COMPARING TRENDS IN UNHEALTHY ALCOHOL USE MEASURED BY A PHOSPATIDYLETHANOL AND SELF-REPORT IN PERSONS WITH HIV IN RURAL UGANDA

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Outline

- **Background**
  - Alcohol and HIV in general and in sub-Saharan Africa
  - Patterns of alcohol consumption among persons with HIV
  - Alcohol biomarker: phosphatidylethanol (PEth)
- **The BREATH Study**
  - Aims
  - Methods
  - Results
  - Discussion

Alcohol consumption in Uganda

- 59% of Ugandans abstain

- High alcohol consumption among drinkers:

  - Average 23.7 liters of pure alcohol per year

  - Rivals Eastern Europe (Russia: 22.3 liters; Poland 24.2 liters)

- Many locally brewed beers and distilled gin

2014 WHO Global Status Report on Alcohol and Health

HIV in Uganda

- Current prevalence: 7.2%
  - Women: 8.3%
  - Men: 6.1%
- Antiretroviral therapy (ART) initiated when CD4<350 cells/mm^3

Alcohol and HIV infection

- Consistent risk factor for HIV transmission
- Delayed HIV diagnosis, entry into HIV care, ART retention
- Can accelerate HIV disease progression
- HIV treatment – decreased adherence, interference with metabolism, liver toxicity

Hahn JA et al (2010). *Curr HIV/AIDS Rep, 7:226-233.*
Hahn JA et al (2011). *Curr HIV/AIDS Rep, 8: 172-80.*
Pandrea I et al (2010). *Alcohol Res. Health, 33: 203-218.*

Self-reported alcohol consumption following HIV counseling and testing at Mulago Hospital, Kampala (n=294 HIV-infected current drinkers)

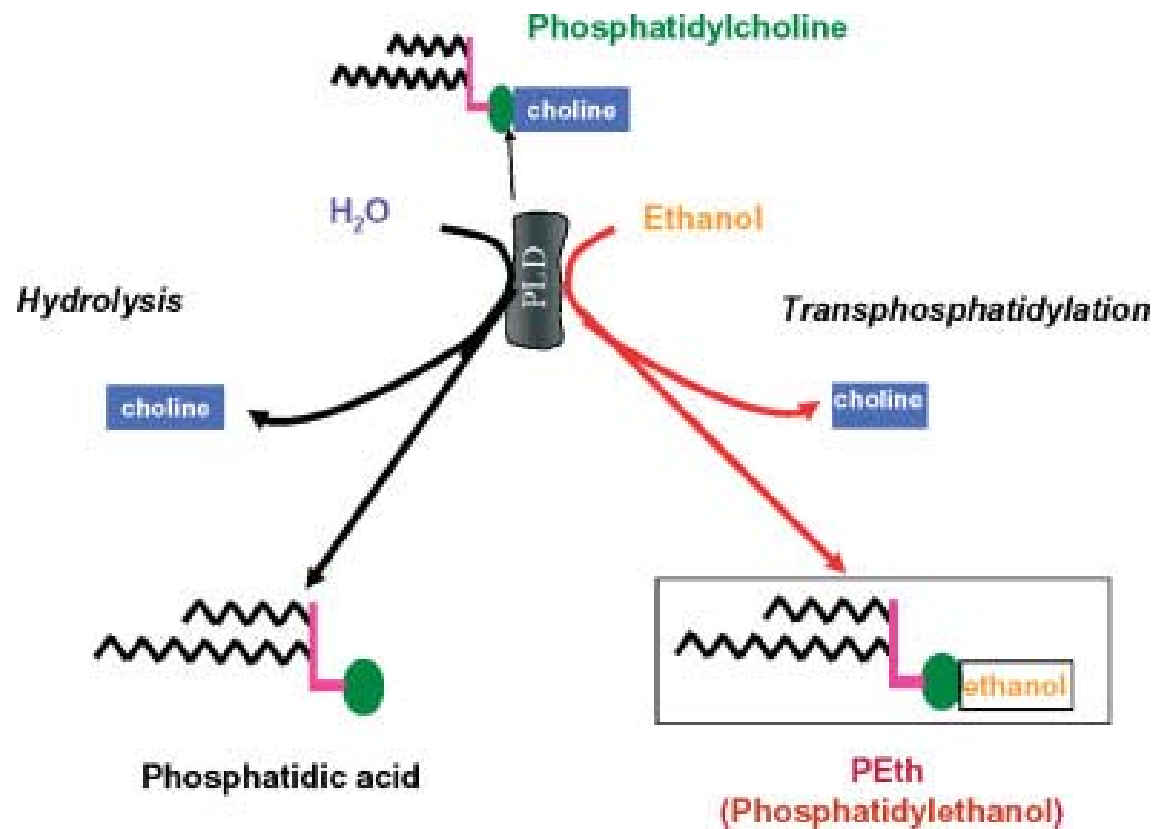29% reported current drinking in the 3 months prior to HIV test

Hahn JA et al, *BMC Infect Dis 2014*
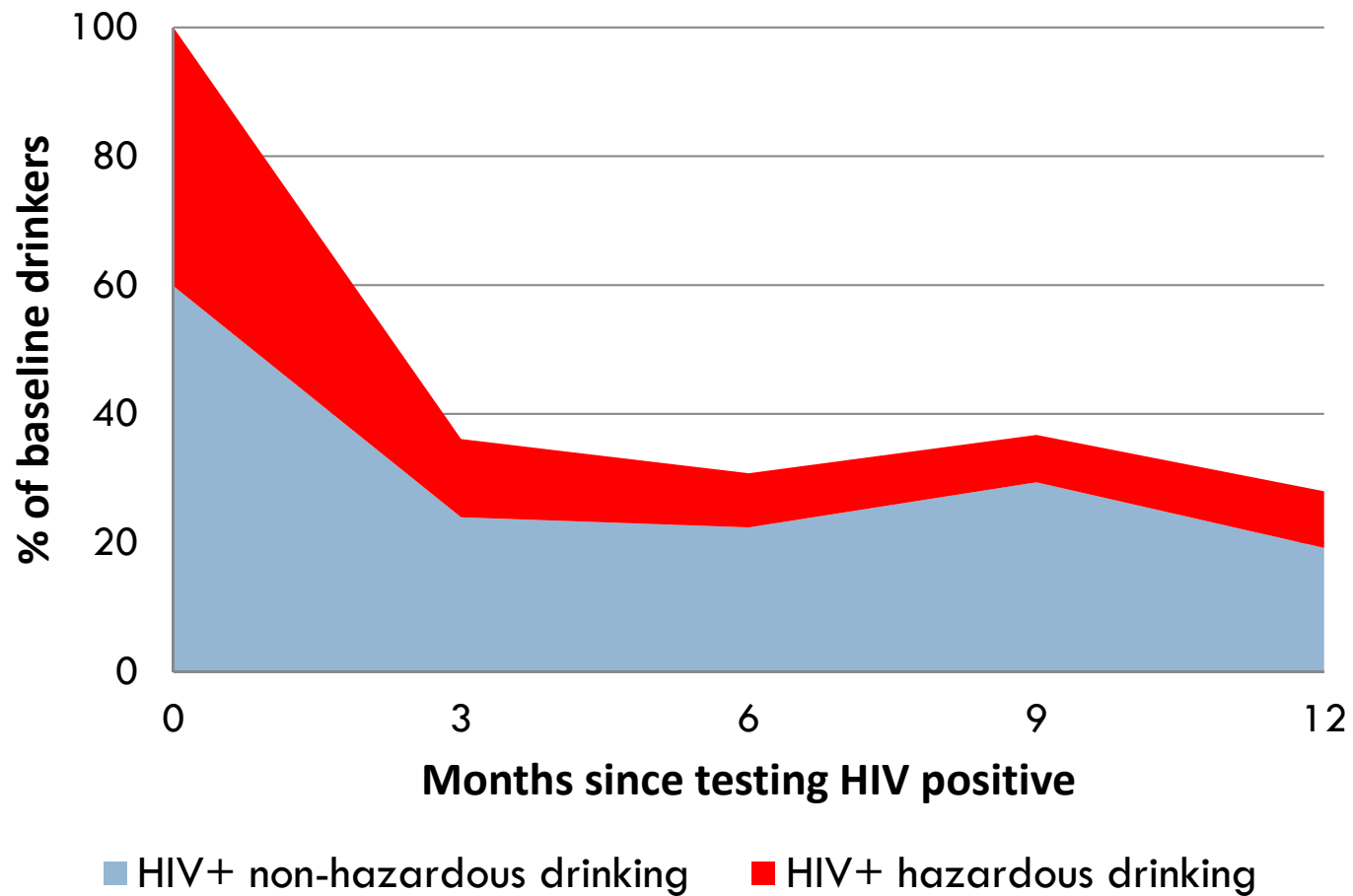
Why?

- "Learnable moment"
  - Clinic/hospital visit, HIV diagnosis, beginning ART
- Clinic counseling
- Assessment reactivity, study effect
- Under-report of alcohol consumption
  - Socially desirable reporting

Phosphatidylethanol (PEth)

- Abnormal phospholipid that is formed in the presence of ethanol

- Currently measured using liquid chromatography and tandem mass spectrometry

Isaksson, A., et al. (2011). Drug Test Anal **3**(4): 195-200.

Phosphatidylethanol (PEth)

- Considered a marker of heavy alcohol consumption
  - Sensitivity
    - 95-99% sensitive in inpatient and outpatient treatment program patients (2 studies, total n=200)
  - Specificity
    - 100% specific in psychiatric patients in a closed ward (n=35)

But these studies did not include moderate drinkers

Aradottir, S., et al. (2006). Alcohol Alcohol **41**(4): 431-437.
Hartmann, S, et al (2007): Addict Biol **12**(1): 81-84.

PEth validation in Uganda

- HIV+s in Uganda, with a range of drinking

- Daily breathalyzer and self-report for 21 days, PEth measured at day 21

- Results: Any heavy alcohol consumption, prior 21 days
  - Sensitivity: 95% (n=40)
  - Specificity 73% (n=37)

Hahn, J. A., et al. (2012). Alcohol Clin Exp Res **36**(5): 854-862.
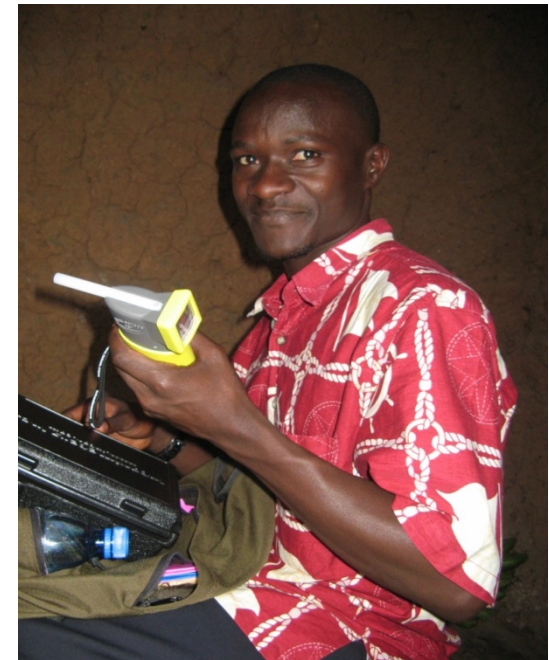
The BREATH Study

Biomarker Research on Ethanol among Those with HIV

BREATH Study Aims

1. To use PEth to determine patterns of unhealthy alcohol consumption during the first year of HIV care in rural Uganda.

2. To determine correlates of reductions in unhealthy alcohol consumption among persons in their first year of HIV care in rural Uganda.

BREATH Study Methods

Study procedures

- Prospective cohort study with quarterly visits over one year
  - Structured interviews, breathalyzer test
  - Blood draws for CD4 cell count and PEth
    - PEth tested from dried blood spots at the US Drug Testing Laboratories in the US.
- Eligibility
  - Age≥18, language=English or Runyankole, new to HIV care
 - Report <u>any alcohol consumption in the prior year </u>on intake visit AUDIT-C

Analysis

- Outcome measures of unhealthy drinking:
  - Self-report: AUDIT-C positive (≥3 for women, ≥4 for men)
  - PEth/self-report: AUDIT-C positive or PEth ≥50 ng/mL
- Modelling: Mixed effects logistic model with random intercepts
  - Main predictor variable: Month since baseline
  - Covariates: Sex, prior unhealthy drinking, and being on ART (time dependent)
  - Interactions of covariates with months since baseline

Results

Prior 3 month unhealthy alcohol consumption by PEth and self-report
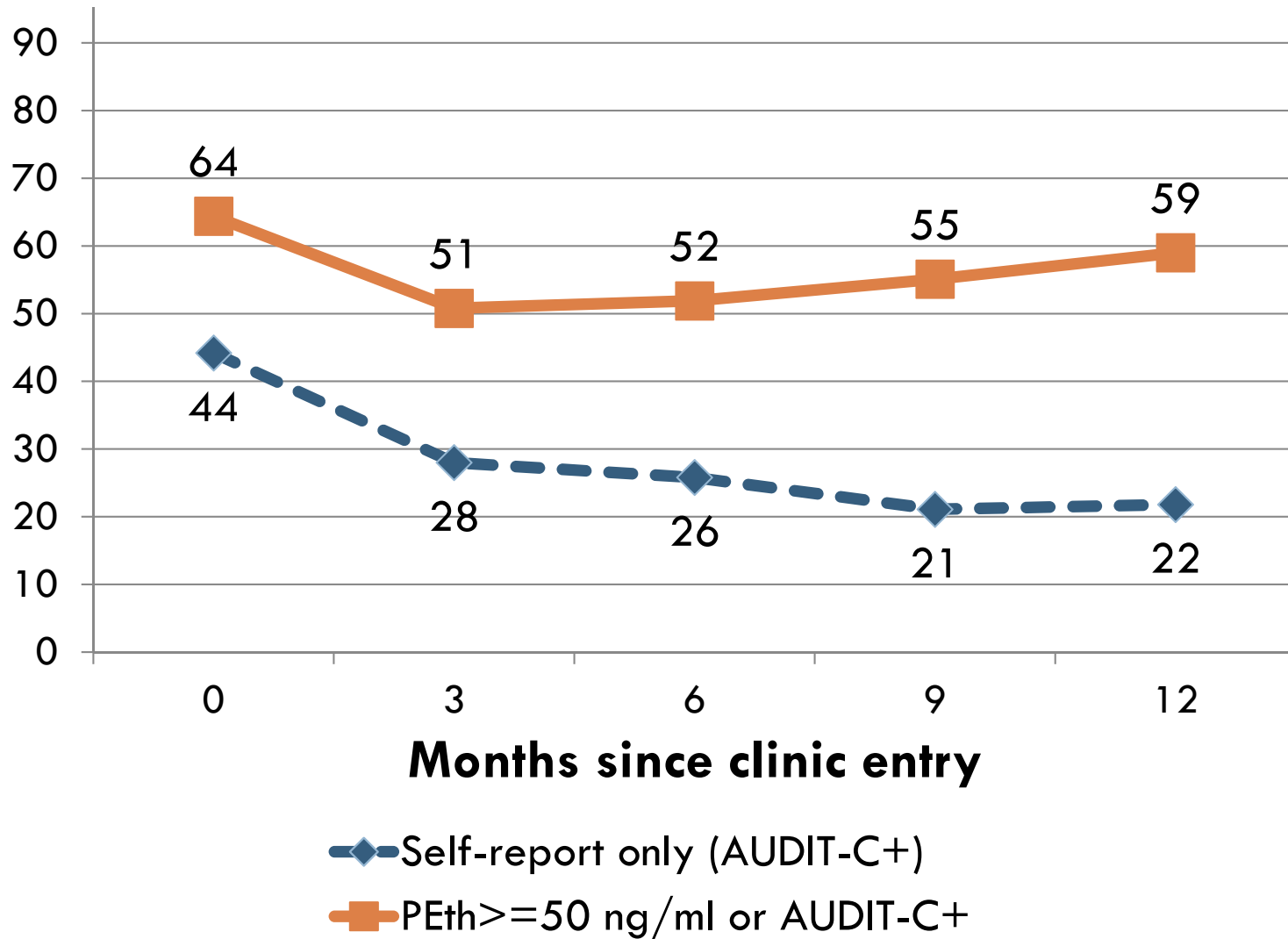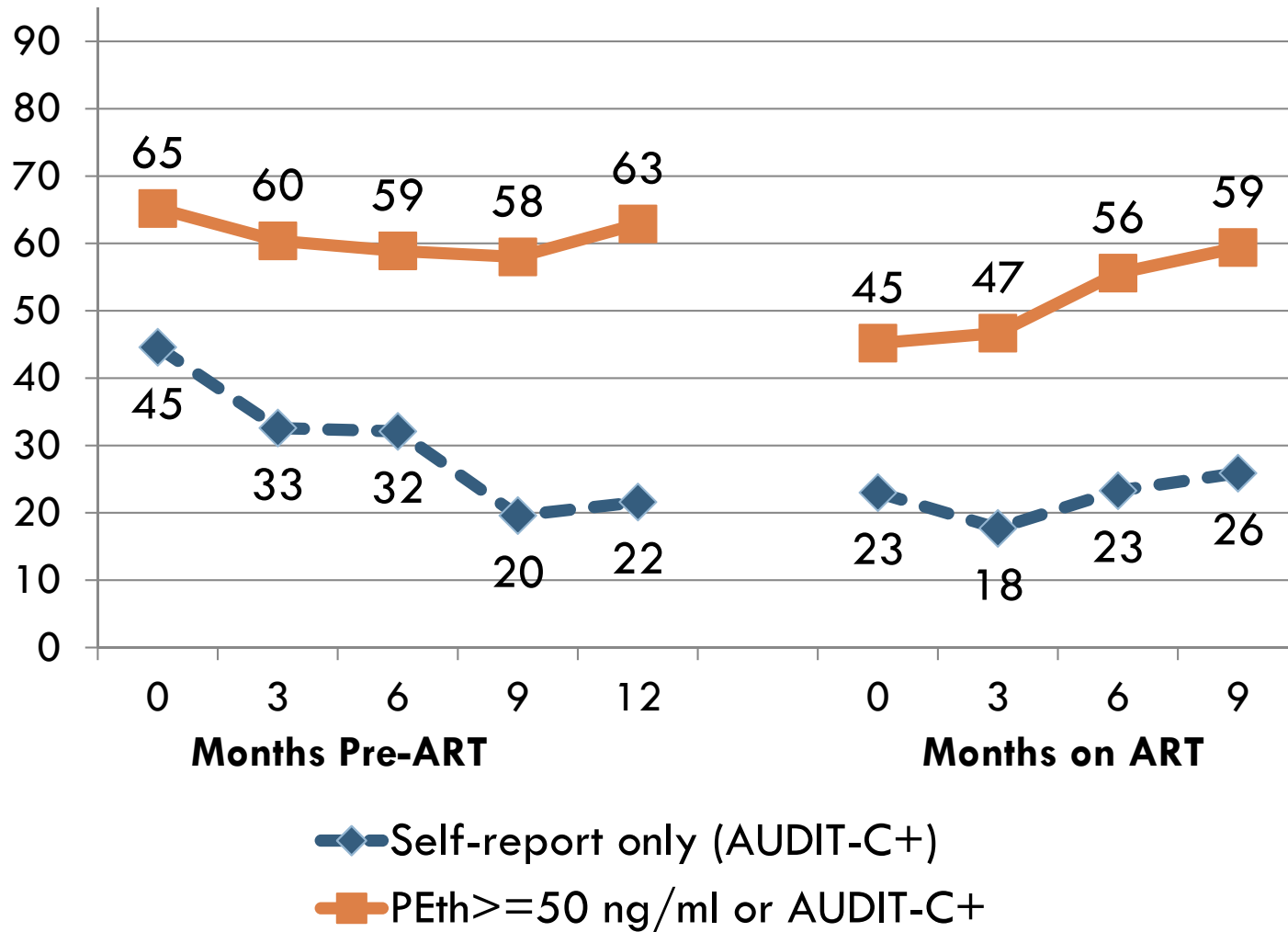
Random effects mixed models (n=209)

	Adjusted odds ratio (95% CI) Self-report alone (AUDIT-C+)	
Months since baseline (Δ+1 month)	0.92 (0.87, 0.97)	
Sex=male	0.90 (0.49, 1.66)	
Unhealthy alcohol use prior to baseline=yes	4.69 (2.19, 10.04)	
On ART=Yes	0.49 (0.29, 0.84)	

Random effects mixed models (n=209)

	Adjusted odds ratio (95% CI) Self-report alone (AUDIT-C+)	Adjusted odds ratio (95% CI) PEth+/AUDIT-C+
Months since baseline (Δ+1 month)	0.92 (0.87, 0.97)	1.06 (1.00, 1.13)
Sex=male	0.90 (0.49, 1.66)	3.94 (1.61, 9.69)
Unhealthy alcohol use prior to baseline=yes	4.69 (2.19, 10.04)	18.33 (6.20, 54.18)
On ART=Yes	0.49 (0.29, 0.84)	0.25 (0.13, 0.48)

Unhealthy alcohol consumption by PEth/self-report prior to and on ART

Legend:
- Self-report only (AUDIT-C+)
- PEth>=50 ng/ml or AUDIT-C+

Random effects mixed models, by ART status

	Adjusted odds ratio (95% CI) Self-report alone (AUDIT-C+)	
Pre-ART (n=204 persons, 455 observations)		
Months since baseline (∆+1 month)	0.87 (0.81, 0.93)	
Sex=male	0.65 (0.33, 1.28)	
Unhealthy alcohol use prior to baseline=yes	9.25 (3.65, 23.43)	
On ART (n=144 persons, 430 observations)		
Months since initiated ART (∆+1 month)	1.03 (0.93, 1.14)	
Sex=male	1.31 (0.42, 4.09)	
Unhealthy alcohol use prior to baseline=yes	1.96 (0.51, 7.49)	

Random effects mixed models, by ART status

	Adjusted odds ratio (95% CI) Self-report alone (AUDIT-C+)	Adjusted odds ratio (95% CI) PEth+/AUDIT-C+
Pre-ART (n=204 persons, 455 observations)		
Months since baseline (Δ+1 month)	0.87 (0.81, 0.93)	0.97 (0.88, 1.06)
Sex=male	0.65 (0.33, 1.28)	3.14 (0.99, 9.97)
Unhealthy alcohol use prior to baseline=yes	9.25 (3.65, 23.43)	27.69 (6.49, 118.13)
On ART (n=144 persons, 430 observations)		
Months since initiated ART (Δ+1 month)	1.03 (0.93, 1.14)	1.18 (1.06-1.30)
Sex=male	1.31 (0.42, 4.09)	8.35 (2.23, 31.26)
Unhealthy alcohol use prior to baseline=yes	1.96 (0.51, 7.49)	14.52 (3.06, 68.95)

Summary of results

- Results differ dramatically when PEth was used in addition to self-report as compared to self-report alone

- No decrease in unhealthy alcohol consumption prior to ART

- Decrease in unhealthy alcohol use at ART start, followed by resumption of unhealthy drinking

Discussion

Limitations

- These results are incomplete – need to complete PEth testing

- Generalizability: The sample was of those reporting any prior year alcohol use

Implications

- Biomarkers are needed to offset the effects of under-report in this setting

- Interventions are needed to determine how best to sustain reductions after ART start

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