



Sciences Économiques et Sociales de la Santé  
& Traitement de l'Information Médicale

**August EUBANKS**

Doctorante 3ème année, ED 62 AMU  
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Rate and predictors of ineffective HIV protection in West African men  
who have sex with men (MSM) taking pre-exposure prophylaxis (PrEP)

**décembre 2021**

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# Rate and predictors of ineffective HIV protection for African MSM taking PrEP

**August EUBANKS**

PhD Candidate

ANRS Doctoral Fellowship (12369-B105)

Direction – Bruno SPIRE

SESSTIM Seminar – 16 December 2021

SESSTIM, Faculté des Sciences Médicales et Paramédicales, Aix-Marseille Université, Marseille, France  
<https://sesstim.univ-amu.fr/>



Sciences Economiques et Sociales  
de la Santé & Traitement  
de l'Information Médicale



# Outline



**Context**



**Research questions**



**Objective**



**Methods**



**Results**



**Discussion**

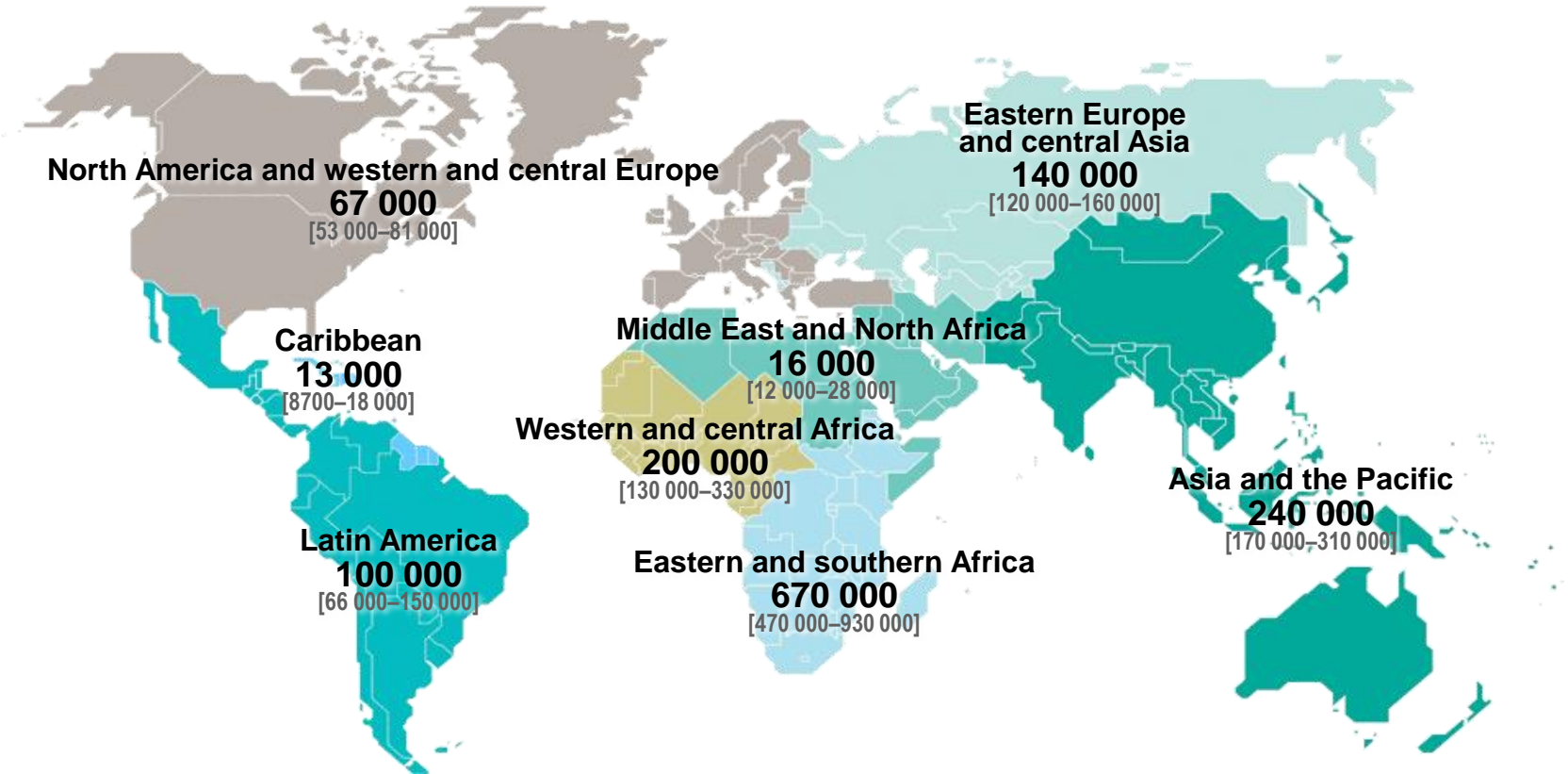


**Conclusion**



# Context – HIV globally

Estimated number of adults and children newly infected with HIV | 2020



**Total: 1.5 million** [1.0 million–2.0 million]



# Context – HIV in West Africa

- Concentrated epidemic among key populations, like men who have sex with men (MSM)
  - HIV prevalence in MSM = 13.3% vs 1.4% in general population

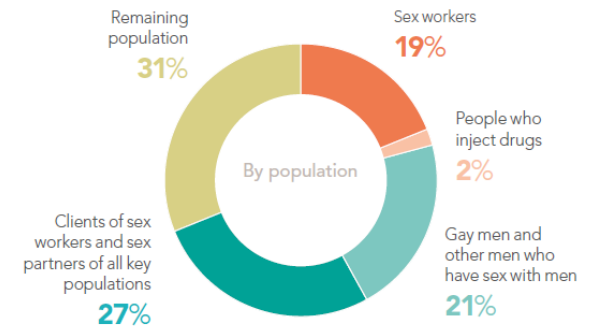
- Reasons?

- Complex legal/cultural context
- Economic constraints
- Biological factors



- Lack of knowledge on MSM/their behaviors
- Limited access to tailored HIV prevention/care
- Limited research and clinical data on MSM
- Increased risk of HIV exposure/infection

Distribution of new HIV infections by population, western and central Africa 2019

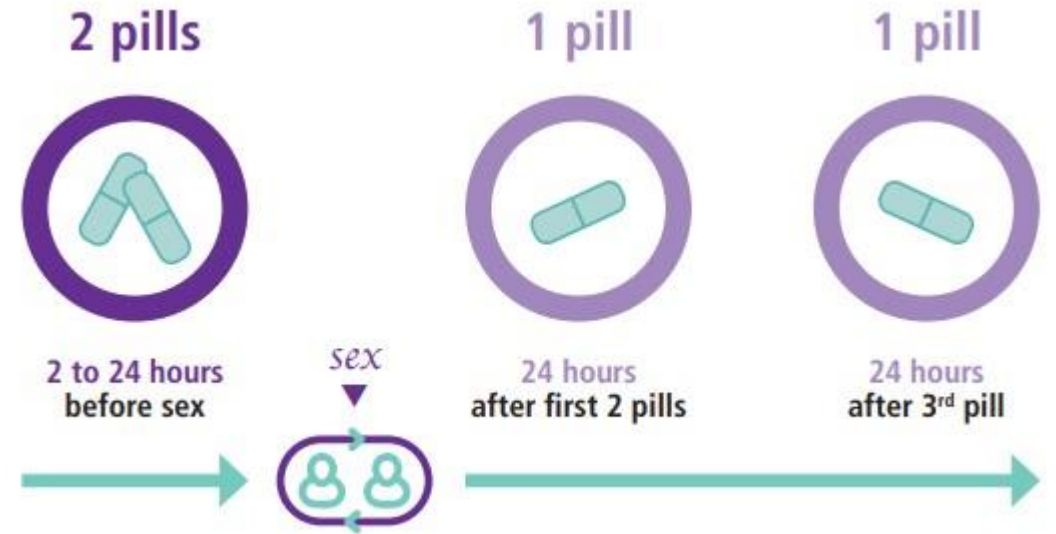


Source: UNAIDS special analysis, 2020 (see methods annex).



# Context – HIV pre-exposure prophylaxis (PrEP)

- Antiretroviral treatment to be taken before HIV exposure (TDF/FTC)
  - Daily = Once a day
  - Event-driven = 2+1+1

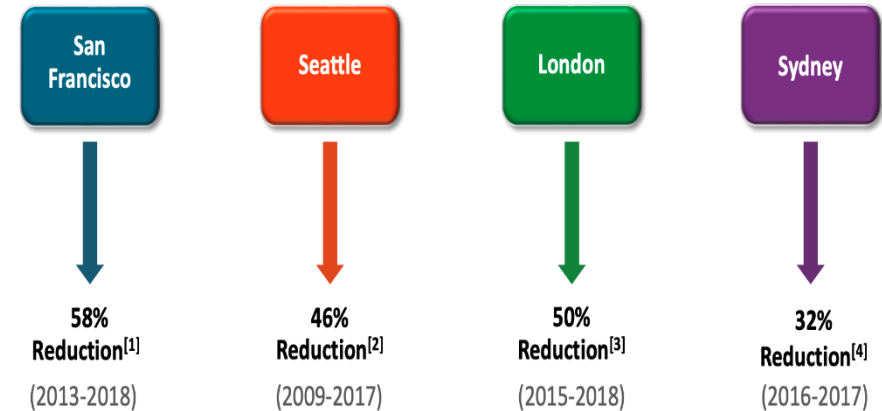


Source: What's the 2+1+1? WHO technical brief July 2019



# Context – HIV pre-exposure prophylaxis (PrEP)

- Antiretroviral treatment to be taken before HIV exposure (TDF/FTC)
  - Daily = Once a day
  - Event-driven = 2+1+1
- Proven efficacy, uptake and adherence widely studied in high income countries...



1. Buchbinder. JAIDS. 2019;82(suppl 3):S176. 2. Seattle & King County and the Infectious Disease Assessment Unit. HIV/AIDS Epidemiology Report 2019. <https://www.kingcounty.gov/depts/health/communicable-diseases/hiv-std/patients/-/media/depts/health/communicable-diseases/documents/hivstd/2019-hiv-aids-epidemiology-annual-report.ashx>. 3. Public Health England. Health Protection Report. 2019;13(31). 4. Grulich. Lancet HIV. 2018;5:e629.

Slide credit: [clinicaloptions.com](http://clinicaloptions.com)





# Context – HIV pre-exposure prophylaxis (PrEP)

- Antiretroviral treatment to be taken before HIV exposure (TDF/FTC)
  - Daily = Once a day
  - Event-driven = 2+1+1
- Proven efficacy, uptake and adherence widely studied in high income countries...
- PrEP scale-up = urgent to contain epidemic in West Africa!
  - BUT, implementation slow despite adoption of WHO recommendations

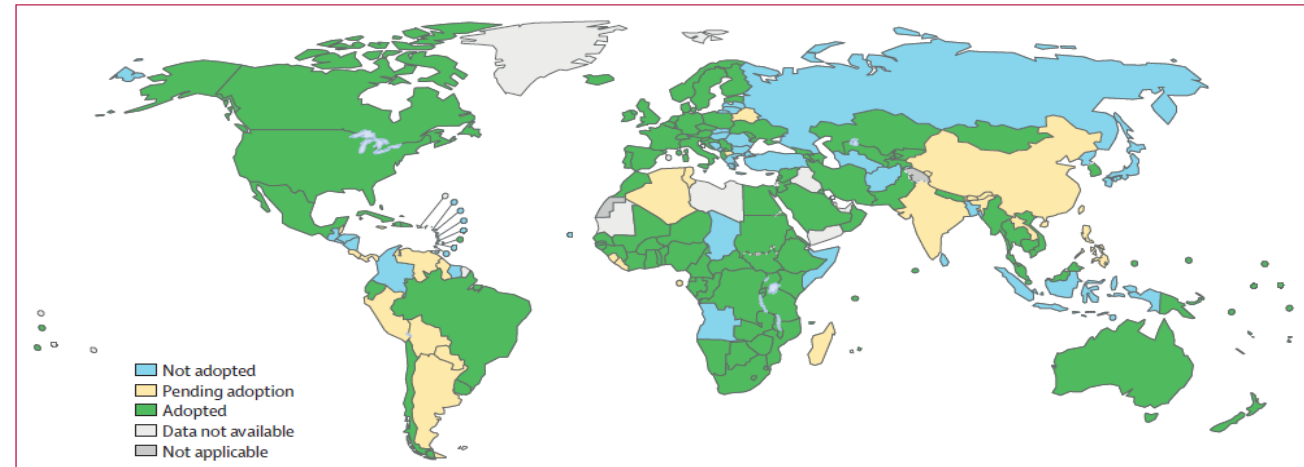
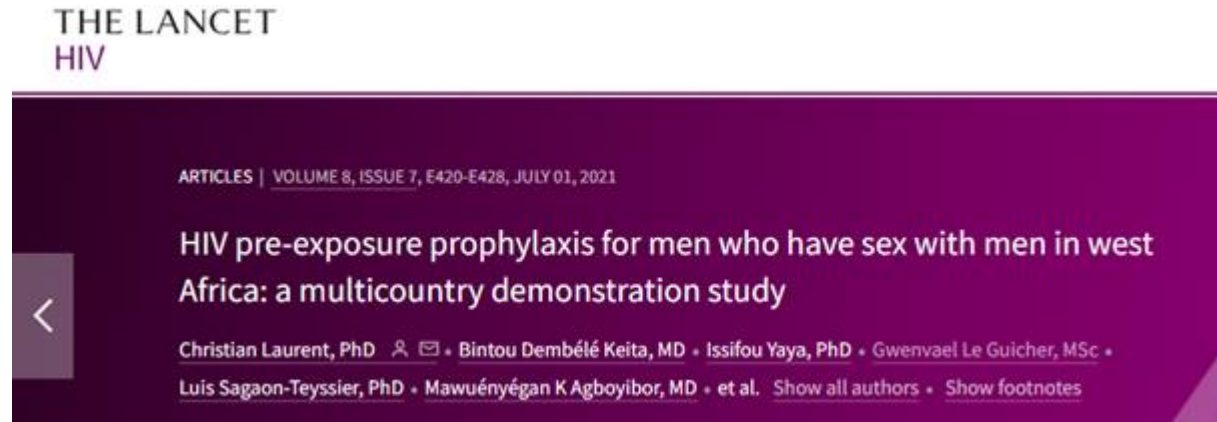


Figure 1: Adoption of the WHO recommendations on oral PrEP into national guidelines globally by 2019. Pending adoption was defined as plans to adopt the recommendation in the next 2 calendar years. Estimates were based on data from the Global AIDS Monitoring system and reporting to WHO. See the appendix (pp 1-7) for details on data. PrEP=pre-exposure prophylaxis.





# Context – CohMSM-PrEP



PrEP uptake helped prevent new HIV infections

- HIV incidence 2.3 per 100 person-years (95% CI 1.3–3.7) vs 10.0 in CohMSM



Problems with adherence, especially for event-driven PrEP

- 15/17 seroconversions among event-driven users



PrEP use decreased over time



# Research questions

Despite some participants' intention to use PrEP, the possibility to switch regimens as desired, and support provided by peer educators, many participants still used it incorrectly...

- Could barriers to PrEP uptake and adherence be heightened in West Africa?
  - Difficult legal and cultural context
  - Social vulnerabilities, socioeconomic strain
- Who was at risk of HIV seroconversion?
  - PrEP non-adherence + condomless sex
- How do CohMSM-PrEP participants protect themselves (or not) from HIV?
  - Determinants of (non)protection





## Objective

Investigate the **rate** and **predictors** of **ineffective HIV protection** (i.e. incorrect PrEP adherence and condomless sex) in the CohMSM-PrEP study



# Methods – Study design

- **What, when and where?**

- Prospective cohort study initiated in November 2017
- Community-based health clinics
  - ARCAD Santé PLUS, Mali (Bamako)
  - Espace Confiance, Cote d'Ivoire (Abidjan)
  - Association African Solidarité, Burkina Faso (Ouagadougou)
  - Espoir Vie Togo, Togo (Lomé)



- **Who and how?**

- 18 years or older, reporting at least one episode of anal intercourse with a man in the 6 months prior to enrollment and at high risk of HIV exposure or wanted to take PrEP
- Recruited directly from a previous MSM cohort (CohMSM) **AND** new participants identified by peer-educators (PE)



# Methods – Study design continued

- **Quarterly follow-up**

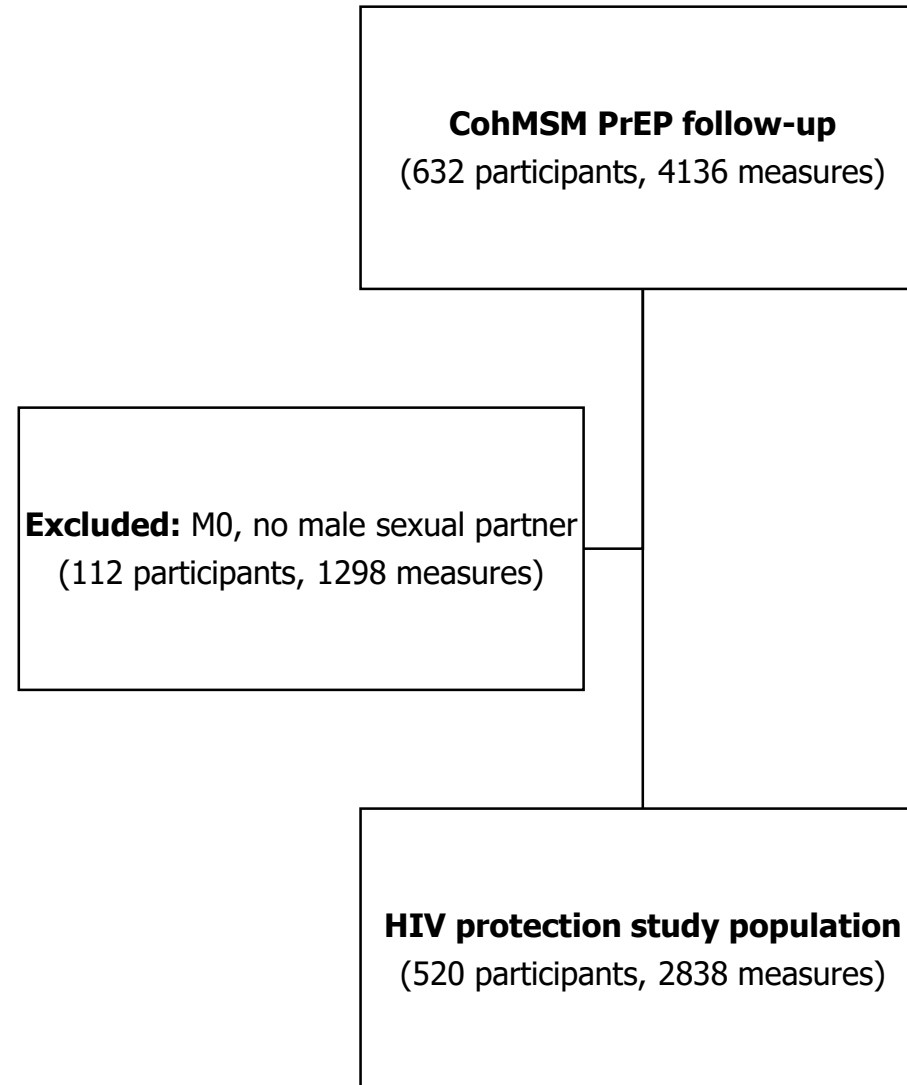
- Clinical exam, HIV testing, STI screening/treatment, condoms and lubricants
- PrEP delivery
  - Daily - one pill per day
  - Event-driven - 2+1+1 protocol, 2 pills between 2–24 hours before sex (1 if PrEP taken the previous week) followed by 1 pill 24h and another 48h after 1<sup>st</sup> pill(s)
- Tailored prevention and adherence counseling by PE

- **Quantitative data collection**

- Sociobehavioral
  - Face to face questionnaires administered every 3 months by trained research assistants
  - Ex: individual characteristics, sexual behaviors, psychosocial aspects, etc.
- Clinical
  - Standardized medical file filled in by medical staff at each visit
  - Ex: PrEP strategy, HIV/STI testing results, etc.



# Methods – Study population





# Methods – Outcome

## PrEP adherence

- **Correct**
  - Daily =  $\geq 4$  pills week before most recent intercourse
  - Event-driven = if taken as prescribed (2+1+1)
- **Incorrect** = all other pill taking combinations or no pills taken before/after sex



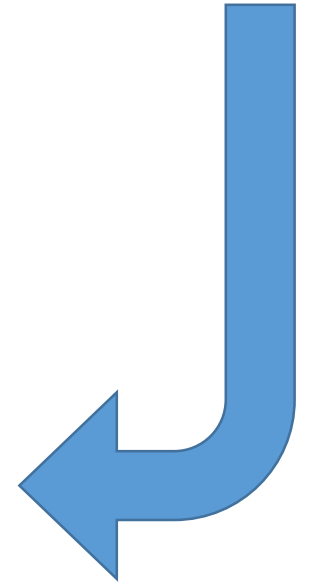
## Condomless sex

- **Insertive**
  - Condomless sex = y/n

And/or
- **Receptive**
  - Condomless sex = y/n

## HIV protection outcome

- **Effective** = Correct adherence and/or used a condom
  - 'correct adherence & condom use', 'correct adherence & condomless sex', 'incorrect adherence & condom use', and 'condom use only'
- **Ineffective** = Incorrect adherence and condomless sex
  - 'incorrect adherence & condomless sex' and 'no PrEP & condomless sex'





# Methods – Statistical analysis

- **Identify factors associated with ineffective HIV protection**
  - Generalized estimating equation (GEE) method, binary logistic distribution function
  - All univariate and multivariate models adjusted for country & recruitment type
  - All covariates with p-value  $\leq 0.20$  in univariate analysis eligible for multivariate model
  - Final multivariate model construction → Forward selection technique
  - Goodness-of-fit → Quasi-likelihood Information Criterion (QIC)
  
- **Potential covariates included...**
  - Sociodemographic and socioeconomic characteristics
  - Cohort or PrEP related characteristics
  - MSM identity (sexual orientation, gender, being “out”, etc.)
  - Psychosocial aspects and substance use
  - Sexual behaviors

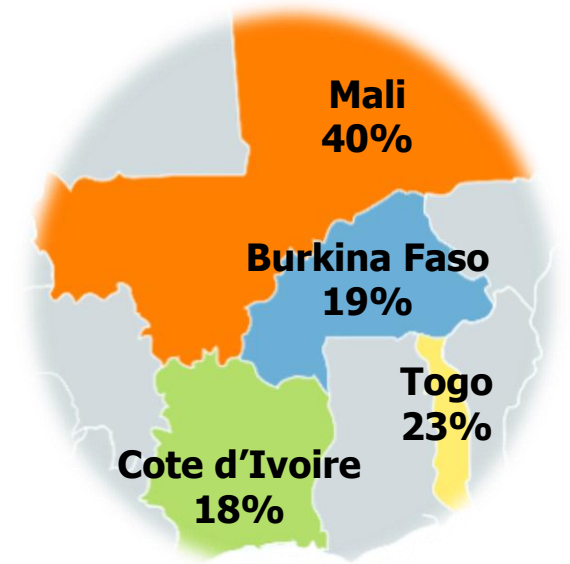






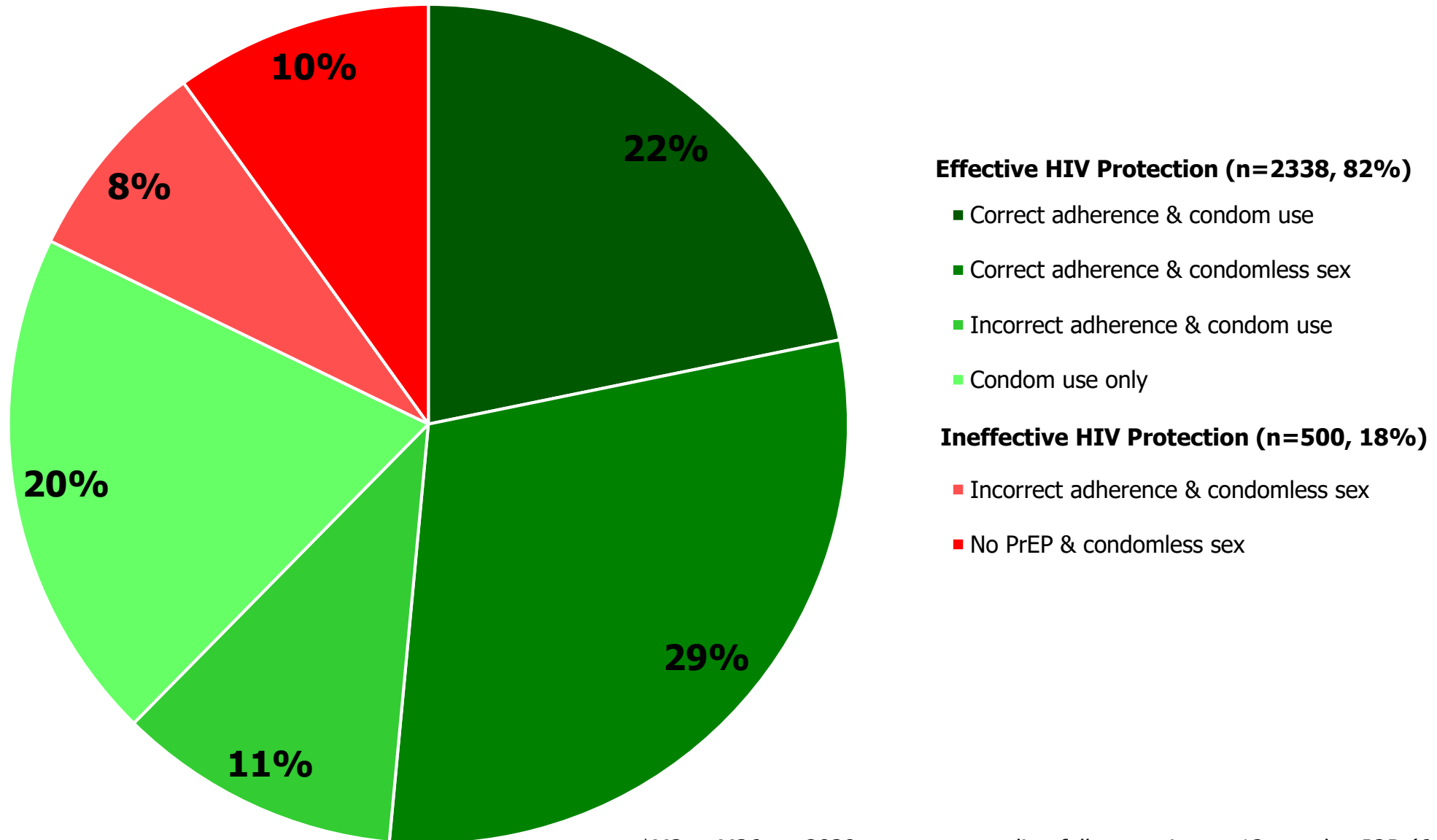
## Results – Sample characteristics at baseline (n=520)

- 74% chose event-driven PrEP
- 56% were recruited from CohMSM
- Mean age was 26.5 years (SD=5.9)
- 55% were employed
- 57% bisexual, 40% homosexual/gay/trans and 2% heterosexual
- 79% had a stable male partner
- 55% reported a casual male partner (previous 3 months)
- 53% were receptive or versatile (vs. exclusively insertive)





# Results – Fig. 1 Over outcome: HIV protection\*



\*M3 to M36, n=2838 measures, median follow-up time = 12 months, IQR (6-21)



# Results – Multivariate analysis of predictors of ineffective HIV protection (GEE, binary logistic distribution; n=520, 2838 obs)\*

Variables	aOR (95% CI)	P-value
<b>Perception of financial situation &amp; PrEP regimen</b>		
Comfortable or fair & Daily	0.79 (0.48-1.29)	0.348
Difficult or very difficult & Daily	0.80 (0.54-1.16)	0.237
Comfortable or fair & Event-driven	1 (ref)	
Difficult or very difficult & Event-driven	1.34 (1.03-1.73)	0.028
<b>Using PrEP is...very or rather difficult (ref very/rather easy)</b>	1.37 (1.05-1.78)	0.020
<b>Not "out" to any family members (ref yes)</b>	3.55 (1.09-11.53)	0.035
<b>Not a member of a LGBT and/or HIV/AIDS association (ref yes)</b>	1.48 (1.03-2.13)	0.034
<b>High risk alcohol use disorder score (AUDIT-C, ref low risk)</b>	1.31 (1.03-1.66)	0.031
<b>Has a stable male partner (ref no partner)</b>	1.29 (1.00-1.65)	0.047

\* Adjusted for country fixed effects and recruitment type

GEE: Generalized estimating equation; OR: odds ratio; aOR: adjusted odds ratio; CI: confidence interval; ref: reference; LGBT: lesbian, gay, bisexual, and transgender; AUDIT-C: Alcohol Use Disorders Identification Test-Concise



# Results – Multivariate analysis of predictors of ineffective HIV protection (GEE, binary logistic distribution; n=520, 2838 obs)\*

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## Discussion – Main results

- HIV protection was **ineffective in 18%** of all most reported recent anal intercoursess
- Ineffectively protected participants were more likely to be/have...
  - Financially insecure event-driven users
  - High alcohol consumption
  - Less involved in the MSM community
  - Less open about their sexuality to family members
  - Stable male partner



# Discussion – Recommendations

- Screening and enhanced adherence counseling for socially vulnerable event-driven users
  - + More comprehensive counseling for switching/stopping/starting PrEP
- Routine screening for hazardous alcohol consumption in PrEP programs
  - + Substance abuse counseling when needed
- Incorporating social capital interventions, especially for community-naïve MSM
  - + Continuing to advocate for LGBT rights and against same-sex stigma/discrimination
- Enhanced counseling on HIV risk in stable partnerships
  - + Enrolling participants' partners and/or dyadic counseling for couples



## Discussion – Limits

- Convenience sample...not fully representative local MSM populations
  - But, previous analysis comparing participants from CohMSM with newly recruited participants suggests the addition of PrEP helped reach a new profile
- Social desirability... ↓ sensitive topics & ↑ PrEP adherence/condom use
  - Minimized by training research assistants, regular contact → trustful relationship overtime
- Self-reported adherence...less reliable?
  - Studies show self-reported outcomes predict drug concentrations
  - Biological measures difficult to implement in resource low settings
- Sero/treatment status of partners not taken into account...U=U
  - HIV care cascade far from UNAIDS targets in West Africa → little epidemiological impact



# Conclusion



- Despite PrEP and condoms being offered free of charge as part of a comprehensive sexual health prevention package to participants...
  - **Rate of ineffective HIV protection = non-negligible and persistent**
- While rapid scale-up of PrEP programs in West Africa is essential...
  - **Must be tailored to the needs of socially vulnerable MSM, who might struggle to adopt PrEP into their lifestyle**



# Acknowledgments



CohMSM

