Ending the HIV Epidemic in the Baltimore Metro Area: A Modeling Study

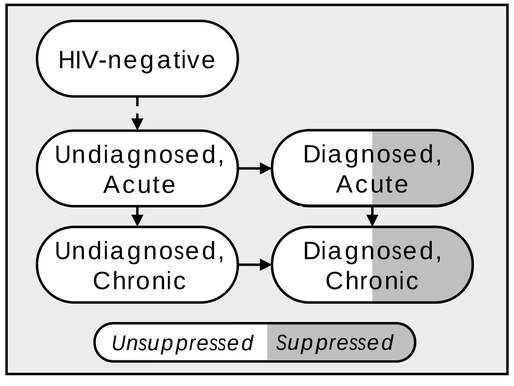
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Background

- The Ending the HIV Epidemic initiative aims to reduce HIV incidence by 90% by 2030
- It is not clear what combinations of viral suppression, rates of diagnosis, and uptake of PrEP are needed to achieve this goal in local epidemics

Methods

- We extended a compartmental model of HIV transmission, to stratify by sex race, age, and CDC risk groups



- We fit the model to CDC-reported new diagnoses, prevalence, mortality, and proportion diagnosed for the Baltimore Metropolitan Statistical Area using adaptive Metropolis sampling with 20,000 iterations
- We ran each simulation multiple times from 2020-2030 under multiple potential interventions targeted at demographic groups

Results

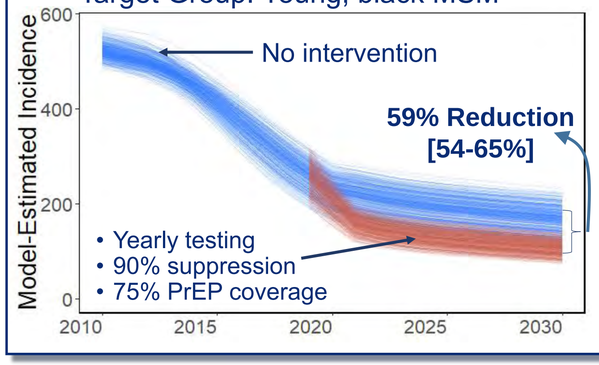
Ending the HIV epidemic in the Baltimore metropolitan area will require yearly screening, 90% suppression among diagnosed individuals, and >25% PrEP uptake (among eligible individuals) in the entire at-risk population.

Model-Projected Reduction in Incidence [95% Uncertainty Range] from 2020 to 2030 Under Interventions Targeting Demographic Groups in the Baltimore Metropolitan Statistical Area

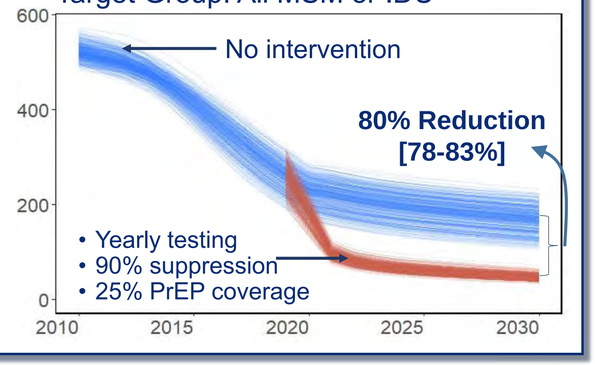
	*Testing**	*As Is*§		*Yearly*				
	Suppression†	*As Is*	*80%*	*80%*		*90%*		
	PrEP‡	*As Is*	*25%*	*25%*	*50%*	*25%*	*50%*	*75%*
Targeted Groups	**Black MSM 13-34yo**	34% [28,41%]	43% [39 - 47%]	51% [46 - 55%]	54% [49 - 59%]	54% [49 - 59%]	57% [52 - 62%]	59% [54 - 65%]
	All Black 13-34yo	34% [28,41%]	45% [41 - 49%]	56% [52 - 59%]	61% [56 - 64%]	60% [56 - 64%]	63% [59 - 68%]	66% [62 - 71%]
	All 13-34yo	34% [28,41%]	47% [43 - 51%]	60% [57 - 64%]	66% [62 - 70%]	65% [61 - 70%]	69% [64 - 74%]	72% [68 - 77%]
	All Black MSM	34% [28,41%]	51% [46 - 55%]	61% [57 - 63%]	65% [61 - 68%]	67% [64 - 70%]	70% [66 - 74%]	73% [69 - 76%]
	All MSM	34% [28,41%]	55% [49 - 60%]	66% [62 - 70%]	71% [67 - 75%]	74% [71 - 78%]	77% [73 - 81%]	79% [75 - 83%]
	All MSM or IDU	34% [28,41%]	59% [52 - 64%]	71% [68 - 74%]	77% [73 - 80%]	80% [78 - 83%]	83% [80 - 86%]	85% [82 - 88%]
	Whole Population	34% [28,41%]	63% [54 - 69%]	81% [77 - 84%]	88% [86 - 90%]	91% [89 - 92%]	94% [93 - 95%]	96% [96 - 97%]

*Testing Frequency = average frequency of HIV testing in targeted groups. †Suppression = proportion of those with diagnosed HIV who are suppressed in targeted groups. ‡PrEP = the proportion of those without HIV in targeted groups who are prescribed and adherent to PrEP at any given time. §As is = continued at 2019 levels

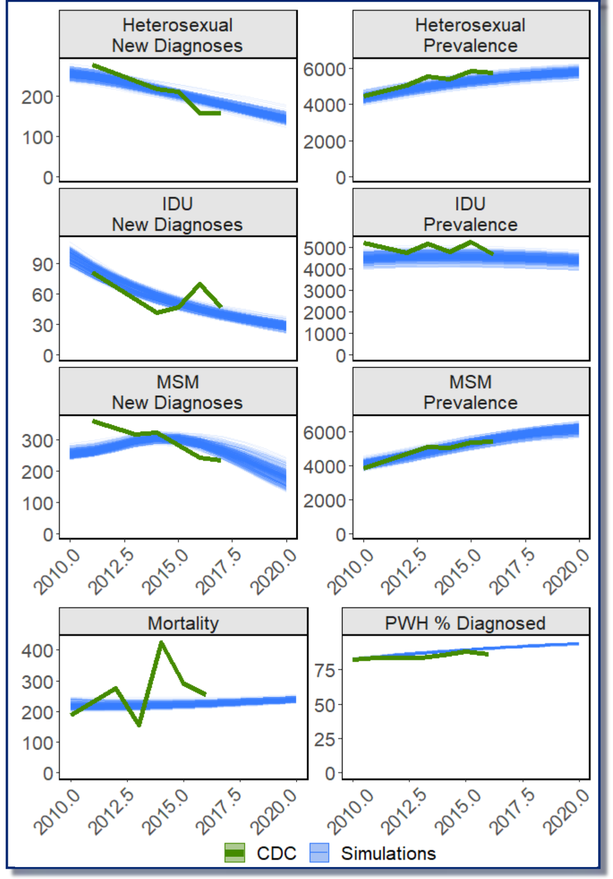
Target Group: Young, black MSM



Target Group: All MSM or IDU



Calibration



Conclusions

- Even high rates of suppression, testing, and PrEP in high risk groups may be insufficient to achieve Ending the HIV Epidemic targets
- Targeting high-risk groups may improve efficiency but is unlikely to achieve 90% reduction alone
- Our model can be calibrated to provide local estimates for interventions in other settings