IMPACT OF HIV CONTINUUM OF CARE INTERVENTIONS AND PRE-EXPOSURE PROPHYLAXIS IN KENYA

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Liem Binh Luong[1] , Stephen S. Wanjala[2] , Elisabeth Szumilin[3] , Pierre Mendiharat[3] , Yazdan Yazdanpanah[1] , Kenneth A. Freedberg[4]
[1]INSERM, Paris, France, [2]MSF, Nairobi, Kenya, [3]MSF, Paris, France, [4]Massachusetts General Hospital, Boston, MA, USA

BACKGROUND

- In Western Kenya up to one quarter of the adult population was HIV-infected in 2012.
- Médecins Sans Frontières (MSF) has implemented an HIV care program to reach the 90-90-90 UNAIDS targets and has surpassed those.
- In this generalized epidemic, **our objective was to compare effectiveness of Preexposure Prophylaxis (PrEP) with improving the continuum of care coverage to 95-95-95**.

METHODS

- Model: time-discrete, dynamic microsimulation model
- Outcomes: HIV incidence and infections averted
- Time horizon: 2018 to 2030.
- Population: adults in two age-group risk strata:
  - Younger adults (YAs), with the highest HIV incidence: women 15-30y and men 20-40y
  - Older adults (OAs), with lower HIV incidence: women >31y and men >41y.
- **3 strategies compared to a 90-90-90 continuum of care base case:**
  1) **Scaling up the continuum of care to 95-95-95 (85.7% suppression)**
  2) **PrEP targeting YAs with 10% coverage**
  3) **Scaling up to 95-95-95 and PrEP.**
- Calibration fit overall prevalence (24.1%) and incidence (1.9/100 PY) in 2012.
- Monthly probabilities for continuum of care matched 2012 levels (61.8% tested, 68.2% on ART among tested, and 73.0% viral suppression among on ART) and 90-90-90 in 2020
- Sensitivity analyses done on key parameters, including PrEP impact starting at higher continuum levels, as obtained in 2018 by MSF (93.0% tested, 95.0% on ART among tested, and 97.0% suppression among on ART).

Table 1. Input parameters for a modeling analysis of combination HIV prevention strategies in rural Kenya

Younger Adult (YA) population		
Proportion	56%	Maman D et al., AIDS 2015
Number of contacts (monthly)	7	Calibration to Maman D et al., AIDS 2015
Proportion of contacts with YA	91%	
Older Adult (OA) population		
Proportion	44%	Maman D et al., AIDS 2015
Number of contacts (monthly)	5	Calibration to Maman D et al., AIDS 2015
Proportion of contacts with OA	93%	
PrEP risk reduction (%)	72%	Baeten JM et al., NEJM 2012

In a generalized epidemic with continuum of care levels at 90-90-90, improving the continuum to 95-95-95 is more effective than providing PrEP

RESULTS

- Base case: in 2030, HIV incidence was 0.31/100 Person-Years (PY) in YAs, 0.35/100 PY in OAs, and 0.32/100 PY overall; a reduction of 52% in YAs, 14% in OAs, and 44% overall from 2020 incidences (Figure 1).
- Continuum to 95-95-95 averted 3.5% of infections in YAs, 5.2% in OAs, and 4.0% overall (Table 2).
- PrEP averted fewer infections: 3.4% in YAs, 0.2% in OAs, and 2.7% overall (Table 2).
- 95-95-95 and PrEP averted 7.1% of infections in YAs, 9.1% in OAs and 7.5% overall (Table 2).

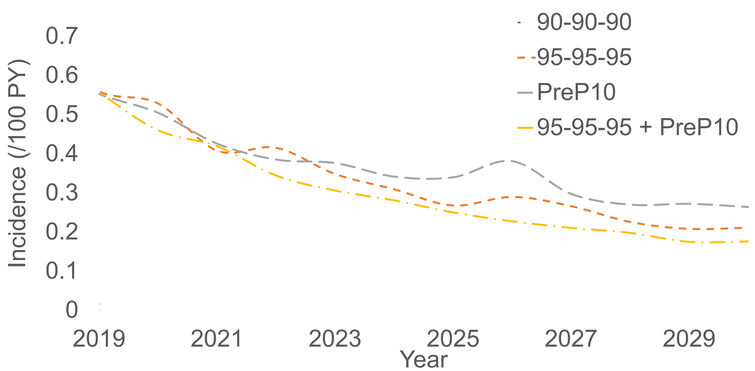


Figure 1: HIV incidence (vertical axis) over time (horizontal axis) /100 PY for three strategies compared to the base case (90-90-90), in overall population. PrEP10: 10% PrEP coveragepre-exposure prophylaxis; PY: Person-year.

Table 2. HIV prevalence and infections averted as a function of continuum of care with addition of PrEP in rural Kenya

Population	2020	2030			
		90-90-90	95-95-95	PrEP 10%	95-95-95 + PrEP 10%
Younger Adults					
Infections averted (%)		-	3.5	3.4	7.1
Prevalence	8.5	3.8	3.4	3.5	3.0
Older Adults					
Infections averted (%)		-	5.2	0.2	9.1
Prevalence	23.4	16.9	16.7	16.9	16.5
Overall					
Infections averted (%)		-	4.0	2.7	7.5
Prevalence	13.3	8.0	7.6	7.8	7.3

SENSITIVITY ANALYSES

Sensitivity analysis shows that PrEP coverage had to be 15% to avert as many infections as 95-95-95. With 88.0% overall suppression, as MSF has achieved, adding PrEP is even less effective.

Figure 2: Two-way sensitivity analyses (heat map). HIV infections averted with PrEP compared to base case (90-90-90), projected in 2030 in younger adult and overall population, depending on PrEP coverage and efficacy.

Population	PrEP efficacy (%)	PrEP coverage (%) 10	15	30	50	70	90
YA	50	1.5	3.3	5.9	9.1	11.0	13.9
	72	3.4	4.9	7.7	13.3	17.4	20.1
	90	3.8	5.8	10.7	14.3	17.5	20.8
OA	50	0.8	0.3	1.6	0.8	1.7	2.2
	72	0.2	1.2	1.4	1.6	3.1	3.3
	90	1.5	0.9	3.5	3.7	5.0	6.3
Overall	50	1.3	2.5	4.9	7.2	8.8	11.2
	72	2.7	4.0	6.2	10.9	14.1	16.1
	90	3.3	4.6	9.0	11.3	14.3	17.2

Infections averted: <5.0%, 5.0% to 10.0%, > 10.0%. PY: Person-year; YA: Young adults; OA: Older adults.

CONCLUSION

- **In a generalized epidemic with continuum of care levels at 90-90-90, improving the continuum to 95-95-95 is more effective than providing PrEP.**
- **To achieve substantial reductions in new HIV cases, it will need to achieve more than 86% suppression (obtained by the 95-95-95 targets), even with PrEP.**