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Thembisa version 4.3: Updated HIV estimates for South Africa and its provinces

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Background

- Thembisa is an integrated HIV and demographic model, developed for South Africa.
- Thembisa version 4.2 was published in June 2019, and produced HIV estimates for SA and each province up to 2018.
- Thembisa version 4.3 has incorporated a number of new data sources and methodological refinements.
 - Produces estimates up to 2019, but projections beyond 2019 are also included (subject to uncertainty).
 - Although results were finalized in June (and made available on the Thembisa website), the official release of the estimates has been delayed.



Overview

- Changes to national model
- Changes to provincial model
- National estimates for 2019
- HIV epidemic trends
- Provincial comparisons
- Comparison with previous Thembisa estimates
- Plans for future work



Main changes to national model (1)

- Based on a recently-published analysis of Western Cape pregnancy data, we assume substantially higher fertility rates in women on ART.
 - Higher # births to HIV-positive women.
- Model allows for interruption of ART in women who were on ART prior to conception.
 - Higher MTCT rates.
- Simplification of condom model, based on updated synthesis of national survey data.
 - Previous assumptions about 'disinhibition' no longer apply.



Main changes to national model (2)

- Model separates ART patients between first and second line.
- The model has been updated to include 2018-19 programme data (HIV testing data, total ART patients, viral suppression, VMHCs, PrEP).
- The model of viral suppression has been updated to better reflect uncertainty due to missing viral load measurements.
- The model is calibrated to antiretroviral metabolite data from the 2012 and 2017 HSRC surveys (not previously included).
- New data sources have been included in calibrating the paediatric model: % of child deaths with an HIV+ diagnosis (Child PIP) and age distribution of children on ART (NHLS).



Main changes to provincial model

- Allowing for HIV profile of migrants into a province to be different from that of the current population.
- Allowing for differences in male rates of contact with sex workers, depending on urbanization and the male-to-female sex ratio.
- Allowing for provincial differences in breastfeeding duration among undiagnosed HIV-positive women.
- The model is simultaneously fit to all adult HIV data sources instead of separately fit to ART data and HIV prevalence data.

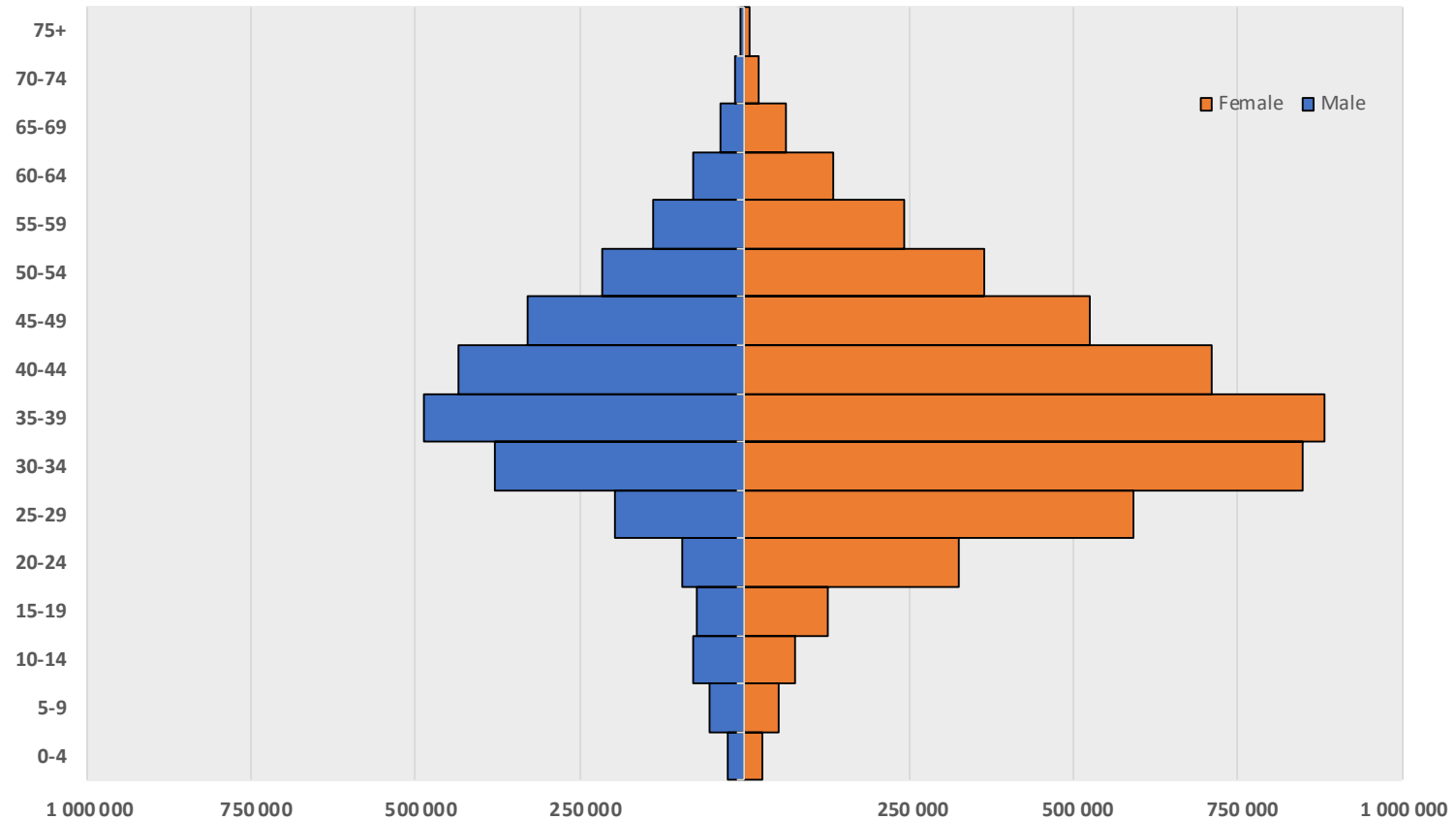


Key indicators (national)

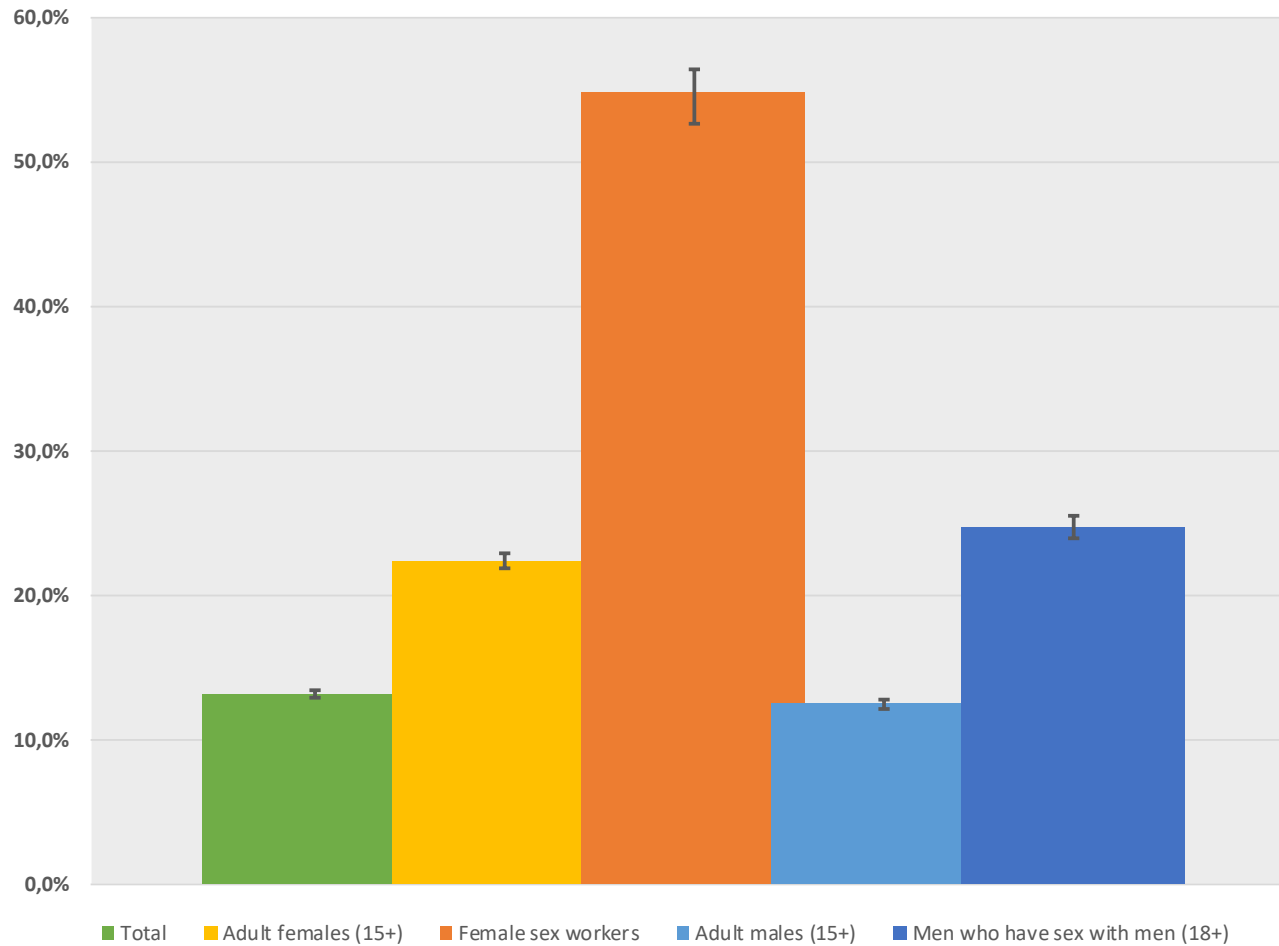
	Indicator	Estimate [95% confidence interval]
Number of People living with HIV in 2019	Total	7 640 000 [7 470 000 – 7 780 000]
	Adult females 15 year and older	4 840 000 [4 730 000 – 4 930 000]
	Adult males 15 years and older	2 490 000 [2 430 000 – 2 540 000]
	Children 0-14 years old	310 000 [300 000 – 320 000]
Number of new HIV infections, 2018-19	Total	201 000 [188 000 – 214 000]
	Adult females 15 year and older	121 000 [129 000 – 113 000]
	Adult males 15 years and older	67 000 [62 000 – 71 000]
	Mother to child transmission	11 600 [11 000 – 12 200]
Number of AIDS-related death, 2018-19	Total	74 000 [66 000 – 80 000]
	Adult females 15 year and older	31 000 [26 000 – 34 000]
	Adult males 15 years and older	39 000 [35 000 – 42 000]
	Children 0-14 years old	3900 [3500 - 4200]



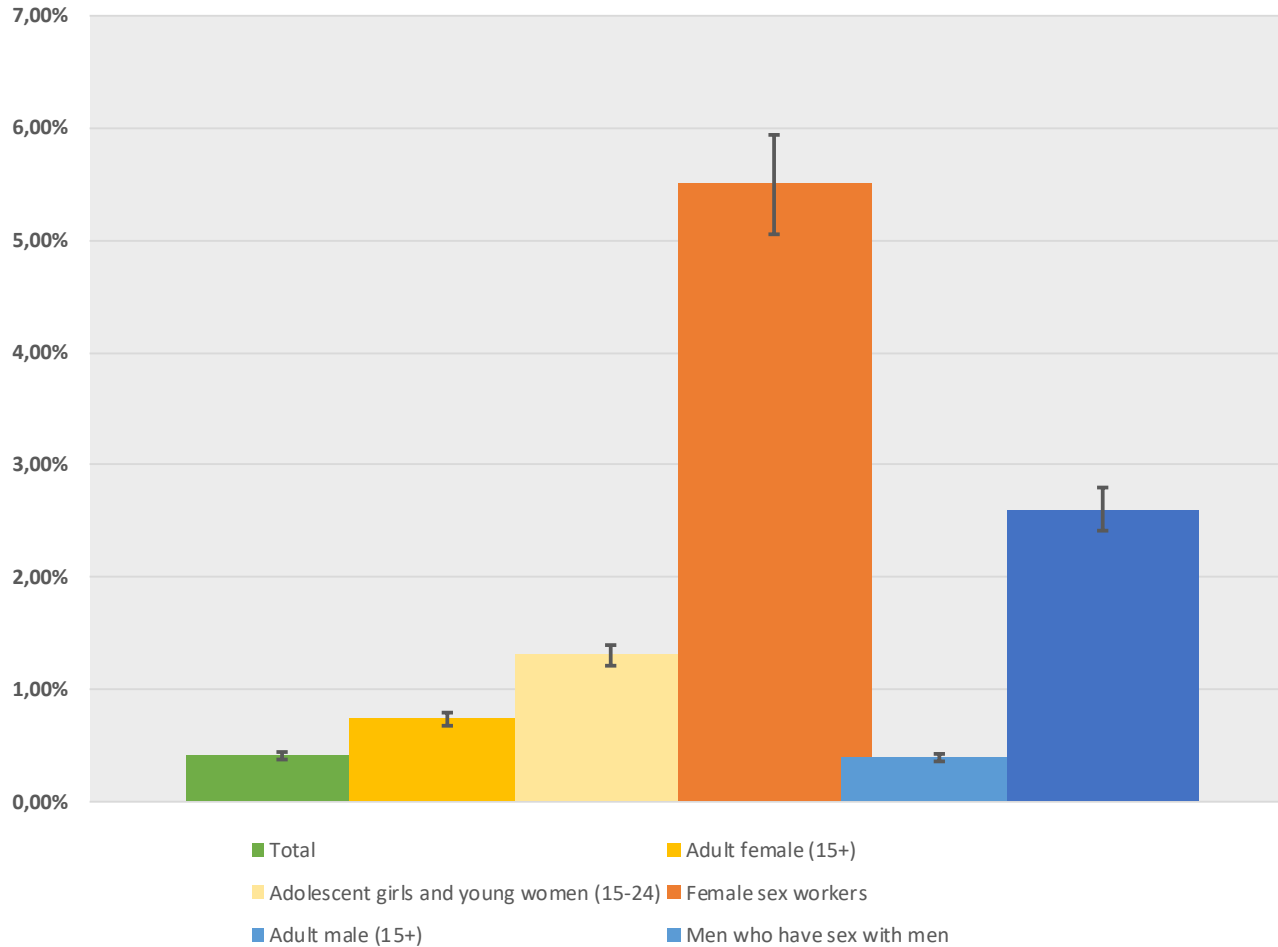
Age and sex profile of people living with HIV in 2019



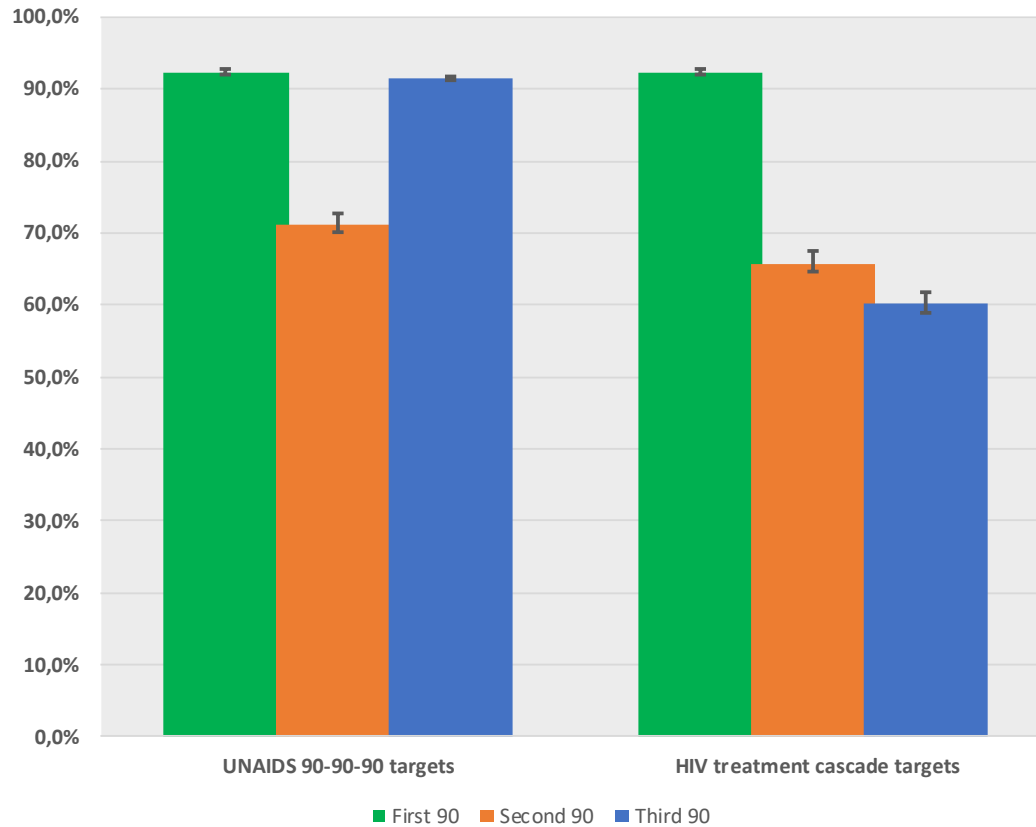
HIV prevalence in 2019



HIV incidence in 2019



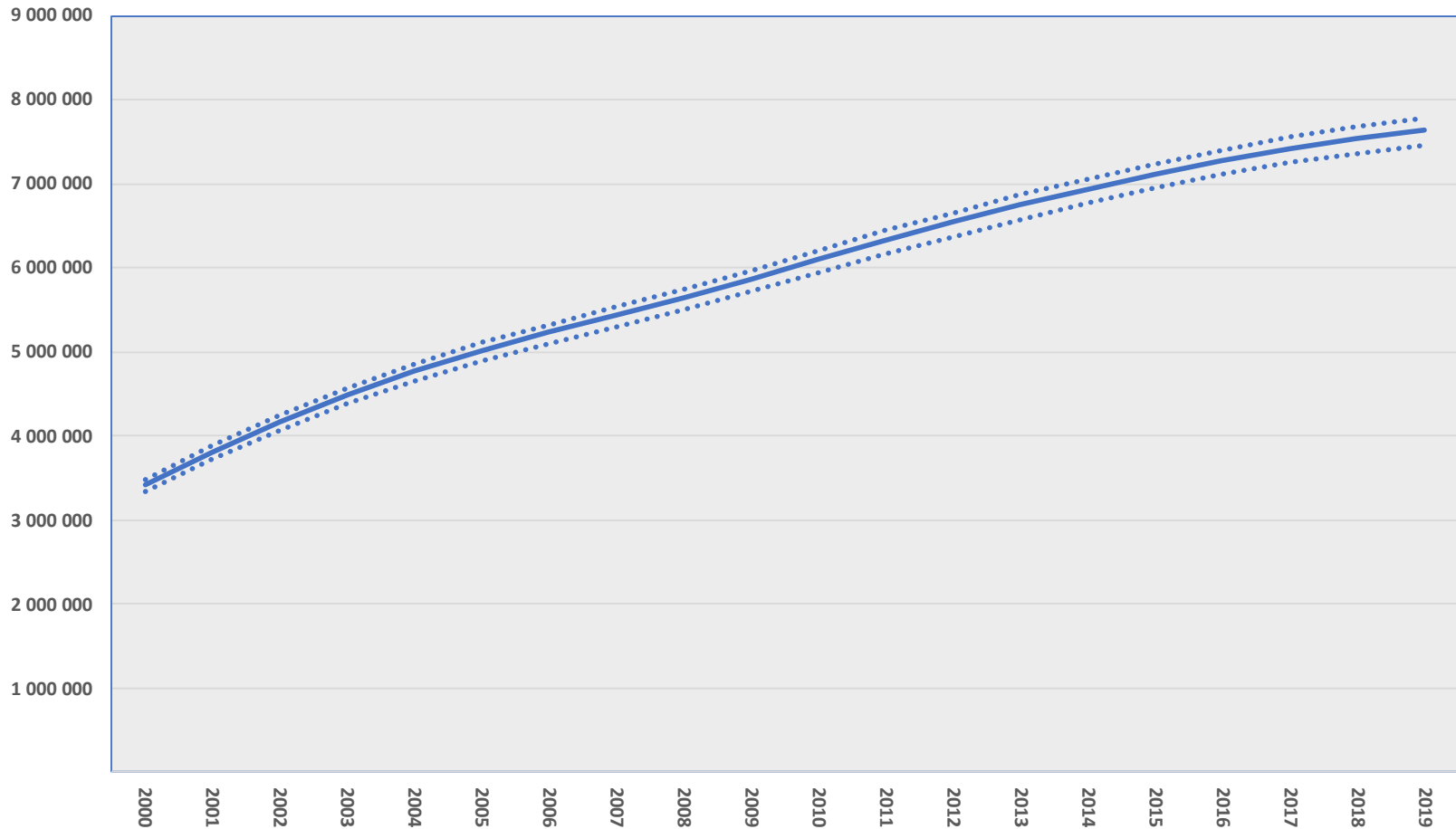
Progress towards the UNAIDS 90-90-90 targets



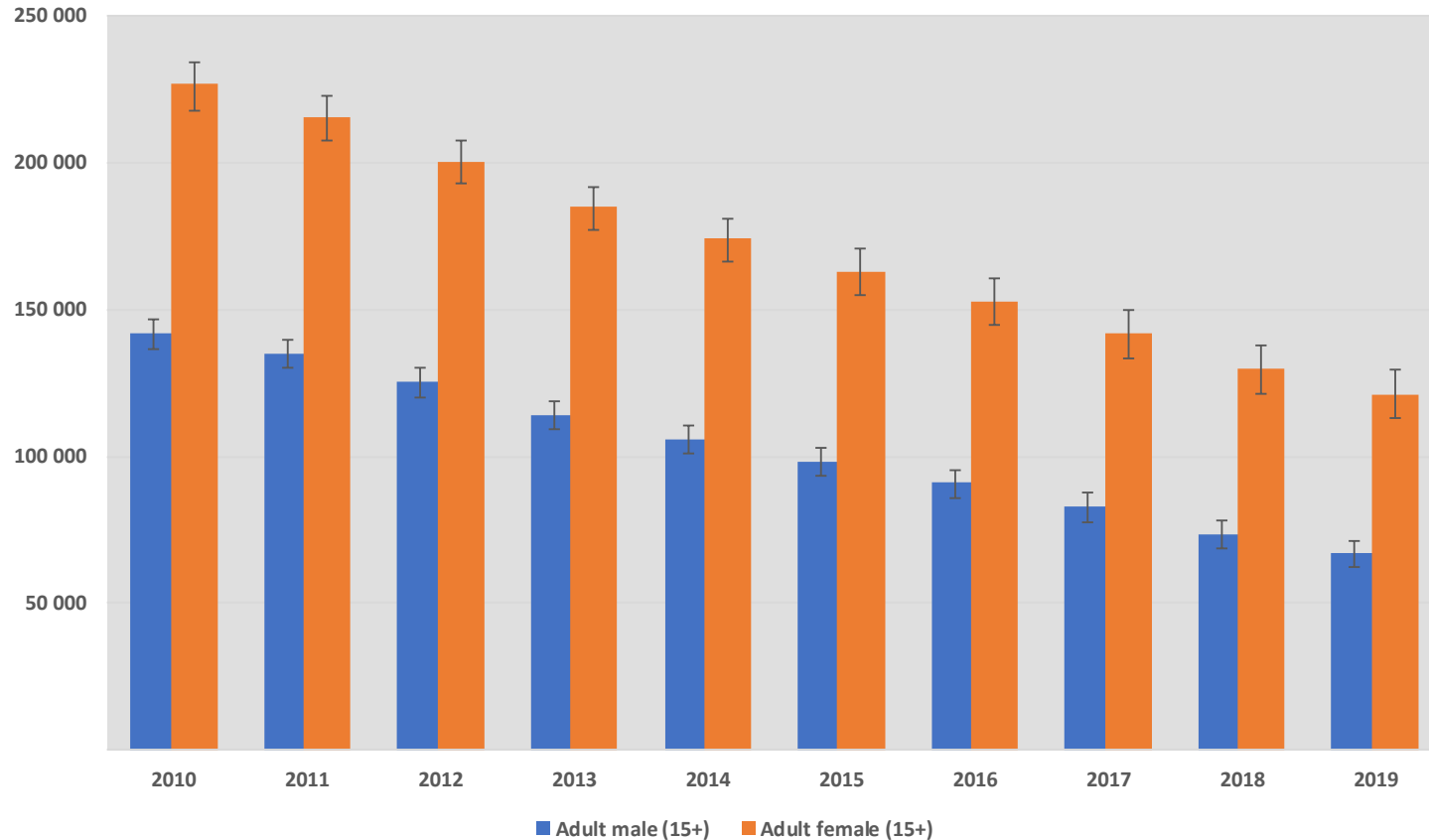
HIV epidemic trends



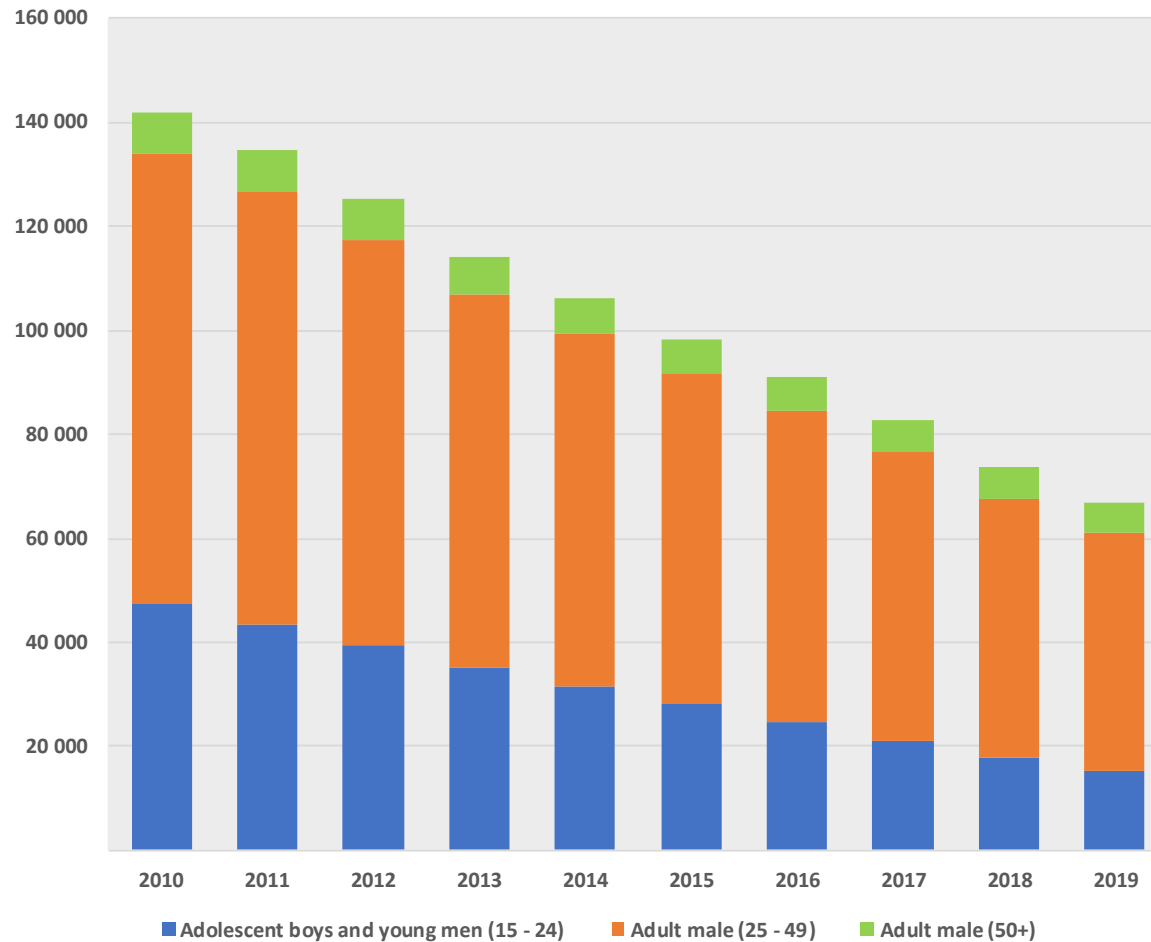
Number of people living with HIV



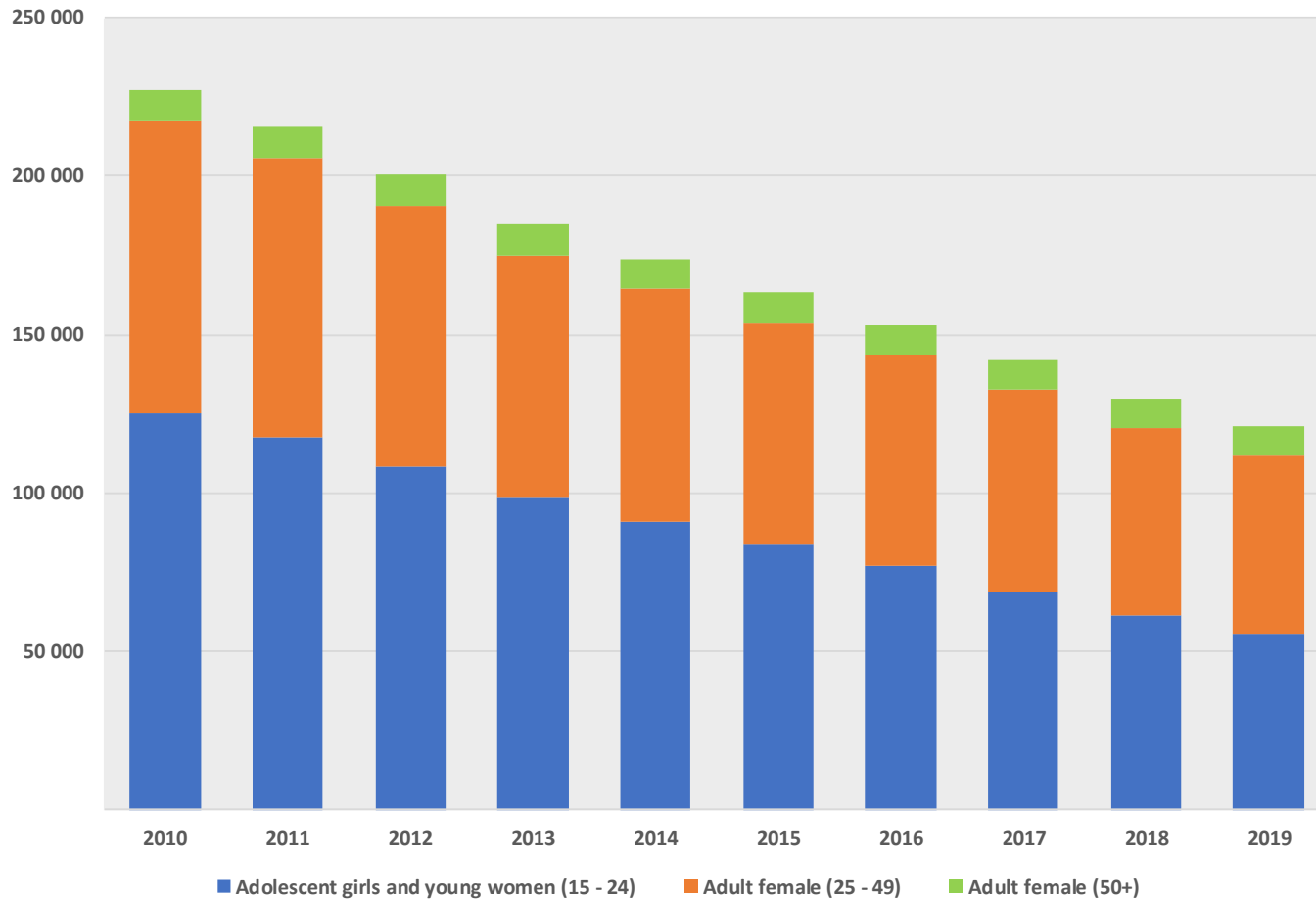
Number of new HIV infections



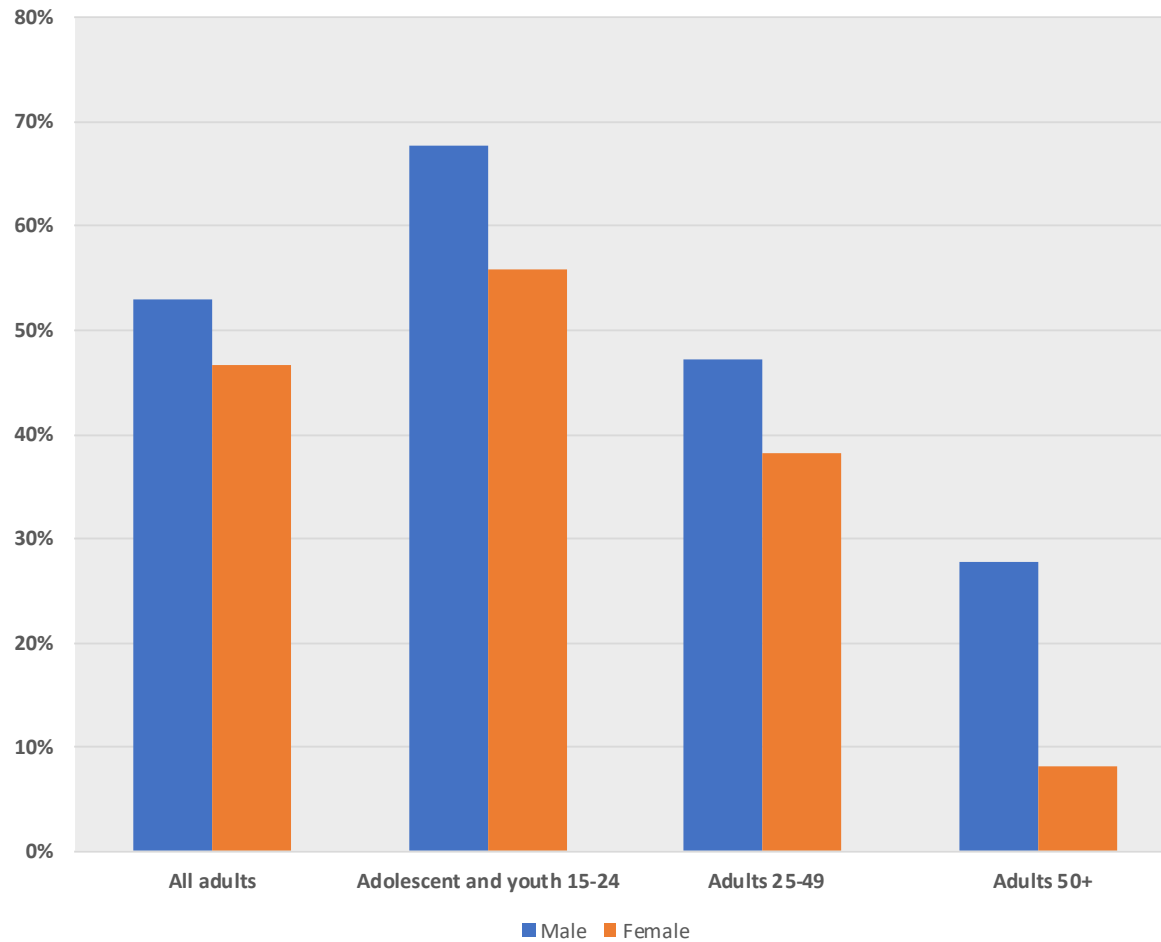
Number of new infections in men



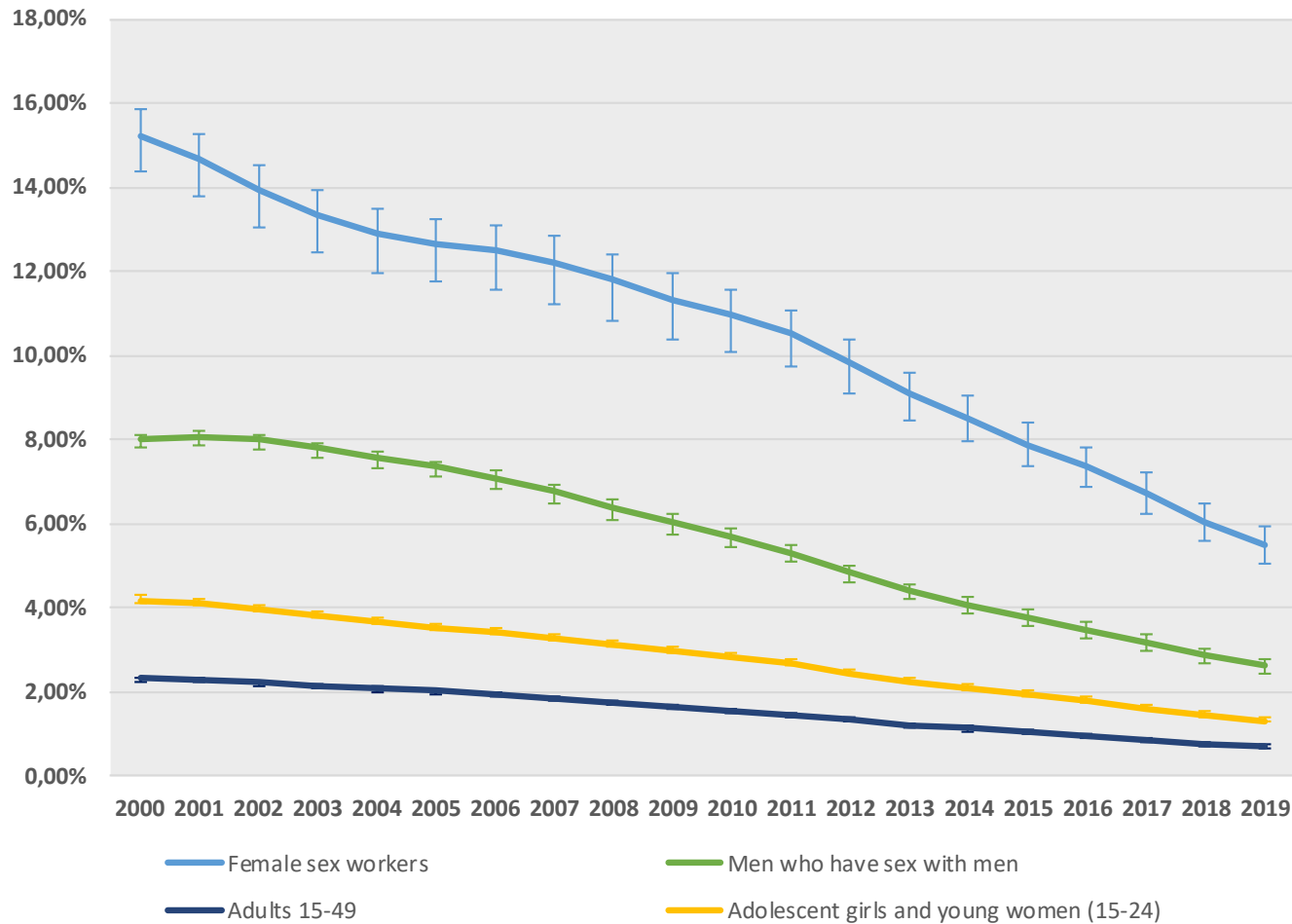
Number of new infections in women



% reduction in new infections between 2010 and 2019



HIV incidence trends, by risk group

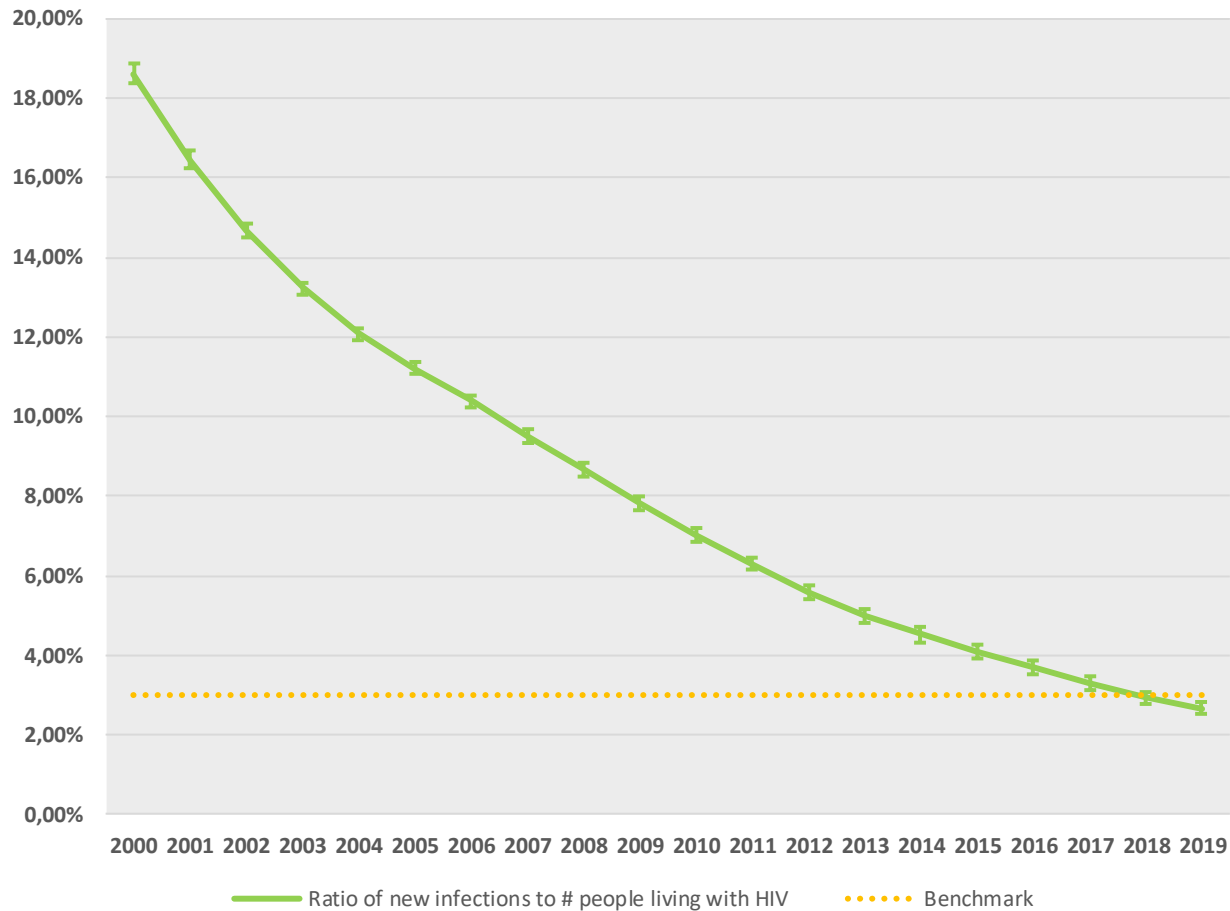


Changes in HIV incidence between 2010 and 2019

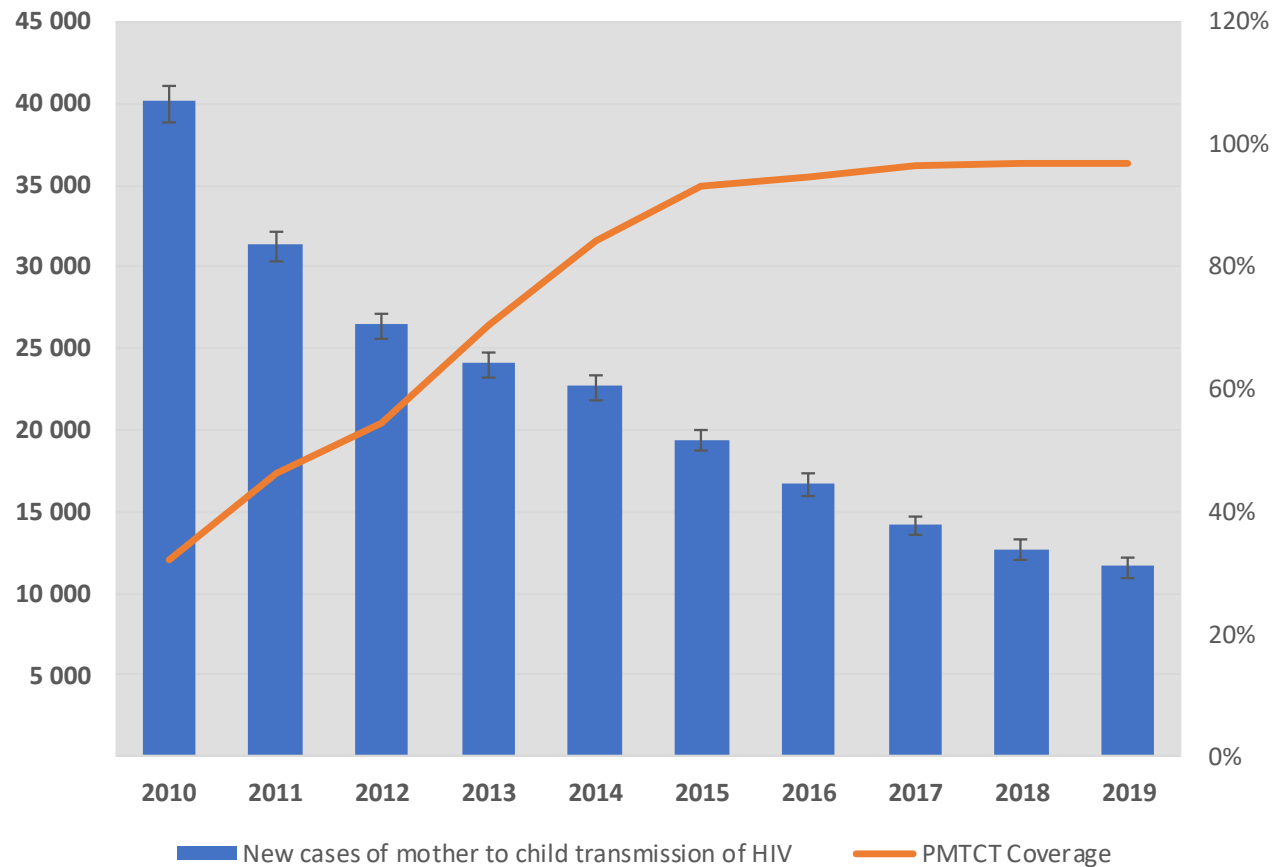
		HIV incidence (%)		Reduction between 2010 and 2019
		2009-10	2018-19	
Total population		0.94 [0.90 – 0.97]	0.41 [0.38 – 0.43]	56.8%
All Adults 15+ years old	Female	1.52 [1.45 – 1.57]	0.73 [0.68 – 0.78]	51.8%
	Male	0.95 [0.91 – 0.99]	0.39 [0.36 – 0.42]	59.1%
Adults 15-49 years old	Female	2.01 [1.91 – 2.08]	0.97 [0.09 – 1.04]	51.7%
	Male	1.13 [1.09 – 1.17]	0.46 [0.42 – 0.49]	59.8%
Adolescent and youth 15-24 years old	Female	2.84 [2.71 – 2.93]	1.30 [1.20 – 1.39]	54.2%
	Male	0.96 [0.92 – 0.99]	0.33 [0.31 – 0.36]	65.3%
Adults 25-49 years old	Female	1.44 [1.37 – 1.51]	0.78 [0.72 – 0.84]	45.8%
	Male	1.26 [1.21 – 1.31]	0.52 [0.48 – 0.56]	58.6%
Adults 50+ years old	Female	0.24 [0.22 – 0.26]	0.18 [0.17 – 0.20]	24.2%
	Male	0.26 [0.24 – 0.28]	0.16 [0.14 – 0.17]	40.8%
Female sex workers		10.96 [10.08 – 11.54]	5.50 [5.06 – 5.94]	49.8%
Men who have sex with men		5.68 [5.43 – 5.86]	2.60 [2.41 – 2.79]	54.1%



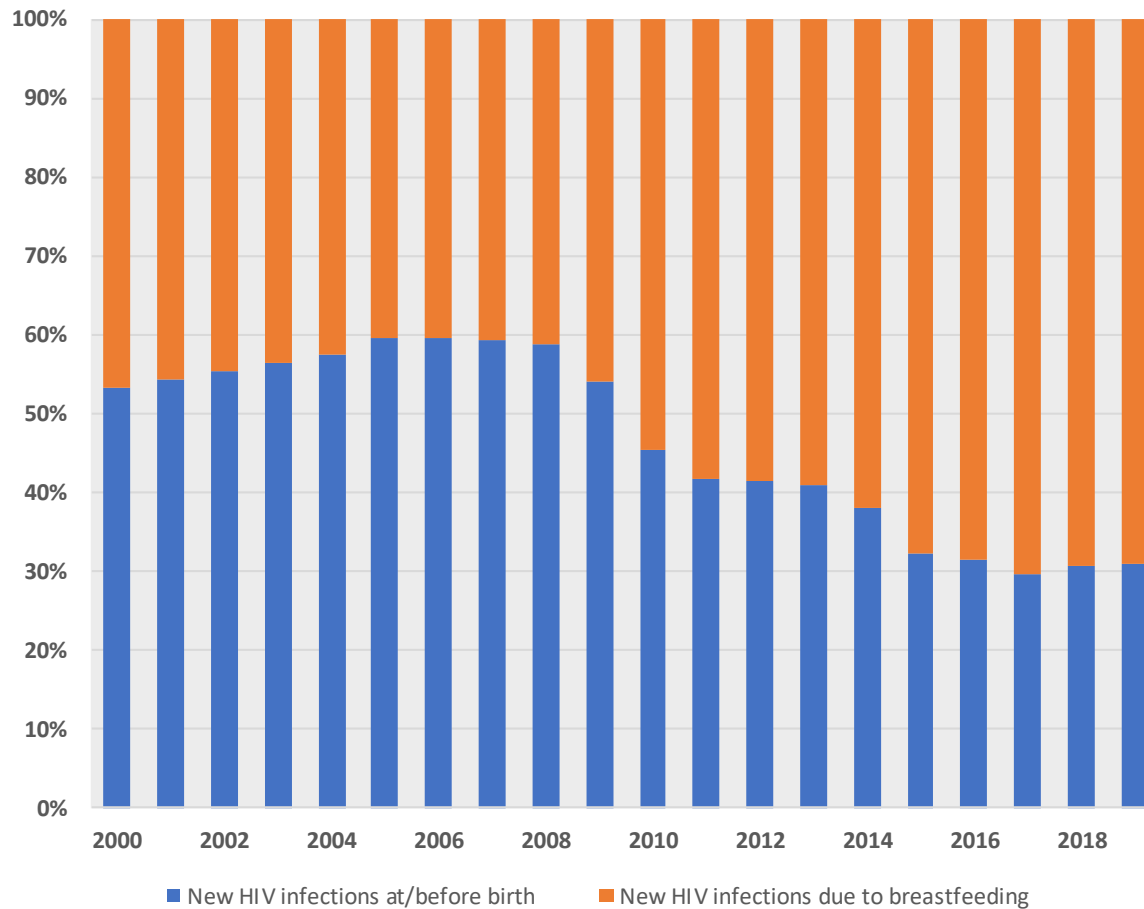
Incidence to prevalence ratio



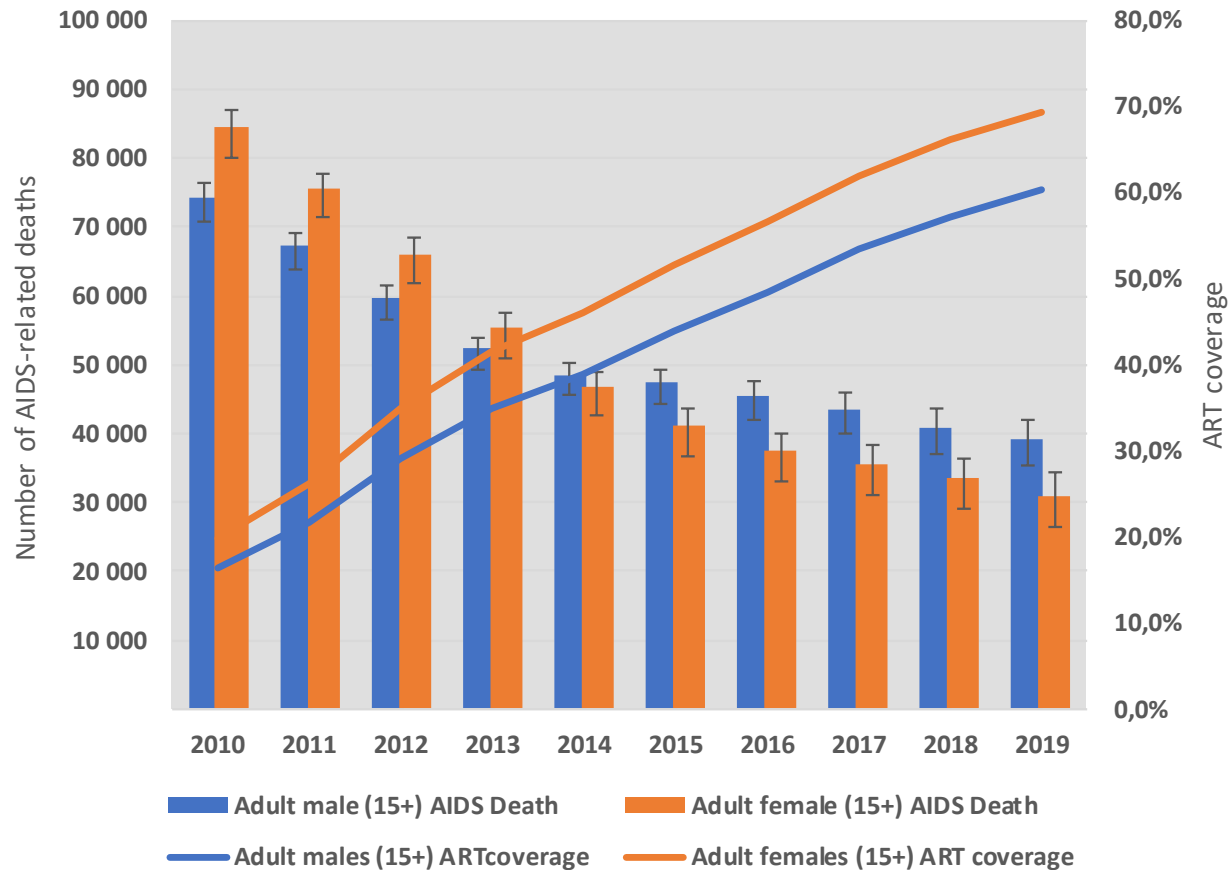
New cases of mother-to-child transmission and PMTCT coverage



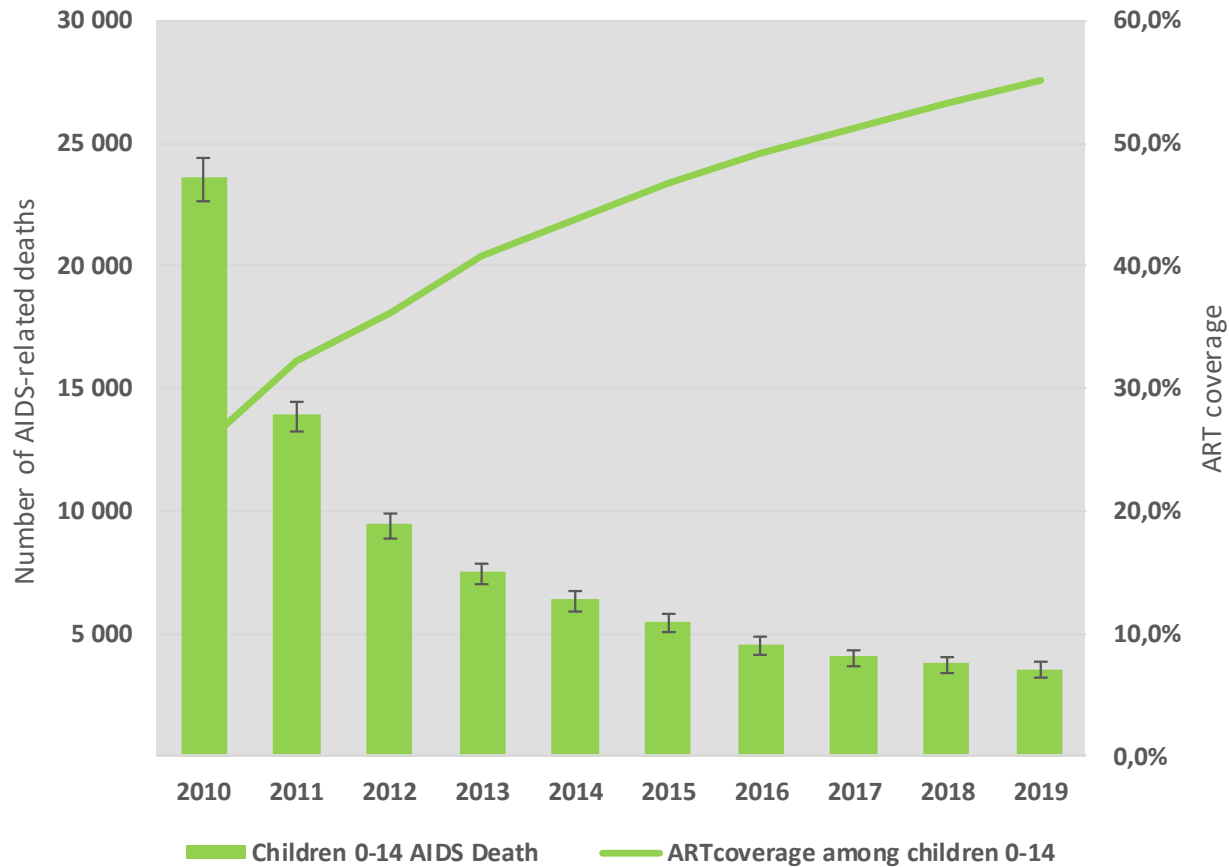
Changes in mode of mother-to-child transmission



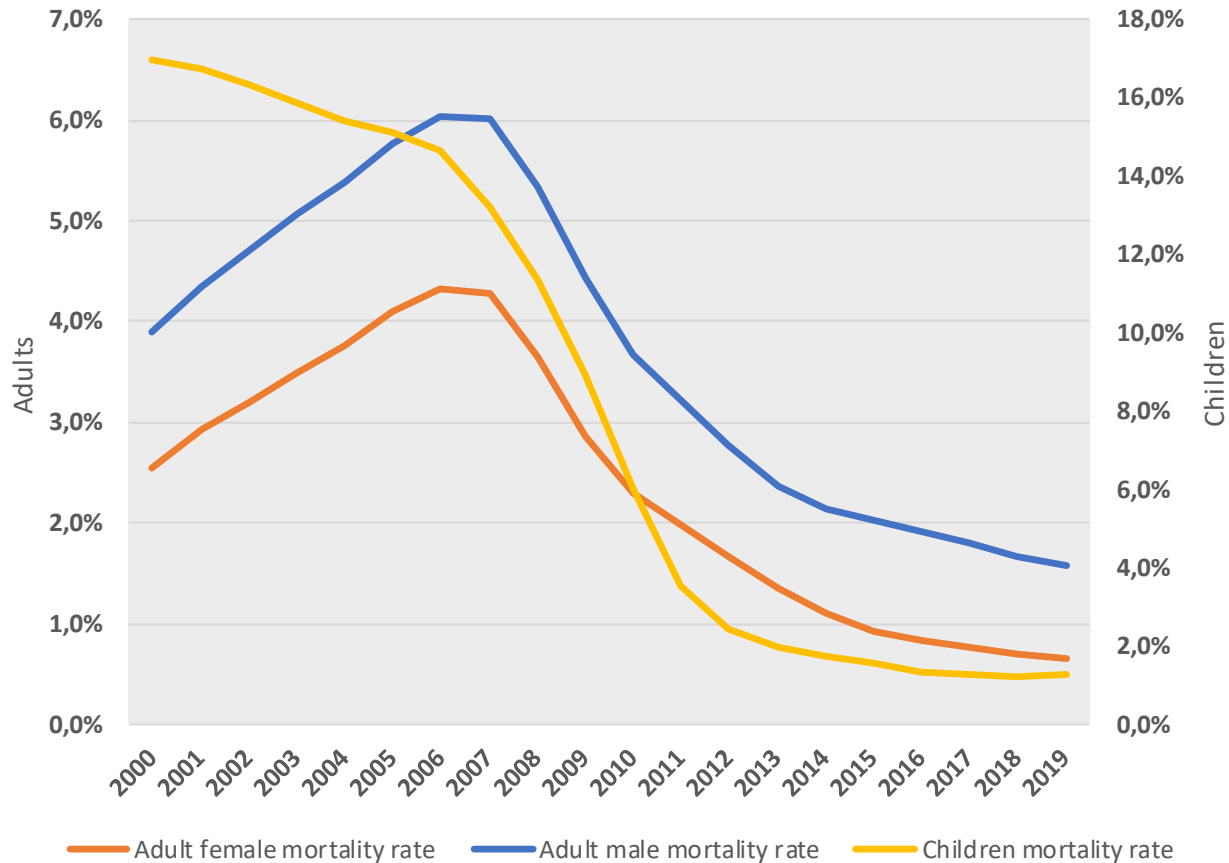
AIDS deaths and ART coverage in adults



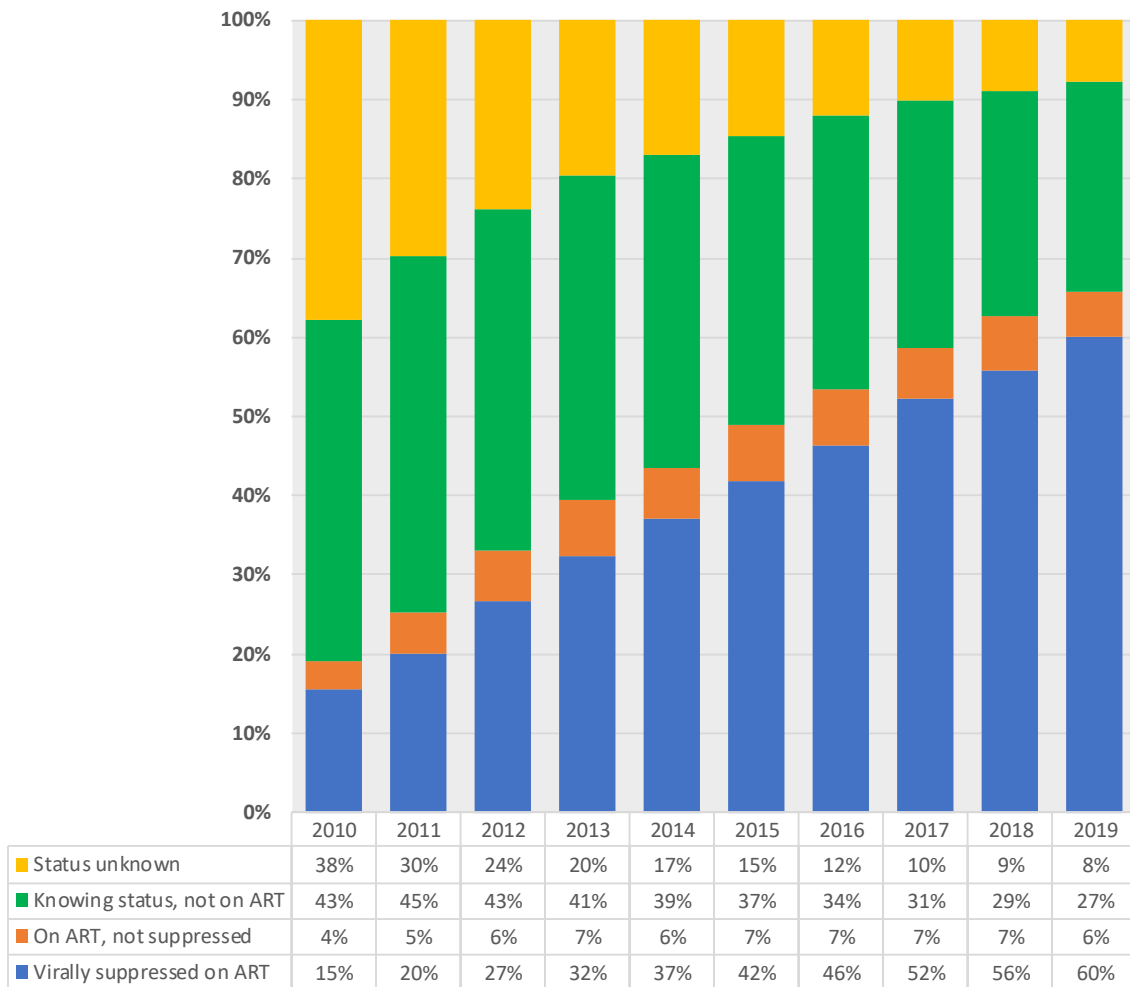
AIDS deaths and ART coverage in children (0-14)



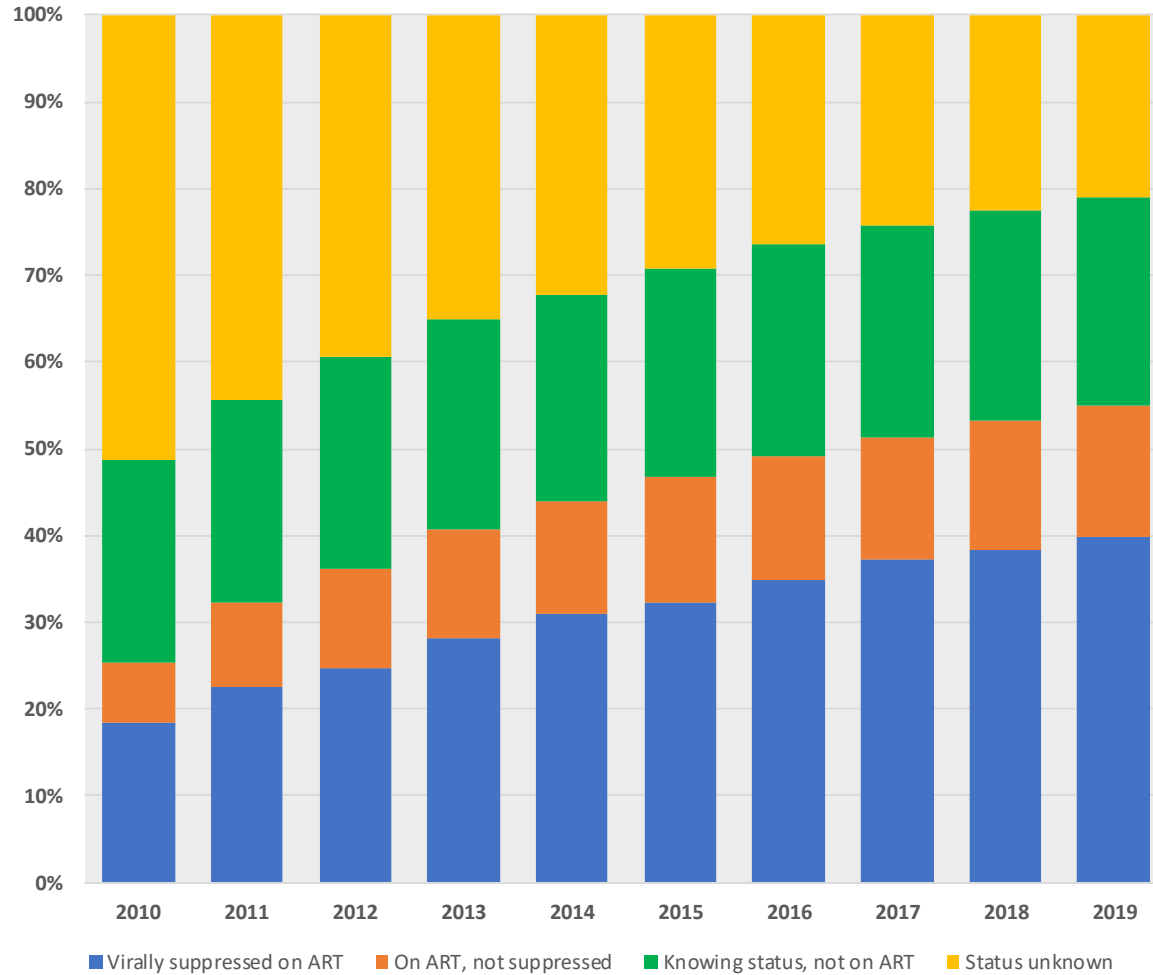
AIDS mortality rate in people living with HIV



Changing engagement in HIV care



Paediatric engagement in HIV care



Provincial comparisons

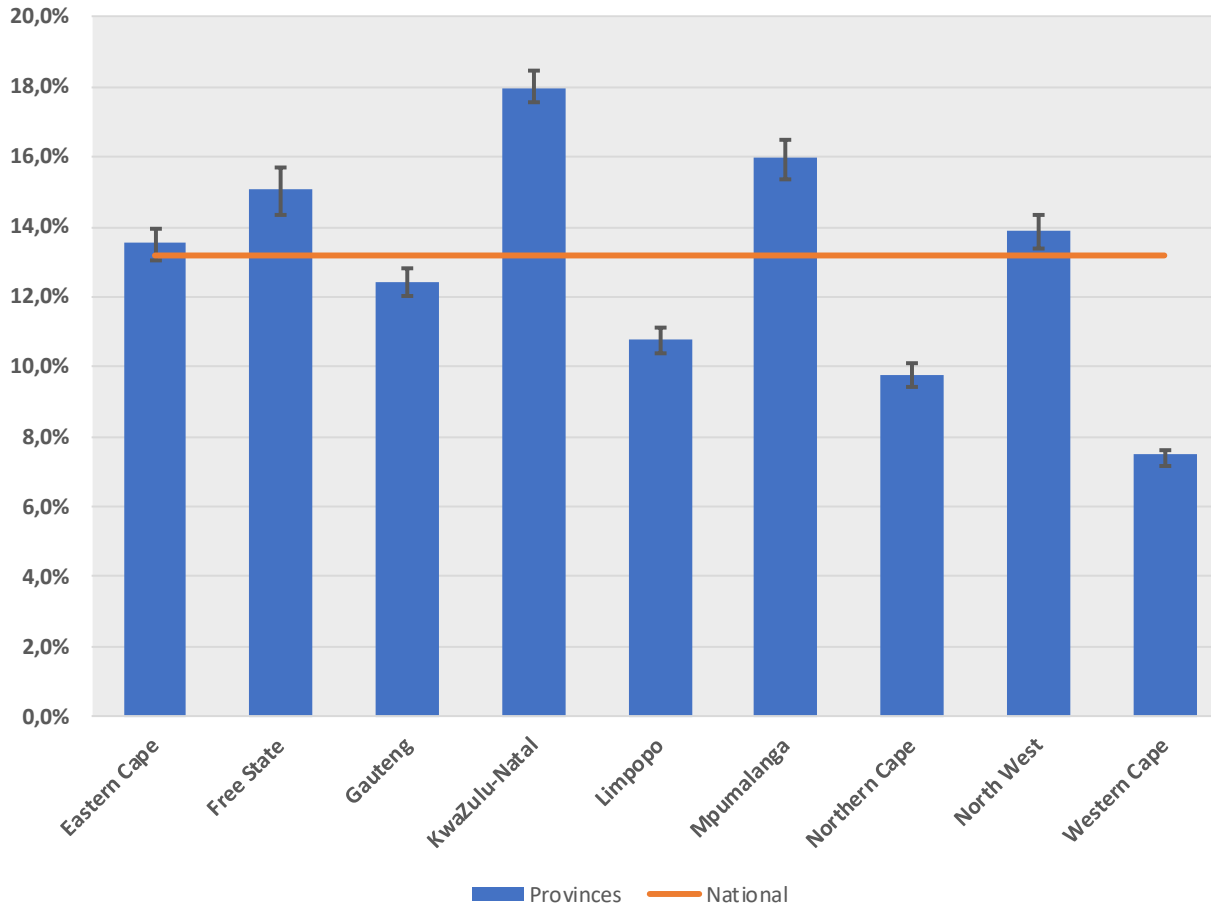


Key HIV indicators in 2019

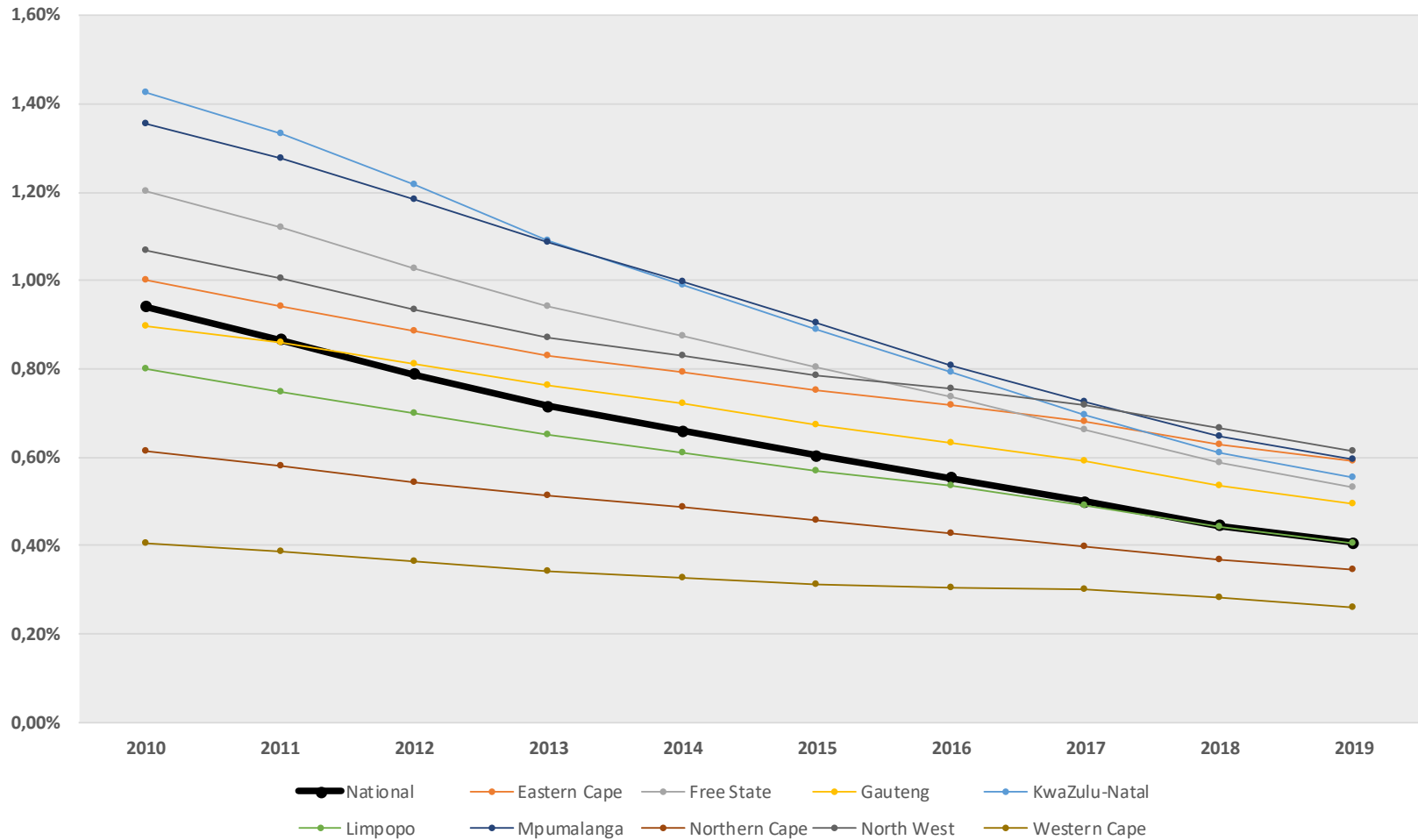
	Total HIV prevalence (%)	People living with HIV		New HIV infections in 2018-19	
		Number	% of total	Number	% of total
Eastern Cape	13.5 [13.0 – 14.0]	900 000 [870 000 – 920 000]	12	34 000 [32 000 – 36 000]	14
Free State	15.1 [14.4 – 15.7]	440 000 [420 000 – 460 000]	6	13 000 [12 000 – 14 000]	5
Gauteng	12.4 [12.0 – 12.8]	1 880 000 [1 830 000 – 1 930 000]	24	64 000 [62 000 – 66 000]	26
KwaZulu-Natal	18.0 [17.6 – 18.5]	2 040 000 [2 000 000 – 2 090 000]	26	51 000 [49 000 – 54 000]	21
Limpopo	10.8 [10.4 – 11.1]	620 000 [600 000 – 640 000]	8	21 000 [19 000 – 22 000]	8
Mpumalanga	16.0 [15.3 – 16.5]	740 000 [720 000 – 770 000]	10	23 000 [21 000 – 24 000]	9
North West	13.9 [13.4 – 14.3]	540 000 [520 000 – 560 000]	7	20 000 [19 000 – 22 000]	8
Northern Cape	9.8 [9.4 – 10.1]	111 000 [107 000 – 114 000]	1	3500 [3300 – 3800]	2
Western Cape	7.5 [7.1 – 7.6]	506 000 [482 000 – 515 000]	6	16 000 [14 600 – 16 500]	7



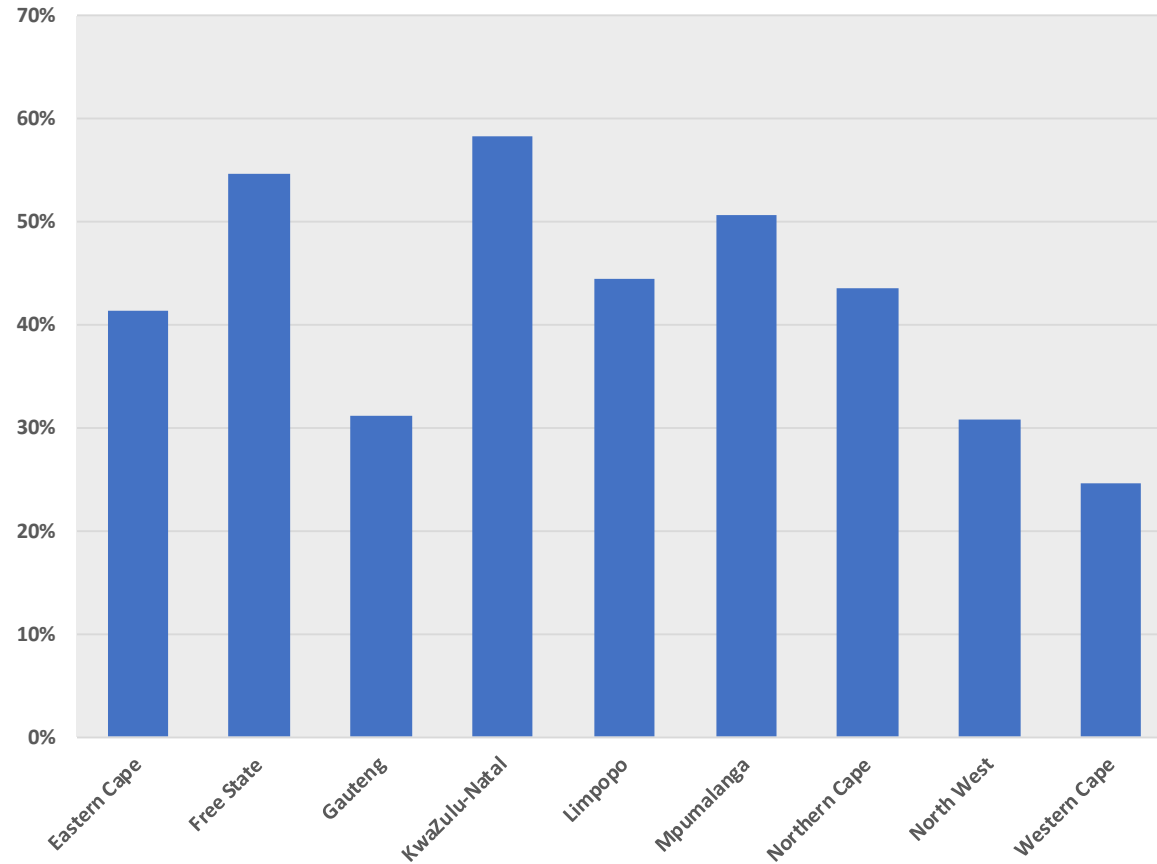
HIV prevalence (all ages), by province



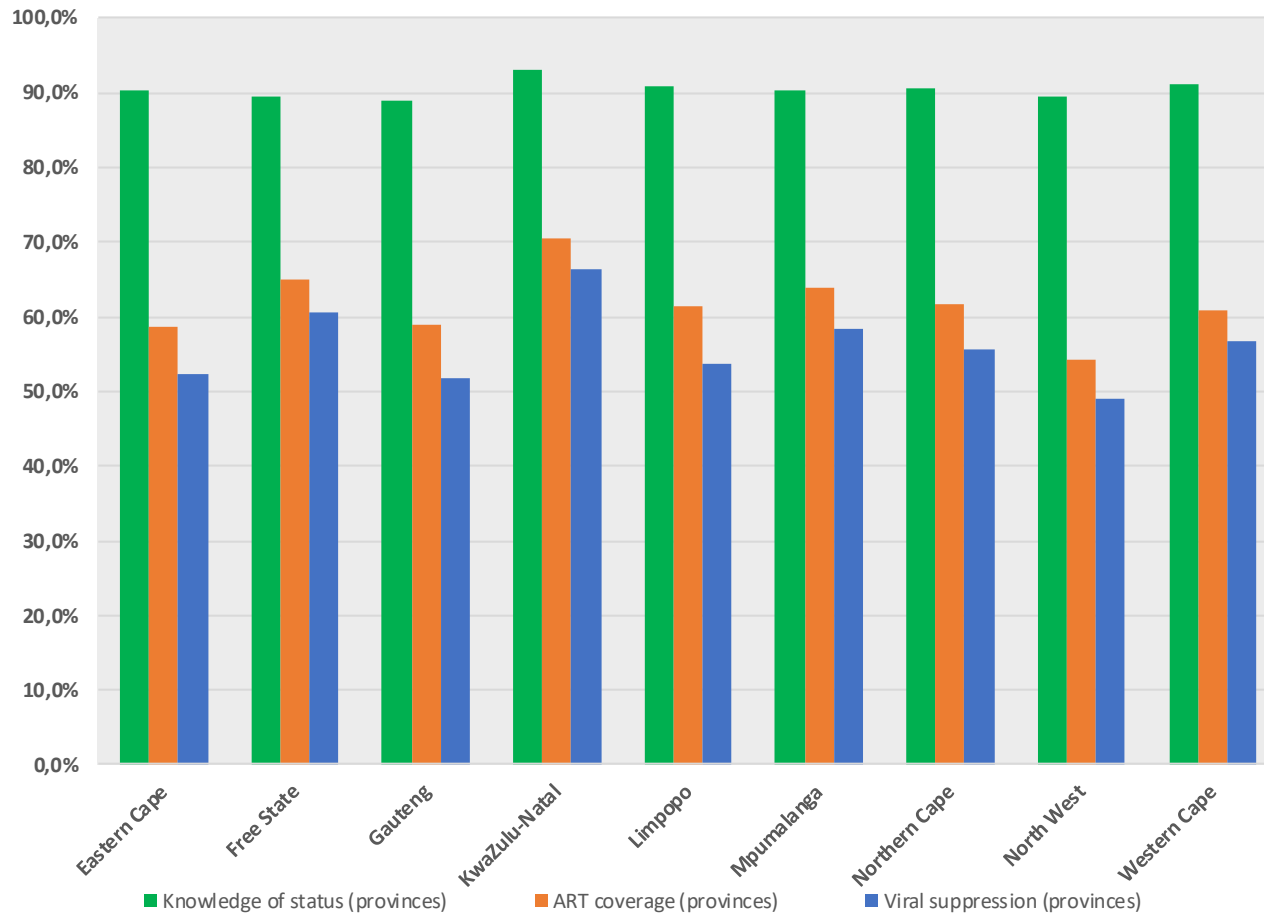
HIV incidence trends (all ages)



% decline in new HIV infections, 2010-2019



Cascade of HIV care in 2019



Progress towards 90-90-90 targets

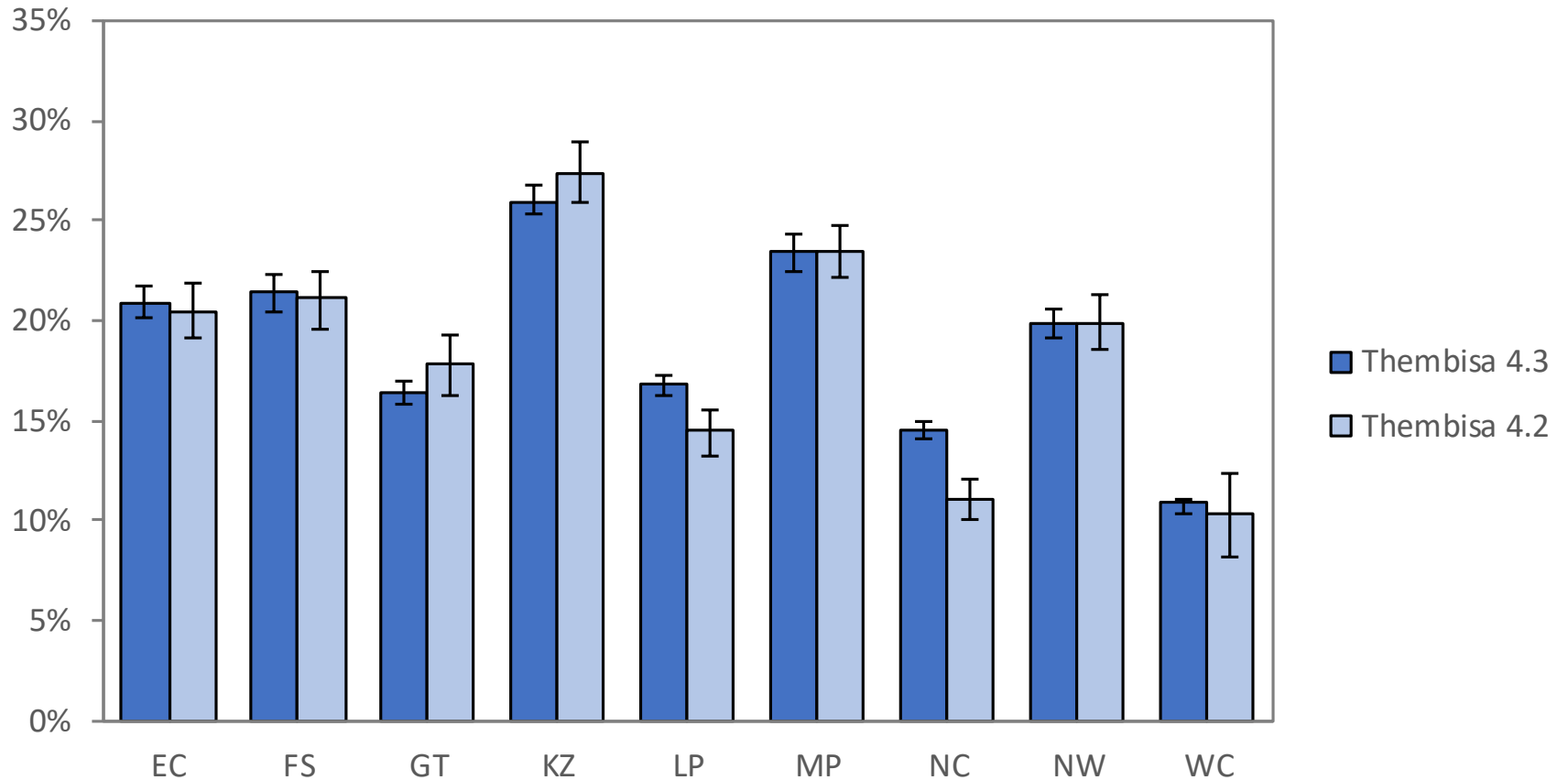
	Knowledge of status			Receiving ART			Reaching viral suppression		
	(first 90)			(second 90)			(third 90)		
	Adult Female	Adult Male	Children	Adult Female	Adult Male	Children	Adult Female	Adult Male	Children
Eastern Cape	92	88	78	66	62	68	90	90	67
Free State	92	87	74	74	70	68	94	94	78
Gauteng	92	86	75	69	62	66	88	88	63
KwaZulu-Natal	95	92	79	77	75	68	95	95	79
Limpopo	93	90	72	70	64	58	89	88	63
Mpumalanga	93	89	73	72	68	65	92	92	71
North West	92	87	82	64	52	70	91	91	70
Northern Cape	93	90	75	71	63	79	91	91	69
Western Cape	93	89	77	68	63	73	94	94	77
National	94	91	79	74	71	70	92	92	72



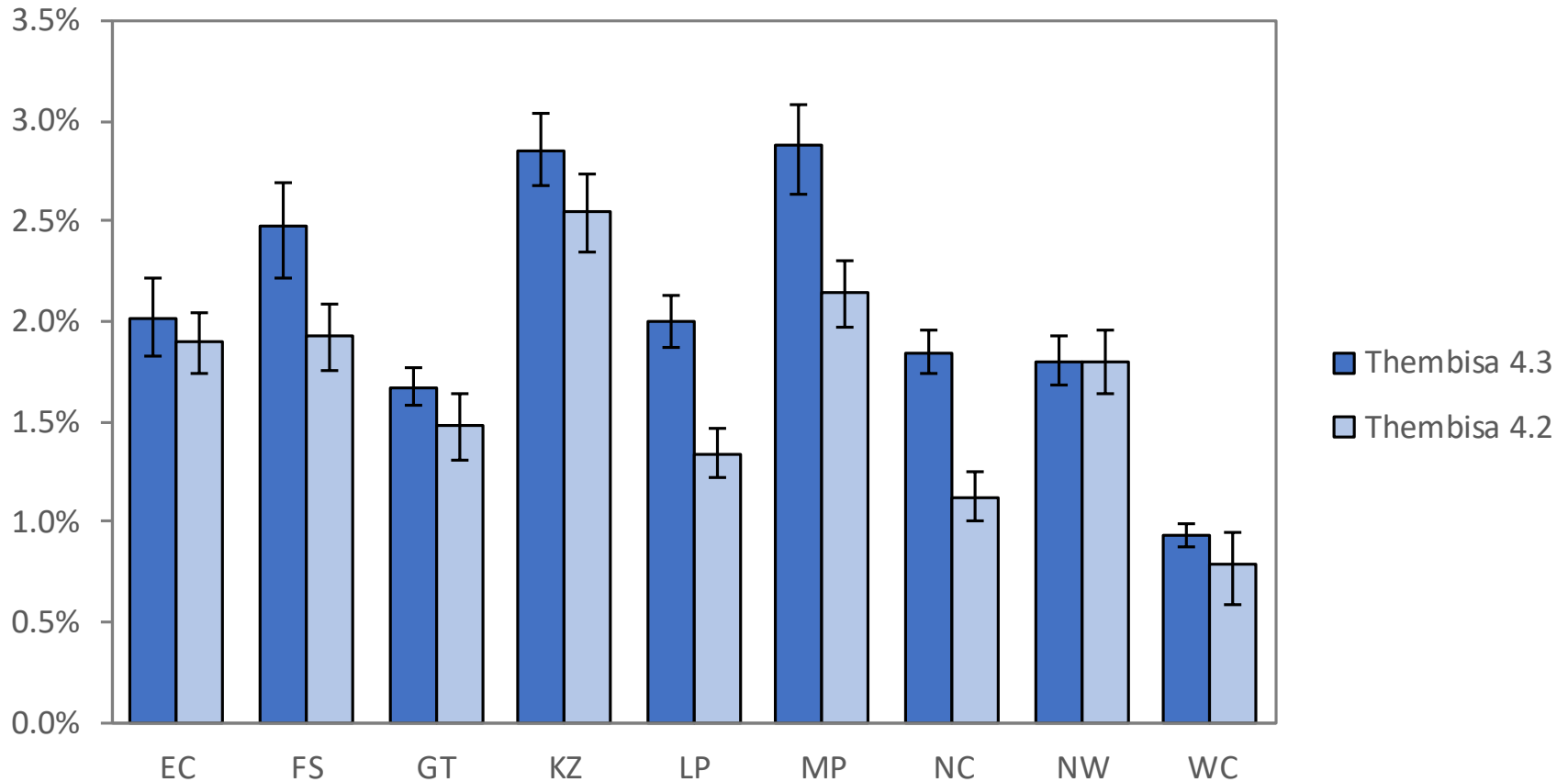
**How do these estimates compare
with the previous Thembisa 4.2
estimates?**



HIV prevalence in 15-49 year olds in 2018



HIV prevalence in children (0-14 years) in 2018



For more information, please visit the Thembisa website:
<https://www.thembisa.org/>



Plans for future work

- Analyses of the impact of HIV prevention and treatment programmes on HIV incidence trends up to 2019.
- Including recorded death data in the calibration of the provincial models, to better estimate impact of ART at a provincial level.
- Alternative metrics of access to ART: treatment coverage versus time to ART initiation.
- Using province-specific data on key populations (sex workers and men who have sex with men) to identify differences in key populations between provinces.
- Extending Thembisa to include TB.



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