NR	9.8	No	Prospectively	Yes	No	Yes	Asia
Biraguma, 2018	698	100	38	32.5	NR	NR	Yes	Prospectively	Yes	Yes	Yes	Rwanda
Boccara, 2006	42	100	46.2	40	12.4	4.4	No	Retrospectively	No	No	Yes	France
Boccara, 2006	42	100	48.7	40	11.2	4.3	No	Retrospectively	No	No	Yes	France
Boger, 2012	107	100	46	76	NR	NR	Yes	Prospectively	No	No	Yes	USA
Bolland, 2019	44	100	48.7	100	7.8	4.2	No	Prospectively	No	No	No	New Zealand
Bonnet, 2004	964	94.3	41	78	7.6	NR	No	Prospectively	Yes	Yes	Yes	France
Bonolo, 2013	306	100	33	65	NR	NR	No	Prospectively	No	No	Yes	Brazil
Brites-Alves, 2018	106	100	52.5	61.3	NR	12.5	No	Prospectively	No	No	Yes	Brazil
Brites-Alves, 2018	114	100	48.8	72.8	NR	11.1	No	Prospectively	No	No	Yes	Brazil
Brown, 2017	197	94	50	80	NR	7	No	Prospectively	No	No	Yes	UK
Buchacz, 2013	3166	100	47	79	NR	6.8	No	Prospectively	Yes	No	Yes	USA
Bucher, 2012	490	100	NR	61.2	NR	NR	No	Prospectively	Yes	Yes	Yes	Switzerland
Bultum, 2018	527	100	NR	40.6	NR	NR	No	Prospectively	Yes	No	Yes	Ethiopia
Cahn, 2010	4010	100	41.9	73.9	NR	2.1	Yes	Prospectively	Yes	No	Yes	Argentina; Brazil; Chile; Colombia; Ecuador; Peru; Venezuela

Camargo, 2019	112	100	42	66	NR	NR	No	Prospectively	Yes	Yes	Yes	Brazil
Carballo, 2015	133	90	51	85	12	11.5	No	Unclear	No	Yes	Yes	Switzerland
Carr, 2015	163	100	30	88	0.9	NR	Yes	Prospectively	No	Yes	Yes	South America
Carr, 2015	128	100	34	71	2.6	NR	Yes	Prospectively	No	Yes	Yes	Asia
Carr, 2015	71	100	40	87	2.2	NR	Yes	Prospectively	No	Yes	Yes	Australia; Europe
Carr, 2015	46	100	39	22	3.7	NR	Yes	Prospectively	No	Yes	Yes	South Africa
Carrieri, 2012	1154	100	37.7	78	NR	5.9	No	Prospectively	Yes	No	Yes	France
Castley, 2016	474	100	45	78.5	NR	NR	No	Prospectively	Yes	Yes	Yes	Australia
Chireshe, 2019	600	100	41.8	44	NR	6.5	No	Prospectively	Yes	Yes	Yes	Zimbabwe
Chițu-Tișu, 2016	60	100	34.6	58.3	4	4	No	Prospectively	No	Yes	Yes	Romania
Chițu-Tișu, 2017	60	100	34.81	61.6	5	4	No	Retrospectively	No	Yes	Yes	Romania
Cioe, 2017	185	100	42.2	100	NR	NR	No	Prospectively	No	No	Yes	USA
Cockerham, 2010	922	100	43	69	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Cole, 2018	134	100	56	93	15	13	No	Prospectively	No	Yes	Yes	Netherlands; UK
Colon-Lopez, 2018	6526	91.3	47.2	64.2	NR	NR	No	Prospectively	Yes	No	Yes	Puerto Rico
Conley, 2015	452	100	41	78	NR	2.9	No	Prospectively	Yes	Yes	Yes	USA
Costiniuk, 2019	101	97	54	87	NR	NR	No	Prospectively	No	No	Yes	Canada
Cournil, 2012	207	100	46.8	32.3	NR	8.8	No	Prospectively	No	Yes	Yes	Senegal
Crane, 2017	8567	91	46	85	NR	NR	No	Retrospectively	Yes	No	Yes	USA
Da Silva, 2009	243	100	41	59.7	5.8	NR	No	Prospectively	No	Yes	Yes	Brazil
Daglan, 2013	40	100	23	42.5	20.85	15.9	Yes	Prospectively	No	No	Yes	Romania
D'Ascenzo, 2014	206	100	54	88	3.9	1.4	Yes	Retrospectively	No	No	Unclear	Europe; South Africa; USA
De Fátima Bonolo, 2008	295	100	NR	65.8	2	2	No	Prospectively	No	Yes	Yes	Brazil
Degroote, 2014	218	92	46	79.4	NR	NR	No	Prospectively	No	Yes	Yes	Belgium
Dentone, 2018	158	100	39	88	NR	NR	No	Prospectively	No	No	Yes	Italy
Depairon, 2001	168	90.5	39	71.4	NR	NR	No	Prospectively	No	No	Yes	Switzerland
Deshwal, 2019	475	100	NR	NR	8.1	NR	No	Prospectively	Yes	Yes	Yes	India
Dimala, 2016	100	100	40.2	30	NR	NR	No	Prospectively	No	No	Yes	Cameroon
Dirajlal-Fargo, 2018	147	100	45.41	68.2	NR	7.2	No	Prospectively	No	Yes	Yes	USA

Do T, 2016	4274	100	40.7	70.7	NR	NR	No	Retrospectively	Yes	No	Yes	Thailand Vietnam Indonesia India Hong Kong SAR Philippines Taiwan Malaysia Japan South Korea Singapore China
Do T, 2016	1496	100	44	67.8	NR	NR	No	Retrospectively	Yes	No	Yes	Thailand Vietnam Indonesia India Hong Kong SAR Philippines Taiwan Malaysia Japan South Korea Singapore China
Donald, 2017	131	100	NR	0	NR	NR	No	Prospectively	No	No	Yes	South Africa
Drozd, 2017	28912	100	NR	81	NR	NR	No	Prospectively	Yes	Yes	Yes	Canada, USA
Dubé, 2006	33	100	43	100	NR	NR	Yes	Prospectively	No	No	Yes	USA
Echeverría, 2014	174	94.4	46.5	84.1	NR	NR	No	Prospectively	No	Yes	Yes	Spain
Edward, 2013	214	100	39.1	79.1	NR	NR	No	Prospectively	No	No	Yes	Nigeria
Engeland, 2008	193	100	NR	24	NR	NR	Yes	Retrospectively	No	Yes	Yes	USA
Erlandson, 2012	250	100	52	88	14	NR	No	Prospectively	No	Yes	Yes	USA
Erlandson, 2012	43	100	51.8	86	16.8	NR	No	Prospectively	No	Yes	Yes	USA
Erlandson, 2012	66	100	52.1	74	15.8	NR	No	Prospectively	No	Yes	Yes	USA
Fabbiani, 2013	245	93.9	46	75.5	11	8	No	Prospectively	No	Yes	Yes	Italy
Farhadian, 2018	108	97.3	55	100	NR	NR	No	Prospectively	No	Yes	Yes	USA
Florindo, 2007	220	100	NR	76.8	NR	NR	No	Prospectively	Yes	Yes	Yes	Brazil
Fontela, 2018	277	100	53	67	NR	NR	No	Prospectively	No	No	Yes	Spain
Fontela, 2018	62	100	66	85	NR	NR	No	Prospectively	No	No	Yes	Spain
Freitas, 2012	149	100	44.4	45.4	6.7	5	No	Unclear	No	Yes	Yes	Portugal
Freitas, 2012	215	100	47	63	9.2	8	No	Unclear	No	Yes	Yes	Portugal
Fricke, 2012	40	100	44	NR	14	9.2	No	Prospectively	No	No	Yes	Germany
Friis-Møller, 2010	22625	100	40	74.1	4.8	2.5	No	Prospectively	Yes	Yes	Yes	USA; Argentina; Australia; Europe
Furuya-Kanamori, 2013	314	100	48.1	100	NR	NR	Yes	Prospectively	No	Yes	Yes	Australia
Fuster, 2016	232	94.7	42.1	68.9	7.15	5.12	Yes	Prospectively	No	No	Yes	Chile
Gaisa, 2014	728	93.68	NR	NR	NR	NR	No	Prospectively	Yes	Yes	Yes	USA

Galán, 2016	89	100	50.04	76.4	NR	NR	No	Prospectively	No	Yes	Yes	Spain
Gamarel, 2017	377	100	46.15	100	13.45	9.85	No	Prospectively	No	Yes	Yes	USA
Gangcuangco, 2016	138	100	50.5	88	NR	NR	No	Retrospectively	No	No	Yes	USA
García-Lázaro, 2007	205	93.2	41.4	NR	NR	NR	Yes	Prospectively	No	No	Yes	Spain
George, 2009	195	100	44.1	82.5	8	NR	Yes	Prospectively	No	No	Yes	USA
George, 2019	318	100	39	25	NR	4	Yes	Prospectively	No	No	Yes	South Africa
Ghadaki, 2016	247	92	49	75.3	NR	NR	No	Prospectively	No	Yes	Yes	Canada
Ghehi, 2017	2056	100	35	21.5	NR	NR	No	Prospectively	Yes	Yes	Yes	Côte d'Ivoire
Gingo, 2015	936	100	36.8	NR	NR	0	No	Prospectively	Yes	No	Yes	USA
Gingo, 2015	1082	100	44.5	NR	NR	8	No	Prospectively	Yes	No	Yes	USA
Glass, 2006	8033	100	NR	NR	NR	NR	No	Prospectively	Yes	Yes	Yes	Switzerland
Gonçalves, 2009	120	100	NR	NR	NR	NR	No	Prospectively	No	No	Yes	Brazil
Grint, 2014	9535	100	41	73.3	NR	NR	No	Prospectively	Yes	No	Yes	Israel; Argentina ; Europe
Grome, 2017	70	100	45	57	NR	6.24	No	Prospectively	No	No	Yes	USA
Guaraldi, 2012	133	100	48.77	100	14.7	NR	No	Prospectively	No	No	Yes	Italy
Guaraldi, 2014	1446	100	49	71.2	NR	NR	No	Prospectively	Yes	Yes	Yes	Italy
Guzmán-Fulgencio, 2011	73	95.9	46	79.5	14	18.4	No	Prospectively	No	Yes	Yes	Spain
Haberer, 2019	483	100	31	31	NR	0	No	Prospectively	Yes	No	Yes	Uganda
Haberer, 2019	421	100	34	30	NR	0	No	Prospectively	Yes	No	Yes	South Africa
Haeri, 2009	151	100	27	0	NR	NR	No	Retrospectively	No	No	Yes	USA
Haskelberg, 2014	210	100	38.8	47.6	NR	3.3	Yes	Prospectively	No	Yes	Yes	Argentina, India, Malaysia, South Africa, Thailand
Hatcher, 2012	270	100	34	100	NR	NR	No	Prospectively	No	Yes	Yes	Uganda
Heaps-Woodruff, 2016	46	100	47	89.5	11.45	NR	No	Prospectively	No	No	Yes	USA
Helleberg, 2015	17995	100	NR	71.3	NR	NR	No	Prospectively	Yes	Yes	Yes	Europe; North America
Helou, 2017	92	100	53	66	NR	NR	No	Retrospectively	No	No	Yes	USA
Hidalgo-Tenorio, 2018	95	93.7	43.7	0	13.6	NR	No	Prospectively	No	No	Yes	Spain
Hileman, 2012	30	100	NR	86	0.6	NR	No	Retrospectively	No	No	Yes	USA

Hileman, 2018	147	100	45.4	78	12	NR	No	Prospectively	Yes	Yes	Yes	USA
Hinojosa, 2018	206	98.5	44	NR	8	NR	Yes	Prospectively	Yes	No	Unclear	Mexico
Ho, 2012	74	100	47	NR	7	NR	No	Prospectively	No	No	Yes	USA
Hoffman, 2016	122	100	49	95	NR	NR	No	Prospectively	No	No	Yes	USA
Horizon, 2011	30	100	49	100	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Hsu, 2016	149	100	48.5	92.6	15.2	8.1	No	Prospectively	No	No	Yes	USA
Hulgan, 2014	37	100	43	0	NR	NR	Yes	Prospectively	Yes	No	Yes	North America
Iloeje, 2005	5787	100	39.4	88	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Iloeje, 2005	1755	100	38.7	80	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Iqbal, 2010	211	100	27.1	0	3	NR	No	Prospectively	No	No	Yes	USA
Iyer, 2019	254	100	37	82.6	NR	NR	No	Retrospectively	Yes	No	Yes	USA
Jackiewicz, 2019	80	100	40.6	NR	NR	NR	No	Prospectively	No	No	Yes	Poland
Jacobson, 2008	379	100	43	74.67	NR	NR	No	Prospectively	No	Yes	Yes	USA
Jaime, 2006	223	100	38.9	76.8	NR	NR	Yes	Prospectively	No	Yes	Yes	Brazil
Jerome, 2017	771	100	NR	28.4	NR	NR	No	Retrospectively	Yes	No	Yes	Benin
Johs, 2017	1015	100	51	81	NR	NR	No	Prospectively	Yes	No	Yes	USA
Jordan, 2014	100	100	29.86	100	NR	1.35	No	Prospectively	No	Yes	Yes	Vietnam
Julnes, 2016	80	100	50	64	18	NR	No	Prospectively	No	No	Yes	USA
Julnes, 2016	34	100	50	62	20	NR	No	Prospectively	No	No	Yes	USA
Kaio, 2013	182	100	43.76	62.1	11.49	10.08	No	Prospectively	No	No	Yes	Brazil
Kakar, 2017	180	100	NR	96	NR	NR	No	Retrospectively	No	No	Yes	Australia
Katoto, 2018	474	95.7	43	28	NR	5	Yes	Prospectively	Yes	No	Yes	DRC
Kazooba, 2017	1024	100	NR	35	NR	NR	No	Prospectively	Yes	Yes	Yes	Uganda
Kerchberger, 2019	1118	100	48.8	0	NR	10.9	No	Retrospectively	Yes	No	Yes	USA
Kesselring, 2011	11459	100	38	77	NR	4.8	No	Prospectively	Yes	No	Yes	Netherlands
Ketut Agus Somia, 2019	42	100	30	35.72	2.04	1.54	No	Prospectively	No	Yes	Yes	Indonesia
Ketut Agus Somia, 2019	42	100	39.5	35.72	3.29	2.71	No	Prospectively	No	Yes	Yes	Indonesia
Knobel, 2019	10897	100	48	71.4	15.8	13.1	No	Unclear	Yes	No	Yes	Spain
Knudsen, 2014	54	100	49	NR	11	6	No	Prospectively	No	No	Yes	Denmark

Knudsen, 2014	54	100	50	NR	9	6	No	Prospectively	No	No	Yes	Denmark
Knudsen, 2015	56	100	53	93	NR	NR	No	Prospectively	No	No	Yes	Denmark
Knudsen, 2015	102	94	52	75	12.5	NR	No	Prospectively	No	Yes	Yes	Denmark
Kobayashi, 2019	79	95	46	NR	NR	NR	Yes	Prospectively	No	Yes	Yes	USA
Koethe, 2013	158	100	45	29.8	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Koethe, 2016	70	100	NR	57.14	NR	NR	No	Prospectively	No	No	Yes	USA
Kooij, 2016	594	94.4	52.8	88.7	NR	NR	No	Prospectively	Yes	Yes	Yes	Netherlands
Krentz, 2005	124	100	NR	NR	NR	NR	No	Retrospectively	No	Yes	Yes	Canada
Krishnan, 2011	3158	100	38	82	NR	NR	No	Prospectively	Yes	No	Yes	Global
Kristoffersen, 2013	105	100	47.4	89	12.3	8.9	No	Prospectively	No	No	Yes	Denmark
Krsak, 2015	438	90	44.3	68	NR	NR	No	Prospectively	Yes	No	Yes	USA
Kulkarni, 2016	49	100	43	100	NR	NR	No	Prospectively	No	No	Yes	USA
Kwong, 2006	18603	100	36	82.79	NR	NR	No	Prospectively	Yes	Yes	Yes	Netherlands; USA
Lake, 2013	35	100	49	57	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Lake, 2015	82	100	NR	95	NR	NR	No	Prospectively	No	No	Yes	USA
Lake, 2015	40	100	NR	95	NR	NR	No	Prospectively	No	No	Yes	USA
Lake, 2018	1018	100	53.7	100	12.2	NR	No	Prospectively	Yes	No	Yes	USA
Leader, 2016	350	100	50.7	81	NR	NR	No	Prospectively	No	Yes	Yes	USA
León, 2017	84	100	42	75	NR	NR	No	Prospectively	No	Yes	Yes	Spain
Leung, 2014	199	99	49.3	100	12.05	NR	No	Prospectively	No	No	Yes	Canada
Levy, 2019	3368	93	50	78.4	13	NR	No	Prospectively	Yes	No	Yes	USA
Li J, 2018	957	100	46	62.5	NR	NR	No	Prospectively, Retrospectively	Yes	Yes	Yes	USA
Lifson, 2015	4685	100	NR	68	NR	NR	Yes	Prospectively	Yes	Yes	Yes	Africa; Asia; Europe; Israel; North America; South America; Mexico
Lima, 2009	87	100	52	91.9	NR	NR	No	Prospectively	Yes	No	Yes	Brazil
Liu, 2015	231	94	49.6	91	12.4	NR	No	Prospectively	No	No	Yes	Canada
Llop, 2018	128	100	57	73	21	18.3	No	Prospectively	No	No	Yes	Spain
Lo, 2010	78	95	46.5	100	13.5	7	No	Prospectively	No	No	Yes	USA
Longenecker, 2018	55	100	49	84	NR	1	No	Prospectively	No	No	Yes	USA

Looby, 2018	33	91	47	0	14	NR	No	Retrospectively	No	No	Yes	USA
Lorenz, 2017	520	93.2	40.8	100	1	NR	No	Prospectively	Yes	No	Yes	USA
Ma, 2011	275	100	46	62.9	NR	NR	Yes	Prospectively	No	No	Yes	USA
MacDonald, 2018	915	100	36	70.7	1.2	NR	No	Prospectively	Yes	Yes	Yes	Africa, Asia, Europe, Israel, Australia, Mexico, South America, USA
Madeddu, 2008	76	100	38.3	82.9	NR	NR	No	Retrospectively	No	Yes	Yes	italy
Madeddu, 2013	111	100	42.3	69.4	NR	NR	No	Prospectively	No	Yes	Yes	italy
Maggi, 2000	55	100	36	85.5	5	NR	No	Prospectively	No	Yes	Yes	Italy
Maggi, 2004	105	100	38	80.9	8	2.16	No	Prospectively	No	Yes	Yes	Italy
Mai, 2018	475	100	38.4	62	NR	NR	No	Prospectively	Yes	Yes	Yes	Vietnam
Makhubele, 2016	46	100	27	0	NR	NR	No	Prospectively	No	No	Yes	South Africa
Makinson, 2011	52	90	48	80.8	NR	NR	No	Retrospectively	No	No	Yes	France
Mama, 2018	291	100	37.4	28.5	NR	NR	Yes	Prospectively	Yes	Yes	Yes	Ethiopia
Mandas, 2009	86	100	40.9	54.7	NR	NR	No	Unclear	No	Yes	Yes	Italy
Marando, 2016	690	100	45	72.5	11.7	NR	Yes	Prospectively	Yes	Yes	Yes	Italy
Marcellin, 2017	955	92	45.6	70	16.2	10.3	No	Prospectively	Yes	Yes	Yes	France
Martin, 2013	210	100	21	47.6	NR	NR	No	Prospectively	No	Yes	Yes	India, Malaysia, Thailand, South Africa, Argentina
Mashinya, 2015	214	100	44.8	20	NR	3.2	No	Prospectively	No	Yes	Yes	South Africa
May, 2007	13100	100	50	100	NR	NR	No	Retrospectively	Yes	Yes	Yes	UK;USA
Mccombe, 2013	1320	100	43.8	81	NR	NR	No	Prospectively	Yes	Yes	Yes	Canada
Melaku, 2019	120	100	42.3	43.3	NR	NR	No	Prospectively	No	Yes	Yes	Ethiopia
Melaku, 2019	120	100	38.4	42.3	NR	NR	No	Prospectively	No	Yes	Yes	Ethiopia
Mercié, 2002	422	100	41	72.8	7	3	No	Prospectively	Yes	No	Yes	France
Miller, 2014	3570	100	NR	77.2	7.3	4	No	Prospectively	Yes	Yes	Yes	Europe, Americas, Western Pacific
Misra, 2013	199	100	43.6	NR	9.5	5.6	No	Unclear	Yes	No	Yes	USA
Missailidis, 2015	97	100	51	100	13	NR	Yes	Prospectively	No	No	Yes	Sweden
Monnig, 2016	124	92.7	42.8	100	9.9	NR	No	Prospectively	No	No	Yes	USA
Monteiro, 2011	53	100	43.4	50.94	NR	4.9	No	Unclear	No	No	Yes	Brazil

Morell, 2016	96	100	44.8	19.2	NR	7	No	Prospectively	No	No	Yes	Spain
Morillo, 2018	53	100	53.6	90.6	NR	NR	Yes	Prospectively	Yes	No	Yes	Spain
Morojele, 2017	130	100	NR	60.8	NR	NR	No	Prospectively	No	Yes	Yes	India
Muiru, 2018	105	100	49	46	NR	NR	No	Prospectively	No	Yes	Yes	Uganda
Muramatsu, 2019	306	96.1	49	95.1	NR	6.23	No	Retrospectively	No	No	Yes	Japan
Muronya, 2011	174	100	40.8	38.5	NR	2.96	Yes	Prospectively	No	Yes	Yes	Malawi
Mussini, 2013	4942	100	37	72.6	NR	NR	No	Prospectively	Yes	No	Yes	Italy
Muyanja, 2016	250	100	36	32	NR	2.6	No	Prospectively	No	Yes	Yes	Uganda
Nakamura, 2011	44	97.8	40	100	NR	5.8	No	Unclear	No	Yes	Yes	Japan
Ndona, 2012	49	100	43	42.9	NR	NR	No	Prospectively	No	Yes	Yes	RDC
Nduka, 2016	306	100	38.6	34.6	4.2	NR	No	Prospectively	Yes	Yes	Yes	Nigeria
Neumann, 2010	309	100	42.1	77.67	NR	NR	No	Prospectively	No	No	Yes	Germany
Nguyen, 2008	36	100	53	97	12	NR	Yes	Prospectively	No	Yes	Yes	USA
Nguyen, 2016	1050	100	35.6	58.4	6.2	4.4	No	Prospectively	Yes	No	Yes	Vietnam
Niewoehner, 2015	328	100	37	36	1.5	NR	Yes	Prospectively	No	Yes	Yes	Africa
Niewoehner, 2015	103	100	36	73	0.8	NR	Yes	Prospectively	No	Yes	Yes	Asia
Niewoehner, 2015	313	100	31.3	92	1.2	NR	Yes	Prospectively	No	Yes	Yes	Australia; Europe; Israel
Niewoehner, 2015	191	100	34	86	0.6	NR	Yes	Prospectively	No	Yes	Yes	Mexico; South America
Nittayananta, 2014	99	100	38.5	52	7	NR	No	Prospectively	No	Yes	Yes	Thailand
Nkuize, 2012	145	100	44.2	47.59	NR	NR	No	Prospectively	No	Yes	Yes	Belgium
Nolan, 2017	202	100	50	65.8	NR	NR	No	Retrospectively	No	No	Yes	USA
North, 2017	734	100	34	30	NR	NR	No	Prospectively	Yes	No	Yes	Uganda
North, 2018	269	100	52	54	NR	9	No	Prospectively	No	No	Yes	Uganda
Nouaman, 2018	795	100	34	46.3	NR	0	No	Prospectively	Yes	No	Yes	Zambia
Obry-Roguet, 2018	862	96	52.8	67.9	20.3	16	No	Retrospectively	Yes	No	Yes	France
O'Halloran, 2019	202	100	55	75	NR	NR	No	Prospectively	No	No	Yes	USA
Okafor, 2017	1902	100	40	69	NR	NR	No	Retrospectively	Yes	No	Yes	USA
Önen, 2010	122	91.8	55.8	82.8	10.4	NR	No	Prospectively	No	No	Yes	USA
Pacek, 2014	358	100	48.9	61.8	NR	0.6	No	Retrospectively	No	No	Yes	USA
Palacios, 2006	95	100	40	82	4.7	NR	No	Prospectively	No	Yes	Yes	Spain

Palella, 2018	917	100	NR	100	NR	NR	No	Prospectively	Yes	Yes	Yes	USA
Parikh, 2015	150	100	52	88	NR	0.5	Yes	Unclear	Yes	No	Yes	USA
Park, 2017	147	100	46	78	11.6	5.5	Yes	Prospectively	Yes	No	Yes	USA
Parrinello, 2012	226	99	41.7	NR	NR	NR	No	Prospectively	No	Yes	Yes	USA
Parrinello, 2012	148	99	42.8	NR	NR	NR	No	Prospectively	No	Yes	Yes	USA
Passos, 2012	73	94.5	43	100	8.5	7.7	No	Prospectively	No	No	Yes	Brazil
Pastori, 2015	36	100	42.6	69.4	NR	11.4	No	Unclear	No	Yes	Yes	Italy
Payam, 2011	68	91.2	48.5	94.1	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Petoumenos, 2011	27136	100	38	77	NR	1.8	No	Prospectively	Yes	No	Yes	Argentina; Australia;Europe; USA.
Petraglia, 2017	164	90	45.1	70.1	NR	NR	No	Prospectively	No	Yes	Yes	Russia
Pinzone, 2019	72	100	47	80.6	10.2	6	No	Prospectively	Yes	No	Yes	Italy
Pool, 2019	819	98.1	52	NR	8	NR	No	Prospectively	Yes	Yes	Yes	Ireland, UK
Poudel, 2014	233	100	35.6	52.4	NR	NR	No	Prospectively	No	No	Yes	Nepal
PrayGod, 2017	273	100	41.5	34.8	NR	NR	No	Retrospectively	No	No	Yes	Tanzania
Protopopescu, 2012	599	100	37.6	77.7	NR	NR	No	Prospectively	Yes	No	Yes	France
Quirico, 2018	79	100	64.4	51	16	11.3	No	Prospectively	No	Yes	Yes	Italy
Quiros-Roldan, 2005	36	100	NR	75	NR	NR	No	Prospectively	No	Yes	Yes	Italy
Rabkin, 2015	175	100	45.4	25.7	4	NR	No	Prospectively	No	No	Yes	South Africa
Rabkin, 2018	1826	100	47	38	NR	NR	No	Prospectively	Yes	Yes	Yes	Swaziland
Rasmussen, 2016	55	100	49	91	10	NR	No	Retrospectively	Yes	No	Yes	Denmark
Rasmussen, 2016	182	100	50	92	10	NR	No	Retrospectively	Yes	No	Yes	Denmark
Reid, 2017	225	100	46.5	NR	NR	13	No	Prospectively	No	Yes	Yes	USA
Reid, 2019	148	100	50	53	NR	8	No	Prospectively	No	No	Yes	USA
Rezaei-Soufi, 2014	50	100	36	71.4	3	1	No	Prospectively	No	No	Yes	Iran
Rezaei-Soufi, 2014	100	100	38	81.8	3	1	No	Prospectively	No	No	Yes	Iran
Rocha-Brischiliari, 2014	178	100	NR	0	NR	NR	No	Retrospectively	Yes	Yes	Yes	Brazil
Rollet-Kurhajec, 2015	308	100	44	72	11	6	Yes	Prospectively	No	Yes	Yes	Canada

Ronit, 2018	4576	100	36.8	73.4	NR	NR	Yes	Prospectively	Yes	Yes	Yes	Africa;Asia;Europe;Israel;South America;USA
Ryom, 2018	1157	93.7	44	88.3	NR	NR	No	Prospectively	Yes	No	Yes	Australia, Europe, and the USA
Ryom, 2019	2467	96	60	77.2	NR	NR	No	Prospectively	Yes	Yes	Yes	Europe; USA; Australia
Sabin, 2008	517	98.4	49	92	NR	NR	No	Prospectively	Yes	No	Yes	Europe, the USA, Australia
Salyer, 2006	95	100	41.3	83	14	11	No	Unclear	No	Yes	Yes	USA
Sampériz, 2014	275	92	49	78.2	11.9	NR	No	Prospectively	No	Yes	Yes	Spain
Sansores, 2008	207	100	41.3	90	6.92	5.39	No	Unclear	No	No	Yes	Mexico
Sarfo, 2019	250	100	45.7	18.8	8.6	NR	No	Unclear	No	Yes	Yes	Ghana
Seang, 2018	57	100	57	100	22	11	No	Prospectively	No	Yes	Yes	USA
Serrano-Villar, 2014	132	100	47	78	11	7.5	No	Prospectively	No	No	Yes	Spain
Shahmanesh, 2016	8762	100	42	76.28	NR	NR	No	Prospectively	Yes	Yes	Yes	Europe; Israel; Argentina
Sharma, 2013	100	100	NR	61	NR	NR	No	Prospectively	No	No	Yes	Nepal
Sherer, 2014	2035	100	NR	63	NR	NR	No	Prospectively	Yes	No	Yes	North America (the United States); Latin American (Brazil); Europe (France, Germany, Italy, Russia, Spain, and the United Kingdom); Asia (Australia and Korea); and Africa (Cote d'Ivoire and South Africa)
Shin, 2019	598	100	37	0	6	NR	No	Retrospectively	Yes	No	Yes	India
Shirley, 2013	200	97	49	84	15.2	NR	No	Prospectively	No	Yes	Yes	USA
Short, 2014	131	100	NR	NR	NR	NR	No	Prospectively	No	Yes	Yes	UK
Shuter, 2008	64	100	NR	55	NR	NR	No	Prospectively	No	No	Yes	USA
Siedner, 2016	105	100	49	49	NR	7	No	Prospectively	No	No	Yes	Uganda
Siemieniuk, 2011	1946	100	NR	78.5	NR	NR	No	Prospectively	Yes	No	Yes	Canada
Smit, 2018	8791	100	43.8	77.9	NR	4.1	No	Prospectively	Yes	No	Yes	Netherlands
Socías, 2016	397	100	41	58.9	NR	NR	Yes	Prospectively	Yes	Yes	Yes	Canada
Søgaard, 2010	75	100	49.1	85.3	NR	NR	No	Unclear	No	Yes	Yes	Denmark
Soliman, 2015	456	100	37	80	1.4	NR	Yes	Prospectively	Yes	Yes	Yes	North America
Soliman, 2015	1428	100	38	92	1.1	NR	Yes	Prospectively	Yes	Yes	Yes	Australia, Europe, Israel
Soliman, 2015	1048	100	32	86	0.5	NR	Yes	Prospectively	Yes	Yes	Yes	South America

Soliman, 2015	154	100	30	80	0.6	NR	Yes	Prospectively	Yes	Yes	Yes	Asia
Spinelli, 2019	156	91.03	NR	92.95	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Sutton, 2019	26526	100	49.3	97	NR	NR	No	Retrospectively	Yes	No	Yes	USA
Sutton, 2019	53052	100	49.3	97	NR	NR	No	Retrospectively	Yes	No	Yes	USA
Syed, 2013	67	100	16.7	NR	NR	NR	No	Unclear	No	Yes	Yes	USA
Szymanek-Pasternak, 2016	98	100	41	NR	NR	NR	No	Prospectively	No	No	Yes	Poland
Tarancon-Diez, 2018	253	96	29	75	19	NR	No	Prospectively	No	No	Yes	Spain
Thudium, 2018	1082	98.6	50.7	84.8	NR	NR	No	Retrospectively	Yes	No	Yes	Denmark
Tomažič, 2007	37	100	43.8	100	11.5	5.5	Yes	Prospectively	No	No	Yes	Slovenia
Tomažič, 2007	35	100	45.5	100	11	5.1	Yes	Prospectively	No	No	Yes	Slovenia
Troy, 2016	208	100	46	67	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Troy, 2016	191	100	45	66	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Troy, 2016	33	100	53	70	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Troy, 2016	193	100	46	68	NR	NR	No	Retrospectively	No	Yes	Yes	USA
Turčinov, 2011	130	100	43	79	NR	NR	No	Retrospectively	No	No	Yes	Croatia
van Zoest, 2016	499	94.7	52.9	88.6	12.2	NR	No	Prospectively	Yes	No	Yes	Netherlands
Vernon, 2009	101	90	42	74	7.2	1.2	No	Prospectively	No	No	Yes	USA
Volpe, 2013	211	100	45	73	11	3.1	No	Prospectively	No	Yes	Yes	USA
Waweru, 2013	207	100	39.9	47.8	NR	NR	Yes	Prospectively	No	No	Yes	South Africa
Weldehaweria, 2017	170	100	39.3	42.4	NR	NR	Yes	Prospectively	Yes	No	Yes	Ethiopia
Weldehaweria, 2017	170	100	39.2	42.4	NR	NR	Yes	Prospectively	Yes	No	Yes	Ethiopia
Willig, 2017	42	100	45.5	0	NR	NR	No	Prospectively	No	No	Yes	USA
Winston, 2013	557	100	44	77	NR	NR	No	Prospectively	Yes	Yes	Yes	UK
Wójtowicz, 2019	3495	99	32.8	77	NR	NR	No	Prospectively	Yes	Yes	Yes	Switzerland
Worm, 2009	23202	100	38	74	NR	NR	No	Prospectively	Yes	No	Yes	USA; Australia; Europe
Wu, 2019	1006	98.5	49.3	93.2	NR	NR	No	Prospectively	Yes	No	Yes	Taiwan
Yanagisawa, 2012	520	100	47.6	NR	NR	NR	No	Prospectively	Yes	Yes	Yes	Japan
Yuan, 2006	3414	100	39.3	86	NR	NR	No	Retrospectively	Yes	Yes	Yes	USA
Zachry, 2013	5530	100	NR	85.79	NR	NR	No	Retrospectively	Yes	No	Yes	USA

Zannou, 2009	79	100	38	40.5	NR	1.9	No	Prospectively	Yes	No	Yes	Benin
Zhang, 2018	1799	100	42	0	NR	NR	No	Prospectively	Yes	No	Unclear	USA

NR: Not reported

Supplementary Table 4. Characteristics of included studies investigating the association between active smoking and non-adherence to antiretroviral therapy

Variables	**N = 20**
General characteristics	
Year of publication, range	2006-2019
Design, n (%)	
- Cross-sectional	15 (75)
- Cohort	5 (25)
Setting, n (%)	
- Hospital-based	19 (95)
- Population-based	1 (5)
Sampling	
- Non-probabilistic	20 (100)
Methodological quality	
Selection of participants, n (%)	
- Low	10 (50)
- Moderate	8 (40)
- High	2 (10)
Comparability of included group, n (%)	
- Low	15 (75)
- Moderate	2 (10)
- High	3 (15)
Outcome assessment, n (%)	
- Low	5 (25)
- Moderate	5 (25)
- High	10 (50)

Supplementary Table 5. Individual characteristics of included studies investigating the association between active smoking and non-adherence to antiretroviral therapy

Author	Year	Design	Sampling	Setting	Period of inclusion	Country	Definition of non-adherence	Sample	Variables for adjustment	Selection	Comparability	Outcome
Sharma	2013	Cross sectional	Non-Probabilistic	Hospital-based	2011-2012	Nepal	Missing of ART regimen (< 95%)	100		Mod	Low	Low
Winhusen	2018	Cohort	Non-Probabilistic	Hospital-based	NR	USA	HIV medication adherence was measured by self-report as the % of pills taken in the last 30 days; "high adherence" was defned as self-reporting taking ≥ 90% of prescribed ART.	623		Low	High	Low
O'Connor	2013	Cohort	Non-Probabilistic	Hospital-based	NR	SMART Countries	Community Programs for Clinical Research on AIDS Antiretroviral Medication Adherence Self-Report Form (form 065)	35695	Study arm, sex, age, ethnicity, mode of transmission, education, residence, calendar year, CD4 count, NRTI, PI, NNRTI in the regimen, No of ART classes experienced, event in past year, history of of AIDS defining illness, concomitant drugs,	Low	Low	Low
Bonolo [Women]	2013	Cohort	Non-Probabilistic	Hospital-based	2001-2002	Brazil	Intake of less than 95% of the prescribed number of doses in the last 3 days	100	Marital status, Alcohol, Self-reported difficulty for ART, Adverse events, Time between HIV and first ART, education, race, income, job, disclosure of HIV status, lifetime IDU, lifetime illicit drug use, psychological support, understanding medical counseling and ART prescription, Number of pills, CD4 count baseline, CDC classification of clinical presentation, baseline anxiety and depression, self-perceived quality of life	Low	Low	Mod
Bonolo [Men]	2013	Cohort	Non-Probabilistic	Hospital-based	2001-2002	Brazil	Intake of less than 95% of the prescribed number of doses in the last 3 days	195	Marital status, Alcohol, Self-reported difficulty for ART, Adverse events, Time between HIV and first ART, education, race, income, job, disclosure of HIV status, lifetime IDU, lifetime illicit drug use, psychological support, understanding medical counseling and ART prescription, Number of pills, CD4 count baseline, CDC classification of clinical presentation, baseline anxiety and depression, self-perceived quality of life	Low	Low	Mod
Yuan	2006	Cohort	Non-Probabilistic	Hospital-based	1996-2003	USA	Non-compliance attributable to patient preference, general non-compliance, including non-compliance on the physician's directive	1341		Low	High	Low
Jordan	2014	Cross sectional	Non-Probabilistic	Hospital-based	2005	VietNam	Adherence to currently prescribed ART was assessed using the patient's subjective rating on a one-item Likert scale of how well he was able to take all his medications in the past 30 days (perfect, very good, good, fair, or poor).	528	CD4 count, live alone, drug use last 6 mo, alcohol, duration on ART, ever TB, hepatitis B and C, Bothersome symptoms	Mod	Low	High
Cioe	2017	Cross sectional	Non-Probabilistic	Hospital-based	2011-2015	USA	An interviewer asked participants to reflect back on the past 30 days, mark memorable events (e.g., vacations, birthdays, paycheck days, parties) on the calendar as anchor points, and then recall day by day whether or not they had missed any doses of their HIV medications. The authors dichotomized 30-day ART adherence at greater than (perfect/near perfect) or less than (imperfect) 95 % adherence	166	MSM color, income, education, marital status, drug use, cocaine use, methamphetamine use, popper use, marijuana use, age, timing living with HIV, age at smoking initiation, drinking behaviors	High	Low	High

Nolan	2017	Cross sectional	Non-Probabilistic	Hospital-based	2012-2014	USA	Self reported past 30-day ART adherence (<90% vs. ≥90%) measured using a validated Visual Analogue Scale (VAS)	200		Low	Low	High
Batista	2014	Cross sectional	Non-Probabilistic	Hospital-based	2007-2009	Brazil	Self-reported irregular use of combined antiretroviral therapy (cART), categorized in 'yes' - when patients reported a discontinuation of treatment at some point on their own - and 'no'.	1380	Age, use of crack	Low	Low	High
Peretti-Watel	2006	Cross sectional	Non-Probabilistic	Hospital-based	2003	France	Adherence to HAART was assessed with a dichotomous outcome (highly adherent versus non-adherent). Adherence was assessed by four survey questions about dose-taking during the previous 7 days: (1) Did you scrupulously follow prescribed doses of HAART? (2) Did you miss at least one dose during the last week? (3) Did you take the entire daily dose at one time rather than at the prescribed intervals? [This question was eliminated for patients following once-daily regimens.] and (4) Did you fail to follow the prescribed intervals for at least one dose? Patients were defined as highly adherent (versus poorly adherent) if they answered "yes" to the first question and "no" to the second, third, and fourth questions	2484	Age, Living with a partner, Being migrant, financial difficulties in household, transmission group, Number of years since HIV diagnosis, HAART adverse effect, Alcohol abuse, Patients on Drug Maintenance therapy, Multiple addictions	Low	Low	High
Soares	2019	Cross sectional	Non-Probabilistic	Hospital-based	2012-2013	Brazil	Nonadherence was defined as intake of less than 90% of the medications prescribed in the last week, considering the number of pills taken by asking the patients and the timetable for each intake	253	Age, Physical activity, Disclosure HIV status with partner, Lack of ART. Others: Alcohol, religious activity, illicit drug use, ART regimens, Partner infected with HIV, Number of casual partners over the last 12 months, Casual partners over the last 12 months, Long-term partners	Mod	Low	High
Nguyen	2016	Cross sectional	Non-Probabilistic	Hospital-based	2013	VietNam	Adherence during the last 30 days was measured by the 100-point visual analog scale (VAS), where 0 indicates complete nonadherence and 100 indicates complete adherence. The established cut point of 95 or above was used to indicate adequate adherence.	1050		Mod	Low	High
Degroote	2014	Cross sectional	Non-Probabilistic	Hospital-based	2012	Belgium	Simplified Medication Adherence Questionnaire: A patient is considered to be not adherent if one or more of the four first questions were answered affirmatively, if he/she missed more than two doses in the past week or if there were more than 2 days without medication during the past 3 months.	218	Sex, Neurocognitive complaints	Mod	Low	High
Camargo	2019	Cross sectional	Non-Probabilistic	Hospital-based	2014-2017	Brazil	Adherence to therapy was evaluated using the Brazilian adaptation of ''Assessment of Adherence to Antiretroviral Therapy Questionnaire'' (CEAT-VIH), which has 20 self-reported questions. The total score for the questionnaire ranges from 17 to 89 points; the higher the score is the better the adherence, that is, low/insufficient adherence (score <70), intermediate adherence (score between 71 and 78), or optimal/adequate adherence (score >79).	112		Mod	Low	High
Wei	2015	Cross sectional	Non-Probabilistic	Hospital-based	2014	China	Self-administrated questionnaire was used to collect the data about HAART compliance	276	demographics, ART status, social support and discrimination, WHO staging, ART side effects	Low	Mod	High

Cropsey	2016	Cross sectional	Non-Probabilistic	Hospital-based	2005-2008	USA	No missed doses or missed any doses in the past 3 months	2928		Mod	High	Low
Aye	2017	Cross sectional	Non-Probabilistic	Hospital-based	2016	Maynnar	The authors used the Adult AIDS Clinical Trials Group (AACTG) adherence instrument and 30 days visual analogue scale (VAS) to assess adherence. AACTG is four days recall method for measuring adherence that also assesses reasons of non-adherence. VAS adherence assessment is the Medication Self-report Inventory that can be used to assess adherence to a single antiretroviral medication. Adherence refers to the PLHIV took ≥95% of doses taken over the past 30 days. On the other hand, patients with <95% of doses taken over the past 30 days, were defined as non-adherence	300	Gender, age, marital status, education, occupation, duration of ART, CD4 count, line of ART, ART regimen, diagnosis of chronic disease, Information, Motivation and Behavioral skills on adherence information, adherence on motivation, adherence on behavioural skills, alcohol, disclosure, stigma, social support, partner who is not on ART, depression, erectile dysfunction	High	Low	Mod
Silva	2015	Cross sectional	Non-Probabilistic	Hospital-based	2010	Brazil	This outcome variable was constructed based on the pharmacy's drug dispensation records, according to the dates scheduled for each patient. A seven-day delay per month for the collection of drugs was allowed. For each patient, a binary indicator was constructed with "0" and "1" values to classify adherence status. The "0" value was failure to show up at the pharmacy to collect the drugs prescribed on the scheduled date; the "1" value meant going to the pharmacy on the scheduled date. For each patient, at the completion of a six-month follow-up, an index ranging from 0 to 6 was obtained from the sum of the binary indicator. For analytical purposes, patients were grouped in two categories: "adherence" – for those whose score was ≥ 5, and nonadherence" – for those with score < 5	205	Sex, Age, Employment status, marital status, sexual orientation, alcohol, use of illicit drugs, CD4 count, clinical status at HAART initiation, number of HAART, type of HAART, adverse drugs	Mod	Low	Mod
Murri	2009	Cross sectional	Non-Probabilistic	Population-based	2006	Italy	Having discontinued therapy for at least 1 day	296	Age, sex, education, IDU, hepatitis B or C, CD4 count, HIV RNA, PIs, NNRTIs, Number of daily doses, Third or more scheme, number of pills, Missing at least one dose in the previous week, Self-reporting suboptimal adherence (Taking therapy not so well or bad), Uncorrect timing, Believing therapy has ''nothing,'' ''poor'' or ''enough efficacy'', Seek for information on AIDS=HIV, Take homeopathic drugs, Physical Health Summary, Mental Health Summary, Symptom score	Low	Mod	Mod

Supplementary Table 6. Sensitivity analysis of prevalence of active smoking in the global population living with HIV undergoing ART

	Prevalence, %	**95% confidence intervals**	**N studies**	**N participants**	**Heterogeneity**		**Egger test**
					I^2, %	**P value**	
Global	**36.1**	**33.7-38.5**	**329**	**462,104**	**99.5**	**< 0.0001**	**0.0002**
- All participants on ART	34.5	31.8-37.2	268	420,575	99.6	< 0.0001	0.0001
- Acceptable precision	33.7	30.1-37.4	132	431,453	99.8	< 0.0001	0.0007
- Probabilistic sampling	31.5	26.0-37.3	52	25,224	98.0	< 0.0001	0.324
- Prospective data collection	35.1	32.5-37.7	261	317,315	99.5	< 0.0001	< 0.0001
- Response rate ≥ 80%	35.4	32.2-38.8	157	193,851	99.5	< 0.0001	< 0.0001
- Identical data collection procedure	36.1	33.7-38.6	325	459,849	99.5	< 0.0001	0.0002

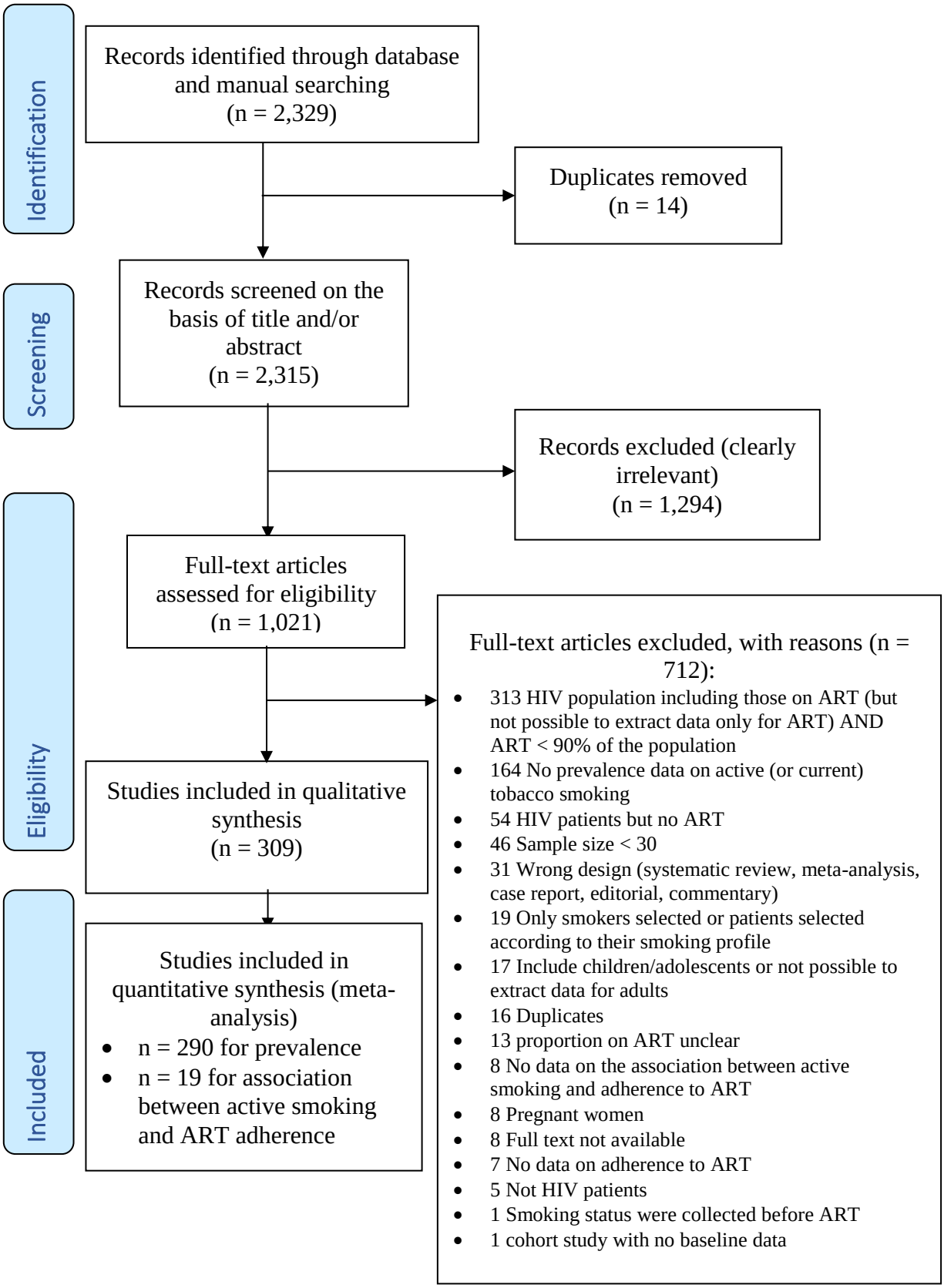
Supplementary Table 7. Complete cases meta-regression analysis of sources of heterogeneity and factors associated with the variation of prevalence of active tobacco smoking in people living with HIV ongoing antiretroviral therapy

	N studies	N participants	Univariable model			Multivariable model		
	N = 329	N = 462,104	Prevalence difference (95% confidence intervals)	*P* value	R^2	Adjusted prevalence difference (95% confidence intervals)	*P* value	LR test
Country level of income				< 0.0001	39.4%			0.023
- Low	30	11,329	Ref			Ref		
- Lower-Middle	21	9,858	9.1 (-1.4; 20.7)	0.091		-0.7 (-4.3; 3.0)	0.916	
- Upper-Middle	39	8,252	25.9 (15.4; 37.2)	< 0.0001		10.0 (6.3; 13.9)	0.092	
- High	216	339,022	51.2 (41.1; 62.0)	< 0.0001		13.8 (9.2; 18.6)	0.047	
- Multi-region	23	93,643	26.4 (14.7; 39.4)	< 0.0001		-2.0 (-6.3; 2.5)	0.776	
UNAIDS				< 0.0001	45.3%			< 0.0001
- West and Central Europe and North America	203	293,547	Ref			Ref		
- West and Central Africa	12	4,868	-40.9 (-46.5; -34.6)	< 0.0001		-32.0 (-35.1; -28.8)	< 0.0001	
- Eastern and Southern Africa	34	12,676	-33.3 (-37.4; -29.0)	< 0.0001		-26.0 (-28.9; -22.9)	< 0.0001	
- Eastern Europe and Central Asia	2	264	-2.2 (-23.3; 24.6)	0.865		5.5 (-2.6; 14.4)	0.650	
- Latin America and the Caribbean	24	16,385	-16.0 (-21.9; -9.6)	< 0.0001		-13.9 (-17.1; -10.6)	0.020	
- Asia and the Pacific	27	16,352	-12.4 (-18.2; -6.0)	0.0002		-4.9 (-7.6; -2.1)	0.388	
- Middle East and North Africa	3	320	-12.0 (-28.1; 7.6)	0.212		-10.9 (-17.1; -4.3)	0.401	
- Multi-region	24	117,692	-11.5 (-17.7; -4.9)	0.0009		-4.0 (-7.1; -0.9)	0.622	
% of males					14.0%			
- Increase of 10%	301	446,434	3.4 (2.4-4.4)	< 0.0001				
Duration since diagnostic infection					9.4%			
- By increase of 5 years	119	68,194	12.5 (5.2-20.3)	0.0006				
Duration of antiretroviral therapy					0.2%			
- By increase of 5 years	98	117,811	2.7 (-0.9; 15.3)	0.625				
Mean age					3.4%			
- By increase of 10 years	290	380,280	6.2 (2.3-10.3)	0.0018				
Response rate					0.1%			
- < 80% or not described	172	268,253	Ref					
- ≥ 80%	157	193,851	-1.2 (-6.1; 3.8)	0.628				
Sampling method					0.9%			

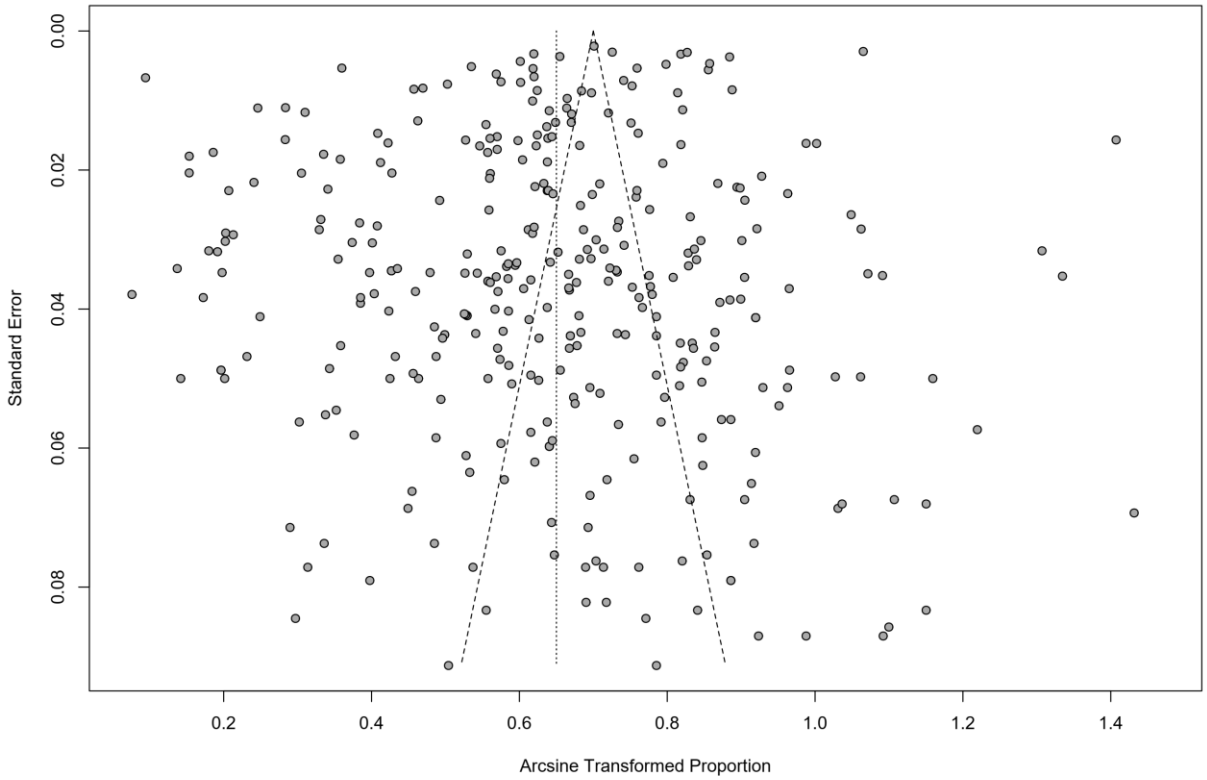
- Non probabilistic	277	436,880	Ref					
- Probabilistic	52	25,224	-5.5 (-11.8; 1.1)	0.102				
Timing of data collection and analysis				0.238	1.3%			
- Prospectively	261	317,315	Ref					
- Retrospectively	50	129,628	4.6 (-2.4; 12.2)	0.205				
- Both	1	957	42.4 (-8.7; 122.2)	0.119				
- Unclear	17	14,204	4.0 (-7.1; 16.5)	0.493				
Precision					0.8%			
- Low	197	30,651	Ref					
- Acceptable	132	431,453	-4.1 (-8.9; 0.8)	0.102				

ART: antiretroviral therapy; UNAIDS: Joint United Program on HIV; NA: not applicable; LR: likelihood ratio
*Missing data were imputed

Supplementary Figure 1. PRISMA flow chart



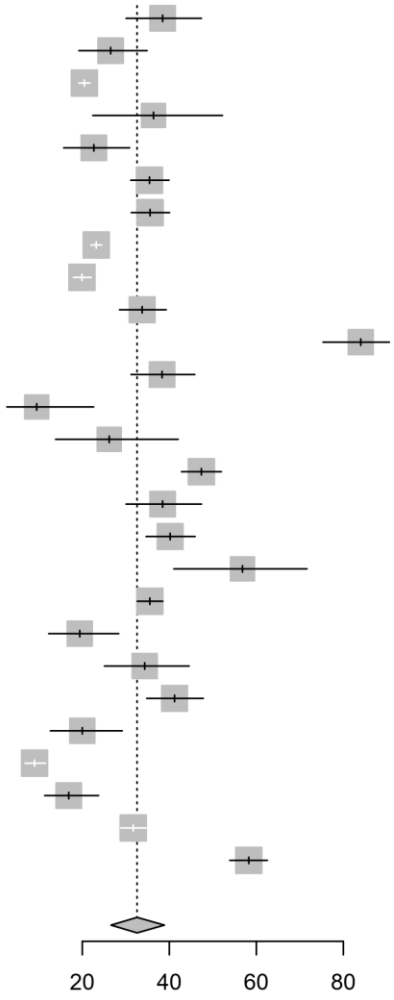
Supplementary Figure 2. Funnel plot for meta-analysis of prevalence of active smoking in people undergoing antiretroviral therapy



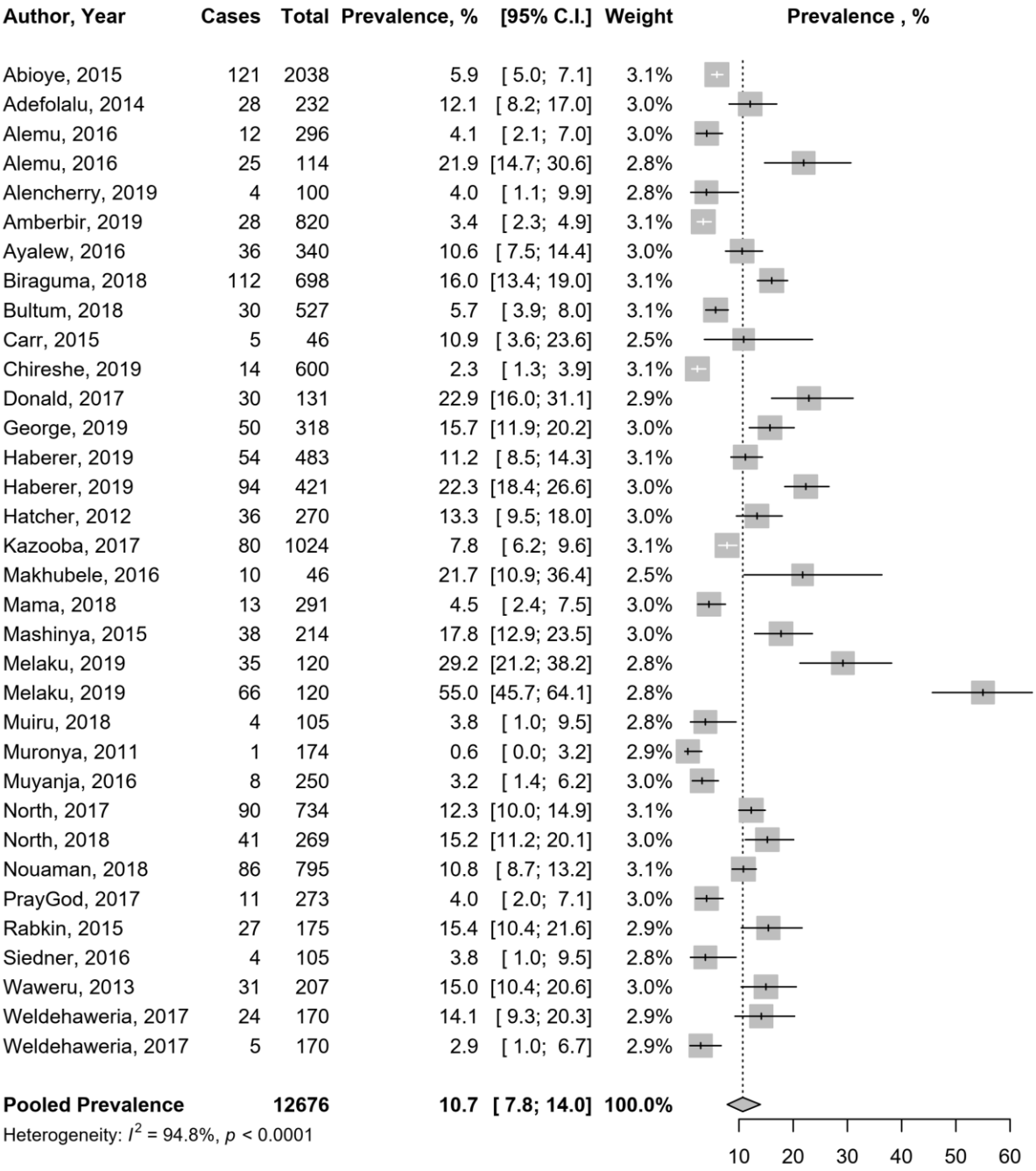
Supplementary Figure 3. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in Asia and Pacific

Author, Year	Cases	Total	Prevalence, %	[95% C.I.]	Weight
Balasundaram, 2014	50	130	38.5	[30.1; 47.4]	3.7%
Bhatta, 2018	35	132	26.5	[19.2; 34.9]	3.7%
Bijker, 2019	758	3703	20.5	[19.2; 21.8]	3.9%
Bolland, 2019	16	44	36.4	[22.4; 52.2]	3.3%
Carr, 2015	29	128	22.7	[15.7; 30.9]	3.7%
Castley, 2016	168	474	35.4	[31.1; 39.9]	3.9%
Deshwal, 2019	169	475	35.6	[31.3; 40.1]	3.9%
Do T, 2016	992	4274	23.2	[22.0; 24.5]	3.9%
Do T, 2016	298	1496	19.9	[17.9; 22.0]	3.9%
Furuya-Kanamori, 2013	106	314	33.8	[28.5; 39.3]	3.8%
Jordan, 2014	84	100	84.0	[75.3; 90.6]	3.6%
Kakar, 2017	69	180	38.3	[31.2; 45.9]	3.7%
Ketut Agus Somia, 2019	4	42	9.5	[2.7; 22.6]	3.3%
Ketut Agus Somia, 2019	11	42	26.2	[13.9; 42.0]	3.3%
Mai, 2018	225	475	47.4	[42.8; 52.0]	3.9%
Morojele, 2017	50	130	38.5	[30.1; 47.4]	3.7%
Muramatsu, 2019	123	306	40.2	[34.7; 45.9]	3.8%
Nakamura, 2011	25	44	56.8	[41.0; 71.7]	3.3%
Nguyen, 2016	373	1050	35.5	[32.6; 38.5]	3.9%
Niewoehner, 2015	20	103	19.4	[12.3; 28.4]	3.6%
Nittayananta, 2014	34	99	34.3	[25.1; 44.6]	3.6%
Poudel, 2014	96	233	41.2	[34.8; 47.8]	3.8%
Sharma, 2013	20	100	20.0	[12.7; 29.2]	3.6%
Shin, 2019	54	598	9.0	[6.9; 11.6]	3.9%
Soliman, 2015	26	154	16.9	[11.3; 23.8]	3.7%
Wu, 2019	319	1006	31.7	[28.8; 34.7]	3.9%
Yanagisawa, 2012	303	520	58.3	[53.9; 62.5]	3.9%
Pooled Prevalence		**16352**	**32.6**	**[26.6; 38.9]**	**100.0%**

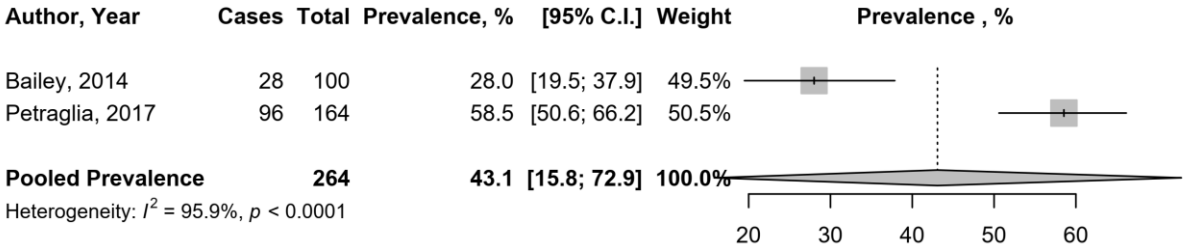
Heterogeneity: I^2 = 97.3%, p < 0.0001



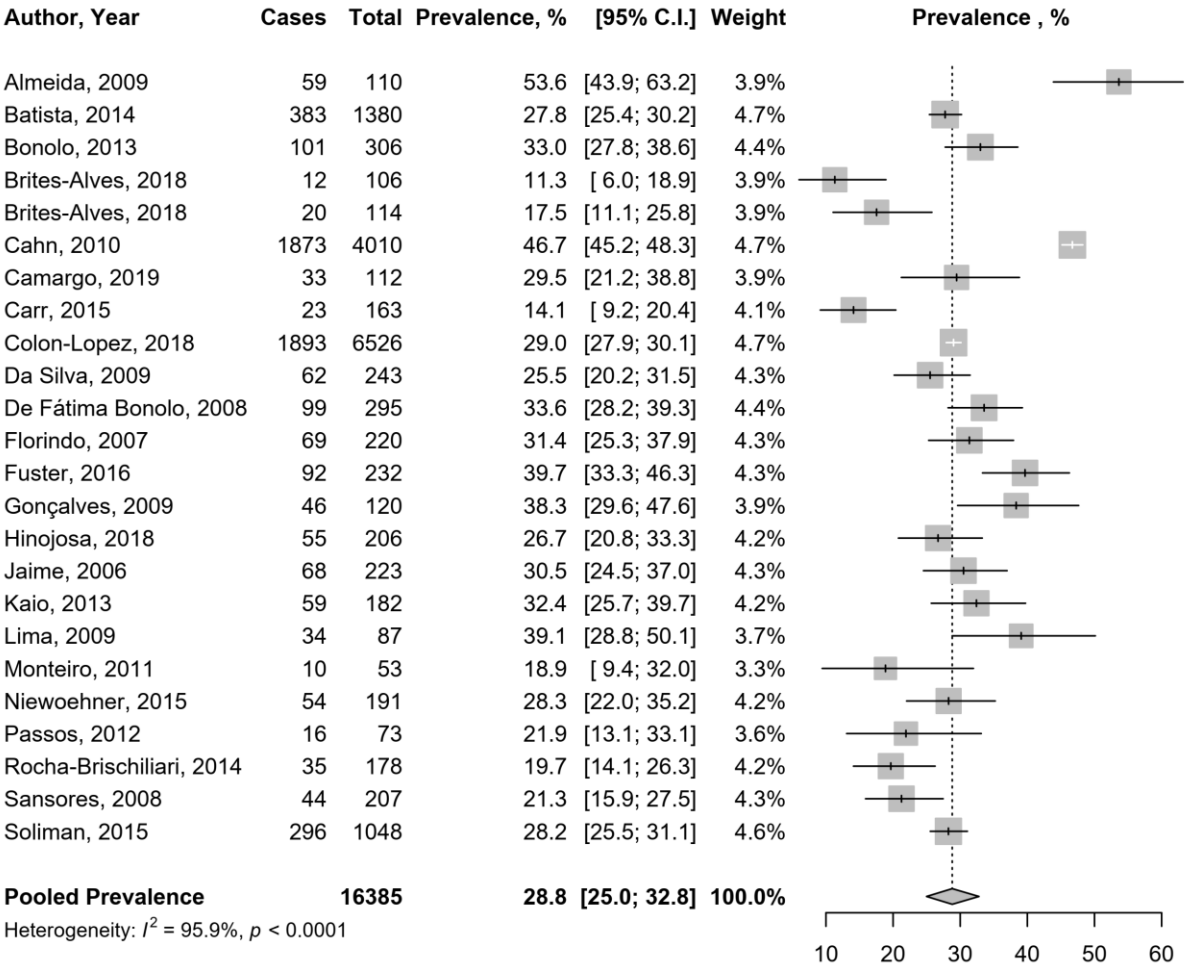
Supplementary Figure 4. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in Eastern and Southern Africa



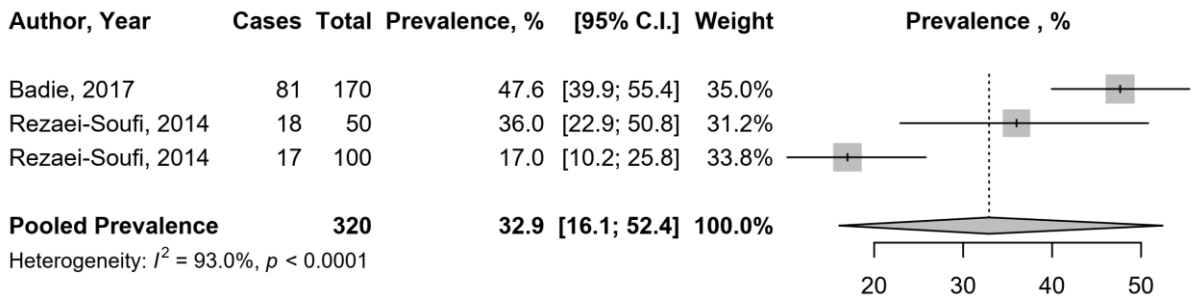
Supplementary Figure 5. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in Eastern Europe and Central Asia



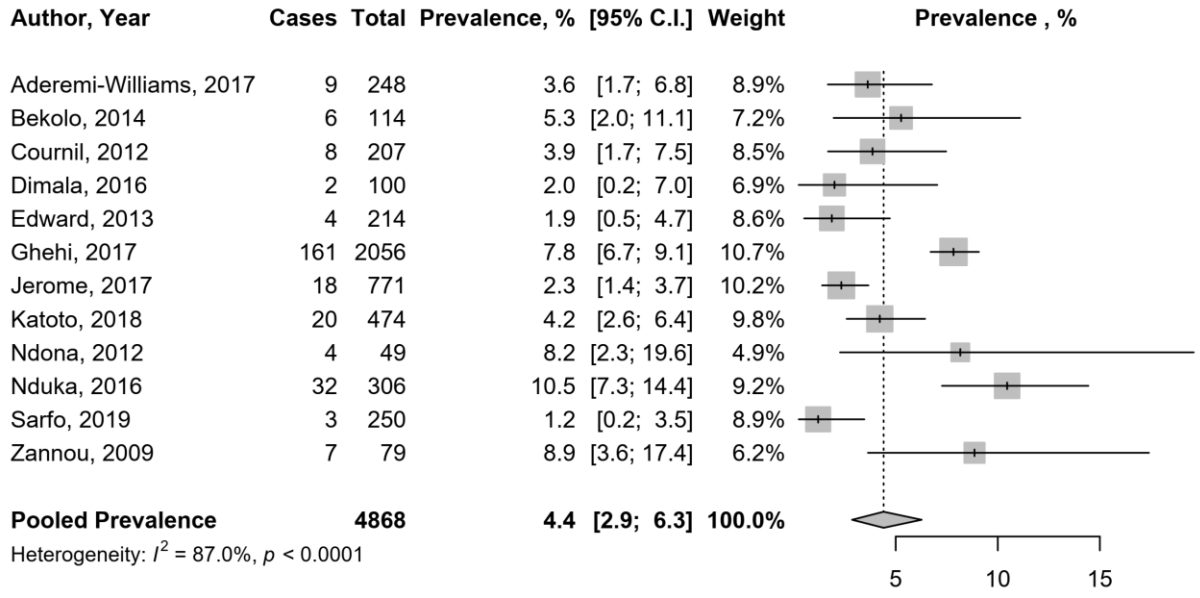
Supplementary Figure 6. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in Latin America and the Caribbean



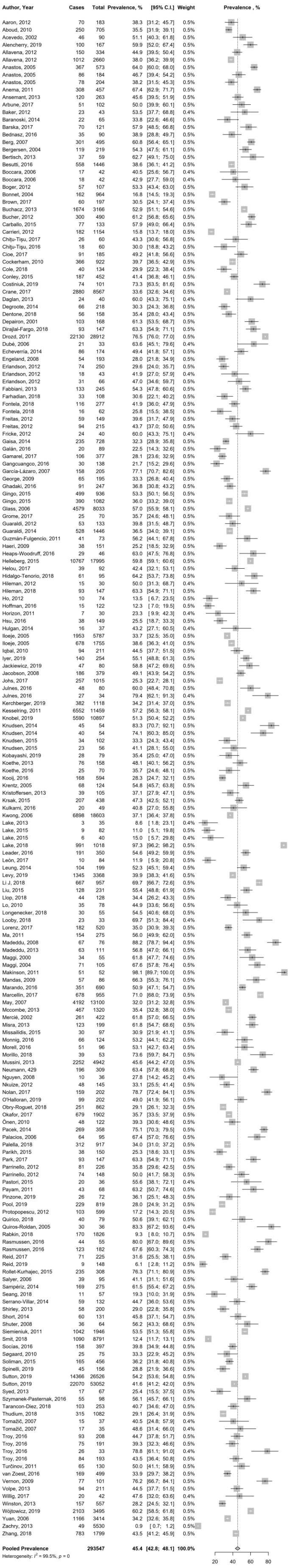
Supplementary Figure 7. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in Middle-East and North Africa



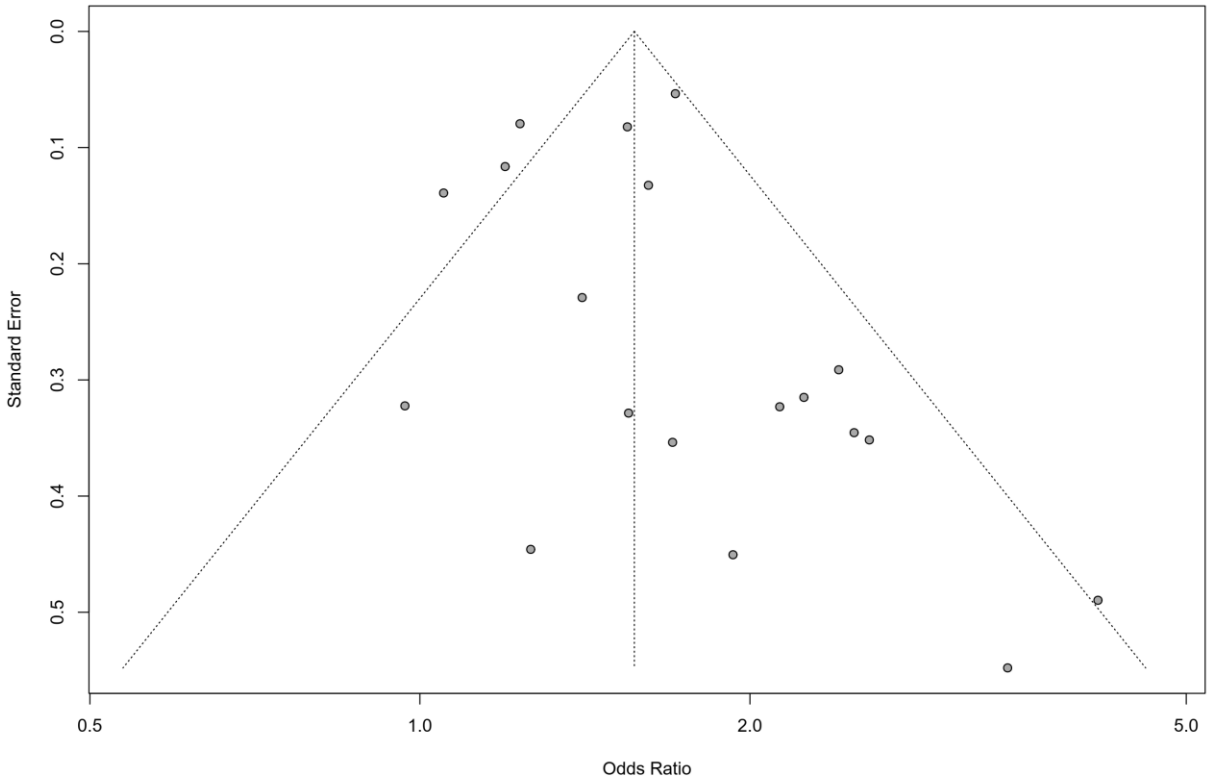
Supplementary Figure 8. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in West and Central Africa



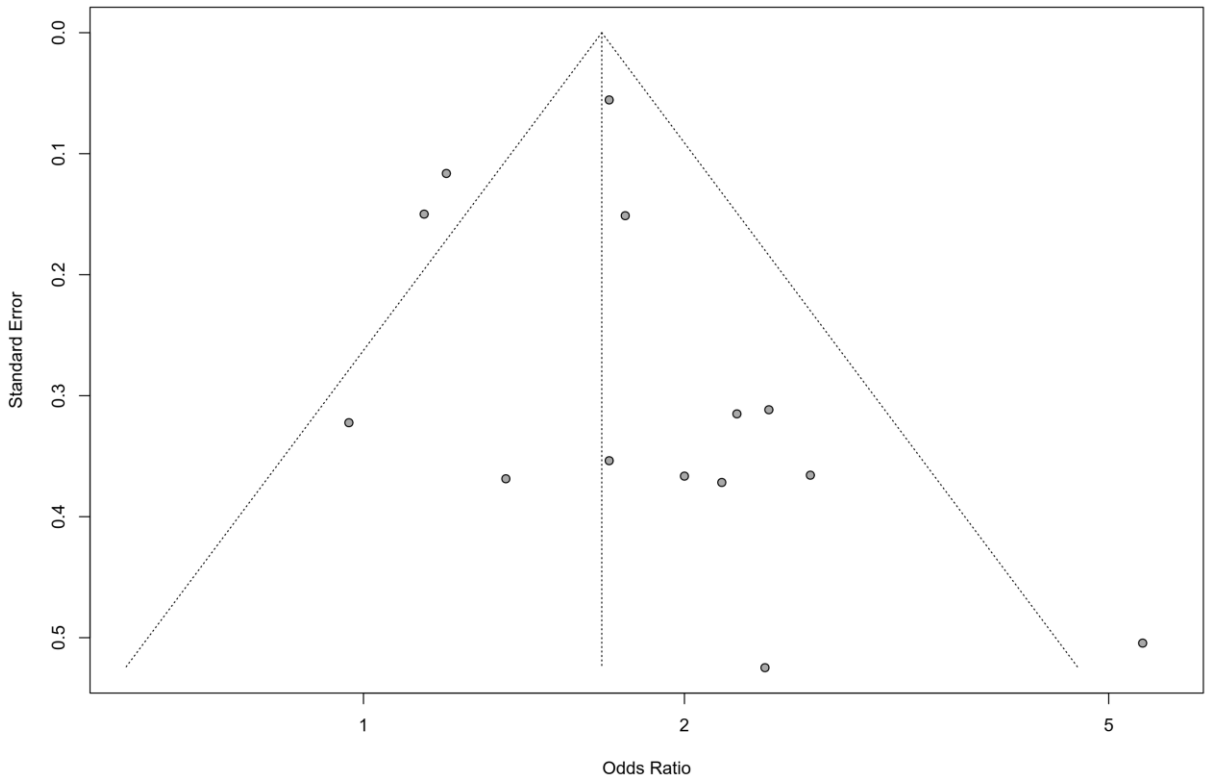
Supplementary Figure 9. Meta-analysis prevalence of active tobacco smoking in people living with HIV undergoing antiretroviral therapy in West and Central Europe and North America



Supplementary Figure 10. Funnel plot of the meta-analysis of association between exposure to active smoking and non-adherence to antiretroviral therapy in people living with HIV, crude analysis



Supplementary Figure 11. Funnel plot of the meta-analysis of association between exposure to active smoking and non-adherence to antiretroviral therapy in people living with HIV, adjusted analysis



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