Supplementary Material

Table S1: Search strategy

Database	Search strategy	Results
PubMed	(("resistan*"[Title]) AND ("HIV"[Title] OR "human immunodeficiency virus"[Title] OR "AIDS"[Title] OR "acquired immunodeficiency syndrome"[Title]) AND ("child*"[Title/Abstract] OR "adolecen*"[Title/Abstract] OR "infant*"[Title/Abstract] OR "newborn*"[Title/Abstract] OR "pediatri*"[Title/Abstract])) NOT ("Case Reports"[Publication Type] OR "Comment"[Publication Type] OR "Editorial"[Publication Type] OR "Review"[Publication Type] OR "Meta-analysis"[Publication Type])) AND (humans[Filter]) up to 28 June 2024	461
Embase	('hiv'/exp OR 'aids'/exp OR hiv:ti OR 'human immunodeficiency virus':ti OR aids:ti OR 'acquired immunodeficiency syndrome':ti) AND resistan*:ti AND (child*:ab,ti OR adolescent*:ab,ti OR infant*:ab,ti OR newborn*:ab,ti OR pediatr*:ab,ti) AND [article]/lim AND [humans]/lim AND [english]/lim up to 28 June 2024	945
Web Of Science	TI=(resistan*) AND (TI=(child* or adolescen* or infan* or newborn* or pediatri*) OR AB=(child* or adolescen* or infan* or newborn* or pediatri*)) AND TI=(aids OR "acquired immunodeficiency syndrome" OR HIV OR "human immunodeficiency virus") up to 28 June 2024	876

Table S2: Countries included in analysis listed by income level

(In the order of data extraction process)

First author	Study performed country	Region	World Bank Income level	Median sampling year	Age (month)
Lindström, 2010	Malawi	Southern Africa	Low income	2007	3.3
Lindström, 2010	Malawi	Southern Africa	Low income	2007	3.3
Towler, 2010	Uganda	Eastern Africa	Low income	2005	51.5
Towler, 2008	Uganda	Eastern Africa	Low income	/	1.4
Fogel, 2011	Malawi	Southern Africa	Low income	2008	3
Van Dyke, 2016	United States	North America	High income	2011	37.2
Kurle, 2007	India	Asia	Lower middle income	/	0.7
Kurle, 2007	India	Asia	Lower middle income	/	6
Vignoles, 2009	Argentina	South America	Upper middle income	2005	51.2
Gibb, 2002	UK, Italy, Spain	Europe	/	1999	6
Nelson, 2015	Malawi	Southern Africa	Low income	2007	3.62
Nelson, 2015	Malawi	Southern Africa	Low income	2007	3.62
Nelson, 2015	Malawi	Southern Africa	Low income	2007	8.63
Louis, 2019	Haiti	North America	Lower middle income	2013	6.5
Boerma, 2016	Nigeria	Western and Central Africa	Lower middle income	2012	57.6
Bennett, 2020	Zambian	Southern Africa	Lower middle income	2017	5
Inzaule, 2018	Nigeria	Western and Central Africa	Lower middle income	2015	5.1
Crowell, 2017	Mali	Western and Central Africa	Low income	2012	31.2
Salou, 2016	Togo	western and Central Africa	Low income	2012	5
Kityo, 2016	Uganda	Eastern Africa	Low income	2010	58.8
Dow, 2017	Tanzania	Eastern Africa	Lower middle income	2013	3.73
Hunt, 2011	Southern Africa	Southern Africa	Upper middle income	2006	24
Zeh, 2011	Kenya	Eastern Africa	Lower middle income	2005	6
Nii-Trebi, 2013	Ghana	Western and Central Africa	Lower middle income	2009	60
Neubert, 2016	Germany	Europe	High income	2005	24
Taylor, 2011	Southern Africa	Southern Africa	Upper middle income	2005	8
Fofana, 2023	Mali and Benin	Western and Central Africa	/	2019	31.2
Hunt, 2019	Southern Africa	Southern Africa	Upper middle income	2012	1.2
Parker, 2003	United States	North America	High income	1998	3
Parker, 2003	United States	North America	High income	1998	3
Karchava, 2006	United States	North America	High income	2001	6
Frange, 2018	France	Europe	High income	2012	26
Ngo-Giang-Huong, 2016	Europe and Thailand	Asia	/	2003	79.2
Tadesse, 2019	Ethiopia	Eastern Africa	Low income	2018	108
Jordan, 2022	Namibia	Southern Africa	Upper middle income	2016	18
Soeria-Atmadja, 2020	Ugandan	Eastern Africa	Low income	2015	74.4
Aulicino, 2019	Argentina	South America	Upper middle income	2010	2.3

Abidi, 2021	Pakistan	Asia	Lower middle income	2019	36
Kovacs, 2005	United States	North America	High income	/	2.6
Delaugerre, 2009	France	Europe	High income	2001	0.97
Ikomey, 2017	Cameroon	Western and Central Africa	Lower middle income	2015	30
de Andrade, 2017	Brazil	South America	Upper middle income	2013	44.4
Kuhn, 2015	Southern Africa	Southern Africa	Upper middle income	2011	4.43
Kuhn, 2015	Southern Africa	Southern Africa	Upper middle income	2011	24
Fokam, 2011	Cameroon	Western and Central Africa	Lower middle income	2010	72
Han, 2009	China	Asia	Upper middle income	2006	6
Eshleman, 2001	Uganda	Eastern Africa	Low income	2000	1.63
Martinson, 2007	Southern Africa	Southern Africa	Upper middle income	2002	6
Vaz, 2012	Mozambique	Southern Africa	Low income	2008	25.2
Olusola, 2021	Nigeria	Western and Central Africa	Lower middle income	2016	76.8
Guimarães, 2015	Brazil	South America	Upper middle income	2013	108
Masquelier, 2001	France	Europe	High income	1995	6
Jordan, 2017	5 sub-Saharan African countries (Mozambique, Swaziland, Southern Africa, Uganda, and Zimbabwe)	Southern Africa		2012	4
Jordan, 2017	Mozambique	Southern Africa	Low income	2012	4
Jordan, 2017	Swaziland	Southern Africa	Lower middle income	2012	4
Jordan, 2017	Uganda	Eastern Africa	Low income	2012	4
Jordan, 2017	Zimbabwe	Southern Africa	Lower middle income	2012	4
Yeganeh, 2018	Southern Africa, Brazil, Argentina	South America	Upper middle income	2008	3
Neogi, 2012	India	Asia	Lower middle income	2009	96
de Azevedo, 2022	Brazil	South America	Upper middle income	2004	6
de Azevedo, 2022	Brazil	South America	Upper middle income	2010	12
Rogo, 2015	United States	North America	High income	2001	180
Chalermchockcharoenkit, 2009	Thailand	Asia	Upper middle income	2002	1
Phung, 2015	Vietnam	Asia	Lower middle income	2010	50
Antunes, 2015	Mozambique	Southern Africa	Low income	2011	7
Almeida, 2009	Brazil	South America	Upper middle income	2002	21.5
Fogel, 2013	Southern Africa,Tanzania, Uganda, and Zimbabwe	Southern Africa	/	2012	18
Chaix, 2007	Coˆte d'Ivoire	Western and Central Africa	Lower middle income	2006	3
Jarchi, 2019	Iran	Asia	Lower middle income	2017	144
Green,2006	Italy,Brazil,UK,Spain,Germany,Portugal	Europe	/	2001	114
Boender, 2016	Uganda	Eastern Africa	Low income	2010	64.8
Towler, 2010	Uganda	Eastern Africa	Low income	2005	/
Kamori, 2023	Tanzania	Eastern Africa	Lower middle income	2020	120

Coetzer, 2013	Cambodia	Asia	Lower middle income	2007	96
Rossouw, 2015	Southern Africa	Southern Africa	Upper middle income	2010	56.3
Chaix, 2005	Côte d'Ivoire	Western and Central Africa	Lower middle income	2002	76.2
Machado, 2004	Brazil	South America	Upper middle income	2000	7.6
Rodríguez-Galet, 2023	Equatorial Guinea	Western and Central Africa	Upper middle income	2020	6
Rubio-Garrido, 2021	the Democratic Republic of Congo	Western and Central Africa	Low income	2017	48
Tadesse, 2018	Southern Ethiopia	Eastern Africa	Low income	2016	144
Mossoro-Kpinde, 2017	the Central African Republic	Western and Central Africa	Low income	2013	144
Kebe, 2013	Senegalese	Western and Central Africa	Lower middle income	2010	84
Crowell, 2017	Mali	Western and Central Africa	Low income	2012	31.2
Stoddart, 2014	Southern African	Southern Africa	Upper middle income	2011	96
Aboulker, 2004	France, Spain, Germany, Italy, UK	Europe	/	2000	2.5
Puthanakit, 2010	Thailand	Asia	Upper middle income	2005	109.2
Nyandiko, 2022	Kenya	Asia	Lower middle income	2011	96
Taylor, 2011	Southern Africa.	Southern Africa	Upper middle income	2005	7.3
Fofana, 2023	Mali and Benin	Western and Central Africa	/	2019	120
Contreras, 2013	United States	North America	High income	2003	75.6
Delaugerre, 2007	France	Europe	High income	2002	144
Agwu, 2014	United States, Puerto Rico	North America	/	2006	121.2
Inzaule, 2016	Kenya	Eastern Africa	Lower middle income	2006	6
Kityo, 2017	Ugnda	Eastern Africa	Low income	2010	58.8
Soeria-Atmadja, 2020	Ugandan	Eastern Africa	Low income	2015	74.4
Jittamala, 2009	Thailand	Asia	Upper middle income	2004	85.2
Abidi, 2021	Pakistan	Asia	Lower middle income	2019	36
Chohan, 2015	Kenya	Eastern Africa	Lower middle income	2008	45.6
Shet, 2013	India	Asia	Lower middle income	2009	120
Theodore, 2011	Ugandan	Eastern Africa	Low income	2010	64.8
Yan, 2022	China	Asia	Upper middle income	2020	84
Zhao, 2011	China	Asia	Upper middle income	2007	166.8
Bratholm, 2010	Tanzanian	Eastern Africa	Lower middle income	2009	60
Gupta, 2010	Zambian	Southern Africa	Lower middle income	2004	94.8
Beghin, 2020	Southern African	Southern Africa	Upper middle income	2008	8.6
Beghin, 2020	Southern African	Southern Africa	Upper middle income	2008	54
Ventosa-Cubillo, 2023	Panama	South America	High income	2018	144
Muri, 2017	Tanzania	Eastern Africa	Lower middle income	2016	132
Vaz, 2018	Mozambique	Southern Africa	Low income	2013	103
Makadzange, 2015	Zimbabwe	Southern Africa	Lower middle income	2012	136.8
Yendewa, 2021	Sierra Leone	Western and Central Africa	Low income	2019	108
Brice, 2020	Mali	Western and Central Africa	Low income	2013	118.8
Vaz, 2009	Mozambique	Southern Africa	Low income	2005	49
Sylla, 2019	Mali	Western and Central Africa	Low income	2013	150

Vaz, 2012	Mozambique	Southern Africa	Low income	2008	25.2
Brindeiro, 2002	Brazil	South America	Upper middle income	1999	68.28
Adje-Toure, 2008	Côte d'Ivoire	Western and Central Africa	Lower middle income	2001	84
Tagnouokam Ngoupo, 2021	Cameroon	Western and Central Africa	Lower middle income	2009	4.2
Amani-Bossé, 2017	Burkina Faso, Côte d' Ivoire	Western and Central Africa	/	2012	13.9
Ahoua, 2011	Uganda	Eastern Africa	Low income	2006	64.8
Ahoua, 2011	Uganda	Eastern Africa	Low income	2006	66
Mutwa, 2014	Rwanda	Eastern Africa	Low income	2010	129.6
Rogo, 2015	United States	North America	High income	2001	/
Mulder, 2011	Spain	Europe	High income	2001	182.4
Fitzgibbon, 2001	United States	North America	High income	2004	94.8
Francesca, 2019	Switzerland	Europe	High income	1999	168
Ross, 2015	North America, Europe and Southern Africa	North America, Europe, Southern Africa	/	2007	108
Ross, 2015	Southern Africa, Mexico, Argentina and Portugal	Southern Africa, North America, Europe	/	2007	16
Lwembe, 2007	Kenya	Eastern Africa	Lower middle income	2003	90
Al Hajjar, 2012	Saudi Arab	Asia	High income	2008	84
Makatini, 2019	Southern Africa	Southern Africa	Upper middle income	2014	96
Camara-Cissé, 2021	Côte d'Ivoire	Western and Central Africa	Lower middle income	2012	132
Dumans, 2009	Brazil	South America	Upper middle income	2002	80.4
Fokam, 2011	Cameroon	Western and Central Africa	Lower middle income	2010	72
Green, 2012	Southern Africa	Southern Africa	Upper middle income	2009	94.8
Pillay, 2014	Southern Africa	Southern Africa	Upper middle income	2012	122.4
Hunt, 2023	Southern Africa	Southern Africa	Upper middle income	2018	154.8
Fofana, 2018	Benin	Western and Central Africa	Lower middle income	2016	120
Servais, 2002	Belgian	Europe	High income	1999	114
Ramkissoon, 2015	Jamaica	North America	Upper middle income	2015	120
Saravanan, 2017	India	Asia	Lower middle income	2012	109.2
Bismara, 2012	Brazil	South America	Upper middle income	2012	90
Khanh Thu et al(2024)	Vietnam	Asia	Lower middle income	2019	2
Lehman et al(2015)	Kenya, America	Africa, North America	/	2007	4.7
Fisher et al(2015)	Southern Africa	Southern Africa	Upper middle income	2008	3.4
Ronen et al(2017)	Kenya	Eastern Africa	Lower middle income	2007	6
Fokam et al(2018)	Cameroon	Western and Central Africa	Lower middle income	2015	72
Abuogi et al(2023)	Kenya	Eastern Africa	Lower middle income	2020	9
Djiyou et al(2023)	Cameroon	Western and Central Africa	Lower middle income	2021	192
Khamadi et al(2023)	Tanzania	Eastern Africa	Lower middle income	2020	144
Charpentier et al(2012)	the Central African Republic	Western and Central Africa	Low income	2009	96
Bouassa et al(2019)	the Central African Republic	Western and Central Africa	Low income	2008	132

Pang et al(2024)	China	Asia	Upper middle income	2024	
Sivay et al(2024)	Russia	Europe	Upper middle income	2020	60
Tambuyzer et al(2016)	Thailand, Argentina, United States, South Africa	/	/	2010	144
Lange et al(2015)	South Africa	Southern Africa	Upper middle income	2015	8
Gopalan et al(2019)	India	Asia	Lower middle income	2014	96
Szubert et al(2017)	Uganda, Zimbabwe	/	/	2008	72

Table S3A: PICO Summary of included studies for treatment-naive children prevalence analysis

Study	Patient/Population	Intervention	Comparison	Outcome
J. Lidstrom, 2010	Infant patients with utero HIV-1 infection	6 weeks of PMTCT drugs： sdNVP+AZT	6 weeks of PMTCT drugs: sdNVP+AZT+NVP	Overall HIV-1 pretreatment drug resistance
J. Lidstrom, 2010	Infants infected with HIV in utero in Malawi, aged 0 to 14 weeks	6 weeks of PMTCT drugs： sdNVP+AZT	6 weeks of PMTCT drugs ： sdNVP+AZT+NVP	Overall HIV-1 pretreatment drug resistance
J. Lidstrom, 2010	Infants infected with HIV in utero in Malawi, aged 0 to 14 weeks	6 weeks of PMTCT drugs： sdNVP+AZT+NVP	6 weeks of PMTCT drugs： sdNVP+AZT	Overall HIV-1 pretreatment drug resistance
W. I. Towler, 2010	HIV-infected children in Uganda	sdNVP to prevent MTCT exposure; d4T+3TC+NVP	Children previously exposed to sdNVP compared with those who were not exposed	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
J. D. Church, 2008	Newborn infants in Uganda from 2005 to 2008	PMTCT drugs:sdNVP at birth for the infant and the mother in labor, extended NVP prophylaxis up to 6 weeks of age for the infant	Control Group: Infants who received sdNVP only Intervention Group: Infants who received sdNVP plus daily NVP up to 6 weeks of age	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
J. Fogel, 2011	Neonates to 14-week-old infants in Malawi	36 weeks of PMTCT drugs: extended NVP arm for infants. sdNVP+ZDV for 1 week, sdNVP+NVP up to 14 weeks of age, sdNVP+NVP+ZDV up to 14 weeks of age	Infants receiving sdNVP +ZDV for 1 week	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
R. B. V. Dyke, 2016	Children and adolescents in the United States with perinatal HIV infection, enrolled in the study between 2007 and 2009	NRTI/PI/NNRTI/ EI/FI/ INSTI	Reference laboratory overall antiretroviral resistance rates	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
S. N. Kurle, 2007	Neonates infected with HIV-1 subtype C in India within 48 hours and 2 months of birth	neonates exposed to sdNVP for PMTCT of HIV	Neonates infected with HIV-1 subtype C not exposed to SD-NVP (hypothetical control group)	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
S. N. Kurle, 2007	Neonates infected with HIV-1 subtype C in India within 48 hours and 2 months of birth	neonates exposed to sdNVP for PMTCT of HIV	Neonates infected with HIV-1 subtype C not exposed to SD-NVP (hypothetical control group)	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
M. Vignoles, 2009	Vertically HIV-1-infected children in Argentina, aged 0 to 17 years, newly diagnosed and initiating their first HAART regimen between December 2004 and July 2006.	Administration of HAART, including various combinations of antiretroviral drugs, with some children receiving maternal/infant ARV prophylaxis: AZT, AZT+sdNVP	Not explicitly mentioned in the study, but the baseline characteristics of the patients (prior to HAART initiation) can serve as a form of comparison.	Specific mutation resistance prevalence
D. M. Gibb, 2003	Untreated HIV-1 infected children	Administration of different combinations of antiretroviral drugs including ZDV, 3TC, ABC, and NFV. A minority of participants had documented exposure to antiretroviral	Comparison among different antiretroviral regimens	Different regimens resistance prevalence

		therapy before birth		
J. A E. Nelson, 2015	Neonates and infants up to 48 weeks of age living in Lilongwe, Malawi	7days PMTCT drugs: Infant: sdNVP at delivery, a week of AZT/3TC postpartum	No additional intervention	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
J. A E. Nelson, 2015	Neonates and infants up to 48 weeks of age living in Lilongwe, Malawi	Infant: sdNVP at delivery, a week of AZT/3TC postpartum; Mother: sdNVP at delivery, a week of AZT/3TC postpartum; ART (AZT/3TC/NVP, AZT/3TC/nelfinivir, or AZT/3TC/ritonavir-boosted lopinavir) for 28 weeks	No additional intervention	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
J. A E. Nelson, 2015	Neonates and infants up to 48 weeks of age living in Lilongwe, Malawi	Infant: sdNVP at delivery, a week of AZT/3TC postpartum; daily NVP prophylaxis for 28 weeks	No additional intervention	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
F. J. Louis, 2019	Children <18 months old who acquired HIV infection through mother-to-child transmission in Haiti during the period of January 1, 2013 to December 31, 2014.	Genotyping of HIV-1 to detect drug resistance mutations in children exposed to ART	Comparisons could be made to historical data or studies conducted in different settings.	specific mutation resistance prevalence
R. S. Boerma, 2016	Children aged 1 to 12 years from Lagos, Nigeria, who were untreated for HIV and had no prior exposure to PMTCT drugs, recruited between 2012 and 2013 for a 24-month follow-up study	Initiation of ART, typically an NNRTI (such as NVP) plus two NRTIs (such as AZT, and 3TC)	No specific control group, but compared treatment outcomes between children with and without pre-treatment HIV drug resistance (PDR).	Overall HIV-1 pretreatment drug resistance prevalence
S. J. TOWNSEND, 2020	HIV-1 infected mothers and their infants aged 0 to 15 months in Lusaka, Zambia, from 2015 to 2018	Prophylaxis: NVP/Other/None/Missing	the study compared resistance profiles between mothers and infants who were on different ART regimens	Overall HIV-1 pretreatment drug resistance prevalence
S. C. Inzaule, 2018	HIV-infected infants aged up to 18 months from Nigeria, with samples collected between June 2014 and July 2015 across all six geopolitical regions.	PMTCT drugs: Sd-NVP/ extended prophylaxis	HIV-infected infants who were not exposed to PMTCT medication	Overall HIV-1 pretreatment drug resistance prevalence
C. S. Crowell, 2017	HIV-1 infected children less than 10 years of age initiating antiretroviral therapy (ART) in Mali.	HIV exposure	Baseline NNRTI resistance among children receiving NNRTI-based ART versus those without baseline NNRTI resistance receiving PI-based ART	Overall HIV-1 pretreatment drug resistance prevalence
M. Salou, 2016	Children diagnosed with HIV who are less than 18 months old in Togo	Different types of antiretroviral exposure Infant: no ARV exposure/exposed to both neonatal prophylaxis and maternal ARV/neonatal prophylaxis. Neonatal exposure consisted of NVP, AZT or NVP+AZT. Mother: short-time prophylaxis: AZT, NVP, AZT/3TC（3TC); AZT/NVP or AZT/efavirenz cART: AZT/3TC/NVP, AZT/3TC/EFV stavdine/3TC/NVP, TDF/3TC/EFV	No maternal ART and no neonatal prophylaxis	Different regimens resistance prevalence
C. Kityo, 2016	HIV-infected children less than 12 years old recruited at	PMTCT drugs:	Children without prior ART exposure	Overall HIV-1 pretreatment drug resistance,

	three clinics in Uganda between January 2010 and August 2011.	sdNVP, sdNVP+AZT		different regimens resistance prevalence, specific mutation resistance prevalence
D. E. Dow, 2017	HIV-exposed infants aged approximately 3 months in Northern Tanzania.	Maternal regimen: sdNVP Option A (daily zidovudine (AZT) as early as 14 weeks of gestation, sdNVP onset of labor, aAZT+3TC 7 days postpartum) Infant regimen: NVP given /NVP not given	Infants not exposed to NVP or infants whose mothers did not receive any form of PMTCT intervention	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
G. M. Hunt, 2011	HIV-positive infants aged 2 years or younger who were born in South Africa and had been exposed to single-dose nevirapine (sdNVP) before initiating antiretroviral therapy (ART). Infants were categorized into different age groups: 0-6 months, 6-12 months, 12-18 months, and 18-24 months.	Mother and Infant: sdNVP	The study did not include a formal control group. However, comparisons could be made indirectly between different age groups of infants to assess the impact of sdNVP exposure over time	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
C. Zeh, 2011	Neonates to 6 months old in Kisumu, Kenya, whose HIV-infected mothers received triple antiretroviral prophylaxis from the 34th week of gestation through 6 months of breastfeeding.	Mother: AZT/3TC/ NVP or NFV from 34 weeks gestation to 6 months postpartum Infant: sdNVP at birth, breastfeeding 6 months	No direct control group, but a comparison between NVP-based and NFV-based regimens within the intervention group	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
N. I. Nii-Trebi, 2013	101 HIV-1 infected patients (adults ≥15 years old and children) in Koforidua, Eastern Region, Ghana, during February 2009 to January 2010	Antiretroviral therapy (ART) with NRTIs (AZT, d4T, 3TC), NNRTIs (NVP, EFV), and PIs (NFV)	ART-naive individuals (newly diagnosed cases without prior ART exposure)	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
J. Neubert, 2016	HIV-1-infected children treated at the University Hospital Düsseldorf, Germany, between January 2005 and December 2015	Children who received or did not receive ART to prevent MTCT, and subsequently started on antiretroviral therapy including NRTIs, NNRTIs, and PIs	Comparison with data from other countries, such as Spain and the United States, regarding HIV-1-infected children	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
B. S. Taylor, 2011	HIV-infected children less than two years old in South Africa who were exposed to NVP for PMTCT	Initiation of ART with RTV or LPV/r	Comparison of LPV/r treatment to RTV treatment	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
D. B. Fofana, 2023	HIV-positive children (ages not specified but typically considered 0-18 years) in West Africa (Benin and Mali)	Integrase strand transfer inhibitors (INSTIs) including RAL, EVG, DTG, BIC, and CAB	HIV-positive children who have not been treated with INSTIs (INSTI-naïve) or have received other types of antiretroviral therapy (ART).	Different regimens resistance prevalence, specific mutation resistance prevalence
G. M. Hunt, 2019	Neonates (4-8 weeks old) in South Africa, studied in 2010, 2011-2012, and 2012-2013	Maternal ART plus infant NVP +/− AZT, Infant NVP+/−AZT, Any other ARV combination, No/unknown exposure	Infants with no or unknown PMTCT exposure compared to infants with known PMTCT exposure	HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
M. M. Parker, 2003	Neonates (infants younger than 60 days of age) born in New York State, USA, in 1998 and 1999	Infants exposed to antiretroviral drugs prenatally (including AZT, 3TC, NVP, and PIs)	Infants without documented prenatal antiretroviral exposure	Overall HIV-1 pretreatment drug resistance
M. M. Parker, 2003	Neonates (infants younger than 60 days of age) born in New York State, USA, in 1998 and 1999	PMTCT exposure	Infants without documented prenatal antiretroviral exposure	Overall HIV-1 pretreatment drug resistance

M. Karchava, 2006	Infants born in New York State and diagnosed as HIV-positive within 24 weeks of age between 2001 and 2002	Infants exposed to antiretroviral drugs (ARVs), including prenatal, intrapartum, and neonatal (up to 6 weeks postnatal) ARV exposure	Comparison with data from 1998-1999 to assess trends in drug resistance.	Overall HIV-1 pretreatment drug resistance
P. Frange, 2018	Children newly diagnosed with HIV-1 infection in France between 2006 and 2017	Previous exposure to in utero or postnatal antiretroviral prophylaxis, including only NRTI, including NRTI+PI, including NRTI+NNRTI, including NRTI+NNRTI+PI+NI	No prior exposure to antiretroviral prophylaxis for PMTCT	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
N. Ngo-Giang-Huong, 2016	HIV-infected children under 18 years old who initiated cART between 1998 and 2008 in international multi-center settings, primarily Europe and Africa	Initial cART regimens including NNRTIs plus at least two NRTIs or unboosted PIs plus at least two NRTIs, with some children having pre-treatment drug resistance	Children without PDR or with "PDR and fully active cART" as a control group	Different regimens resistance prevalence
B. T. Tadesse, 2019	Children aged 0 to 18 years diagnosed with HIV infection in Ethiopia during the period of 2017 to 2019	Children who have not previously received antiretroviral therapy (cART-naive)	No direct comparator group is specified, but the results can be compared with other studies or data from different regions or time periods	Overall HIV-1 pretreatment drug resistance
M. R. Jordan, 2022	Infants less than 18 months old, newly diagnosed with HIV and treatment-naive in Namibia in 2016	Some infants may have received prophylactic treatment with NVP+AZT for 6 weeks. Neonates (<1 month) were prescribed RAL+AZT+3TC; infants 4 weeks to 2 months of age were given zidovudine (AZT) + lamivudine (3TC) and ritonavir-boosted lopinavir; for infants 3 to 35 months old, ABC could substitute AZT	No direct control group, but comparison can be made with infants who have received ART or with data from other countries	Overall HIV-1 pretreatment drug resistance
S. S. Soeria-Atmadja, 2020	ART-naïve children aged 3-12 years living in urban Uganda during the period 2015-2016, some of whom may have been exposed to antiretrovirals through PMTCT programs	Initiation of efavirenz-based ART consisting of two NRTIs and efavirenz	Comparison of children with baseline PDR versus those without PDR	Overall HIV-1 pretreatment drug resistance
P. C. Aulicino, 2019	Newborns to 2.3-month-old infants born in Argentina between 2007 and 2014	Infant prophylaxis: short-course ZDV, ZDV+NVP (+3TC) at birth, zidovudine monotherapy Maternal ART: NNRTI-based cART, PI-based cART 28, Breastfeeding	Infants who were not exposed to ARVs (ARV-unexposed group)	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
S. H. Abidi, 2021	Children aged 0-15 years diagnosed with HIV-1 during the 2019 extensive pediatric HIV-1 outbreak in Larkana, Pakistan	Antiretroviral therapy (ART) regimens containing NNRTIs (e.g., efavirenz) and NRTIs (e.g., zidovudine)	ART-naive individuals (children who have not yet started ART)	Overall HIV-1 pretreatment drug resistance prevalence, specific mutation resistance prevalence
A. Kovacs, 2005	Infants aged ≤120 days	Administration of didanosine (ddI) following at least 24 hours of zidovudine (ZDV) treatment	Comparison between infants receiving ddI + placebo and infants receiving ddI + ZDV	Overall HIV-1 pretreatment drug resistance prevalence , different regimens resistance prevalence, specific mutation resistance prevalence

C. Delaugerre, 2009	Neonates born in France between 1997 and 2004 whose mothers received antiretroviral prophylaxis during pregnancy	Mother: AZT+3TC+DDI/NVP/LPV/IDV Infant: AZT+3TC	Comparison of the effects of different antiretroviral drug combinations, and potentially neonates who did not receive antiretroviral prophylaxis as an indirect comparison	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
G. M. Ikomey, 2017	Untreated, immunocompetent HIV-1 positive children aged 9 months to 6 years in Yaoundé, Cameroon, during 2015-2016	Mother： cART naïve, cART exposed during pregnancy Infant: unknown	No specific comparison group; baseline data for drug-naïve children	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
S. D. d. Andrade, 2017	Children aged neonates to adolescents (median age 3.7 years) diagnosed with HIV-1 between 2010 and 2015 in Manaus, Amazonas State, Brazil, who are antiretroviral-naive (28.2% exposed to PMTCT)	Antiretrovirals received during pregnancy, Intra-partum prophylaxis with ZDV, Postnatal infant prophylaxis with ZDV	Comparison between children exposed to PMTCT and those not exposed	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
L. Kuhn, 2015	Newly diagnosed HIV-infected children under 2 years old, recruited in Johannesburg, South Africa	Maternal antiretroviral regimen: cART, Zidovudine/ nevirapine, Zidovudine alone, Nevirapine alone Infant prophylaxis: Nevirapine alone, Zidovudine/ nevirapine	Without documented antiretroviral exposure	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
L. Kuhn, 2015	Newly diagnosed HIV-infected children under 2 years old, recruited in Johannesburg, South Africa	Maternal antiretroviral regimen: Infant prophylaxis	With documented antiretroviral exposure	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
J. Fokam, 2011	This study involved 92 HIV-1-infected children aged between 3 months and 12 years in Yaoundé, Cameroon (from June 2009 to February 2011), including 41 drug-naive and 51 first-line antiretroviral treatment-failing children	The interventions included standard first-line ART regimens such as AZT/3TC/NVP and a fixed-dose combination of d4T/3TC/NVP	The study compared drug-naive children with those experiencing first-line ART failure	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
J. Han, 2009	HIV-1-infected pregnant women in China who are ART-naïve	sdNVP ZDV-sdNVP	Comparison between sdNVP and ZDV-sdNVP regimens	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
S. H. Eshleman, 2001	HIV-1-positive pregnant women and their infants in Uganda	Single-dose nevirapine (NVP) to prevent HIV-1 vertical transmission	Self-comparison within the same intervention group (women and infants receiving NVP)	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
N. A. Martinson, 2007	HIV-1 infected infants aged neonates to 12 weeks old in South Africa (Soweto and Durban) before 2007	Single-dose nevirapine (sd-NVP) administered to mothers at the onset of labor and to newborns	Potentially infants not exposed to sd-NVP or infants without detectable resistance	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
P. Vaz, 2012	HIV-infected children aged 0-15 years initiating ART at the main pediatric ART referral center in Maputo, Mozambique between 2007 and 2008	Standard first-line ART regimens including ZDV+ 3TC+NVP, d4T+3TC+NVP, and d4T+3TC+LPV/r	Baseline characteristics and ART outcomes compared to outcomes at 12 months post-initiation	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
F. I. Olusola, 2021	ART-naïve HIV-infected children less than 15 years old residing in Ibadan, Nigeria, around the year 2021	Sequencing of the HIV-1 pol gene to identify mutations conferring resistance to NNRTIs and NRTIs in ART-naïve	The prevalence of PDR in ART-naïve children compared to historical data or	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence

		children	other populations	
P. M. de S. Guimara˜es, 2015	Adults and children recently diagnosed with HIV in São Paulo, Brazil, between 2012 and 2014	Evaluation of transmitted drug resistance (TDR) among antiretroviral therapy-naïve individuals	No specific comparison group mentioned, but the study compared TDR prevalence against historical data and other studies	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
B. Masquelier, 2001	HIV-1 infected neonates born in France	Mothers who received zidovudine as part of their antiretroviral therapy regimen during pregnancy	For comparison purposes, neonates born to mothers who did not receive zidovudine or those who received alternative antiretroviral regimens during pregnancy	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
M. R. Jordan, 2017	Children under 18 months old in Sub-Saharan African countries (Mozambique, Swaziland, South Africa, Uganda, and Zimbabwe) diagnosed with HIV through early infant diagnosis between 2011 and 2014	Maternal and neonatal ARV drug exposure as part of PMTCT programs. Non-nucleoside reverse transcriptase inhibitors (NNRTIs): NVP, EFV, ETR, RPV Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs/TIs): AZT, d4T, FTC, TDF	Children without documented maternal or neonatal ARV exposure and those with unknown exposure histories	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
M. R. Jordan, 2017	Children under 18 months old in Mozambique diagnosed with HIV through early infant diagnosis between 2011 and 2014	Maternal and neonatal ARV drug exposure as part of PMTCT programs. Non-nucleoside reverse transcriptase inhibitors (NNRTIs): NVP, EFV, ETR, RPV Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs/TIs): AZT, d4T, FTC, TDF	Children without documented maternal or neonatal ARV exposure and those with unknown exposure histories	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
M. R. Jordan, 2017	Children under 18 months old in Sub-Saharan African countries Swaziland diagnosed with HIV through early infant diagnosis between 2011 and 2014	Maternal and neonatal ARV drug exposure as part of PMTCT programs. Non-nucleoside reverse transcriptase inhibitors (NNRTIs): NVP, EFV, ETR, RPV Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs/TIs): AZT, d4T, FTC, TDF	Children without documented maternal or neonatal ARV exposure and those with unknown exposure histories	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
M. R. Jordan, 2017	Children under 18 months old in Sub-Saharan African countries Uganda diagnosed with HIV through early infant diagnosis between 2011 and 2014	Maternal and neonatal ARV drug exposure as part of PMTCT programs. Non-nucleoside reverse transcriptase inhibitors (NNRTIs): NVP, EFV, ETR, RPV Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs/TIs): AZT, d4T, FTC, TDF	Children without documented maternal or neonatal ARV exposure and those with unknown exposure histories	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
M. R. Jordan, 2017	Children under 18 months old in Sub-Saharan African countries Zimbabwe diagnosed with HIV through early infant diagnosis between 2011 and 2014	Maternal and neonatal ARV drug exposure as part of PMTCT programs. Non-nucleoside reverse transcriptase inhibitors (NNRTIs): NVP, EFV, ETR, RPV Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs/TIs): AZT, d4T, FTC, TDF	Children without documented maternal or neonatal ARV exposure and those with unknown exposure histories	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
N. Yeganeh, 2018	Pregnant women and their newborns in South Africa, Brazil, and Argentina between April 2004 and January 2011	group A: AZT 6 weeks group B: AZT 6 weeks + NVP 1 week group C: AZT 6 weeks+NFV+3TC 6 weeks	Untreated mother-infant pairs and those treated with different ART regimens	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence

		Infant prophylaxis medications: ZDV, ZDV+NVP, ZDV+NFV+3TC		
U. Neogi, 2012	Children and adolescents aged 2 to 16 years old, perinatally infected with HIV-1 subtype C, and antiretroviral therapy-naïve, from Bangalore, India, between 2007 and 2011	Participants were antiretroviral therapy-naïve, with some potentially exposed to nevirapine as part of PMTCT strategies	There was no specific control group in this study	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
S. S. D. d. Azevedo, 2022	Treatment-naïve children and adolescents (neonates to 19 years old) infected with HIV-1 through vertical transmission in the Rio de Janeiro State, Brazil, between 2001 and 2007.	Maternal antiretroviral therapy for PMTCT, starting with zidovudine monotherapy and later transitioning to combination ART including NRTIs and NNRTIs	Comparative analysis of TDRM prevalence between the time periods 2008 and 2012	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
S. S. D. d. Azevedo, 2022	Treatment-naïve children and adolescents (neonates to 19 years old) infected with HIV-1 through vertical transmission in the Rio de Janeiro State, Brazil, between 2008 and 2012.	Maternal antiretroviral therapy for PMTCT, starting with zidovudine monotherapy and later transitioning to combination ART including NRTIs and NNRTIs	Comparative analysis of TDRM prevalence between the time periods 2001 and 2007	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
T. Rogo, 2015	HIV-infected children attending the only pediatric HIV clinic in Rhode Island between 1991 and 2012, ranging in age from neonates to adolescents	Antiretroviral therapy (ART), including NNRTIs, NRTIs, and PIs	ART-naïve children serving as a comparison group to ART-experienced children	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
A. Chalermchockcharoenkit, 2009	HIV-positive pregnant women and their infants in Thailand	Mother: AZT+NVP Infant: sdNVP at birth	No specific control group mentioned, but the study likely compares the outcomes to historical data or theoretical scenarios without the intervention	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
T. T. B. Phung, 2015	HIV-1 infected children aged 1 month to 12 years (mean age of 50 months) from 21 provinces in Northern Vietnam, recruited between December 2009 and December 2011	Genotyping of antiretroviral-naïve children to detect drug resistance mutations without specifying any intervention or drug regimen	Historical data on drug resistance rates in other populations in Vietnam	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
F. Antunes, 2015	6 to 48-week-old children in Maputo, Mozambique, enrolled between July 2011 and March 2012	Infant: ARV prophylaxis: AZT, sd-NVP + daily NVP Mothers: antepartum daily AZT as early as 14 weeks of gestation, sd-NVP at onset of labor and twice daily AZT + 3TC for 7 days postpartum	The study did not include an explicit control group but analyzed various factors related to the development of NVP resistance	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
F. J. Almeida, 2009	HIV-1-infected children in São Paulo, Brazil, who were born to mothers who were not treated with antiretroviral therapy during pregnancy	Children receiving or not receiving HAART	Comparison: ARV-naive children versus children failing HAART. Control Group: ARV-naive children (without prior antiretroviral exposure)	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence

J. M. Fogel, 2013	Infants aged 0 to 6 months from South Africa, Tanzania, Uganda, and Zimbabwe who were enrolled in the study between 2010 and 2013.	Mothers received sdNVP and infants received sdNVP+ZDV/3TC for PMTCT Infants received extended nevirapine prophylaxis (daily NVP until 6 weeks of age) followed by NVP or placebo until 6 months of age.	Infants received no additional extended NVP prophylaxis	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence
M. Chaix, 2007	Pregnant women aged 15-49 years old, residing in Abidjan, Côte d'Ivoire, who are HIV positive and participated in the ANRS 1201/1202 Ditrame Plus study between 2006 and 2007.	mother：AZT+NVP at ≥36 weeks infant: AZT+sdNVP 7days	Comparison between women who received sdNVP alone and those who received sdNVP + ZDV, as well as infants who received sdNVP alone versus those who received sdNVP + ZDV	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
M. Jarchi, 2019	Children under 12 years old in Iran, diagnosed between June 2014 and January 2019.	Genotypic testing for transmitted drug resistance (TDR) mutations in the pol gene of HIV-1 in treatment-naïve children	Not applicable, as there is no direct comparison group	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
H. H. K. Thu, 2024	HIV-1 infected children under 18 months old from the Central Highlands and Southern regions of Vietnam during the period 2017–2021	mother: two nucleoside reverse transcriptase inhibitors (NRTIs) plus one non-nucleoside reverse transcriptase infant: sdNVP	Infants born to mothers who did not receive any PMTCT intervention or different ART Regimen	Specific mutation resistance prevalence
D. A. Lehman, 2012	Infants exposed to sdNVP	Infants subsequently treated with NVP-HAART	Infants without detectable nevirapine resistance mutations serve as the reference group	Overall HIV-1 pretreatment drug resistance, specific mutation resistance prevalence
R. G. FISHER, 2015	Infants less than 3 years old in South Africa	Dual AZT and NVP prophylaxis regimen for prevention of HIV mother-to-child transmission (PMTCT)	Conventional bulk sequencing versus next-generation sequencing (NGS) using Ion PGM and MiSeq platforms	different regimens resistance prevalence, specific mutation resistance prevalence
K. Ronen, 2017	Neonates to 6-week-old infants in Ethiopia who participated in the study aimed at preventing mother-to-child transmission of HIV between February 2001 and March 2007	Infants received nevirapine prophylaxis (either sdNVP or ED-NVP) starting from Day 8 of life for up to 6 weeks	Infants receiving single-dose nevirapine (SD-NVP) served as the comparator group	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence
J. Fokam, 2018	Eighteen HIV-1 vertically infected children, seven of whom were born to mothers who received PMTCT interventions, and eleven born to mothers without PMTCT exposure	Next-generation sequencing (NGS) for determining HIV-1 drug resistance and viral tropism, AZT+3TC+NVP were used in PMTCT-exposed infants	Comparative analysis of drug resistance mutations and viral tropism between Sanger sequencing and NGS	Overall HIV-1 pretreatment drug resistance, different regimens resistance prevalence, specific mutation resistance prevalence

Abbreviations, DRMs = drug resistance mutations; ART antiretroviral therapy; cART = combination antiretroviral therapy; NRTIs = nucleoside reverse transcriptase inhibitors; NNRTIs = non-nucleoside reverse transcriptase inhibitors; NVP = nevirapine; PI = protease inhibitor; LPV/r = lopinavir/ritonavir; INSTIs = integrase strand transfer inhibitors; d4T = stavudine; 3TC = lamivudine ; DBS = dried blood spots; VF = virological failure; PDR = pretreatment HIV drug resistance; VL = viral load; PMTCT = mother-to-child transmission; RAMs = resistance-associated mutations; ZDV = Zidovudine; NFV = nelfinavir; RTIs = reverse transcriptase inhibitors; TAMs = thymidine analogue mutations; HAART = Highly Active Antiretroviral Therapy.

Table S3B: PICO Summary of included studies for treatment-experienced children prevalence analysis

Study	Patient/Population	Intervention	Comparison	Outcome
Hannah Green, 2006	HIV-1-infected children aged 3 months to 18 years from six countries (Italy, Brazil, UK, Spain, Germany, Portugal) enrolled between June 2000 and July 2003. The majority (97%) acquired HIV through PMTCT. All children had VF with HIV-1 RNA >2,000 copies/ml.	Children were randomized to receive genotypic resistance testing at the time of switching ART due to VF. Resistance testing was performed using the Virtual Phenotype TM, and results were used to guide subsequent ART regimens. NRTIs:15(17%); NRTIs+NNRTIs:10(11%); NRTIs+Pis:17(20%); NRTIs+NNRTIs+Pis:17(20%)	The control group did not receive resistance testing. Instead, their ART regimens were switched based on clinical judgment without the guidance of genotypic resistance testing.	Primary outcomes included the change in HIV-1 RNA viral load at 48 and 96 weeks, the proportion of patients with undetectable viral loads, and changes in CD4+ T-cell percentages.
T. Sonia Boender, 2016	HIV-1-positive adults and children in Uganda who were on NNRTI-based first-line ART and experienced virological failure between 2010 and 2011.	Continuation of first-line NNRTI-based ART with the following regimens: Nevirapine-based ART: d4T + 3TC + NVP or AZT + 3TC + NVP; Efavirenz-based ART: AZT + 3TC + EFV or TDF + FTC + EFV Participants with VL ≥1000 copies/mL underwent genotypic resistance testing to monitor the accumulation of DRMs.	Comparison of DRM accumulation rates and predicted drug susceptibility between adults and children, as well as between those on nevirapine-based versus efavirenz-based ART regimens.	Rate of DRM accumulation per year and the decline in susceptibility to NNRTIs and NRTIs following continued virological failure.
W. I. Towler, 2010	HIV-1-infected children in Uganda who received ART as part of a prospective observational study between 2004 and 2006. The study included children with and without prior single-dose nevirapine exposure.	The children received a cART regimen consisting of d4T, 3TC, and NVP. Children weighing <9 kg received syrup formulations, while those >9 kg received a fixed-dose combination tablet (Triomune).	Comparison between children with prior sdNVP exposure and those without it in terms of the presence and development of DRMs before and after ART initiation.	DRM accumulation, virological suppression, NRTI/NNRTI resistance emergence
Doreen Kamori, 2023	HIV-1-positive children (≤15 years old) and adults in Tanzania, who were not part of PMTCT programs and were enrolled after confirmed virological failure in 2020.	Participants were on ART regimens, including: - Dolutegravir-based regimen: TDF + 3TC + DTG - PI-based regimen: Various combinations including LPV/r, ATV/r with NRTIs like TDF and 3TC.	Comparison of DRM accumulation and resistance profiles between participants on dolutegravir-based regimens and those on PI-based regimens.	Prevalence of HIV DRMs and the patterns of resistance among participants, including the emergence of resistance to dolutegravir and PIs.
Mia Coetzer, 2013	HIV-infected Cambodian children under 15 years of age who have been on first-line ART for at least 6 months, monitored at the Angkor Hospital for Children in 2011.	Continuation of first-line ART, primarily consisting of stavudine, lamivudine, and nevirapine, with routine monitoring of viral load and CD4 counts. DRMs were determined using the IAS-USA 2011 list.	Children with extensive drug resistance mutations (≥ 4 mutations) versus those with fewer mutations.	Prevalence and patterns of DRMs, resistance levels, number of mutations, and predicted susceptibility to second-line ART
Theresa M Rossouw, 2015	HIV-1 infected children in South Africa, primarily under 3 years of age, who initiated PI-based ART and subsequently experienced virological failure between 2008 and 2012. The cohort included children with advanced clinical disease, severe malnutrition, and a high tuberculosis co-infection rate.	PI-based ART, primarily using regimens including LPV/r, with a focus on children who received ritonavir as a single protease inhibitor (RTV-sPI) during co-treatment for TB. Genotypic drug resistance testing was performed after virological failure.	Children with major PI mutations versus those without, and comparisons of different ART dosing strategies (RTV-sPI, double-dose LPV/r, super-boosted LPV/r).	Prevalence of major PI mutations, associated factors such as duration of ART and TB co-treatment, and the projected susceptibility of the virus to various ART drugs.

Marie-Laure Chaix, 2005	HIV-1-infected children in Côte d'Ivoire, enrolled in the ANRS 1278 cohort between October 2000 and September 2003. The study involved 115 children with a median age of 6.35 years (range: 1.2–15 years) who received HAART for at least 6 months.	Administration of HAART, consisting of 2 NRTIs combined with either nelfinavir (70.5%) or efavirenz (29.5%). NRTIs used included ZDV, 3TC, d4T, and ddI. Genotypic resistance tests were performed in cases of virologic failure (defined as viral load ≥ 3 log10 copies/mL) after at least 6 months of HAART.	Nelfinavir-based versus efavirenz-based regimens, and virologic success versus failure.	Frequency of DRMs, resistance to 3TC, NNRTIs, PIs, and overall prevalence of drug-resistant viruses.
Elizabeth S Machado, 2004	HIV-1-infected children in Brazil, receiving antiretroviral therapy according to Brazilian Ministry of Health guidelines between November 1999 and January 2002. The study included 75 children up to 14 years of age.	Two groups based on treatment history: 1) Dual therapy group, receiving two NRTIs; 2) Triple therapy group, receiving two NRTIs combined with a PI or a NNRTI. Genotypic resistance tests were performed on plasma samples, targeting reverse transcriptase and protease genes.	ual therapy versus triple therapy, with further subdivision by prior ARV exposure, and B versus non-B subtypes in terms of DRMs and treatment response.	Frequency of DRMs, impact on virologic/immunologic responses, cross-resistance, subtype influence on CD4+ recovery, and prior NRTI exposure effects.
Ana Rodríguez-Galet, 2023	HIV-infected children (≤12 years old) and adults in Equatorial Guinea, including 57 children/adolescents and 187 adults in 2019-2020.	ART regimens used in the study population, primarily focusing on NRTIs (AZT, 3TC, TDF, FTC, D4T, ABC), NNRTIs (EFV, NVP), PIs (LPV/r), and INSTIs (DTG). Monitoring included DRMs and virological failure.	ART-naïve versus ART-treated children, and effectiveness of different ART regimens, including resistance to various drug classes.	Prevalence of DRMs in both ART-naïve and ART-treated populations, virological failure rates (defined as viral load >1000 copies/mL), and the impact on predicted antiretroviral drug susceptibility.
M. Rubio-Garrido, 2021	HIV-infected children and adolescents in Democratic Republic of Congo, who were receiving ART in 2016. The study included 71 participants with a median age of 14 years.	Continuation of ART with the following regimens: NRTI-based ART: AZT + 3TC + NVP or TDF + FTC + EFV NNRTI-based ART: EFV + 3TC + AZT or ABC + 3TC + LPV/r Participants with viral load (VL) ≥1000 copies/mL underwent genotypic resistance testing to monitor the accumulation of DRMs.	Comparison of DRMs between different drug classes and across different ART regimens. The study also examined the impact of ART exposure time on the development of DRMs.	Prevalence of major DRMs to NRTIs, NNRTIs, PIs, and INSTIs. The study found high levels of resistance, particularly to NNRTIs and NRTIs.
Birkneh Tilahun Tadesse, 2018	HIV-infected children under 18 years of age in Southern Ethiopia, enrolled in the Ethiopia Pediatric HIV Cohort (EPHIC) between 2015 and 2017, who were experiencing virologic treatment failure after being on cART for more than 5 months.	Continuation of first-line NNRTI-based ART with the following regimens: - Nevirapine-based ART: d4T + 3TC + NVP or AZT + 3TC + NVP - Efavirenz-based ART: AZT + 3TC + EFV or TDF + FTC + EFV Participants with VL ≥1000 copies/mL underwent genotypic resistance testing to monitor the accumulation of DRMs.	Comparison of DRMs between different drug classes (NRTIs, NNRTIs) among children failing first-line ART. The study also compared the prevalence and impact of DRMs on second-line treatment options.	Prevalence of DRMs, particularly dual-class resistance (NRTIs and NNRTIs), and the impact on the effectiveness of recommended second-line ART regimens.
Christian Diamant Mossoro-Kpinde, 2017	HIV-1-infected children in the Central African Republic, aged 4–17 years, who had been on ART for at least 6 months in 2013. The study included 220 children, with a median age of 12 years.	Continuation of WHO-recommended first-line and second-line ART regimens: - First-line ART: AZT + 3TC + NVP, AZT + 3TC + EFV, d4T + 3TC + EFV, d4T + 3TC + LPV/r	Comparison of DRMs between children on first-line ART versus second-line ART. The study also compared the resistance profiles of viruses to NRTIs, NNRTIs, and	Prevalence of DRMs, particularly resistance to NRTIs, NNRTIs, and PIs. The study observed high levels of virological failure and drug resistance among the children, leading to the

		- Second-line ART: AZT + 3TC + LPV/r, d4T + 3TC + LPV/r Participants with VL ≥1000 copies/mL underwent genotypic resistance testing to monitor DRMs.	PIs among the children.	need for potential third-line regimens.
Khady Kebe, 2013	HIV-1-infected children in Senegalese, aged less than 15 years, treated with NRTI and NNRTI based first-line ART for at least 6 months according to WHO recommendations. 125 children were included, with a median age of 7 years.	Continuation of WHO-recommended first-line ART regimens, including: - AZT + 3TC + NVP - AZT + 3TC + EFV - d4T + 3TC + NVP - d4T + 3TC + EFV Participants with a viral load ≥3.0 log10 copies/mL underwent genotypic resistance testing to monitor DRMs.	No direct comparison group mentioned in the provided text, but the study evaluates VF based on the 2010 revised WHO criteria (HIV-1 RNA ≥ 3.7 log10 copies/ml).	Virological failure rates, prevalence of drug-resistant mutations, resistance patterns to NRTIs, NNRTIs, and PIs, multi-class resistance occurrences
Claudia S. Crowell, 2017	HIV-infected children under 10 years of age in Mali in 2010. The study included 120 children, with a median age of 2.6 years.	Initiation of ART, with regimens including: - NNRTI-based ART: Mainly EFV or NVP combined with NRTIs such as AZT, 3TC, and ABC. - PI-based ART: Mainly LPV/r combined with NRTIs. Baseline resistance testing was performed, and participants with VL ≥1000 copies/mL at 6 months underwent further genotypic resistance testing.	Comparison of virological failure rates and DRMs among children initiated on NNRTI-based versus PI-based ART. The study also analyzed the impact of baseline NNRTI resistance on treatment outcomes.	Prevalence of baseline NNRTI resistance, virological failure rates at 6 months, and the association between baseline resistance and treatment outcomes.
Cheryl A. Stoddart, 2014	South African children < 15 years old with known treatment history, who were exposed to a d4T+3TC (n = 279) or a ABC+3TC-based regimen (n = 91) in 2012	Continuation of first-line ART regimens: - ABC + 3TC + EFV/NVP/LPV/r - d4T + 3TC + EFV/NVP/LPV/r Second-line ART: Didanosine-based regimen upon virological failure.	Comparison between children failing ABC-based regimens and those failing d4T-based regimens.	Cross-resistance to didanosine, effectiveness of didanosine in second-line regimens, recommendation for zidovudine-based second-line regimens
J-P Aboulker, 2004	HIV-1-positive children under 12 weeks were eligible if they had evidence of definitive HIV-1 infection, they were a part of PMTCT programs and initiated HAART (stavudine, didanosine, nelfinavir) at a median age of 2.5 months in a multicenter study across France, Spain, Germany, Italy ,UK in 1999.	Continuation of HAART with stavudine (d4T) + didanosine (ddl) + nelfinavir (NFV). Participants were followed up for 72 weeks with monitoring for CD4 counts, viral load, and emergence of drug resistance mutations.	Not applicable (non-randomized, open-label study).	Safety, efficacy (CD4 count, viral load), drug resistance, virological failure, acquisition of resistance mutations, regimen tolerability.
T Puthanakit, 2010	HIV-infected children in Thailand, enrolled in 2002, under 18 years old, who failed first-line NNRTI-based ART (nevirapine or efavirenz) and underwent genotypic resistance testing within 12 months before switching to second-line therapy.	Continuation of NNRTI-based ART with the following regimens: - Nevirapine-based ART: d4T + 3TC + NVP or AZT + 3TC + NVP - Efavirenz-based ART: AZT + 3TC + EFV Participants with VL ≥1000 copies/mL underwent genotypic resistance testing to monitor DRMs.	Different NNRTI-based regimens (NVP vs. EFV), and their association with virological failure.	Prevalence of DRMs, resistance to NRTIs, resistance to NNRTIs, effectiveness of second-line regimens

Winstone Nyandiko, 2022	HIV-1-infected children and adolescents in Western Kenya who were perinatally infected, under 14 years of age or beginning NNRTI-based 1st-line ART in 2010. The study included 480 participants, with a median age of 8 years.	Continuation of first-line NNRTI-based ART with the following regimens: - ABC + 3TC + EFV/NVP - AZT + 3TC + EFV/NVP - D4T + 3TC + EFV/NVP Participants with VL >1000 copies/mL underwent genotypic resistance testing to monitor DRMs.	Different ART regimens and their association with virological failure and clinical outcomes, including the impact of DRMs on second-line ART effectiveness.	Prevalence of DRMs, particularly resistance to NRTIs and NNRTIs, and the impact on second-line ART outcomes.
Barbara S. Taylor, 2011	HIV-1-infected children (< 24 months of age) and adolescents in Johannesburg and South Africa, either prior to ART start or after ART start if they had recently initiated ART, were receiving a first-line PI-based regimen, and had not had any changes to this first-line regimen.	Initiation of PI-based ART, primarily with the following regimens: - LPV/r-based ART: Used for children over 6 months of age and those not receiving TB treatment. - RTV-based ART: Used for children under 6 months of age or those receiving TB treatment. Genotypic resistance testing was conducted for children who did not achieve HIV-1 plasma RNA <400 copies/ml by 52 weeks.	LPV/r-based ART versus RTV-based ART, including virological outcomes and resistance profiles.	Prevalence of DRMs, particularly PI-related mutations, and the impact on virological suppression.
Djeneba B. Fofana, 2023	HIV-1-infected children aged less than 15 years in West African, Mali and Benin. The study involved 107 children, with a median age of 10 years for ART-treated children.	The ART regimens included: - NNRTI-based: 3TC + (ZDV or ABC) + NVP or EFV - NRTI+PI-based: TDF + (3TC or FTC or ABC) + LPV/r Genotypic sequencing was conducted on DBS collected from ART-treated children with virological failure.	Comparison of integrase RAMs between ART-naïve and ART-treated children. The study also compared the prevalence of integrase polymorphisms between these groups.	Prevalence of natural polymorphisms and RAMs associated with integrase inhibitors.
German A. Contreras, 2013	Perinatally HIV-infected children and adolescents who received routine care at UTHealth Houston in the United States in 2009. The study involved 66 patients with a history of ART and resistance testing.	Analysis of the prevalence of resistance-associated mutations to etravirine (RAM) among children and adolescents. The ART regimens included: - NRTI-based regimens: with history of exposure to NRTIs. - Protease inhibitor-based regimens: with history of exposure to PIs. - NNRTI-based regimens: specifically including nevirapine or efavirenz, with some patients exposed to both drugs. The study also evaluated the factors associated with the presence of RAM, such as CD4% and history of NNRTI use.	Children with versus without RAM, association with previous NNRTI use (especially nevirapine), and prevalence across different birth cohorts and ethnic groups.	Prevalence of etravirine among the cohort and the identification of risk factors associated with RAM.

Constance Delaugerre, 2007	HIV-1-infected children treated with ART who experienced virological failure (defined as HIV-1 RNA > 500 copies/mL) at Necker Hospital, Paris, France in 2007. The population included children born between 1983 and 2003, with a median age of 12 years.	Analysis of genotypic resistance profiles following virological failure. This included the detection of resistance mutations to NRTIs, NNRTIs, and PIs. The study focused on identifying risk factors associated with resistance, including the number of prior ART drugs, viral load, and demographic factors like gender.	Children with versus without resistance to ART drugs, and resistance to different ART classes (NRTIs, NNRTIs, PIs), including factors like age, gender, and ART history.	Prevalence of drug resistance, resistance to NRTIs, resistance to NNRTIs, resistance to PIs, association with viral load, association with the number of PIs, gender differences, triple-class resistance.
Allison L. Agwu, 2014	HIV-1-infected children and youth enrolled in the LEGACY cohort across the United States and Puerto Rico in 2005, with documented NNRTI resistance (NNRTI-R). The study included 133 participants with a median age of 10.1 years, predominantly Black, non-Hispanic, and infected perinatally.	Recycling of NNRTI-based regimens despite documented NNRTI-R. This involved restarting NNRTI therapy after a median of 402 days from the first detection of NNRTI-R, with a median duration of 370 days on the recycled regimen.	Participants who recycled NNRTIs versus those who did not, focusing on adherence, CD4 count, specific NNRTI mutations (e.g., K103N), and virologic suppression outcomes.	Virologic suppression (VL < 400 copies/mL) at 24 weeks post-recycling, CD4 count changes, and the development of additional NNRTI-R mutations.
Seth C. Inzaule, 2016	HIV-1-infected infants in the Kisumu Breastfeeding Study (KiBS) in Kenya in 2003, whose mothers were on a triple-antiretroviral regimen of zidovudine (AZT), lamivudine (3TC), and either nevirapine (NVP) or nelfinavir (NFV) during breastfeeding. The study involved 24 infants who acquired HIV-1 during the study period.	Mother: NFV/ZDV/3TC from 34 weeks of gestation to 6 months post-partum children: sdNVP within 72h of birth, then breastfeeding	Infants with versus without the K65R mutation, focusing on CD4 cell counts, timing of DRM emergence, and presence of multiclass resistance.	Development of K65R mutation, association with lower baseline CD4 counts, early emergence of DRMs, multiclass drug resistance, disappearance of K65R by 6 to 9 months, impact on future NRTI-based ART responses.
Cissy Kityo, 2017	HIV-1-infected children aged ≤12 years in Uganda in 2010, initiating first-line ART between January 2010 and August 2011. The study enrolled 317 children from three Joint Clinical Research Center (JCRC) Regional Centers of Excellence (RCEs) in Kampala, Mbale, and Fort Portal, Uganda.	The study evaluated the impact of PDR on virological outcomes. Children initiated on first-line ART, primarily NNRTI-based regimens, with follow-up for 24 months, including viral load (VL) monitoring and genotypic resistance testing.	Children with and without PDR were compared in terms of VF and the accumulation of additional resistance mutations (ADR).	Association between PDR and increased likelihood of VF and ADR, prevalence of VF within 24 months, PDR as a strong predictor of VF and ADR.
Sandra Soeria-Atmadja, 2020	ART-naïve Ugandan children aged 3-12 years, initiating efavirenz-based ART between February 2015 and February 2016. The study included 99 children from an urban cohort, primarily from families living within a 50 km radius of Kampala, Uganda.	The study assessed the prevalence of PDR and its association with virological outcomes after 24 weeks of efavirenz-based ART. Baseline and 24-week assessments included VL and genotypic drug resistance testing for NRTI and NNRTI.	Children with and without PDR were compared regarding virological suppression, the development of acquired drug resistance, and accumulation of new drug resistance mutations (DRMs) after 24 weeks of treatment.	Baseline PDR prevalence, association with odds of viremia, accumulation of new DRMs, viral suppression rates by week 24.
Podjanee Jittamala, 2009	HIV-1-infected children aged less than 18 years who were antiretroviral drug-naive before initiation of NNRTI-based ART in 2017, except for exposure to antiretroviral prophylaxis for mother-to-child transmission. The study involved 202 children from Thailand, enrolled from four hospitals between August 2002 and October 2006.	NNRTI-based antiretroviral therapy, primarily using nevirapine (NVP)-based regimens, with some children receiving efavirenz (EFV)-based regimens. Clinical, immunologic, and virologic outcomes were assessed, with HIV RNA and CD4 monitored every 6 months.	NVP-based regimens (d4T+3TC+NVP) versus EFV-based regimens (3TC+d4T+AZT).	Virologic failure rates, comparison of failure risk between NVP-based and EFV-based regimens, common resistance mutations identified.

Syed Hani Abidi, 2021	Children aged 0-15 years who were part of an extensive HIV-1 outbreak in Pakistan, between April and June 2019. A total of 401 blood samples were collected, with 344 samples successfully sequenced for HIV-1 subtype and drug resistance mutation analysis.	Phylogenetic and drug-resistance analysis of HIV-1 sequences, specifically focusing on subtype distribution, transmission clusters, and DRM. Bayesian and maximum-likelihood phylogenetic methods were used to determine subtype distribution, identify clusters, and estimate the time to the most recent common ancestor (tMRCA).	HIV-1 sequences from the outbreak versus sequences from high-risk groups in Pakistan (PWID and MSM), focusing on phylogenetic relationships and DRMs.	Clusters of HIV-1 transmission, presence of drug resistance mutations, common HIV-1 strains (CRF02_AG, subtype A1), resistance in RT genes, potential challenges for treatment due to resistant strains
Bhavna H. Chohan, 2015	HIV-1-infected Kenyan infants less than 5 months old who were not previously exposed to NVP for PMTCT in 2007. A total of 22 infants initiated on NVP-based ART were followed for 12 months.	Nevirapine-based antiretroviral therapy (NVP-ART) was administered to the infants in a dose-escalation strategy, combined with two NRTIs, either lamivudine and zidovudine (NVP/3TC/AZT) or lamivudine and abacavir (NVP/3TC/ABC).	Development of NVP resistance in NVP-unexposed infants over 12 months, focusing on resistance association with virologic failure, viral load, HIV-1 subtype, and adherence.	NVP resistance development, detection timeline (3 to 6 months), association with higher viral loads, virologic failure, comparison of viral loads in infants with and without NVP resistance.
Anita Shet, 2013	HIV-1-infected children in India less than 16 years old on first-line ART in 2007. A total of 80 children were included, with 68 achieving virologic suppression and 12 experiencing virologic failure.	First-line ART including pediatric fixed-dose combination pills. The ART regimens were based on NRTIs and NNRTIs. 2 NRTI (zidovudine/stavudine + lamivudine) + 1 NNRTI (nevirapine or efavirenz)	Children on first-line ART with virologic suppression versus those with virologic failure, focusing on associated drug resistance mutations.	Virologic suppression rate, presence of resistance-associated mutations, M184V mutation, thymidine analogue mutations (M41L, T215Y/F/I), NNRTI mutations (K103N/R, Y181C, G190A).
Theodore D, 2011	HIV-1-infected Ugandan children (n=120) starting ART in 2010.	First-line ART, including regimens based on NVP or EFV combined with 3TC and either ZDV) or D4T.NVP/3TC/ZDV 19 (16%), NVP/3TC/D4T 17 (14%), EFV/3TC/ZDV 73 (61%), EFV/3TC/ZDV 7(6%), 4 (3%) children ABC/ZDV/3TC for concurrent anti-tuberculosis therapy, then changed to NVP/ZDV/3TC after 154-237 days of ARV therapy	Comparison of virologic outcomes in children with early virological failure (EVF) versus those without EVF, and the evolution of ARV resistance mutations over time.	Extended virologic failure (EVF), persistent viremia, reverse transcriptase mutations (M184V, NNRTI-associated mutations), thymidine analog mutations (TAMs) after 12 months of virologic failure.
Liting Yan, 2022	HIV-1-infected children and adolescents less than 15 years old in China in 2019, receiving long-term antiretroviral therapy (ART) from five different centers, with a median ART duration of 10 years.	Genotypic resistance testing for those identified with virological failure (VF) (viral load (VL) ≥ 400 copies/mL) after long-term ART.ZDV + 3TC + NVP/EFV 17 (18.3) TDF + 3TC + EFV 13 (14.0) ZDV + 3TC +LPV/r 21 (22.6) ABC + 3TC + LPV/r 26 (27.9) TDF + 3TC + LPV/r 13 (14.0) ABC + ZDV + 3TC + LPV/r 3 (3.2)	Comparison between participants with DRMs and those without, based on various factors such as age at ART initiation, ART regimen, and HIV subtype.	Major DRM presence, NNRTI resistance, NRTI resistance, PI resistance, younger age at ART initiation, subtype B association, NNRTI-based regimen association, continued virologic failure, accumulation of major mutations.
Yan Zhao, 2011	HIV-1-infected children from rural China experiencing virologic failure to first-line antiretroviral therapy regimens and who were part of a national pediatric antiretroviral therapy program in 2005.	Switching to a second-line antiretroviral therapy regimen after experiencing virologic failure on the first-line regimen.Regimen at enrollment of resistance test, AZT/D4T + 3TC + NVP, AZT/D4T + 3TC + EFV, AZT/D4T + ddI + NVP. Second-line regimen, ABC + 3TC + LPV/r, AZT + 3TC + LPV/r, ABC + 3TC + AZT +	Comparison between the effectiveness of second-line regimens (including boosted protease inhibitors) after switching from failing first-line regimens, focusing on drug resistance profiles before and after the switch.	Resistance to nevirapine, resistance to efavirenz, undetectable viral loads after switching to second-line therapy, increases in CD4 counts.

		LPV/r		
Clara Bratholm, 2010	HIV-1-infected children under 15 years who received long-term antiretroviral treatment at Haydom Lutheran Hospital in rural Tanzania in 2009.	First-line NNRTI-based ART regimen with regular monitoring of virological response and genotypic resistance testing for those with viral load >200 copies/mL. zidovudine/lamivudine/nevirapine 7(36%), stavudine/lamivudine/nevirapine 7(36%), zidovudine/lamivudine/efavirenz 4 (21%), stavudine/lamivudine/efavirenz 1(5%).	Comparison between virologically suppressed children and those with clinically relevant drug resistance mutations after long-term ART.	Virological suppression, drug resistance mutations, resistance to NRTIs and NNRTIs
Ravindra K. Gupta, 2010	HIV-1-infected Zambian children on adult fixed-dose combination cART (stavudine, lamivudine, nevirapine) in 2003 with a median age of 8 years.	Administration of adult fixed-dose combination antiretroviral therapy (cART) consisting of D4T+3TC+NVP (Triomune30), dosed according to WHO guidelines.	Children with previous ART exposure versus those without, and children with different levels of drug resistance.	Viral suppression, virologic failure, NNRTI resistance, M184V mutations, thymidine analogue mutations (TAM), resistance to NNRTI and lamivudine.
Jean-Christophe Beghin, 2020	HIV-1-infected South African children under 2 years old in 2014. This group includes infants and toddlers who were diagnosed with HIV and initiated on combination antiretroviral therapy (cART) shortly after diagnosis.	Treatment with NRTI + 1 PI regimen. - Initial cART Regimens: Lopinavir/ritonavir + Stavudine + Lamivudine, Lopinavir/ritonavir + Zidovudine + Lamivudine. - Updated Regimens in 2014: Lopinavir/ritonavir + Abacavir + Lamivudine, Lopinavir/ritonavir + Zidovudine + Lamivudine, Lopinavir/ritonavir + Tenofovir + Lamivudine, Efavirenz + Abacavir + Zidovudine, Efavirenz + Abacavir + Lamivudine, Efavirenz + Lopinavir/ritonavir + Abacavir + Zidovudine.	NRTI + 1 PI regimens at initiation of cART versus subsequent treatments, including the impact of switching from Stavudine or Zidovudine to Abacavir or Tenofovir on virologic suppression, CD4% recovery, and drug resistance development.	Virologic suppression rates, CD4% increases, and development of drug resistance mutations, focusing on the effectiveness and resistance profiles associated with NRTI + 1 PI regimens.
Jean-Christophe Beghin, 2020	HIV-1-infected South African children under 2 years old in 2014. This population consists of very young children, including those diagnosed at birth or within the first few months of life. The children are from diverse backgrounds, receiving treatment in various healthcare facilities across South Africa.	Treatment with NRTI + NNRTI regimen. - Initial cART Regimens: Lopinavir/ritonavir + Stavudine + Lamivudine, Efavirenz + Stavudine + Lamivudine, Efavirenz + Abacavir + Lamivudine. - Updated Regimens in 2014: Lopinavir/ritonavir + Abacavir + Lamivudine, Lopinavir/ritonavir + Zidovudine + Lamivudine, Lopinavir/ritonavir + Tenofovir + Lamivudine, Lopinavir/ritonavir + Abacavir + Zidovudine, Efavirenz + Abacavir + Lamivudine, Efavirenz + Tenofovir + Lamivudine, Efavirenz + Stavudine + Lamivudine.	Different NRTI + NNRTI regimens at cART initiation, including switches between Stavudine and Tenofovir or Zidovudine and Abacavir, focusing on virologic response and immune recovery. It also compares NNRTI-based regimens (especially Efavirenz) versus PI-based regimens for maintaining viral suppression, improving CD4 counts, and minimizing resistance development.	Virologic suppression rates, CD4% increases, and development of drug resistance mutations, focusing on the effectiveness and resistance profiles associated with NRTI + NNRTI regimens.

Judit Ventosa-Cubillo, 2023	HIV-1-infected children aged less than 18 years in Panama, who were part of a the mother-to-child transmission of HIVprogram. The study involved 107 children, with a median age of 10 years for ART-treated children.	The ART regimens included: - NNRTI-based: 3TC + (ZDV or ABC) + NVP or EFV - NRTI+PI-based: TDF + (3TC or FTC or ABC) + LPV/r. Genotypic sequencing was conducted on DBS collected from ART-treated children with virological failure.	Integrase RAMs and polymorphisms between ART-naïve and ART-treated children.	Prevalence of natural polymorphisms and RAMs associated with integrase inhibitors.
Lukas Muri, 2017	HIV-1-infected children and adolescents aged 18 years or less, from rural Tanzania, attending the paediatric HIV Clinic of Ifakara in 2016. The study involved 213 children on ART for at least 12 months. The median age was 11 years, and the median time on ART was 4.45 years. Some children had prior ART exposure, excluding PMTCT.	The ART regimens included NNRTI-based and PI-based treatments. Initial regimens consisted mostly of ZDV/3TC with NNRTI (54.9%) or d4T/3TC with NVP (39%). 15% of the children were on a PI-based regimen at the time of investigation.	Comparison of virologic failure and acquisition of DRMs between children on NNRTI-based and PI-based ART regimens.	Virologic failure, prevalence of HIV-DRM, multiclass resistances.
Paula Vaz, 2018	HIV-1-infected children aged 1 to 14 years on ART for ≥12 months from Mozambique in 2013. The study involved 715 children, with a mean age of 103 months and a mean time on ART of 60 months. Approximately 20.1% had a history of exposure to the PMTCT of HIV. Children were included if they had been on ART for at least 12 months.	Children were treated with first-line ART regimens, primarily using fixed-dose combinations containing d4T, 3TC, and NVP. Viral load testing was performed, and for those with ≥1000 copies/mL, genotyping was conducted to assess drug resistance mutations.	Children with virologic failure (VL ≥ 1000 copies/mL) versus those with suppressed viral loads, including prevalence of drug resistance mutations and effectiveness of standard second-line ART regimens.	Virologic failure, drug resistance mutations, compromised efficacy of second-line ART, effectiveness of drugs in the regimen.
A.T. Makadzange, 2015	HIV-1-infected children and adolescents aged 0-19 years in Zimbabwe in 2012, enrolled between 2004 and 2011. The participants were part of a public ART program at Parirenyatwa Hospital Family Care Center (PHFCC), Harare. The median age at ART initiation was 8 years. The study included children with a history of advanced clinical disease (WHO stages 3 and 4), with many participants having experienced severe immunosuppression.	The intervention primarily involved first-line ART regimens, with a significant proportion of the participants on a Nevirapine-based regimen (82.6%). Zidovudine and Stavudine were also commonly used in the NRTI backbone. Protease inhibitors were used for infants and in cases of treatment failure, with all children and adolescents on a PI-based regimen receiving Lopinavir/ritonavir. The median time on ART was 2.9 years.	Different age groups (children vs. adolescents) in terms of virologic and immunologic outcomes, impact of age at ART initiation and duration of ART on virologic failure, and outcomes based on Nevirapine versus other ART regimens.	Virologic failure, drug resistance mutations, compromised efficacy of second-line ART, effectiveness of drugs in the regimen.
George A. Yendewa, 2021	HIV-1-infected children, adolescents, and pregnant women in Sierra Leone in 2019. This study involved 96 children (age 2–9 years, median age 5), 47 adolescents (age 10–18 years, median age 13), and 54 pregnant women (age >18 years, median age 26). All children and adolescents acquired HIV through mother-to-child transmission, and 72.2% of the pregnant women were ART-experienced.	ART regimens included: NRTI + NNRTI-based (TDF + 3TC + EFV, AZT+ 3TC+ EFV, AZT+ 3TC+ NVP, AZT+ 3TC+ LPV/r) and NRTI + PI-based (ABC+ 3TC+ EFV, ABC+ 3TC+ NVP, ABC+ 3TC+ LPV/r). Genotypic sequencing was conducted on plasma samples collected from ART-experienced patients.	Drug resistance mutations across different age groups and ART regimens, and prevalence of RAMs between ART-naïve and ART-experienced patients.	Prevalence of drug resistance mutations to NRTIs, NNRTIs, and PIs.
Josephine Brice, 2020	HIV-1-infected children in Mali, with ages ranging from infancy to under 20 years old, involved in a cross-sectional study conducted from August 2013 to April 2014. The children were part of the Prevention of Mother-to-Child Transmission (PMTCT) program and had been on ART for more than 6 months with	The ART regimens included: 2 NRTIs + 1 NNRTI (most commonly, combinations such as Zidovudine + Lamivudine + Nevirapine, or Abacavir + Lamivudine + Efavirenz) and 2 NRTIs + 1 PI (commonly Abacavir + Lamivudine + Lopinavir). Genotypic resistance testing was	Presence of RAMs and defective viral populations between children with different ART regimens, including the genotypic susceptibility score (GSS) for each regimen.	HIV-1 resistance in DNA, resistance to NRTIs and NNRTIs.

	virological suppression (HIV-1 RNA ≤ 50 copies/mL). The median age at the time of inclusion was 9.9 years, and the median duration of ART was 5.5 years.	performed on DNA from dried blood spots (DBS).		
Vaz, Paula, 2009	HIV-1-infected children under 15 years old in Mozambique, treated between December 2003 and September 2007. The study involved 512 children who received first-line ART for at least 6 months, with a median age of 49 months at treatment initiation. Among them, some had a history of perinatal prophylaxis (PMTCT), and 135 children experienced virological failure (VF), defined as HIV-1 RNA >50 copies/mL.	The ART regimen included NNRTI-based therapy: Nevirapine combined with 2 NRTIs (Stavudine or Zidovudine and Lamivudine). Genotypic resistance testing was performed on available samples from children with virological failure.	Presence and pattern of resistance mutations between children with virologic failure (VF) treated for different durations, including extended resistance to drugs not previously administered, and resistance patterns in children with shorter versus longer treatment durations.	Resistance to Lamivudine and Nevirapine, extended spectrum of resistance, resistance to Abacavir, Tenofovir, and Etravirine.
M. Sylla, 2019	The study involved HIV-1-infected children less than 18 years of age who were infected with HIV-1 and receiving second-line ART for at least 6 months in Mali, receiving second-line ART. These children were enrolled from November 2013 to August 2014 at Gabriel Touré Hospital in Bamako. All children included in the study were experiencing virological failure (VF), defined as a viral load ≥ 1000 copies/mL after 6 months on second-line ART.	The intervention involved sequencing the protease and reverse transcriptase genes from children experiencing VF on second-line ART. The first-line regimens: d4T + 3TC + NVP, AZT + 3TC + NVP. second-line regimens: ABC + 3TC + LPV/r, ddI + ABC + LPV/r	The study compared the prevalence and patterns of drug resistance mutations in the children, focusing on mutations associated with NRTIs, NNRTIs, and PIs.	Resistance to NRTIs, NNRTIs, and PIs, common presence of the M184V mutation, continued activity of LPV/r despite second-line ART failure.
P. Vaz, 2012	HIV-1-infected children aged ≤13 years in Mozambique, enrolled between 2007 and 2008 at the Pediatric Day Hospital (HDP) in Maputo. This study involved 119 children, with a median age of 25.2 months. 50% were aged <18 months, and 13 children had maternal or child PMTCT exposure. All children were in WHO clinical stages III or IV at the time of ART initiation, and 48% were severely immunocompromised.	First-line ART regimens included: ZDV or d4T in combination with 3TC and either NVP or EFV. A small number of children (2 of 119) received a boosted PI regimen (Lopinavir/ritonavir + ZDV + 3TC).	Virological outcomes at 12 months after ART initiation, comparing children with HIV drug resistance mutations and viral load suppression (<1000 copies/mL) versus those with virologic failure (VF).	Viral suppression at 12 months, presence of HIVDR mutations, dual class resistance (NRTI and NNRTI), predictors including maternal ARV exposure for PMTCT, baseline HIVDR.
Patricia A. Brindeiro, 2002	HIV-1-infected children aged 2 to 14 years in Brazil (specifically in Rio de Janeiro and São Paulo), from April 1999. All children were vertically infected with HIV. Most children were undergoing highly active antiretroviral treatment with some on dual-nucleoside reverse transcriptase inhibitor therapy. A significant number of children had virological failure. No specific information is provided on whether the children were exposed to PMTCT.	The study involved testing genotypic and phenotypic resistance to ARV therapy in children who were failing their treatment. Plasma samples were collected for HIV-1 pol gene sequencing and phenotyping. The children were receiving various ARV regimens, including dual-NRTI therapy and HAART, with specific drugs like AZT, 3TC, and various PIs such as ritonavir and NFV.	Genotypic resistance patterns and phenotypic resistance profiles in children infected with different HIV-1 clades (B versus non-B), focusing on resistance mutations and their impact on treatment outcomes.	Primary mutations conferring resistance to ARV drugs, differences in secondary resistance mutations between B and non-B subtypes.

Christiane Adjé-Touré, 2008	HIV-1-infected children aged 0–15 years in Côte d'Ivoire, between 1998 and 2003. A total of 134 children were included in the study who had initiated ART and remained on treatment for approximately 1 year. The median age was 7 years, and 25% were less than 4 years old at treatment initiation. PMTCT was not explicitly mentioned.	The study involved ART regimens primarily consisting of two reverse transcriptase inhibitors (ZDV, ddI, d4T, 3TC) combined with either one protease inhibitor (nelfinavir) or one NNRTI (efavirenz).	The study compared the virologic and immunologic responses to ART, as well as the development of drug resistance among children receiving these regimens.	Changes in viral load, CD4 T cell percentage, incidence of drug resistance.
Paul Alain Tagnouokam -Ngoup, 2021	HIV-1-infected children under 15 years old in Cameroon, enrolled in the ANRS 12225-PEDIACAM cohort study between November 2007 and October 2011. The cohort included 210 children born to HIV-infected mothers, with 155 included in the final analysis. The median age at cART initiation was 4.2 months. Approximately 61.3% received PMTCT prophylaxis at birth, and 47.1% were born to mothers who received PMTCT prophylaxis.	The study primarily focused on the administration of cART with regimens including AZT/3TC/LVP/r, 3TC/D4T/LVP/r, AZT/3TC/NVP, and 3TC/D4T/NVP. Follow-up included regular viral load measurements and drug resistance testing for five years.	Comparison was made between different ART regimens (e.g., LPV/r-containing regimens vs. NVP-containing regimens) and their effectiveness in preventing VF and drug resistance.	Occurrence of virological failure, presence of drug resistance mutations, duration between cART initiation and VF.
Clarisse Amani-Bosse, 2017	HIV-1-infected children under the age of 2 years, residing in Côte d'Ivoire and Burkina Faso in 2010. These children were ART-naive except for PMTCT exposure. The study cohort consisted of 156 children, with a median age of 13.9 months at ART initiation, and included children who had experienced virological failure.	History of antiretroviral drug exposure, n (%) : Prenatal maternal ART 19 (12.2) PMTCT and postnatal maternal ART 11 (7.1) . PMTCT only 50 (32.1) Postnatal maternal ART only 18 (11.5) No previous exposure to any PMTCT or maternal ART 58 (37.2). First-line NRTI backbone, n (%) ZDV-3TC 142 (91.0) ABC-3TC 14 (9.0).	Outcomes based on variables such as access to tap water, main caregiver (mother vs. father), and socio-economic factors, and the difference in virological suppression rates between children with versus without prior PMTCT exposure.	Development of antiretroviral resistance mutations among those with virological failure, identification of risk factors for virological failure.
Laurence Ahoua, 2011	The study involved HIV-1-infected children aged less than 15 years from rural Uganda. The children were part of a cohort initiated on ART between 2005 and 2006. The majority of the children were 5 years old at the start of the therapy, and most had advanced stages of the disease (clinical stage 3 or 4). Some children had previously been exposed to PMTCT interventions, including single-dose nevirapine.	The intervention included initiating cART regimens. The majority of children were on a regimen that included NNRTI-based therapy, primarily using NVP with a combination of 3TC and either AZT or d4T. Adjustments were made based on clinical responses, and some children switched to PI-based regimens due to drug resistance or toxicity. ART regimen (%): AZT 3TC NVP 54 (77.1), d4T 3TC NVP 16 (22.9).	Virological and immunological responses between children who maintained viral suppression versus those with virological failure, including a comparison of drug resistance patterns and mutations associated with resistance to NNRTIs and NRTIs.	Virological suppression (HIV RNA < 400 copies/mL), immunological response (CD4 count and percentage), prevalence of drug resistance mutations.
Laurence Ahoua, 2011	The study involved HIV-1-infected children aged less than 15 years from rural Uganda. The children were part of a cohort initiated on ART between 2005 and 2006. Most of the children were 5 years old at the start of the therapy, and most had advanced stages of the disease (clinical stage 3 or 4). Some children had previously been exposed to PMTCT interventions,	The intervention included initiating cART regimens. The majority of children were on a regimen that included NNRTI-based therapy, primarily using NVP with a combination of 3TC and either AZT or d4T. Adjustments were made based on clinical responses, and some children switched to PI-based regimens due to drug resistance or	Differences in virological and immunological responses between children who maintained viral suppression versus those with virological failure, and drug resistance patterns, including mutations associated with NNRTI and	Virological suppression (HIV RNA < 400 copies/mL), immunological response (CD4 count and percentage), prevalence of drug resistance mutations at 12 and 24 months.

	including single-dose nevirapine.	toxicity. ART regimen (%): AZT 3TC NVP 25 (78.1), d4T 3TC NVP 7 (21.9).	NRTI resistance.	
Philippe R. Mutwa, 2014	HIV-1-infected children and adolescents aged 1 to 18 years in Rwanda in 2009. The study was conducted between September 2009 and October 2010. Participants were perinatally infected and were on combination antiretroviral therapy (cART) for a median of 3.4 years. Some had prior exposure to PMTCT, including single-dose nevirapine.	cART which included either NNRTI-based regimens (AZT/3TC/NVP, d4t/3TC/NVP) or PI-based regimens (AZT/3TC/EFV, d4T/3TC/EFV) based on Rwandan national guidelines.	No direct comparison group. However, the study evaluated outcomes based on different cART regimens and factors such as CD4 count at cART initiation, regimen changes, and exposure to PMTCT.	Long-term effectiveness of cART, virologic failure, genotypic drug resistance mutations, clinical condition, immunologic criteria.
Tanya Rogo, 2015	The study involved HIV-1-infected children attending the only pediatric HIV clinic in USA between 1991 and 2012. The cohort consisted of 56 children, including ART-naive and ART-experienced individuals. 64% of the children were perinatally infected, with ages at diagnosis ranging from less than 1 year to over 5 years. A significant proportion (20%) were refugees, and 73% were Black or Hispanic. The study also included children who experienced virologic failure (57% of ART-experienced children).	The study focused on ART regimens given to these children, which included various combinations of NRTIs, NNRTIs, and PIs. ART regimens were individualized, and the study investigated the development of DRMs over time.	The study compared virologic outcomes and the development of drug resistance between different ART regimens, as well as between children with different adherence levels, caregiver support, and disclosure of HIV status. It also compared ART-naive children to ART-experienced children regarding the prevalence of DRMs.	Drug resistance, virologic failure, missed appointments and doses.
Miguel de Mulder, 2011	HIV-1-infected children under 18 months, primarily from Spain, with data collected between 1993 and 2009. The majority were perinatally infected, with a high percentage presenting moderate to severe AIDS symptoms. Of these, 85% were receiving ART at the time of sample collection. A subset was infected through PMTCT, with about 96% being perinatally infected. Among the 198 children in the cohort, 67% were infected during the 1990s. The cohort included both ART-naive and ART-experienced children, with 61.6% having received four or more different ART regimens during their follow-up.	The study involved the administration of ART, including regimens based on NNRTIs, NRTIs, and PIs. The resistance analysis was conducted on specimens collected from plasma, PBMCs, and DNA, with sequences analyzed for drug resistance mutations. Treatment regimens varied, and some children were treated with multiple regimens over time.	Comparison of drug resistance mutations between ART-naive and ART-experienced children, as well as between children infected with different HIV-1 subtypes (B and non-B variants). The study also compared the prevalence of drug resistance in children on various ART regimens.	Drug resistance mutations, transmitted DRMs in ART-naive children, resistance mutations in ART-experienced children
Joseph E.Fitzgibbon, 2001	HIV-1-infected children, primarily from the Pediatric AIDS Program at Robert Wood Johnson Medical School, New Brunswick, NJ, USA. The study included 17 children with a mean age of 7.9 years (ranging from 1 to 17 years). All children were experienced with reverse transcriptase inhibitors (RTIs) prior to the study, and two had previous exposure to PIs. There is no mention of whether the children were involved in a PMTCT	Nelfinavir-containing regimens combined with various RTIs, including AZT, 3TC, d4T,ddI, and NNRTIs like NVP and DLV. The specific drugs used in combination with nelfinavir varied among the participants. Current therapy: Nelfinavir.	No direct comparison group was indicated in this study; however, the study did assess the emergence of drug resistance mutations following the initiation of nelfinavir therapy.	Virological response, emergence of drug resistance mutations in protease and reverse transcriptase genes, resistance mutations including D30N, L90M, and M184V.

	program or had experienced VF prior to the study.			
Compagno Francesca, 2019	HIV-1-infected children aged under 15 years in Switzerland, part of the Swiss Mother and Child HIV Cohort Study (MoCHIV), born between 1989 and 2009. The study included 22 mother-child pairs, where 95% of mothers were treatment-naïve before pregnancy. The study also accounted for whether ART was administered during pregnancy, with a focus on the rate of VF and DRMs.	cART, including various ART regimens provided to the mothers during pregnancy or at delivery, with a focus on assessing the impact of maternal ART on the emergence of drug-resistant mutations in the children. The intervention also included the monitoring and analysis of HIV-1 genotypes and drug resistance profiles in both mothers and children.	The study compared the rate of transmitted drug resistance mutations (HIV-DRM) versus selected drug resistance mutations (HIV-DRM) in the children. It also looked at the effects of ART administration versus no ART during pregnancy on these outcomes.	Prevalence of HIV-DRM and HIV-DRM in the children, with an emphasis on understanding the timing of these mutations' emergence and their impact on virological failure and treatment efficacy.
Lisa L. Ross, 2015	HIV-infected children from North America, Europe, and South Africa, enrolled in 2004, aged 2 to 18 years. Majority of children were ART-experienced before the study, with some having prior exposure to PIs.	ART experience: 3 NRTIs. Children received either unboosted fosamprenavir (FPV) or FPV/ritonavir (FPV/RTV) regimens, with 13 children on FPV and 65 on FPV/RTV.	Not specifically defined; indirect comparison with standard ART regimens in similar populations.	The incidence of virologic failure (VF) and treatment-emergent mutations in HIV-1 were observed over 48 weeks.
Lisa L. Ross, 2015	HIV-infected children from South Africa, Mexico, Argentina, and Portugal, enrolled in 2003, aged 4 weeks to <2 years. 30% were ART-naïve at study start, and the rest were ART-experienced, but most were PI-naïve.	All children received FPV/RTV with 2 NRTIs.	Not specifically defined; indirect comparison with standard ART regimens in similar populations.	Treatment-emergent mutations.
R. Lwembe, 2007	HIV-1-infected children in Kenya and Nairobi, aged 1-7 years, born to HIV-1-infected mothers unable to care for them, studied between 2001 and 2004. All were vertically infected with non-subtype B HIV-1 (subtypes A1, C, D, CRF02_AG) and had no prior ART or blood transfusion exposure. PMTCT history is unclear, but nevirapine for PMTCT was not yet in use in Kenya by 2002. These children experienced virological failure after initiating ART.	Various ART regimens including zidovudine/lamivudine/nevirapine, zidovudine/didanosine/efavirenz, and didanosine/lamivudine/abacavir. Some children also received multiple ART regimens over the study period.	Comparison of ART-naïve children with those who received different ART regimens in terms of the emergence and patterns of RAMs, particularly RTI and NNRTI resistance.	Persistence of vertically transmitted NNRTI-resistance mutations in the absence of drug pressure, the emergence of RTI-resistance mutations during treatment, and differences in the patterns of drug resistance between non-subtype B and subtype B HIV-1-infected children.
S. H. Al Hajjar, 2012	HIV-infected children aged under 15 years, living in Saudi Arabia and Riyadh, enrolled between July 2006 and January 2009. The study focused on those experiencing VF following first-line highly active antiretroviral therapy. The study included children with a median age of 7 years. There was no specific mention of PMTCT. Among the children, 48% experienced persistent viral load >1000 copies/mL.	The study population received first-line HAART as per the recommended guidelines. The therapy involved various antiretroviral drugs including PIs and RTIs. Genotypic resistance tests were performed on children with virologic failure to optimize subsequent treatment regimens.	Not explicitly provided in the study, as it was a retrospective analysis focusing on the prevalence and patterns of antiretroviral resistance in the study population.	Drug resistance prevalence, adherence issues, common mutations in protease and reverse transcriptase regions, cross-resistance to NRTIs.

Z. Makatini, 2019	Children perinatally infected with HIV in South Africa, attending Dr George Mukhari Academic Hospital (DGMAH) from 2011 to 2017. The cohort included 22 children with a median age of 3 years at cART initiation (IQR 1.25-8.6 years), and all were below 16 years of age at the time of study. Most children were on a failing regimen for a median of 22 months (IQR 6-66 months) and had VF. The study included children exposed to PMTCT regimens, specifically single-dose RTV and 3TC monotherapy.	Children were managed with a PI-based cART regimen. The most common PI regimen was LPV/r with various NRTI backbones, including ABC + 3TC, AZT + 3TC, AZT + ABC, and d4T + 3TC. All children had evidence of major PI resistance mutations after virological failure on first- or second-line regimens.	Emergence of drug resistance mutations in children exposed to PI-based regimens versus resistance profiles against other antiretroviral options (e.g., atazanavir, darunavir), with a focus on resistance patterns and their impact on treatment options.	Major PI resistance mutations observed, frequent mutations included V82A, M46I/L, and I54V, loss of PI activity.
M. Camara-Cisse, 2021	HIV-1-infected children in Côte d'Ivoire, studied between 2012-2013. The study included 61 children, all under 18 years of age, with a median age of 11 years at virological failure. The children were from a national cohort at the Abidjan Integrated Bioclinical Research Centre. The majority of children had been on ART for a median duration of 6 years, with the treatment ongoing for at least 6 months. No specific information was provided regarding exposure to PMTCT interventions. However, the study cohort included children from the first MTCT prevention program. All children had experienced VF with viral loads greater than 1000 copies/mL.	The study focused on evaluating resistance to RTIs in children undergoing ART. Genotypic resistance tests were performed using the ANRS algorithm to assess resistance mutations in the reverse transcriptase gene. The most common treatment regimens included RTIs, with a specific focus on NRTIs and NNRTIs. Children were treated with combinations of NRTIs and NNRTIs, such as ZDV + 3TC + EFV, ABC + 3TC + EFV, and TDF + 3TC + EFV.	Prevalence of resistance mutations in the reverse transcriptase gene among children on ART, focusing on NRTIs and NNRTIs resistance profiles and specific mutations, with additional phylogenetic analysis of HIV-1 viral subtypes.	Resistance to RTIs among HIV-1-infected children, including NRTIs and NNRTIs, with common mutations M184V for NRTIs and K103N/S for NNRTIs.
A. T. Dumans, 2009	HIV-1-infected children and adults in Brazil, with samples collected between 1998 and 2005. The study involved 24 children infected with subtype F1, 90 children with subtype B, 141 adults with subtype B, and 99 adults with subtype F1. Patients were on ART and experienced VF after at least 3 months of PI treatment. Data includes demographic details, CD4 counts, viral load, and PI exposure times.	PI treatment effectiveness in two different HIV-1 subtypes (B and F1). The treatment regimens included various PIs such as RTV, IDV, SQV, and LPV, with differences in exposure times and resistance mutation acquisition.	Rate of acquisition of major and minor PI-associated resistance mutations and polymorphisms in HIV-1 subtypes B and F1, analyzing the emergence of specific mutations in treated versus untreated patients.	Differences in the acquisition of resistance mutations between subtypes.
J. Fokam, 2011	The study focused on 164 infants (mean age was 72 months in both groups (drug-naive and those failing first-line treatment, with a range difference (min-max: 3–144 months and 12–144 months, respectively) from the Cameroon between 1991 and 2005. These infants were confirmed or suspected of having congenital toxoplasmosis. None of the mothers received treatment for Toxoplasma gondii during pregnancy (PMTCT not applied). Most infants did not receive postnatal treatment when their serum was obtained.	Diagnostic evaluation of congenital toxoplasmosis using serological tests (IgM, IgA, IgG), PCR, and attempts to isolate the parasite from various samples (CSF, blood, urine).3TC AZT NVP 51 (26), 3TC D4T NVP 29 (15), 3TC AZT EFV 8 (4), 3TC D4T EFV 4 (2), 3TC AZT ABC 2 (1), 3TC D4T NVP 2 (1), NVP AZT (3TC or D4T) 2 (1), 3TC (D4T NVP) or (ABC AZT) 2 (1)	Not explicitly stated as a comparison group, but findings were compared to Africa cohorts where systematic prenatal screening and treatment during pregnancy were implemented. Differences in clinical severity were analyzed.	Prevalence of drug resistance

T. N. Green, 2012	HIV-1-infected children aged less than 15 years in South Africa, recruited from King Edward VIII hospital in Durban, KwaZulu-Natal. The study was conducted between August 2008 and January 2010. The study included both HAART-failing children (n=51) and HAART-naive children (n=43). Some HAART-naive children had been exposed to antiretroviral therapy for the PMTCT. The median age of HAART-failing children was 7.9 years, while HAART-naive children had a median age of 0.9 years.	The intervention primarily involved HAART regimens, including two NRTIs plus one NNRTI for most children (80.5% of HAART-failing children). Some children (19.5%) were receiving two NRTIs plus one PI. The median duration of HAART prior to study recruitment was 28.6 months.	The study compared drug resistance mutations and coreceptor usage between HAART-failing and HAART-naive children. It assessed the prevalence of drug resistance mutations and the usage of CXCR4 (X4) or dual (R5X4)/mixed (R5, X4) (D/M)-tropic viruses in both groups.	Prevalence of drug resistance mutations, presence of TAMs.
S. Pillay, 2014	The study was conducted on 101 children aged ≤15 years in rural KwaZulu-Natal, South Africa, who were experiencing VF after being on first-line ART. The study period was between August 2011 and December 2012. The children had been on ART for a median of 3.3 years (IQR 2.5-4.4), and the majority were on an NNRTI-based regimen (73 out of 89 successfully genotyped children). The median age at ART initiation was 7 years (IQR 3.7-9.6), and the median age at genotyping was 10.2 years (IQR 7.7-12.9). There was no specific mention of PMTCT drug exposure in the cohort.	The children were on either an NNRTI-based regimen (3TC + d4T/ABC + EFV/NVP) or a PI-based regimen (3TC + d4T/ABC + LPV/r) at the time of genotyping. The study focused on identifying DRMs associated with these regimens.	The study compared the prevalence and patterns of DRMs in children failing NNRTI-based regimens versus those failing PI-based regimens. Additionally, it looked at the presence of TAMs and other DRMs, including the Q151M complex and major PI mutations.	Prevalence of NRTI and NNRTI resistance mutations, and presence of major PI resistance mutations.
G. M. Hunt, 2023	HIV-positive children aged ≤19 years in South Africa, receiving ART from public health facilities, between March 2017 and March 2019. The study included 899 participants from 40 facilities across eight provinces. The median age was 12.9 years, and participants had been on ART for a median of 1.0 years. About 37.6% had documented exposure to PMTCT, and all participants had VF with at least one viral load ≥1000 copies/mL.	Participants were treated with PI-based regimens (ritonavir-boosted lopinavir or atazanavir), NNRTI-based regimens (primarily efavirenz), or NRTI-based regimens. The intervention included genotypic resistance testing using next-generation sequencing technologies.	The study compared the prevalence of drug resistance among children on different ART regimens (PI-based, NNRTI-based, NRTI-based) with virological failure.	Prevalence of HIV drug resistance, resistance to NNRTIs, NRTIs, and PIs, dual-class resistance, efficacy of PI-based regimens in NNRTI-failing patients.
D. B. Fofana, 2018	HIV-infected children in Benin, Cotonou, during 2015-2016, with a median age of 10 years (IQR 6–13). 53% were male. These children were on ART for a median of 5 years (IQR 3–7). All participants were experiencing VF defined as two consecutive VL of >1000 copies/mL. No specific mention of PMTCT exposure.	Participants were on NNRTI-based or boosted PI-based ART regimens. Resistance testing was conducted on dried blood spots using genotypic methods. NNRTI-based regimens, first-line: 3TC ZDV NVP , 3TC ZDV EFV, 3TC ABC NVP, 3TC ABC EFV, 3TC TDF EFV. PI-based regimens, first-line: 3TC ZDV LPV/r.	Not applicable (the study focused on identifying resistance profiles and treatment outcomes in the population without a direct comparative intervention).	Prevalence of DRMs for NRTIs, NNRTIs, and dual-class resistance, resistance to PIs and integrase inhibitors, undetectable ARV concentrations associated with VF.
J. Servais, 2002	HIV-1-infected children aged 3 to 16 years in Belgium, enrolled in a multicenter observational study from 1997 to 2000. All children had acquired HIV through PMTCT, with a majority having advanced disease. The study included 21 children, 18 of whom were of African origin. Virological failure was defined as a	Switching children from a failing PI-based HAART regimen to a second-line regimen. First-line treatments predominantly involved ritonavir (RTV) with two NRTIs. The second-line regimen involved single or dual PI-based therapy, mainly with NFV or ritonavir-saquinavir (RTV-	The study compared the effectiveness of the second-line PI-based therapy after virological failure of the first PI-based regimen. Genotypic and phenotypic resistance testing was used to predict the	Virologic response, change in viral load after switching to second-line therapy, presence of resistance mutations, cross-resistance between protease inhibitors.

	<1 log10 decrease in viral load compared with pretreatment values. Most children had prior exposure to NRTIs before starting their first PI-based therapy.	SQV), and in some cases, the addition of NVP.	response to the second-line therapy.	
A. P. Ramkissoon, 2015	HIV-1-infected pediatric patients in Jamaica, with a median age of 10 years, attending the Kingston Pediatric and Perinatal HIV/AIDS Programme. The study includes 55 children, with 75% on first-line ART (NRTI/NNRTI-based regimen) and 25% on second-line ART (PI-based regimen). All participants have been on ART for at least 24 months, and nearly all (98%) experienced virological failure. PMTCT programs were implemented, with 98% of HIV-exposed infants receiving ART.	First-line ART: NRTI/NNRTI-based regimen (AZT+3TC+NVP, LPV/r+NRTI). Second-line ART: PI-based regimen (ritonavir-boosted lopinavir). The study investigates drug resistance mutations in these pediatric patients.	Between the frequency and type of resistance mutations in pediatric patients on first-line vs. second-line ART. The study also compares the mutation patterns in Jamaican pediatric patients with those in the adult population.	Frequency of drug resistance mutations, virological failure, common mutations affecting NRTIs and NNRTIs (M184V, T215Y, K103N, Y181C, G190A), resistance to protease inhibitors in patients on second-line therapy.
Shanmugam Saravanan, 2017	HIV-1-infected children aged less than 15 years in India, who have been exposed to ART for at least 24 months. The study involved 55 children, with a median age of 10 years. Most children (75%) were on first-line ART with an NRTI/NNRTI-based regimen (Zidovudine + Lamivudine + Nevirapine). The remaining 25% were on second-line ART with a PI-based regimen (Lopinavir/ritonavir + NRTI backbone). The cohort likely included children who had undergone PMTCT, as indicated by the high prevalence of ART exposure. All but one of the children experienced virological failure (98%).	The primary intervention was ART with either first-line NNRTI-based regimens or second-line PI-based regimens. For the first-line regimen, the most common combination was Zidovudine + Lamivudine + Nevirapine. The second-line regimen typically included Lopinavir/ritonavir with an NRTI backbone.Treatment history: d4T + 3TC + NVP, d4T + 3TC + EFV, AZT +3TC + NVP, AZT +3TC + EFV, IDV +3TC + NVP, ABC +3TC + NVP, TDF +3TC + EFV/NVP, TDF/3TC/RTV + ATV.	RAMs in reverse transcriptase and protease genes among children on first-line NNRTI-based regimens versus second-line PI-based regimens, focusing on the prevalence and specific mutations conferring drug resistance.	Prevalence of DRMs associated with ART regimens, frequency of RAMs in reverse transcriptase and protease genes, significant resistance to NRTIs and NNRTIs, compromised efficacy of ART regimens.
Bismara BA, 2012	The study involved 61 vertically HIV-1-infected children from Brazil, specifically followed at the Immunodeficiency Clinic at the State University of Campinas, São Paulo, Brazil. The children had a median age of 7.5 years, with 60.6% being male. The study was conducted in 2012, and all children had been on HAART for at least 6 months. Most had already experienced VF, with a viral load higher than 10,000 copies/ml.	The intervention included ART regimens using a combination of drugs such as zidovudine, lamivudine, and nelfinavir. The study specifically focused on identifying drug-resistance mutations in the HIV-1 polymerase gene, particularly in the protease and reverse transcriptase regions. ZDV, 3TC, DDC, NEF.	Prevalence of drug-resistance mutations in the studied HIV-1-infected children and established resistance profiles from other studies. The study also compared the mutation frequencies between different subtypes (B, F, and recombinant forms).	Resistance to at least one antiretroviral drug, common mutations in reverse transcriptase gene (M184V, M41L, D67N, T215Y, L210W), common mutations in protease gene (L63P, M36I, L90M).
Abuogi L, 2023	HIV-1-infected children aged 1–14 years in Kisumu County, Kenya, enrolled from March 2019 to December 2020. The study included a total of 704 children, with a median age of 9 years (IQR 7, 12). Among the participants, 344 (49%) were female. Some children had exposure to antiretrovirals as part of PMTCT.	Point-of-care viral load testing every three months combined with targeted genotypic drug resistance testing for children with VF (HIV RNA ≥ 1000 copies/mL). The intervention included a multidisciplinary committee review of DRT results to offer tailored treatment recommendations.	Standard-of-care management following national guidelines for children with VF. This typically included enhanced adherence counseling and repeat VL testing after three months of confirmed adherence. DRT was less commonly used and required approval by a regional HIV	Detection of major HIV drug resistance mutations, viral suppression, loss to follow-up, mortality, association with history of VF, and duration on ART.

			Technical Working Group, primarily for those failing a PI-containing regimen or with persistent VF.	
Djiyou ABD, 2023	HIV-1-infected adolescents aged 10-19 years in Cameroon, 2021, receiving ART for at least 6 months. The majority of participants (89.7%) were infected perinatally, and they were followed up in an urban hospital setting. Participants were categorized based on their viral load: those with low-level viraemia (VL 200-999 copies/mL) and those with virological failure (VL ≥1000 copies/mL).	ART regimens included TDF-3TC-EFV, ABC-3TC-EFV, TDF-3TC-DTG, TDF-3TC-LPV/r, ABC-3TC-LPV/r, and TDF-3TC-ATV/r.	Comparison of HIV drug resistance between adolescents with low-level viraemia and those with confirmed VF.	Presence of HIV drug resistance mutations, resistance to specific drug classes, risk associated with functional monotherapy.
Khamadi SA, 2023	HIV-infected children and adolescents aged 1-19 years, living in the Southern Highland zone of Tanzania. The study includes participants on ART for more than 6 months between 2019 and 2021. The median age is 12 years, with 54% female. The study also notes participants receiving ART through PMTCT programs and those experiencing VF.	The intervention includes 290 (41.0%) participants were on an ART regimen with an abacavir ABC/3TC backbone, 54 (7.6%) were on an AZT/3TC backbone, and 363 (51.3%) were on a TDF/3TC backbone regimen, including 339 (93.4%) who were on TDF/3TC/DTG.	Different ART regimens (NNRTI-based, PI-based, and INSTI-based) to evaluate their effectiveness in achieving viral suppression and in managing drug resistance mutations.	Prevalence of viral suppression (VS) (<1000 copies/mL) and the occurrence of HIV drug resistance mutations (HIVDRMs).
C. Charpentier, 2012	HIV-1-infected children from the Central African Republic, studied between April and June 2009. The study involved 242 children, with a median age of 8 years (range: 4 months to 18 years). Among these children, 165 were receiving ART, including first-line, second-line, and third-line regimens. Most children were infected through PMTCT. The study assessed virological failure and resistance profiles after a median of 18 months on first-line ART and 30 months on second-/third-line ART.	Children were receiving ART regimens based on WHO recommendations. The majority of children were on a first-line regimen, primarily consisting of a combination of d4T, 3TC, and NVP. A smaller group of children was on second-line or third-line regimens, including PIs such as LPV or IDV.	Virological failure and the prevalence of drug resistance mutations between children on first-line ART regimens and those on second-/third-line regimens. The study also assessed the difference in resistance patterns to NRTIs and NNRTIs between these groups.	Detection of HIV-1 RNA, virological failure, presence of drug-resistance mutations, major resistance mutations (excluding M184V), resistance mutations to NRTIs or NNRTIs.
Mboumba Bouassa RS, 2019	HIV-1-infected children aged 5-19 years (median age 11 years), in Central African Republic (Bangui). Most were born to HIV-infected mothers who failed PMTCT. All participants were in virological failure, defined as viral load > 1000 copies/mL, and were cART-experienced but INSTI-naive (no prior exposure to integrase strand transfer inhibitors).	Fourteen of them received a combination of ZDV + d4T + NVP, two children received ZDV +3TC + EFV and one child received a PI-based combination composed of d4T + 3TC + lopinavir boosted by LPV/r.	The study compared the prevalence of DRMs in the integrase gene among children failing first- and second-line WHO-recommended ART regimens, evaluating the susceptibility of their HIV-1 strains to INSTIs. This was contrasted against the effectiveness of other antiretrovirals in use, particularly NRTIs, NNRTIs, and PIs.	Susceptibility to INSTIs, presence of major resistance mutations (E138K and E138T), potential effectiveness of INSTIs (particularly dolutegravir) in optimized regimens.

Pang X, 2024	The study involved 491 HIV-1-infected children and adolescents from Guangxi, China, under the age of 18. These individuals were undergoing prolonged ART and experiencing virologic failure. The median treatment duration was 7.4 years, and the study population predominantly contracted HIV through mother-to-child transmission (86.62%). Most participants were on ART regimens containing NNRTIs and NRTIs, with some having pretreatment CD4+ T cell counts below 200 cells/mm³ and high viral loads (>1000 copies/mL).	The intervention examined was the continued administration of various ART regimens, primarily involving NNRTIs (Nevirapine) and NRTIs (Lamivudine, Zidovudine). The study focused on understanding the prevalence and patterns of DRMs among this population.	The study compared the emergence of drug resistance mutations between different ART regimens and their effectiveness. It also examined the differences in DRMs based on various factors like gender, HIV subtype (CRF01_AE, CRF08_BC), pretreatment CD4 counts, and viral load levels.	Prevalence of HIV drug resistance mutations (DRMs), resistance to NNRTIs and NRTIs, key mutations (M184V/I, K103N), associated risk factors (male sex, CRF01_AE subtype, low pretreatment CD4+ T cells, high viral load).
Sivay MV, 2024	This study was conducted in four Siberian regions of Russia (Altai, Krasnoyarsk, Novosibirsk, Omsk) from 2019 to 2021. It involved 815 HIV-infected individuals, including 96 children (0-14 years old) and 719 adults (≥15 years old). The median age of the patients was 37 years. The study population included individuals who had been diagnosed with HIV for a median of 5 years. Some of the participants were infected through perinatal transmission (11.9%) while others were through heterosexual contact or persons who inject drugs. All children in the study received ART to PMTCT.	The intervention involved ART regimens. For children, INSTI-based therapy was the most common (51.1%), followed by PI-based (24.9%) and NNRTI-based (20.5%). For adults, NNRTI-based ART was the most common (51.4%), followed by INSTI-based (18.1%) and PI-based (17.5%). ART adherence was assessed using self-reported data. The most common ART regimens included ABC + 3TC + RAL for children and TDF + 3TC + NVP/EFV/ETR for adults.	The study compared DRMs between different ART regimens and among patients with varying epidemiological characteristics. Factors such as viral load levels, CD4 cell counts, and region of residence were analyzed to determine their association with the presence of DRMs.	Prevalence of HIV drug resistance mutations (DRMs), resistance to NNRTIs and NRTIs, key mutations (M184V/I, K103N), associated factors (male sex, CRF01_AE subtype, low pretreatment CD4+ T cells, high viral load).
Tambuyzer L, 2016	The study involved HIV-1-infected children and adolescents aged 6 to <18 years who were treatment-experienced. The participants were from multiple countries, including Thailand, Argentina, the USA, and South Africa in 2008. A total of 101 patients (41 children and 60 adolescents) were enrolled, with a median baseline viral load of 3.6 log10 copies/ml for children and 4.0 log10 copies/ml for adolescents. Patients had previously used at least two ARVs, including NRTIs, NNRTIs, and PIs. The study assessed those currently failing virologically (confirmed plasma viral load >500 copies/ml) at the start of the study.	The intervention included the administration of etravirine (5.2 mg/kg twice daily) along with an optimized background regimen consisting of a boosted PI, NRTIs, and optional enfuvirtide and/or raltegravir. Etravirine was chosen based on its resistance profile and previous usage of NNRTIs in the population.	The study compared the presence and emergence of resistance-associated mutations between VFs and responders, focusing on mutations related to etravirine and other NNRTIs. Both population sequencing and deep sequencing were utilized to detect minority variants and emerging mutations.	The study found that 40.6% of the patients experienced virological failure by week 48. The emergence of resistance to etravirine was observed, with specific RAMs, such as Y181C, L100I, and E138A, being detected. The study concluded that etravirine resistance patterns in children and adolescents were similar to those observed in adults, and the presence of minority variants was not consistently associated with treatment failure.
Lange CM, 2015	HIV-1-infected children in South Africa, involved in the CHER trial. The study includes children who were infected despite receiving nevirapine prophylaxis for the PMTCT. The children were aged less than 12 weeks at ART initiation. Baseline drug resistance was analyzed, and the children had virological failure while on PI-based ART.	Early ART with a regimen including AZT, 3TC, and LPV/r. ART was initiated within the first 12 weeks of life, and the treatment continued for various periods. Some children also received ritonavir to achieve VL with LPV due to tuberculosis treatment.	Presence of DRMs detected by single genome sequencing and bulk sequencing. The focus was on identifying multiclass drug resistance, particularly in children with early virological failure after PI-based ART.	Virological failure rate by week 48, emergence of resistance to etravirine, specific resistance-associated mutations (RAMs) (Y181C, L100I, E138A), comparison of etravirine resistance patterns in children/adolescents and adults, association of minority variants with treatment failure.

B. P. Gopalan, 2019	The study involved HIV-1-infected children aged ≤16 years in Bangalore, India, between January 2012 and March 2016. All children were vertically infected and initiated on NNRTI-based ART. The study focused on those who had been on continuous ART for ≥2 years and had available pre and post ART samples. The population included both virological nonresponders (children with VL ≥ 200 copies/mL at two consecutive time points within 2 years of ART initiation) and responders (children who maintained VL < 200 copies/mL for two or more years after six months of ART initiation). The analysis also looked at the presence of PMTCT exposure, but specific details about PMTCT were not highlighted.	The intervention involved initiating NNRTI-based ART regimens. Specifically, the children received either Nevirapine or Efavirenz combined with NRTIs such as AZT+3TC, d4T+3TC, or TDF+3TC. The study also examined the presence of DRMs in cell-associated DNA and cell-free RNA at different time points (baseline, month six of ART, and at virological failure) using next-generation sequencing and Sanger sequencing.	Virological nonresponders and responders. The study compared the presence and frequency of DRMs in cell-associated DNA and cell-free RNA between these groups. It also compared the predictive value of NGS analysis of cell-associated DNA at six months of ART with Sanger sequencing of cell-free RNA for early virological failure.	Prevalence of treatment-relevant DRMs.
A. J. Szubert, 2017	HIV-infected children from Uganda and Zimbabwe, aged 3 months to 17 years, recruited between March 2007 and November 2008. The study involved 1,206 children with a median age of 6 years at ART initiation. The majority had advanced HIV disease with a median CD4% of 12%. The study also included children born to mothers who may have received PMTCT interventions, though specific details about PMTCT exposure were not extensively discussed. Children were followed for a median of 4 years.	The intervention included ART regimens initiated based on WHO 2006 guidelines. Children were randomized to receive either 2NRTIs plus an NNRTI (mainly lamivudine and abacavir plus nevirapine or efavirenz) or a 3NRTI regimen as long-term ART. Viral load was not monitored in real-time, and CD4 counts were monitored in some children. The study focused on evaluating virological outcomes, drug resistance, and long-term virological suppression without regular viral load monitoring.	Comparison was between children monitored with CD4 counts versus those without CD4 counts, and between the different ART regimens. The study also compared the virological suppression rates, drug resistance patterns, and the development of resistance mutations over time among the different monitoring strategies.	Long-term virological response, accumulation of resistance mutations, effectiveness of ART regimens without real-time viral load monitoring, viral load suppression below 1,000 copies/mL after 4 years, resistance to second-line drugs, importance of confirming virological failure before switching therapies.

Abbreviations, DRMs = drug resistance mutations; ART antiretroviral therapy; cART = combination antiretroviral therapy; NRTIs = nucleoside reverse transcriptase inhibitors; NNRTIs = non-nucleoside reverse transcriptase inhibitors; NVP = nevirapine; PI = protease inhibitor; LPV/r = lopinavir/ritonavir; INSTIs = integrase strand transfer inhibitors; d4T = stavudine; 3TC = lamivudine ; DBS = dried blood spots; VF = virological failure; PDR = pretreatment HIV drug resistance; VL = viral load; PMTCT = mother-to-child transmission; RAMs = resistance-associated mutations; ZDV = Zidovudine; NFV = nelfinavir; RTIs = reverse transcriptase inhibitors; TAMs = thymidine analogue mutations; HAART = Highly Active Antiretroviral Therapy.

Table S4A: Quality assessment of included DR studies for treatment-naive children prevalence analysis

Q1. Was the study's target population a close representation of the national population in relation to relevant variables?

Q2. Was some form of random selection used to select the sample, OR was a census undertaken?

Q3. Was the likelihood of nonresponse bias minimal?

Q4. Were data collected directly from the subjects (as opposed to a proxy)?

Q5. Was an acceptable case definition used in the study?

Q6. Was the study instrument that measured the parameter of interest shown to have validity and reliability?

Q7. Was the same mode of data collection used for all subjects?

Q8. Was the length of the shortest prevalence period for the parameter of interest appropriate?

Q9. Were the numerator(s) and denominator(s) for the parameter of interest appropriate

TOTAL SCORE: Poor (0-3), Fair (4-6), Good (7-9).

Quality assessment of naive children studies

Study	Overall Quality Rating	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
J. Lidstrom, 2010	Fair	N	N	Y	Y	Y	Y	N	Y	Y
W. I. Towler, 2010	Good	N	N	Y	Y	Y	Y	Y	Y	Y
Jessica D. Church, 2008	Good	NR	Y	Y	Y	Y	Y	N	Y	Y
Jessica Fogel, 2011	Fair	NR	N	Y	Y	Y	Y	N	Y	Y
Russell B. Van Dyke, 2016	Good	Y	Y	Y	Y	Y	Y	Y	Y	Y
SwaraliN Kurle, 2007	Fair	N	N	Y	Y	Y	Y	N	Y	N
Moira Vignoles, 2009	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Diana M Gibb, 2003	Fair	NR	N	N	Y	Y	NR	Y	Y	Y
Julie A E Nelson, 2015	Fair	NR	N	Y	Y	Y	Y	N	Y	Y
Frantz Jean Louis, 2019	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Ragna S Boerma, 2016	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Sydney J. TOWNSEND, 2020	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Seth C. Inzaule, 2018	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Claudia S. Crowell, 2017	Fair	N	Y	N	Y	Y	Y	N	Y	Y
Mounerou Salou, 2016	Good	Y	Y	N	Y	Y	Y	Y	Y	Y
Cissy Kityo, 2016	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Dorothy E. Dow, 2017	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Gillian M. Hunt, 2011	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Clement Zeh, 2011	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Nicholas I. Nii-Trebi, 2013	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Jennifer Neubert, 2016	Good	N	Y	Y	Y	Y	Y	N	Y	Y
Barbara S. Taylor, 2011	Fair	N	Y	N	Y	Y	Y	Y	Y	N
Djeneba B. Fofana, 2023	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Gillian M. Hunt, 2019	Good	Y	Y	Y	Y	Y	Y	Y	Y	Y
Monica M Parker, 2003	Fair	N	N	Y	Y	Y	Y	N	Y	Y
Marine Karchava, 2006	Fair	N	N	Y	Y	Y	N	Y	Y	N
Pierre Frange, 2018	Good	N	N	Y	Y	Y	Y	Y	Y	Y
Nicole Ngo-Giang-Huong, 2016	Fair	NR	N	Y	Y	Y	Y	Y	Y	N
Birkneh Tilahun Tadesse, 2019	Good	N	N	Y	Y	Y	Y	Y	Y	Y

Michael R Jordan, 2022	Fair	N	N	Y	Y	Y	Y	N	Y	Y
Sandra Soeria-Atmadja, 2020	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Paula C. Aulicino, 2019	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Syed Hani Abidi, 2021	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Andrea Kovacs, 2005	Fair	N	N	Y	Y	Y	N	Y	Y	Y
Study	Overall Quality Rating	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Constance Delaugerre, 2009	Fair	Y	N	Y	Y	Y	Y	N	Y	N
George Mondinde Ikomey, 2017	Good	N	N	Y	Y	Y	Y	Y	Y	Y
Solange Dourado de Andrade, 2017	Fair	N	N	Y	Y	Y	Y	Y	Y	NR
Louise Kuhn, 2015	Good	N	Y	Y	Y	Y	Y	Y	Y	N
Joseph Fokam, 2011	Fair	N	N	Y	Y	Y	Y	Y	Y	N
J Han, 2009	Good	N	Y	Y	Y	Y	Y	N	Y	Y
Susan H. Eshleman, 2001	Fair	NR	N	Y	Y	Y	Y	N	Y	N
Neil A. Martinson, 2007	Good	N	Y	Y	Y	Y	Y	Y	Y	N
P. Vaz, 2012	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Fiyinfoluwa I. Olusola, 2021	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Paula Morena de Souza Guimara˜es, 2015	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Bernard Masquelier, 2001	Fair	N	N	Y	Y	Y	N	Y	Y	N
Michael R Jordan, 2017	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Nava Yeganeh, 2018	Fair	N	N	Y	Y	Y	Y	N	Y	Y
Ujjwal Neogi, 2012	Fair	N	N	Y	Y	Y	Y	Y	N	Y
Suwellen Sardinha Dias de Azevedo, 2022	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Tanya Rogo, 2015	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Amphan Chalermchockcharoenkit, 2009	Fair	N	N	N	Y	Y	Y	Y	Y	Y
Thuy Thi Bich Phung, 2015	Fair	N	N	N	Y	Y	Y	Y	Y	Y
Francisco Antunes, 2015	Fair	N	Y	N	Y	Y	Y	N	Y	Y
Flávia J. Almeida, 2009	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Jessica M. Fogel, 2013	Good	N	N	Y	Y	Y	Y	Y	Y	Y
Marie-Laure Chaix, 2007	Fair	N	Y	N	Y	Y	N	N	Y	Y
Maryam Jarchi, 2019	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
L. Tambuyzer, 2016	Fair	N	N	N	Y	Y	Y	N	Y	N
D. A. Lehman, 2012	Fair	N	NR	N	Y	Y	N	Y	Y	Y
R. G. Fisher, 2015	Fair	N	NR	Y	Y	Y	N	Y	N	Y
J. Fokam, 2018	Fair	N	N	Y	Y	N	N	N	Y	Y
C. M. Lange, 2015	Good	N	Y	Y	Y	Y	Y	Y	N	Y
D. Persaud, 2011	Fair	Y	Y	N	Y	Y	N	Y	Y	N

Table S4B: Quality assessment of included DR studies for treatment-experienced children prevalence analysis

Study	Overall Quality Rating	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Hannah Green, 2006	Good	Y	Y	Y	Y	Y	N	Y	Y	Y
T. Sonia Boender, 2016	Good	N	Y	Y	Y	Y	Y	Y	Y	N
W. I. Towler, 2010	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Doreen Kamori, 2023	Good	Y	Y	Y	Y	Y	Y	N	Y	Y
Mia Coetzer, 2013	Fair	N	N	Y	Y	Y	Y	N	Y	N
Theresa M Rossouw, 2015	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Marie-Laure Chaix, 2005	Fair	N	N	N	Y	Y	Y	Y	Y	Y
Elizabeth S Machado, 2004	Fair	N	N	Y	Y	Y	Y	N	Y	Y
Ana Rodríguez-Galet, 2023	Good	N	N	Y	Y	Y	Y	Y	Y	Y
M. Rubio-Garrido, 2021	Fair	N	Y	N	Y	Y	Y	N	Y	Y
Birkneh Tilahun Tadesse, 2018	Good	Y	Y	Y	Y	Y	Y	Y	Y	Y
Christian Diamant Mossoro-Kpinde, 2017	Fair	N	Y	N	Y	Y	Y	Y	Y	N
Khady Kebe, 2013	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Claudia S. Crowell, 2017	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Cheryl A. Stoddart, 2014	Fair	N	N	Y	Y	Y	Y	Y	Y	N
J-P Aboulker, 2004	Fair	Y	N	Y	Y	Y	N	Y	Y	N
T Puthanakit, 2010	Good	Y	Y	N	Y	Y	N	Y	Y	Y
Winstone Nyandiko, 2022	Fair	N	Y	N	Y	Y	Y	Y	Y	N
Barbara S. Taylor, 2011	Fair	N	N	N	Y	Y	Y	Y	Y	Y
Djeneba B. Fofana, 2023	Good	NR	N	Y	Y	Y	Y	Y	Y	Y
German A. Contreras, 2013	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Constance Delaugerre, 2007	Fair	N	Y	Y	Y	Y	N	N	Y	N
Allison L. Agwu, 2014	Good	Y	N	Y	Y	Y	Y	Y	Y	Y
Seth C. Inzaule, 2016	Fair	NR	N	Y	Y	Y	Y	Y	Y	N
Cissy Kityo, 2017	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Sandra Soeria-Atmadja, 2020	Good	N	N	Y	Y	Y	Y	Y	Y	Y
Podjanee Jittamala, 2009	Fair	N	Y	N	Y	Y	N	Y	Y	N
Syed Hani Abidi, 2021	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Bhavna H. Chohan, 2015	Fair	N	N	Y	Y	Y	N	Y	Y	Y
Anita Shet, 2013	Good	N	Y	Y	Y	Y	N	Y	Y	Y
Theodore D, 2011	Fair	N	N	N	Y	Y	Y	N	Y	Y
Liting Yan, 2022	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Yan Zhao, 2011	Fair	N	N	Y	Y	Y	Y	N	Y	Y
Clara Bratholm, 2010	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Ravindra K. Gupta, 2010	Fair	N	Y	N	Y	Y	Y	N	Y	Y
Jean-Christophe Beghin, 2020	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Judit Ventosa-Cubillo, 2023	Fair	N	N	Y	Y	Y	Y	Y	Y	N
Lukas Muri, 2017	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Paula Vaz, 2018	Good	Y	Y	N	Y	Y	Y	Y	Y	Y
A.T. Makadzange, 2015	Fair	N	Y	N	Y	Y	Y	Y	Y	N
George A. Yendewa, 2021	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Josephine Brice, 2020	Good	N	Y	Y	Y	Y	Y	Y	Y	Y
Vaz, Paula, 2009	Fair	N	N	N	Y	Y	N	Y	Y	Y
M. Sylla, 2019	Fair	N	Y	N	Y	Y	Y	N	Y	Y
P. Vaz, 2012	Good	N	Y	Y	Y	Y	Y	Y	Y	Y

Patricia A. Brindeiro, 2002	Fair	N	Y	Y	Y	Y	Y	N	Y	N
Study	Overall Quality Rating	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Christiane Adjé-Touré, 2008	Fair	NR	N	N	Y	Y	NR	Y	Y	Y
Paul Alain Tagnouokam-Ngoup, 2021	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Clarisse Amani-Bosse, 2017	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Laurence Ahoua, 2011	Fair	N	Y	N	Y	Y	N	Y	Y	Y
Philippe R. Mutwa, 2014	Fair	N	N	N	Y	Y	Y	Y	Y	Y
Tanya Rogo, 2015	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Miguel de Mulder, 2011	Fair	Y	Y	N	Y	Y	Y	N	Y	N
Joseph E.Fitzgibbon, 2004	Fair	N	N	Y	Y	Y	N	Y	Y	N
Compagno Francesca, 2019	Fair	NR	N	Y	Y	Y	Y	N	Y	Y
Lisa L. Ross, 2015	Good	Y	Y	N	Y	Y	N	Y	Y	Y
R. Lwembe, 2007	Fair	NR	N	Y	Y	Y	Y	Y	Y	N
S. H. Al Hajjar, 2012	Good	N	Y	Y	Y	Y	NR	Y	Y	Y
Z. Makatini, 2019	Fair	N	Y	Y	Y	Y	Y	NR	Y	N
M. Camara-Cisse, 2021	Good	N	Y	Y	Y	Y	N	Y	Y	Y
A. T. Dumans, 2009	Fair	NR	N	Y	Y	Y	N	Y	Y	N
J. Fokam, 2011	Good	N	N	Y	Y	Y	Y	Y	Y	Y
T. N. Green, 2012	Fair	N	N	Y	Y	Y	Y	Y	Y	N
S. Pillay, 2014	Fair	N	N	Y	Y	Y	Y	N	Y	Y
G. M. Hunt, 2023	Good	Y	Y	Y	Y	Y	Y	Y	Y	Y
D. B. Fofana, 2018	Good	N	Y	Y	Y	Y	N	Y	Y	Y
J. Servais, 2002	Fair	N	N	Y	Y	Y	NR	Y	Y	N
A. P. Ramkissoon, 2015	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Shanmugam Saravanan, 2017	Fair	NR	N	Y	Y	Y	Y	Y	Y	N
Bismara BA, 2012	Fair	N	N	Y	Y	Y	N	Y	Y	Y
B. P. Gopalan, 2019	Good	N	Y	Y	Y	Y	Y	Y	Y	N
A. J. Szubert, 2017	Good	Y	N	Y	Y	Y	Y	Y	N	Y
C. Charpentier, 2012	Fair	N	Y	N	Y	Y	N	Y	Y	N
Abuogi L, 2023	Good	N	Y	Y	Y	Y	Y	Y	N	Y
Djiyou ABD, 2023	Fair	N	Y	N	Y	Y	Y	Y	N	Y
Khamadi SA, 2023	Good	N	Y	N	Y	Y	Y	Y	Y	Y
Pang X, 2024	Fair	N	N	Y	Y	Y	N	Y	Y	Y
Sivay MV, 2024	Good	Y	N	Y	Y	Y	Y	Y	N	Y
Thu HHK, 2024	Good	Y	N	N	Y	Y	Y	Y	Y	N
Mboumba Bouassa RS, 2019	Fair	N	Y	N	Y	Y	Y	Y	Y	N

Table S5A: Pooled prevalence of drug resistance among treatment-naive children after 2015

	Number of datasets	Number of HIV-infected individuals	Number of Individuals with DR	Prevalence of DR (95% Confidence Interval)	Heterogeneity		p value for subgroup difference
					I^2 (%)	p value	
Overall	11	904	361	25.40 (11.80-41.79)	94	<0.01	
Region*							<0.01
Asia	3	170	83	36.20 (11.08-65.93)	92	<0.01	
Eastern Africa	2	147	26	17.58 (11.75-24.25)	0	0.37	
Southern Africa	1	49	33	67.35 (51.46-80.05)	-	-	
Western and Central Africa	5	538	219	15.67 (0.79-40.82)	96	<0.01	
World Bank Income Level							0.07
Low income	2	147	26	17.58 (11.75-24.25)	0	0.37	
Lower middle income	8	713	335	33.86 (17.20-52.70)	89	<0.01	
Age group (years)							<0.01
< 2	3	584	304	58.18 (45.81-70.00)	84	<0.01	
⩾2	11	320	57	13.85 (5.17-25.29)	81	<0.01	
PMTCT experience							<0.01
Yes	6	686	330	38.10 (17.37-61.27)	91	<0.01	
no	5	218	31	11.37 (2.47-24.44)	81	<0.01	

PMTCT= the prevention of mother-to-child transmission
*median (range).
Several datasets are generated from the same study.

Table S5B: Pooled prevalence of drug resistance among treatment-experienced children after 2015

	Number of datasets	Number of HIV-infected individuals	Number of Individuals with DR	Prevalence of DR (95% Confidence Interval)	Heterogeneity		p value for subgroup difference
					I^2	p value	
Overall	20	2644	1808	67.93 (55.59-79.15)	97%	<0.01	
Region							<0.01
South America	1	62	36	58.06 (44.85-70.49)	-	-	
North America	1	41	39	95.12 (83.47-99.40)	-	-	
Europe	1	96	71	73.96 (64.00-82.38)	-	-	
Asia	3	760	390	55.72 (37.88-72.83)	93	<0.01	
Eastern Africa	6	599	368	68.32 (46.63-86.56)	96	<0.01	
Southern Africa	2	819	716	84.21 (64.78-97.34)	58	0.12	
Western and Central Africa	6	267	206	63.65 (30.02-91.35)	96	<0.01	
Income level							0.17
Low income	4	273	165	63.68 (36.06-87.27)	96	<0.01	
Lower middle income	7	795	478	74.10 (57.96-87.50)	96	<0.01	
Upper middle income	7	1483	1129	76.25 (63.92-86.76)	97	<0.01	
High income	1	62	36	58.06 (36.06-87.27)	-	-	
Age group (Years)							<0.01
< 7	7	733	353	55.06 (40.16-69.53)	91	<0.01	
⩾ 7	12	1515	1247	75.49 (58.55-89.21)	94	<0.01	
Antiretroviral treatment time							0.77
< 3 years	8	1067	583	62.03 (46.63-76.32)	94	<0.01	
⩾ 3 years	8	519	325	66.61 (38.68-89.54)	96	<0.01	
Proportion of viral failure							0.36
100%	8	861	548	64.41 (39.19-86.13)	96	<0.01	
50%-99%	6	1031	872	78.24 (65.61-88.73)	89	<0.01	
< 50%	3	218	130	67.38 (24.93-97.53)	98	<0.01	
Unknown	3	534	258	56.20 (32.67-78.35)	94	<0.01	
ART regimen#							<0.01
NRTI+NNRTI	4	527	270	58.00 (29.29-84.08)	97	<0.01	
NRTI+NNRTI/PI	10	1681	1304	80.59 (71.86-88.08)	95	<0.01	
NNRTI+PI	1	199	93	46.73 (39.65-53.92)	-	-	
NRTI+PI	1	10	7	70.00 (34.75-93.33)	-	-	
NRTI+NNRTI+PI	3	131	63	36.51 (0.15-88.10)	97	<0.01	
NRTI+NNRTI/PI/INSTI	1	96	71	73.96 (64.00-82.38)	-	-	

DR= drug resistance; WHO= World Health Organization; CDC= National Centers for Disease Control; PMTCT= the prevention of mother-to-child transmission
*median (range).
#ART regimes are defined as the maximum proportion of all treatment among each dataset.
Several datasets are generated from the same study.

Table S6A: Meta regression analysis for the variation of the prevalence of treatment-naive HIV infected children

Variables(reference)	Univariate analysis				Multivariate analysis	
	No. of datasets	P value	Coefficient (95% confidence interval)	R2, %	P value	Adjusted coefficient (95% confidence interval)
Region	69	0.0319		11.58		
Asia	10	Ref			Ref	
Eastern Africa	11	0.1374	0.1659 (-0.0530-0.3849)		0.4092	0.0988 (-0.1358-0.3333)
Europe	5	0.8644	-0.0238 (-0.2968-0.2493)		0.6303	-0.0795 (-0.4030-0.2441)
North America	7	0.2586	0.1421 (-0.1044-0.3886)		0.0252	0.3250 (0.0405-0.6096)
South America	8	0.4367	-0.1003 (-0.3373-0.1366)		0.3854	-0.1089 (-0.3547-0.1370)
Southern Africa	18	0.0282	0.2269 (0.0282-0.4256)		0.4261	0.0927 (-0.1356-0.3209)
Western and Central Africa	10	0.7423	0.0381 (-0.1888-0.2649)		0.7651	0.0526 (-0.1051-0.2104)
Sample Year	69	0.1352	0.0088 (-0.0028-0.0204)	2.41		
Age	69	0.0001	-0.0031 (-0.0047-0.0015)	18.58	0.0005	-0.0038 (-0.0060-0.0017)
Income Level	63	0.4238		0.00		
High income	11	Ref			Ref	
Low income	15	0.1765	0.1419 (-0.0638-0.3476)			
Lower middle income	20	0.2954	0.1044 (-0.0912-0.3001)			
Upper middle income	17	0.8412	0.0205 (-0.1802-0.2213)			
CD4 count	22	0.6686		0.00		
<500	8	Ref			Ref	
⩾500	14	0.6686	-0.0497 (-0.2774-0.1779)			
HIV-RNA	27	0.1464		5.02		
< 5	9	Ref			Ref	
⩾5	18	0.1464	-0.1527 (-0.3589-0.0534)			
PMTCT	69	0.0045		10.71		
No	23	Ref			Ref	
Yes	46	0.0045	0.1844 (0.0571-0.3116)		0.5133	0.0526 (-0.1051-0.2104)
WHO Stage	10	0.6442		0.00		
⩾50%	4	Ref			Ref	
>50%	6	0.6442	-0.0385 (-0.2021-0.1250)			
Male	36	0.1961		2.57		
⩽50%	23	0.1961	0.1106 (-0.0571-0.2782)		Ref	
>50%	14	Ref				

Table S6B: Meta regression analysis for the variation of the prevalence of treatment-experienced HIV-infected children

Variables(reference)	Univariate analysis				Multivariate analysis	
	No. of datasets	P value	Coefficient (95% confidence interval)	R2, %	P value	Adjusted coefficient (95% confidence interval)
Region	79	0.5774		0.00		
Asia	12	Ref			Ref	
Eastern Africa	17	0.1818	-0.1634 (-0.4032-0.0764)		0.2411	-0.1488 (-0.3975-0.1000)
Europe	6	0.2520	-0.1861 (-0.5045-0.1323)		0.1124	-0.2540 (-0.5677-0.0596)
North America	7	0.0816	-0.2693 (-0.5724-0.0337)		0.0966	-0.2890 (-0.6299-0.0519)
South America	5	0.8959	-0.0225 (-0.3591-0.3142)		0.3672	-0.1702 (-0.5401-0.1997)
Southern Africa	15	0.6532	-0.0562 (-0.3015-0.1890)		0.9033	0.0155 (-0.2340-0.2650)
Western and Central Africa	17	0.2535	-0.1392 (-0.3780-0.0997)		0.1886	-0.1716 (-0.4274-0.0842)
Sample Year	81	0.9517	-0.0004 (-0.0118-0.0111)	0.00		
Age	78	0.0198	0.0018 (0.0003-0.0033)	6.40	<0.0001	0.9477 (0.6830-1.2123)
Male	72	0.0866		3.03		
⩽50%	20	0.0866	-0.1380 (-0.2958-0.0198)		0.5781	-0.0535 (-0.2422-0.1351)
>50%	52	Ref			Ref	
Income Level	75	0.2395		1.81		
High income	11	Ref				
Low income	18	0.5939	0.0598 (-0.1600-0.2796)			
Lower middle income	24	0.8263	0.0234 (-0.1855-0.2323)			
Upper middle income	22	0.1025	0.1763 (-0.0353-0.3880)			
CD4 count	36	0.6618		0.00		
<500	18	Ref				
⩾500	18	0.6618	0.0525 (-0.1826-0.2785)			
HIV-RNA	41	0.3510		0.00		
<5	24	Ref				
⩾5	17	0.3510	-0.1032 (-0.3201-0.1137)			
WHO Stage	35	0.5425		0.00		
⩽50%	18	Ref				
>50%	17	0.5425	-0.0664 (-0.2799-0.1472)	7.40		
Viral failure	81	0.0307				
< 50%	28	Ref			Ref	
50-99%	15	0.2246	0.1209 (-0.0742-0.3159)		0.1873	0.1513 (-0.0736-0.3761)
100%	28	0.0094	0.2152 (0.0528-0.3776)		0.1070	0.1505 (-0.0325-0.3336)
Unkown	10	0.0213	0.2615 (0.0390-0.4841)		0.0607	0.2433 (-0.0109-0.4976)
ART duration	72	0.6533	0.0006 (-0.0020-0.0032)	0.00		

Figure S1: Demonstration of countries and regions included in the study

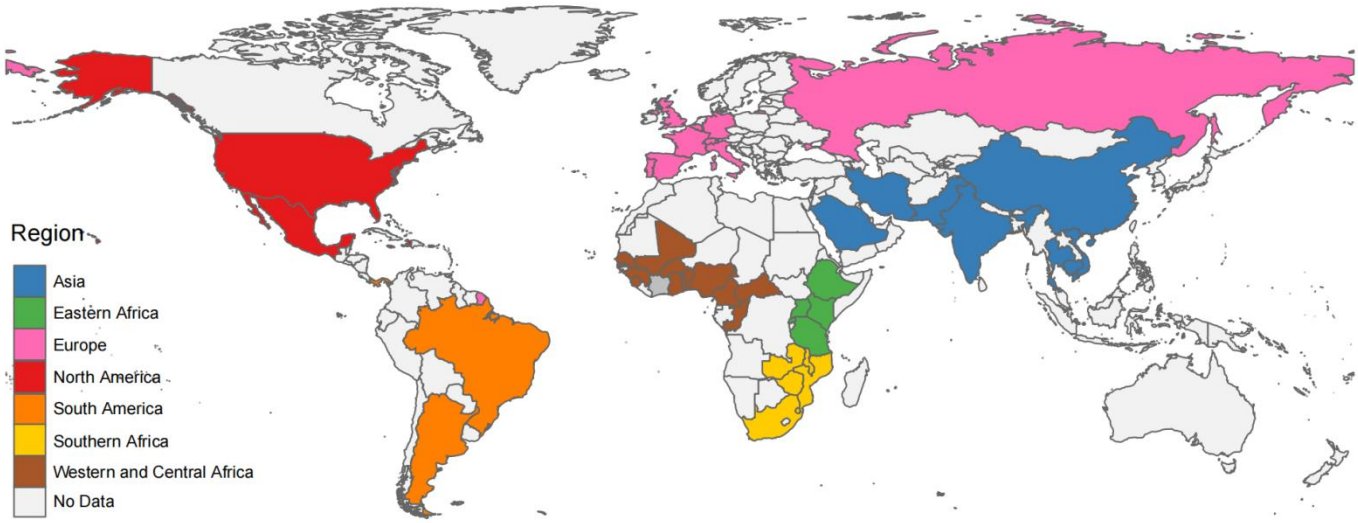


Figure S2A: Forest plot of the drug resistance prevalence among treatment-naive groups

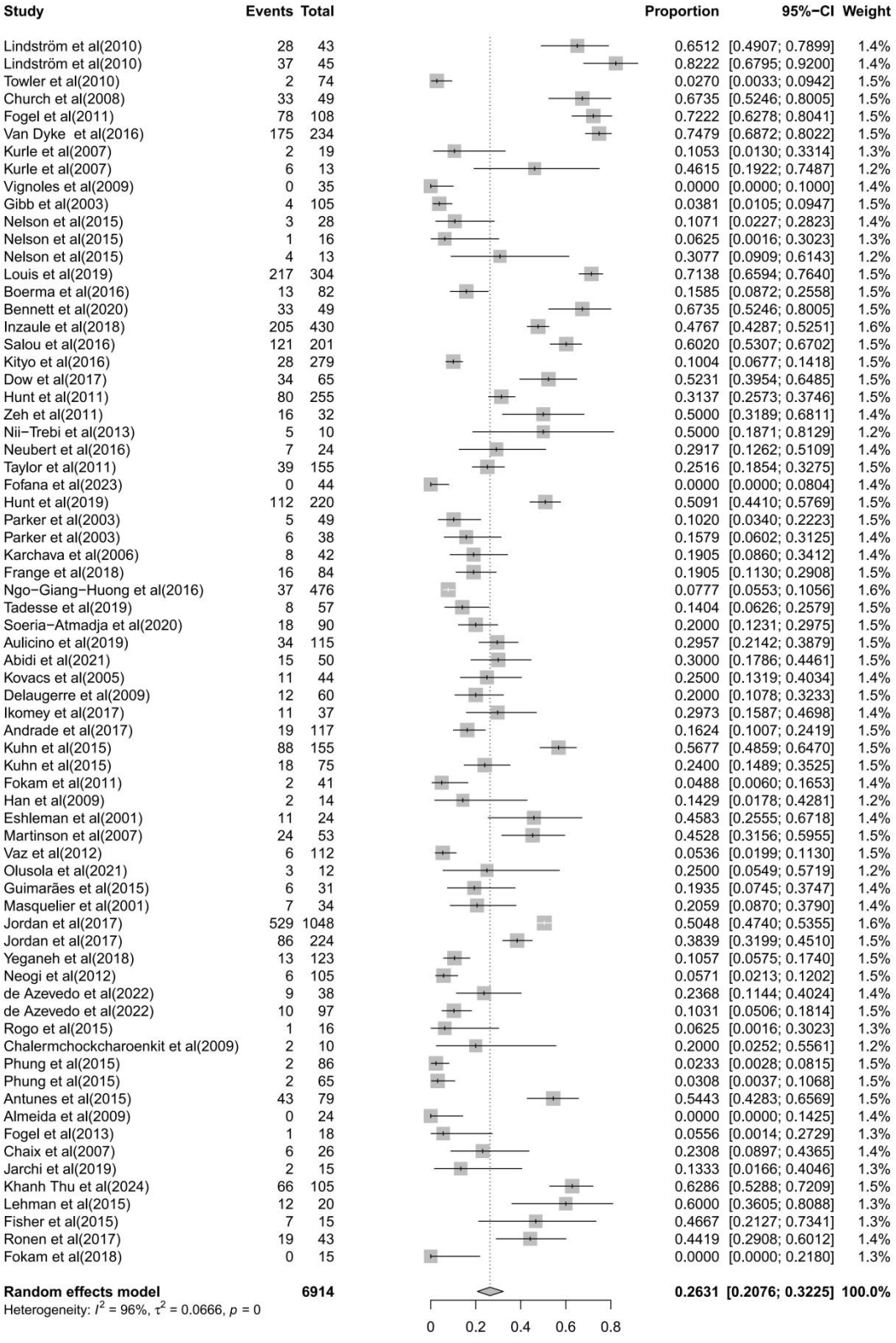


Figure S2B: Forest plot of the drug resistance prevalence among treatment-experienced groups

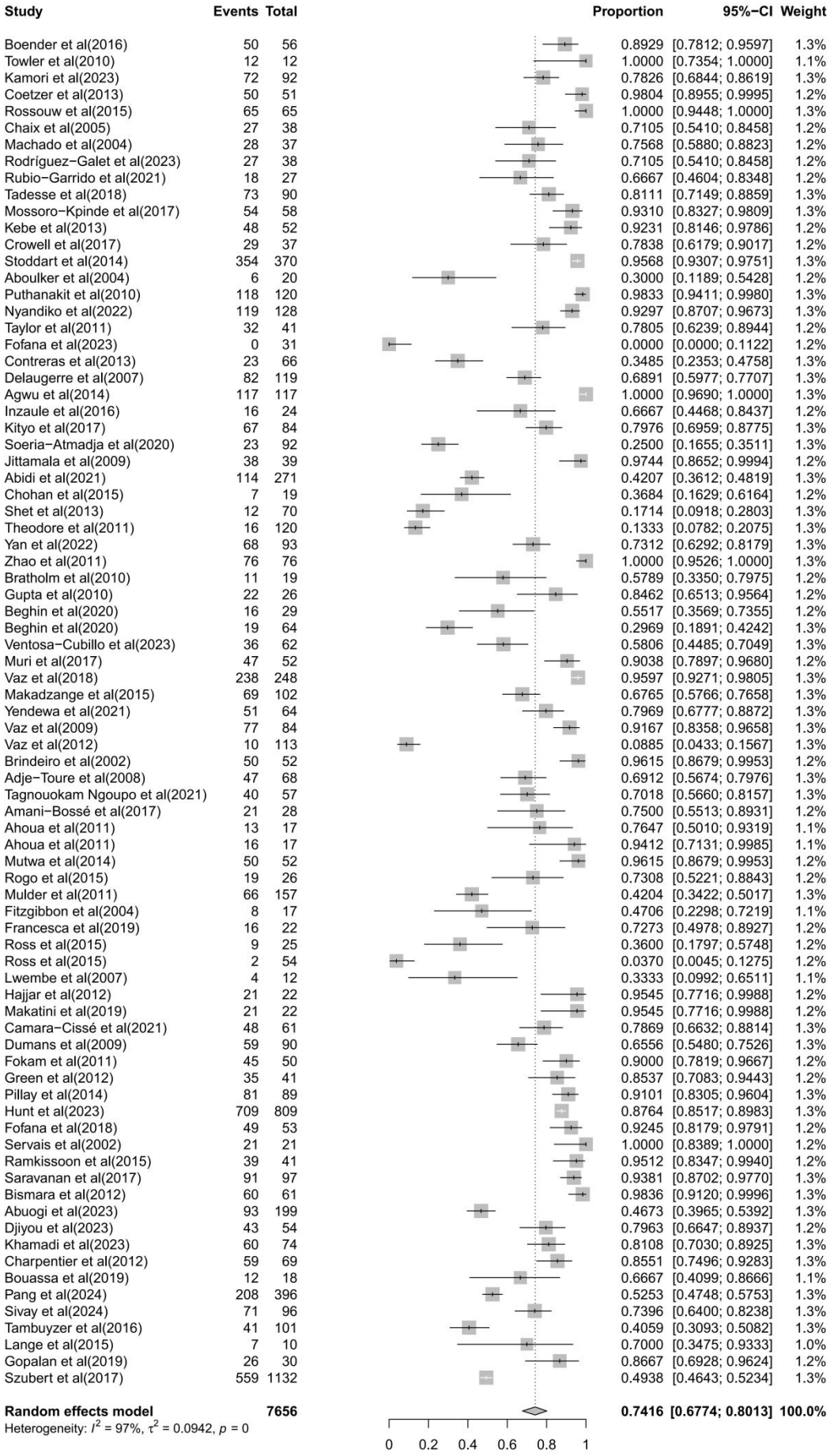


Figure S3A: Sensitivity analysis for the variation of the prevalence of treatment-naive groups

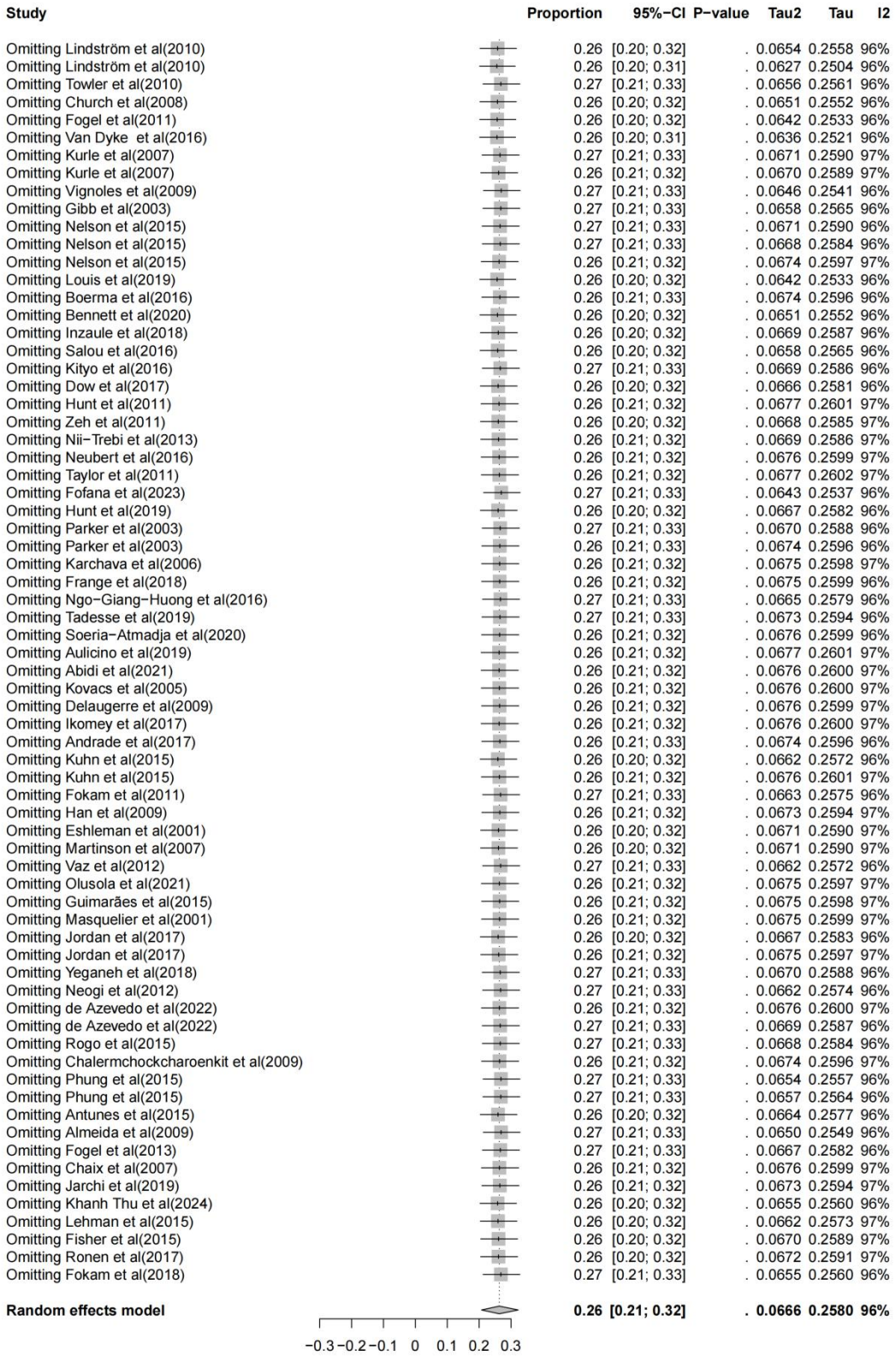


Figure S3B: Sensitivity analysis for the variation of the prevalence of treatment-experienced groups

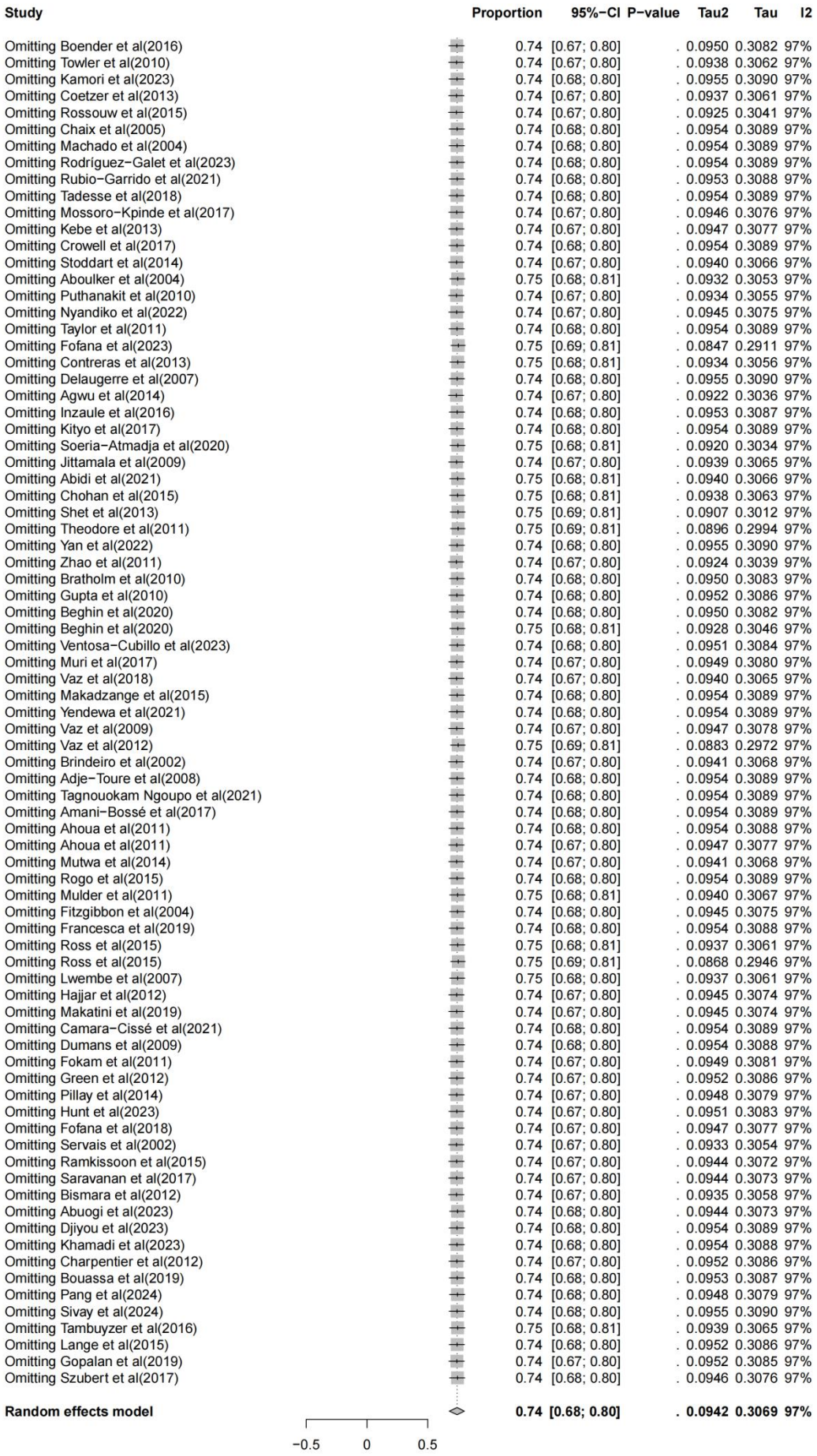


Figure S4A: Forest plot of the NNRTI mutation prevalence among treatment-naive groups

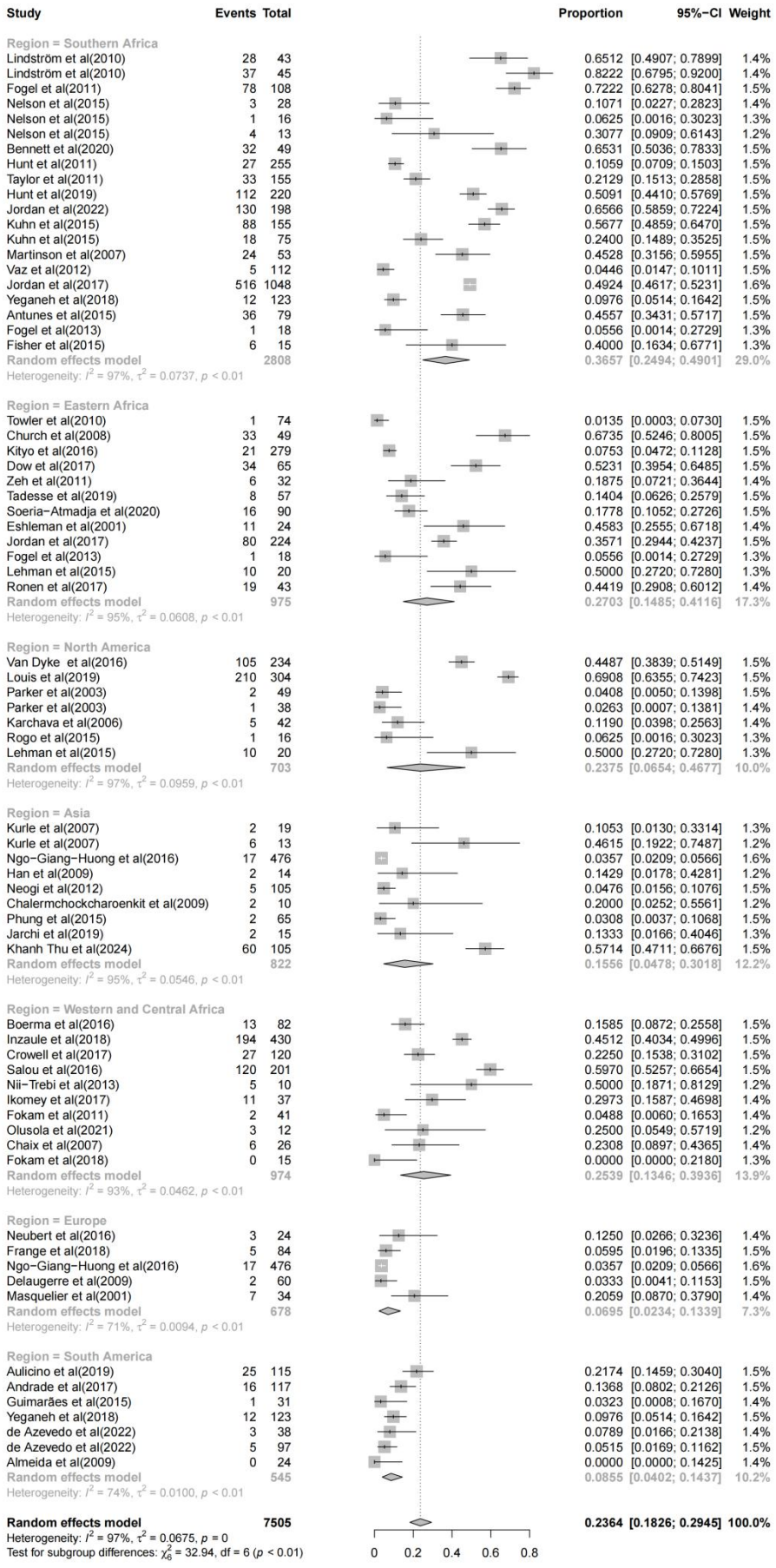


Figure S4B: Forest plot of the NNRTI mutation prevalence among treatment-experienced groups

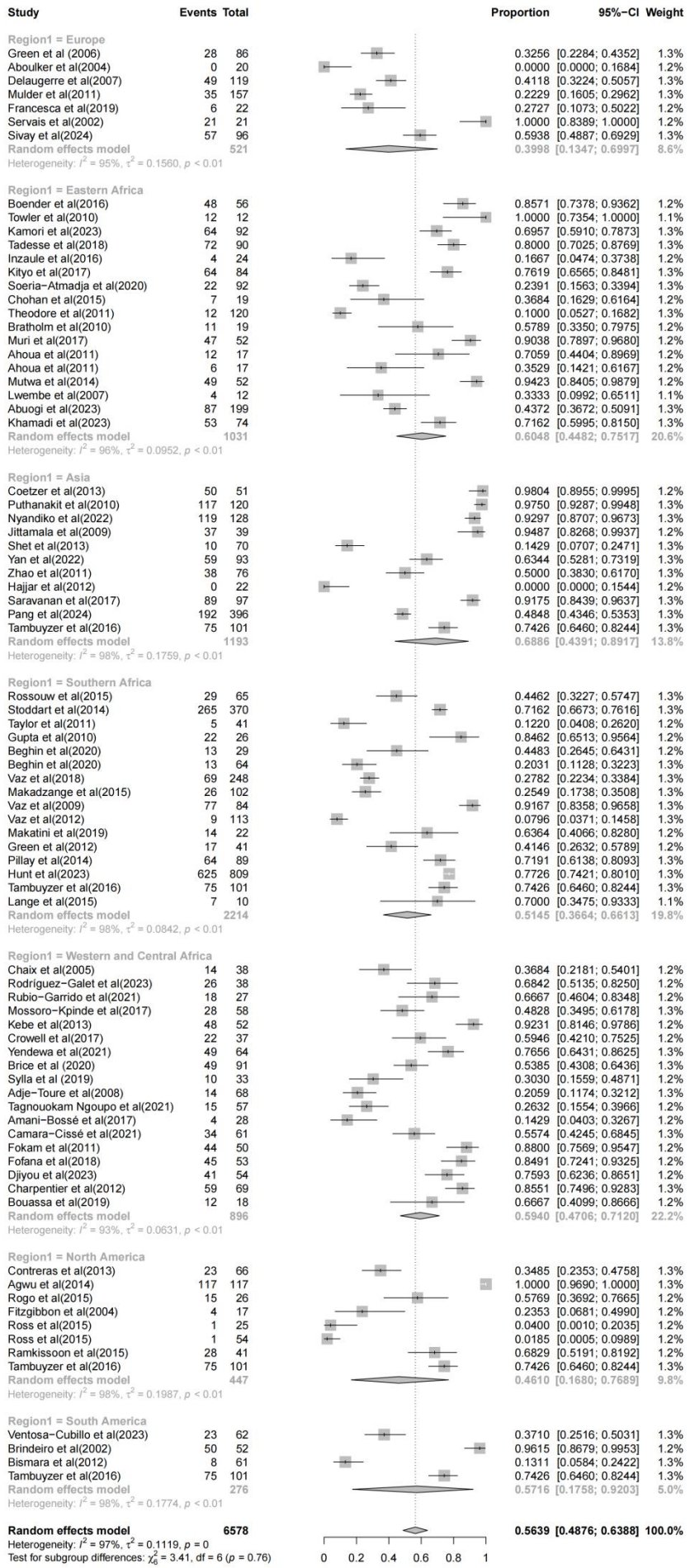


Figure S5A: Forest plot of the NRTI mutation prevalence among treatment-naive groups

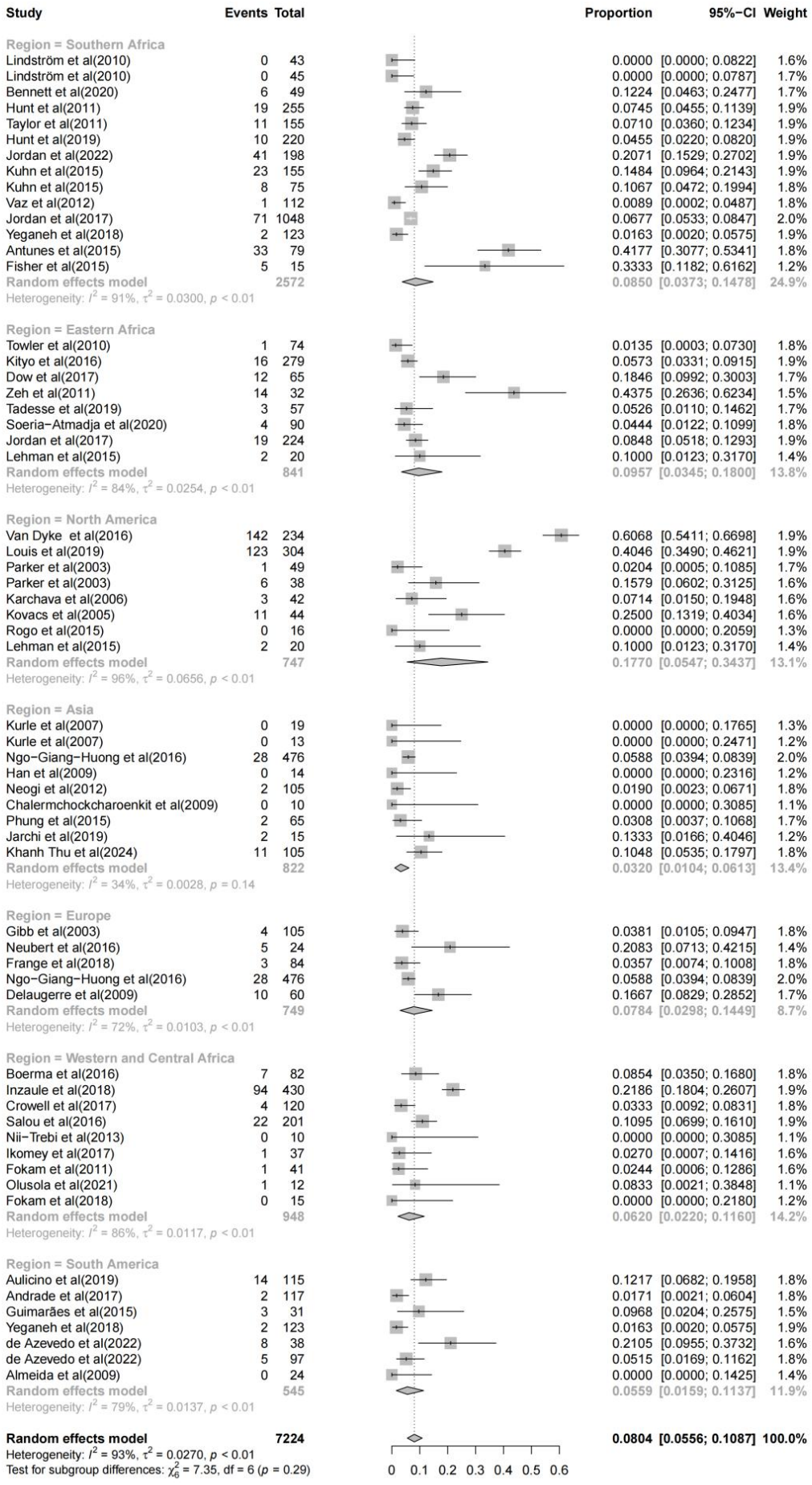


Figure S5B: Forest plot of the NRTI mutation prevalence among treatment-experienced groups

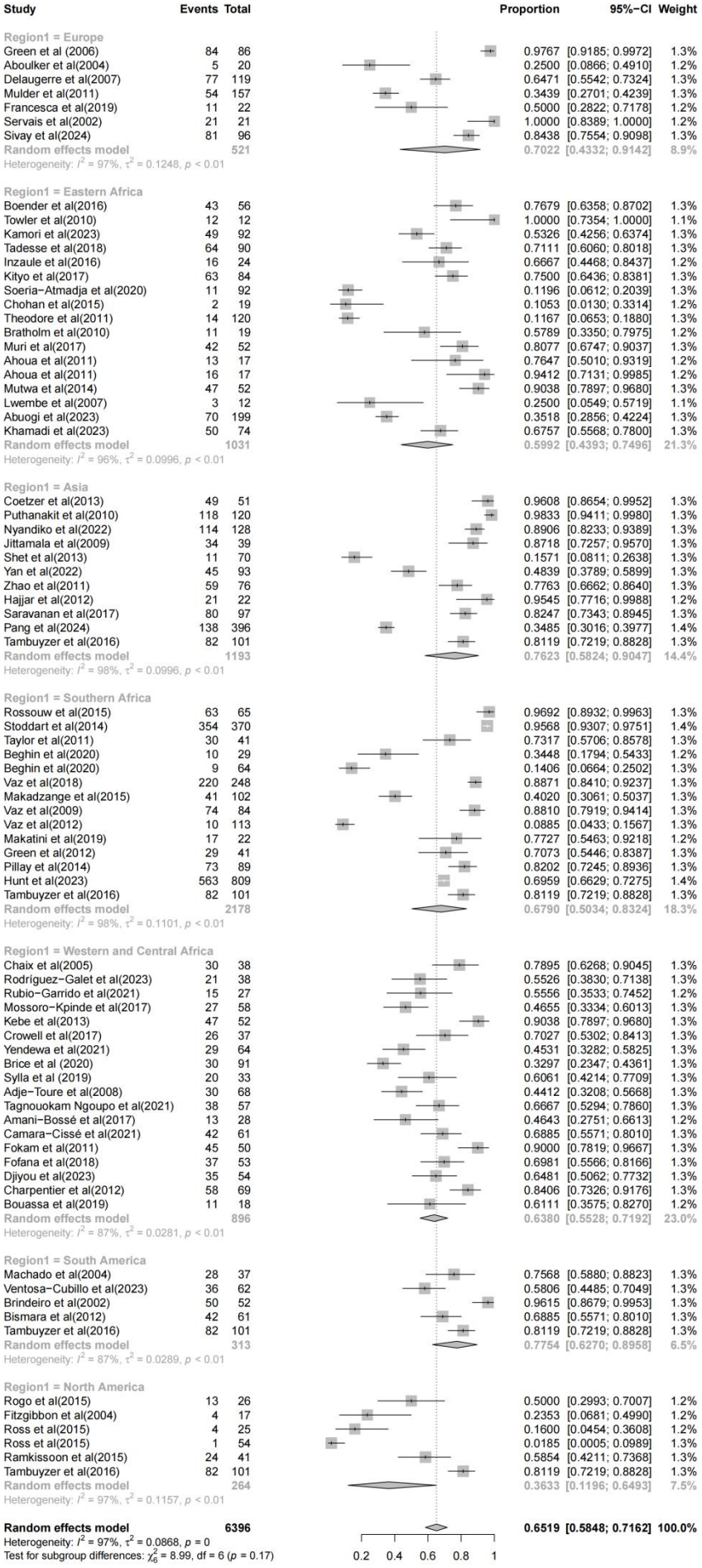


Figure S6A: Forest plot of the PI mutation prevalence among treatment-naive groups

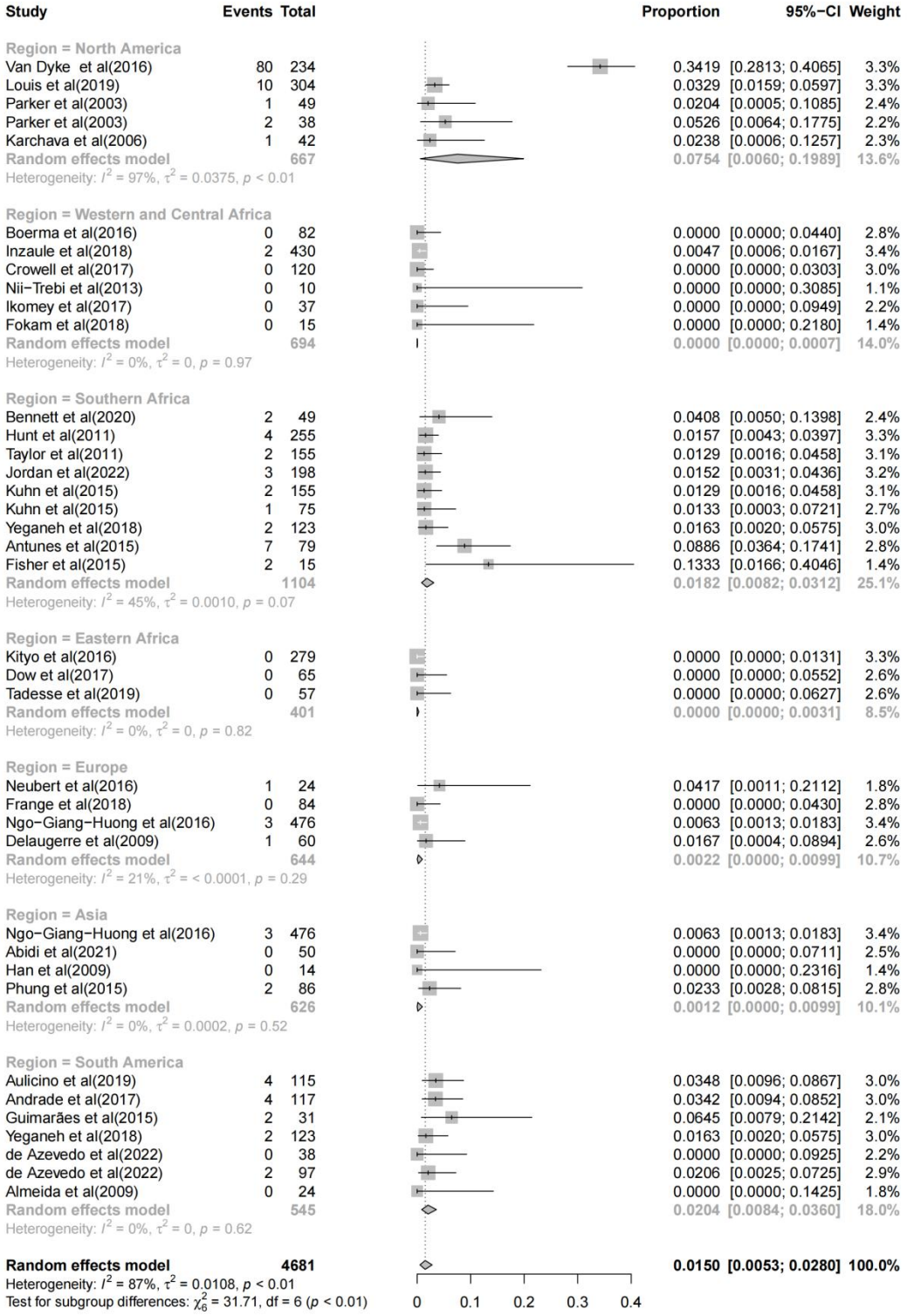


Figure S6B: Forest plot of the PI mutation prevalence among treatment-experienced groups

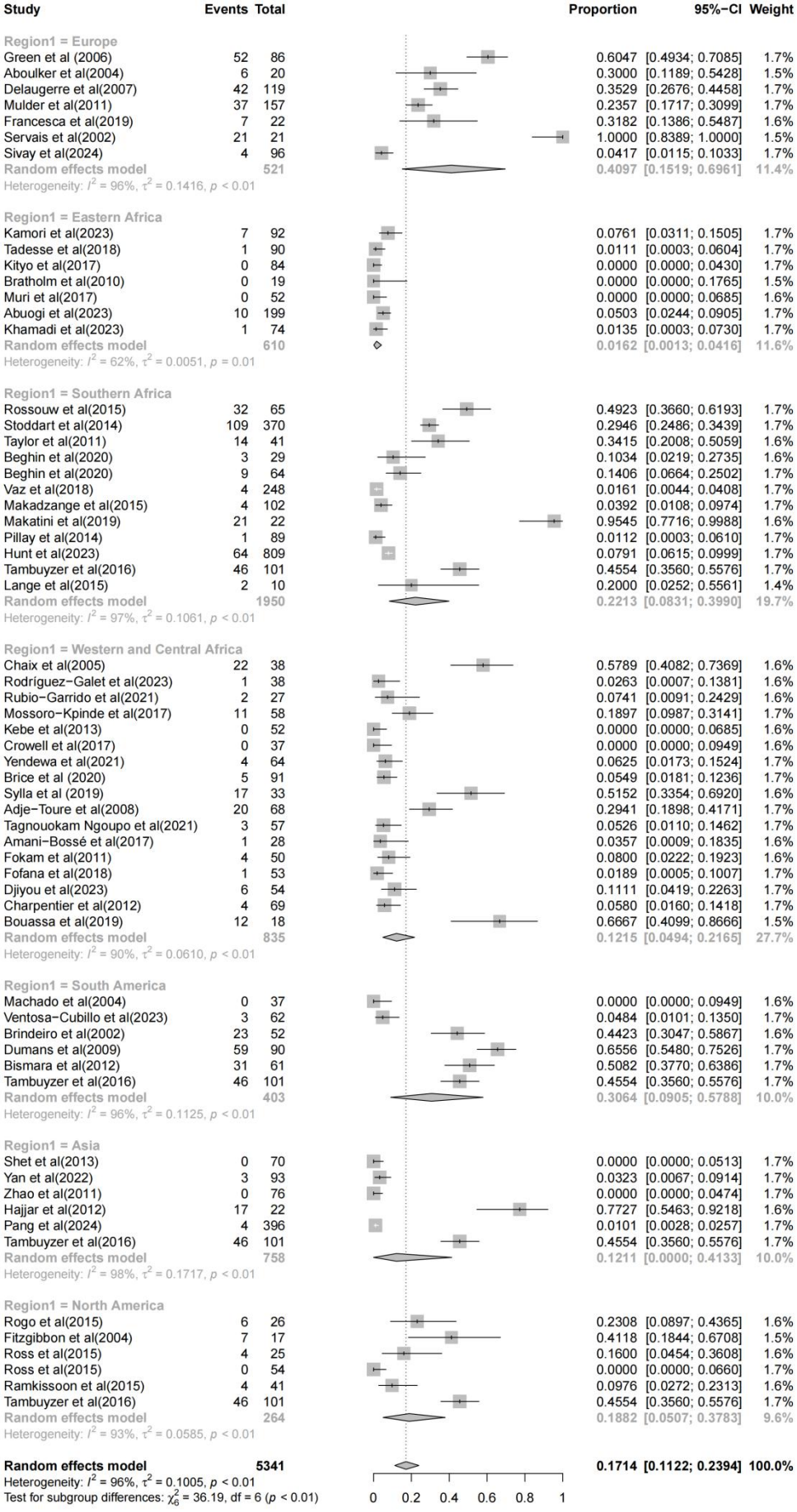


Figure S7A: Forest plot of the INST mutation prevalence among treatment-naive groups

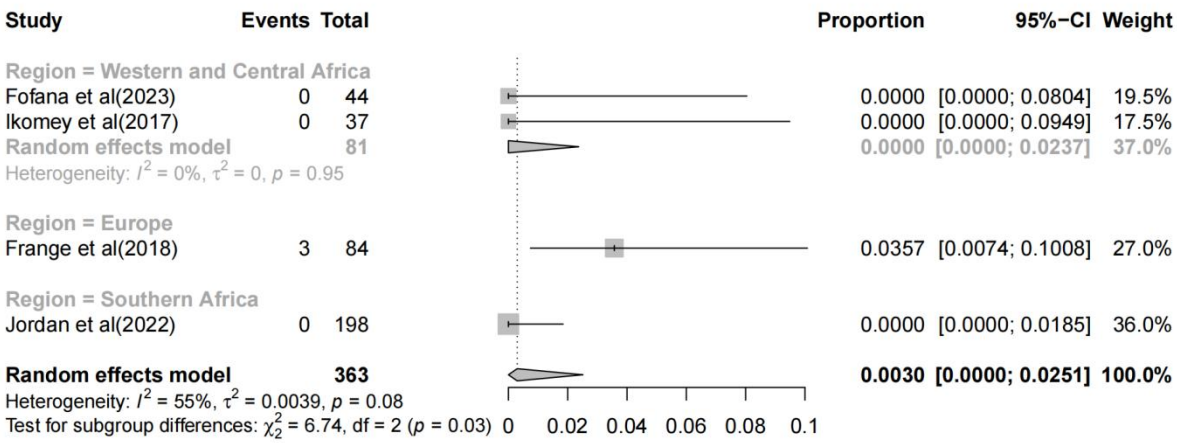


Figure S7B: Forest plot of the INST mutation prevalence among treatment-experienced groups

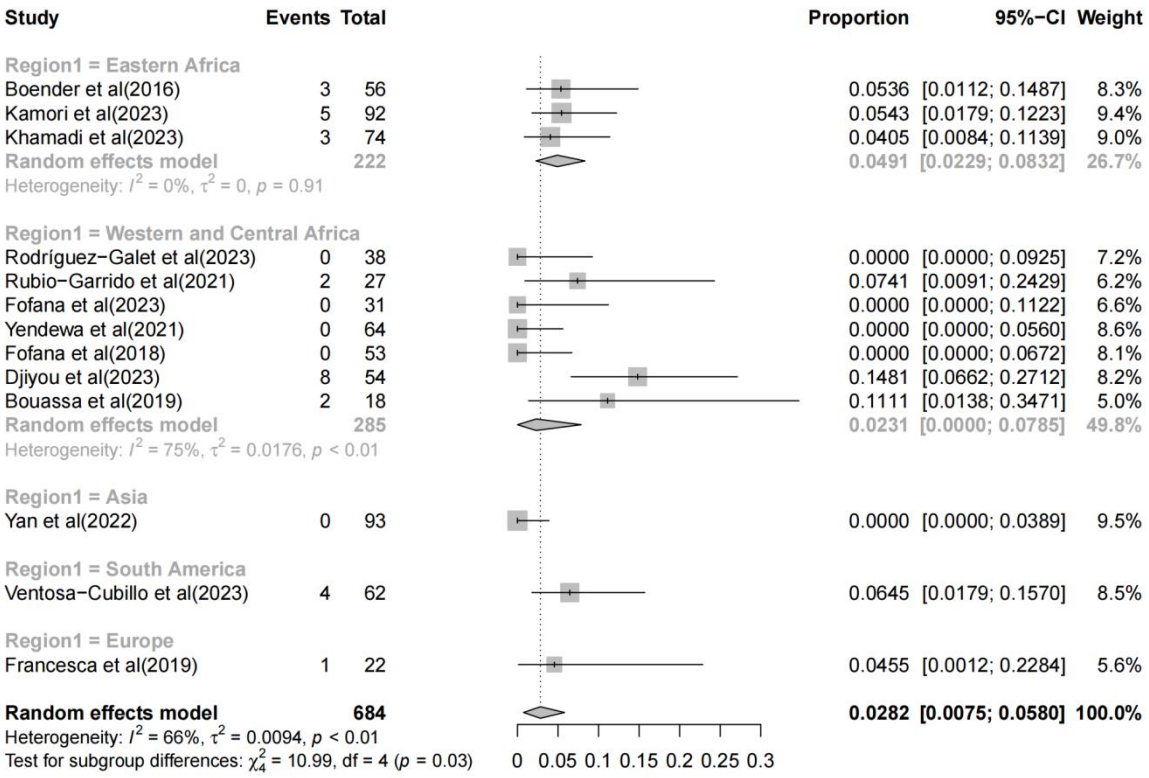


Figure S8A: Forest plot of the dual-class mutation prevalence among treatment-naive groups

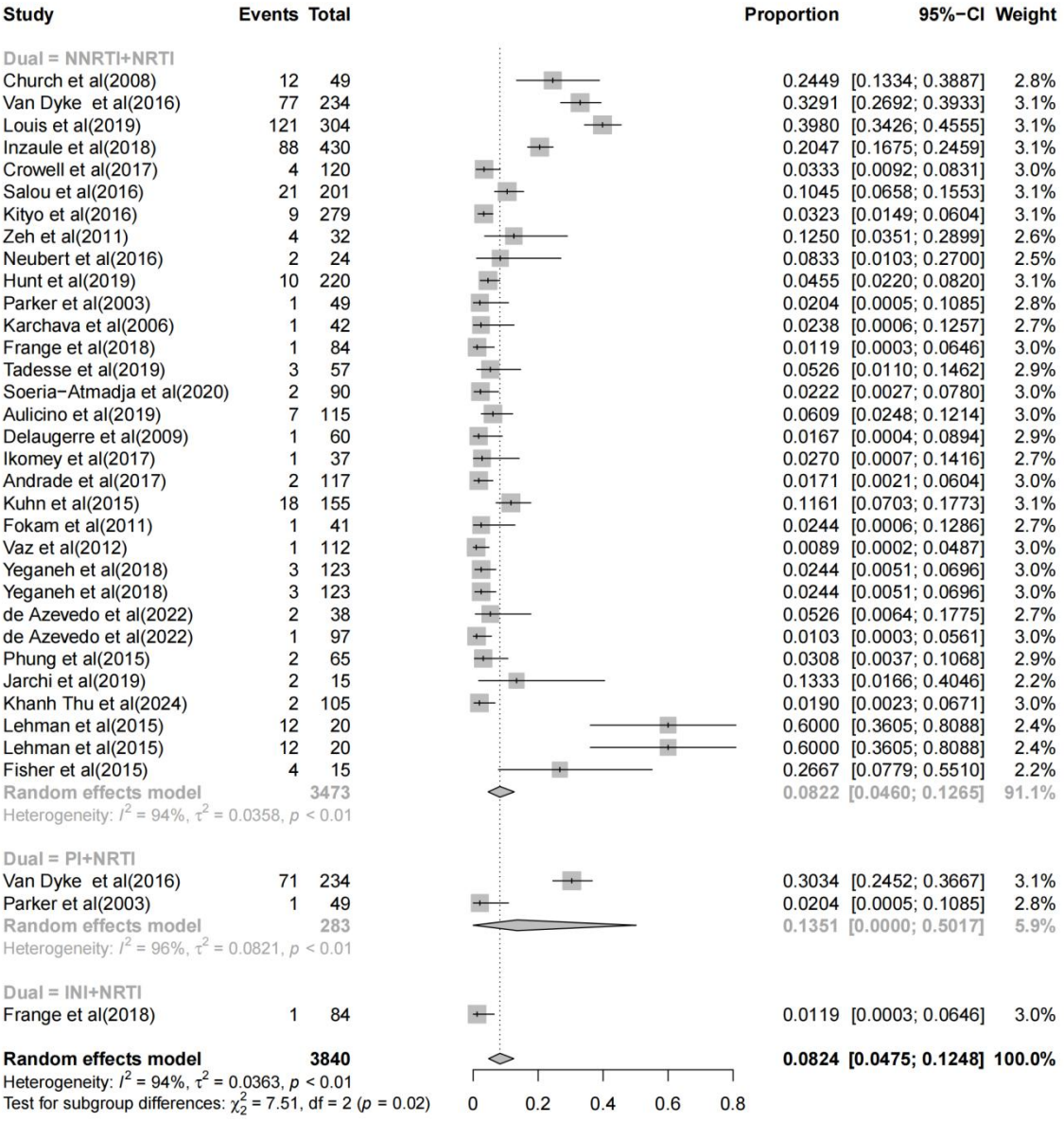


Figure S8B: Forest plot of the dual-class mutation prevalence among treatment-experienced groups

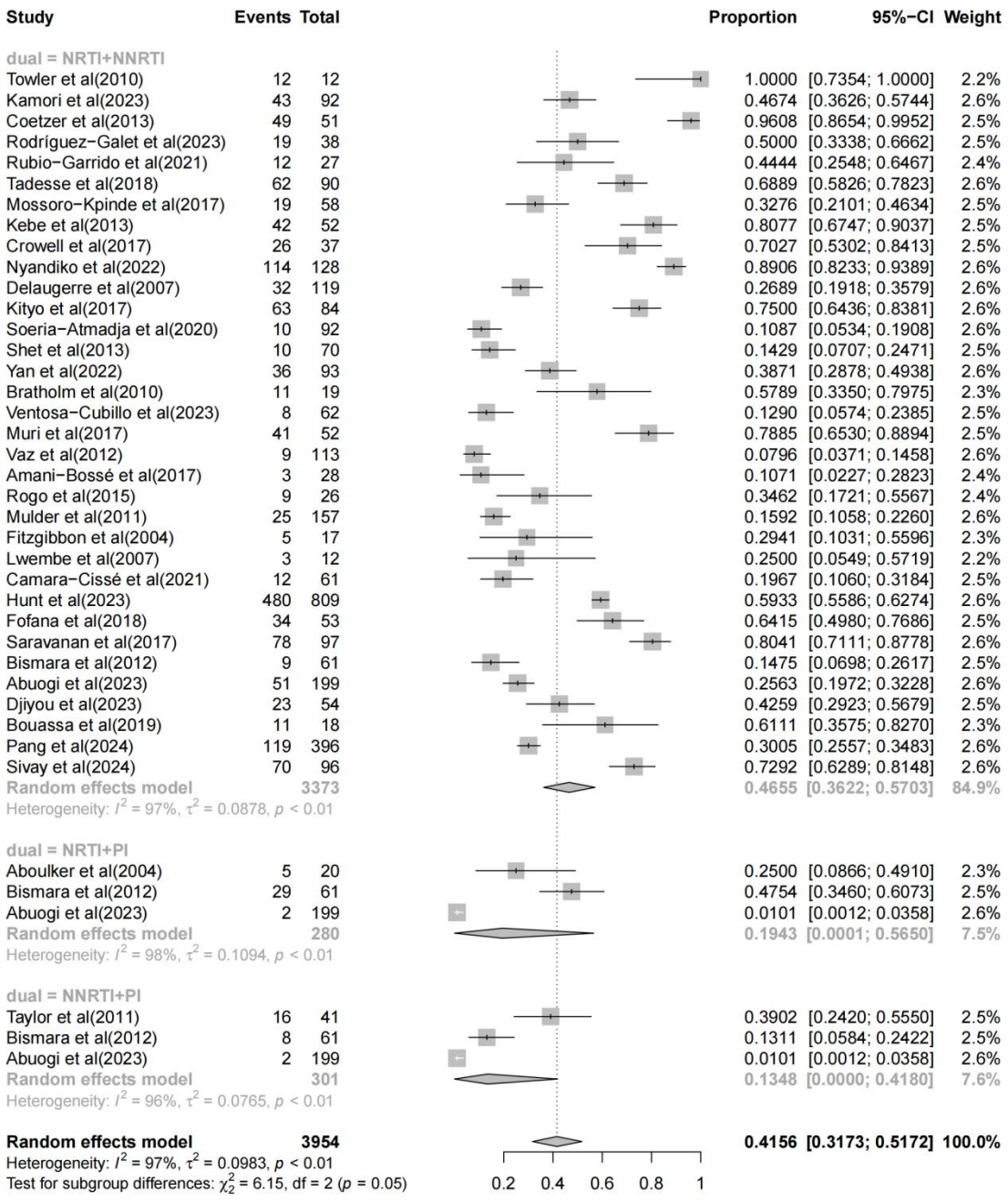


Figure S9A: Forest plot of the triple-class mutation prevalence among treatment-naive groups

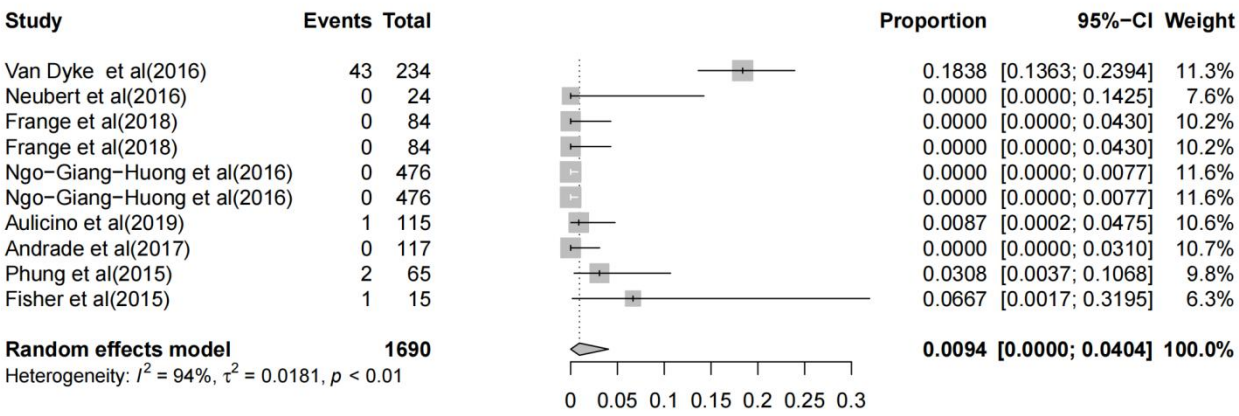
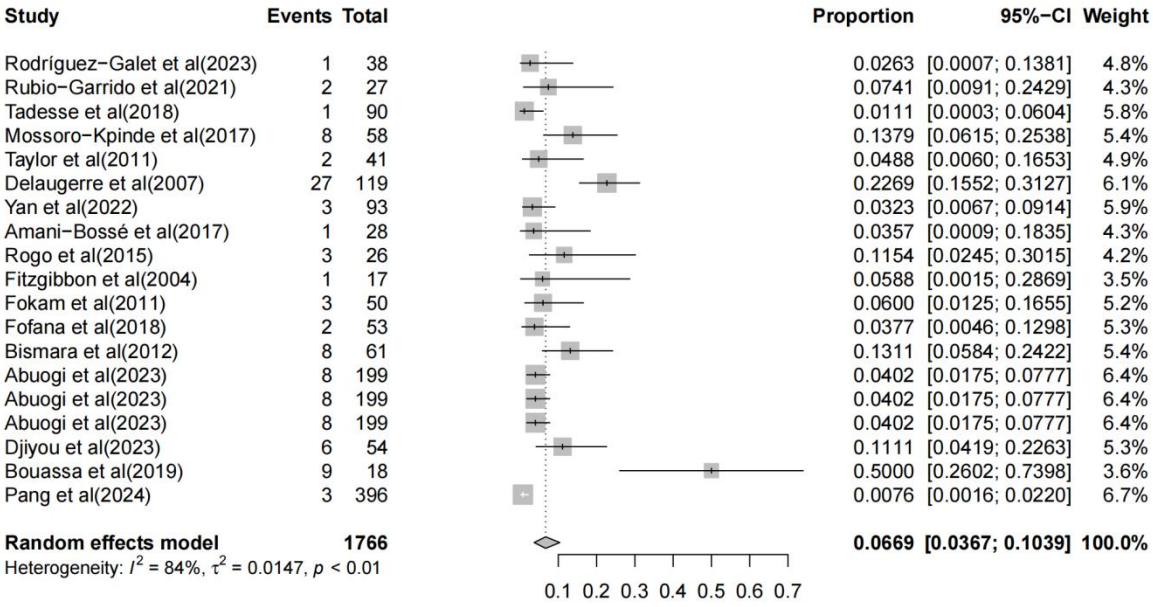


Figure S9B: Forest plot of the triple-class mutation prevalence among treatment-experienced groups



PRISMA Checklist

Section and Topic	Item #	Checklist item	Page where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5-6
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	6
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	6
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	6, Table S1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	6
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	7
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	7
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	7
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	7
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	8
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	8
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	8
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	8
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	8-9
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	8
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	8
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	7
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	8
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	9, Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	9
Study characteristics	17	Cite each included study and present its characteristics.	9, Table 1

Risk of bias in studies	18	Present assessments of risk of bias for each included study.	9, Table S3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	9-10, Table 2-3
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	9-10
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	10-12
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	10-11
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	11
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	10-11
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	9-12
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	12
	23b	Discuss any limitations of the evidence included in the review.	14-15
	23c	Discuss any limitations of the review processes used.	14-15
	23d	Discuss implications of the results for practice, policy, and future research.	12-15
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	7
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	7
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	9
Competing interests	26	Declare any competing interests of review authors.	16
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	16

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71