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# Prevalence and Risk Factors of Diabetes Mellitus among People Living with HIV Receiving Medical Care in Texas

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# Cardiovascular disease (CVD) → #1 cause of death in the US and worldwide<sup>1</sup>



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HIV therapies/immune activation/inflammations



adipose tissue changes + glucose/lipid metabolism disorders



increase CVD risk<sup>2,3</sup>

**Aging-related comorbidities on CVD risk poses an important health challenge among people living with HIV (PLWH)**

<sup>1</sup>Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics--2015 update: a report from the American Heart Association. *Circulation*. 2015;131(4):e29-322.

<sup>2</sup>Currier JS, Taylor A, Boyd F, et al. Coronary heart disease in HIV-infected individuals. *Journal of acquired immune deficiency syndromes* 1999. 2003 Aug 1; 33(4):<sup>3</sup>Nix, L. M. & Ti506-512.

en, P. C. Metabolic syndrome, diabetes, and cardiovascular risk in HIV. *Curr. HIV/AIDS Rep.* 11, 271-278 (2014).

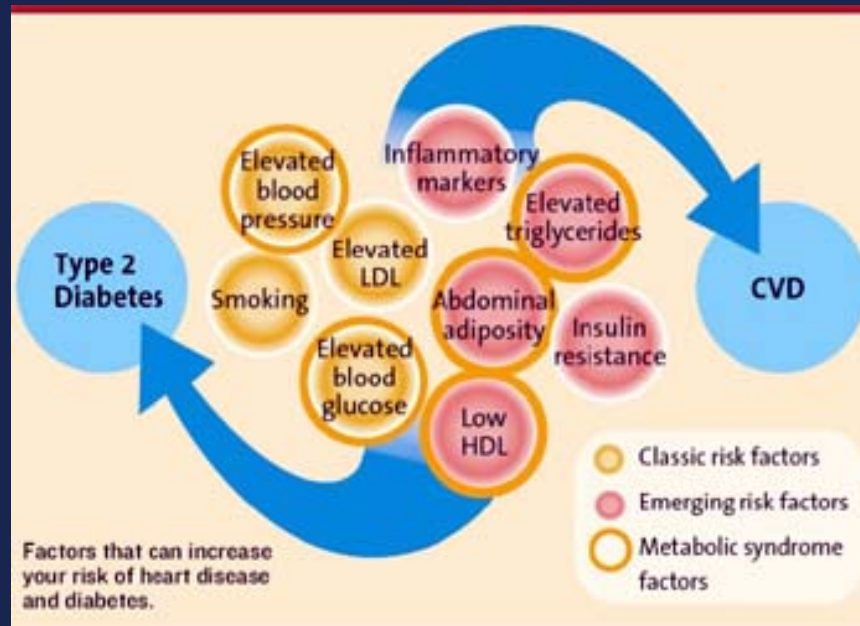
# Type 2 Diabetes Mellitus (T2DM) is a predictor of CVD



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- (T2DM) is a major risk factor for cardiovascular disease (CVD), which is the leading cause of all adult deaths in the U.S<sup>1,2</sup>



<sup>1</sup>Ford ES. Risks for all-cause mortality, cardiovascular disease, and diabetes: a summary of the evidence. *Diabetes care.* 2005;28(7):1769-78.

Diagram derived from: Cardiometabolic Risk Working Group (2011) *The Canadian journal of cardiology*, 27 (2) PMID: 21459257 [Executive Committee](#)

# 10-15% of people living with HIV have T2DM<sup>1</sup>



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- In 2017, T2DM prevalence in the US was 9.4%<sup>2</sup>
- Previous 2009-10 MMP analysis found T2DM prevalence among PLWH to be 10.3% (vs. 8.3% using NHANES)<sup>1</sup>

<sup>1</sup>Hernandez-Romieu et al. Is diabetes prevalence higher among HIV-infected individuals? Evidence from MMP and NHANES 2009–2010. *BMJ Open Diabetes Research and Care* 2017

<sup>2</sup>Center for Disease Control (2017): More than 100 million Americans have diabetes or prediabetes. Press release. <https://www.cdc.gov/media/releases/2017/p0718-diabetes-report.html>. Accessed 15 January 2019.

<sup>3</sup>Glass TR et al. Prevalence of CVD risk factors: the Swiss HIV Cohort Study. *HIV Med* 2006;7:404–10.



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# Study Objectives

- To estimate the prevalence of T2DM and identify risk factors among people living with HIV (PLWH) using MMP data 2013-2014
- To estimate the odds of having T2DM among PLWH by various sociodemographic characteristics such as age, sex, and race.

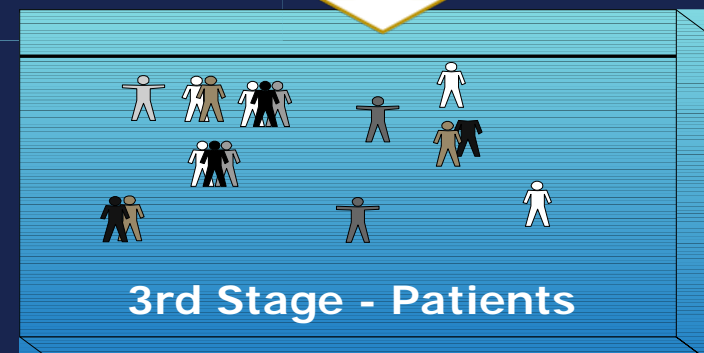
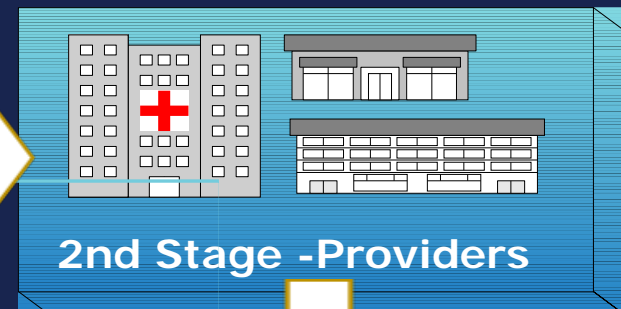
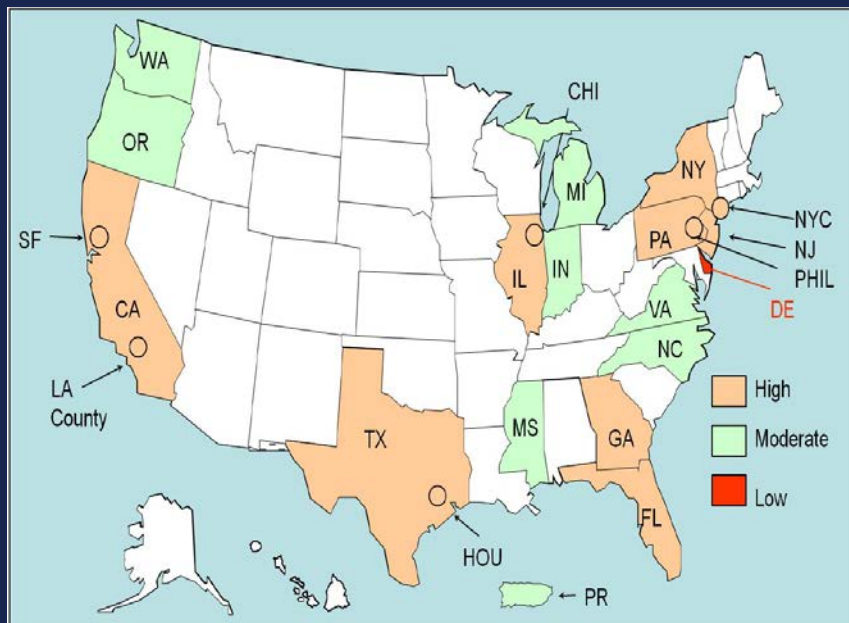
# Methods – MMP 3-Stage Sample Design



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## 1<sup>st</sup> Stage: states and dependent areas





# Outcome – T2DM

- Study sample: Texas & Houston MMP Sites using 2013-2014 medical chart and interview data (N=957)
- T2DM – identified by one of the of the following:
  - ❖ formal diagnosis in the medical chart
  - ❖ prescription of insulin or oral hypoglycemic medications
  - ❖ or most recent fasting blood glucose of  $>126$  mg/dL



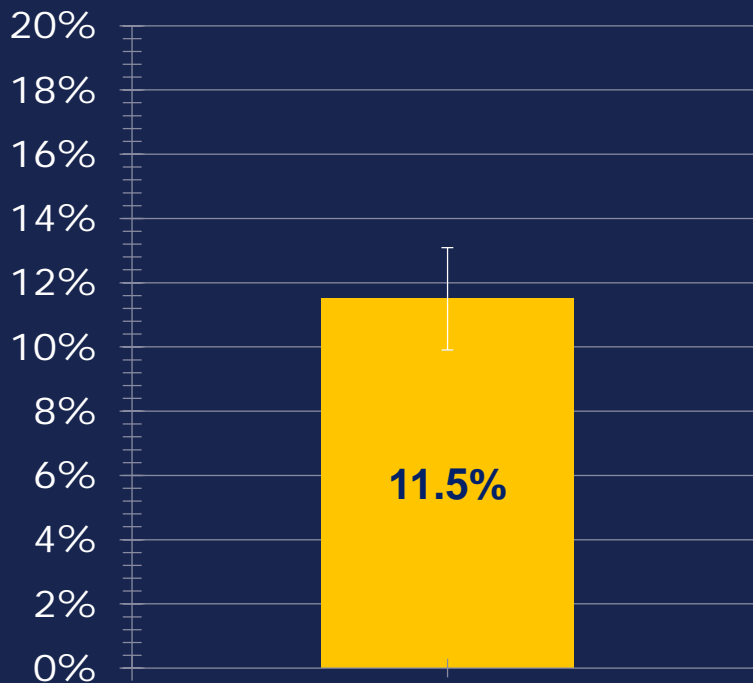
# T2DM prevalence among PLWH higher than general population



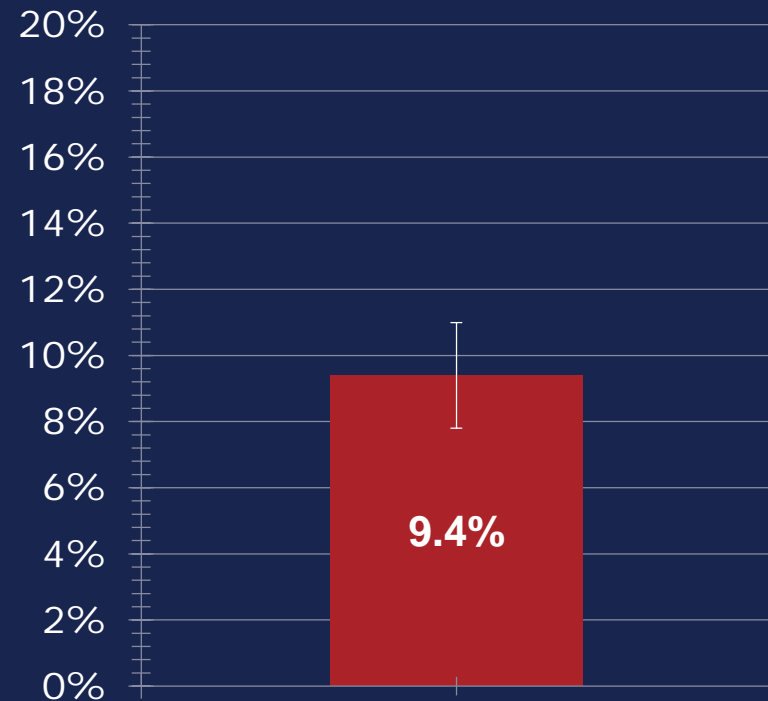
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### MMP T2DM Prevalence



### General population T2DM Prevalence





# No significant differences by sex, race, smoking, and poverty with T2DM



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Sex	T2DM
Male	11%
Female	12%

Race / Ethnicity	T2DM
White	11%
Black	11%
Hispanic	13%

Smoking	T2DM
Never	10%
Former	15%
Current	12%

Poverty	T2DM
Above	10%
Below	13%

# BMI, age, educ. & insurance are significantly associated with T2DM



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Education*	T2DM
<HS	18%
HS/equiv	10%
>HS	10%

Age*	T2DM
18-39	4%
40-49	9%
50-59	16%
60+	30%

BMI*	T2DM
<25	6%
25-<30	12%
≥30	19%

Insurance*	T2DM
Private	5%
Public	18%
Ryan White Only	8%
Unspecified	20%
None	2%

\*Statistically significant difference <0.05

# HIV Dx duration was associated with T2DM prevalence



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HIV Dx Duration*	T2DM
<5 years	10%
5-9 years	6%
≥10 years	15%

Viral Load (copies/ml)	T2DM
Undetectable (<200)	11%
≥200	12%

Mean CD4 (cells/μl)	T2DM
0-199	10%
200-349	11%
350-499	13%
≥500	11%

Current ART Use	T2DM
Yes	11%
No	11%

ART Use Duration	T2DM
<5 years	9%
5-9 years	7%
≥10 years	14%

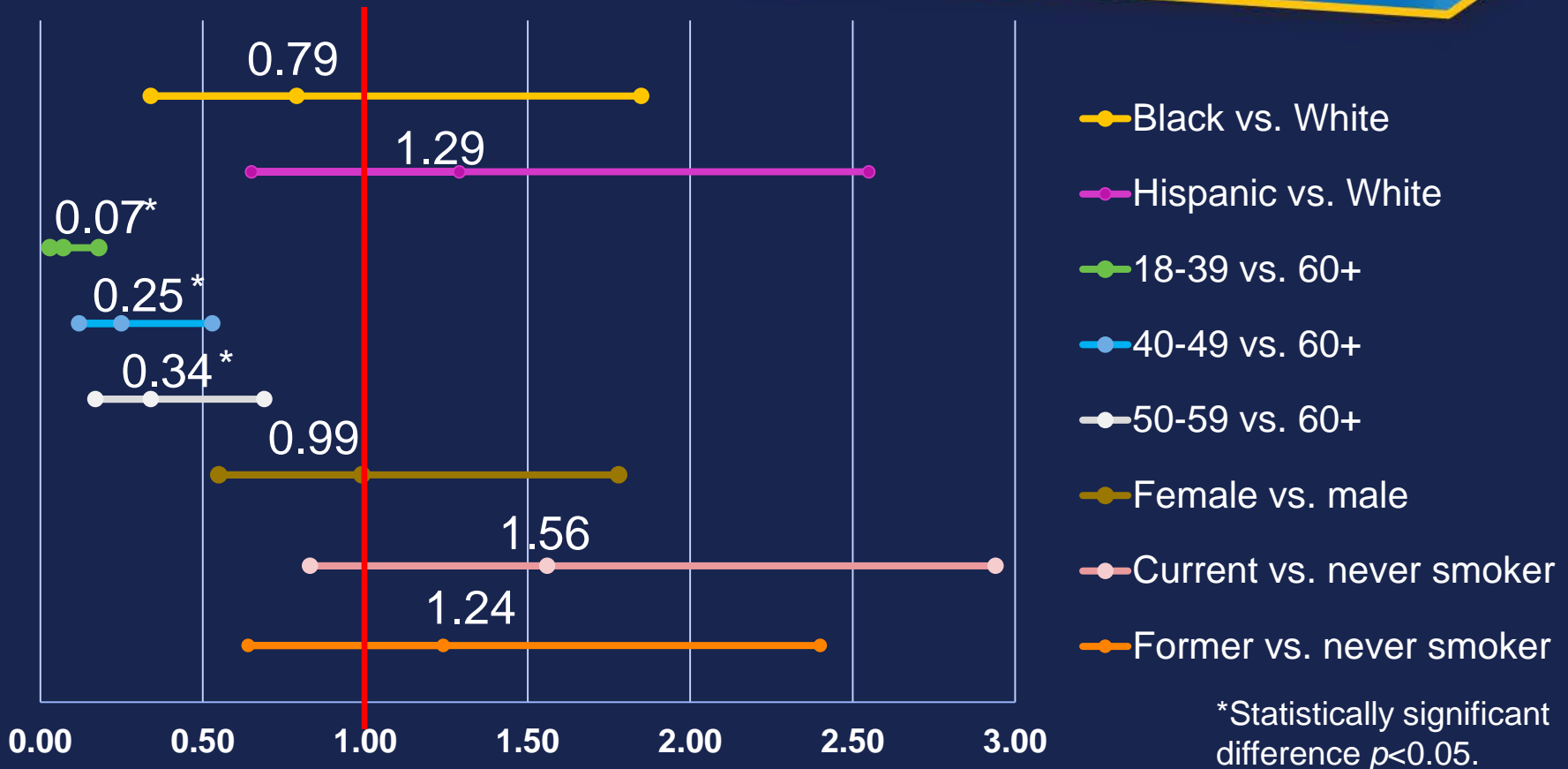
\*Statistically significant difference <0.05

# Age is linearly associated with diabetes likelihood



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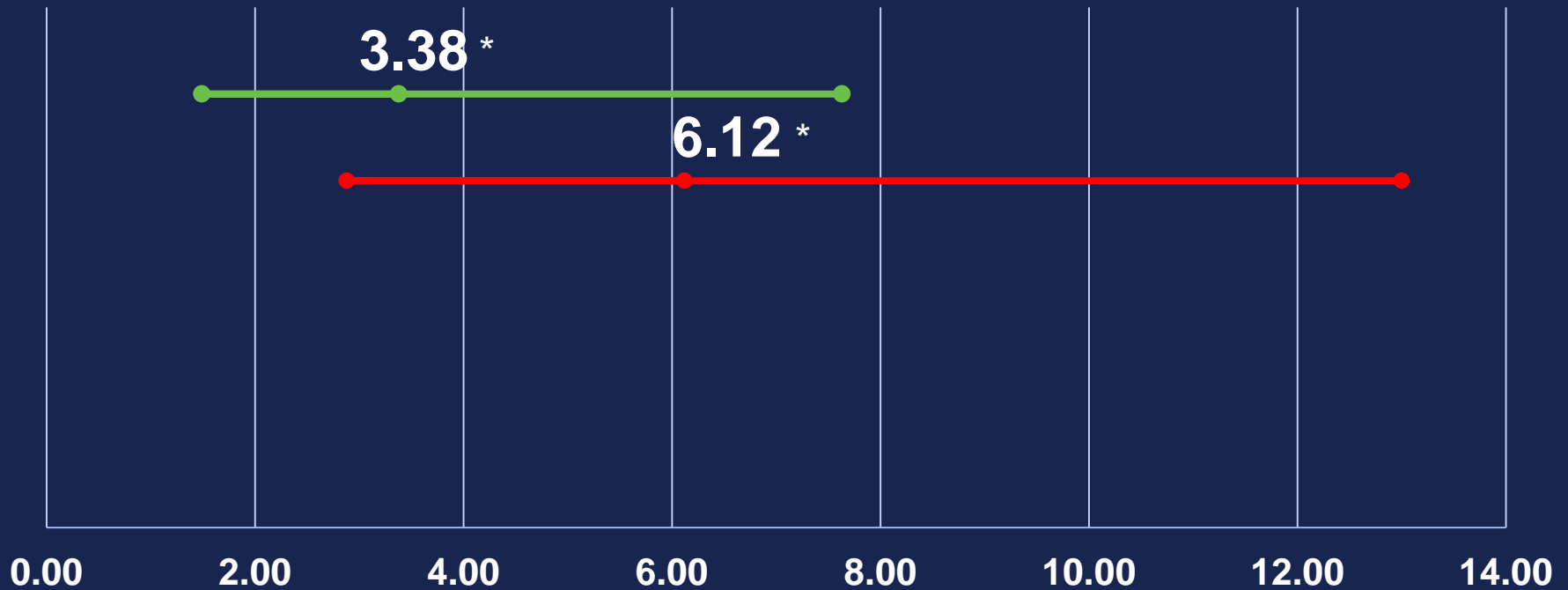
Multivariable model adjusted for age, race, birth sex, poverty, education, smoking, HIV Dx duration, CD4 count, current ART use, ART use duration, and BMI

# Higher BMI → Significant odds of having diabetes



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— BMI: 25-<30 vs. <25    — BMI: 30+ vs. <25

\*Statistically significant difference  $p < 0.01$

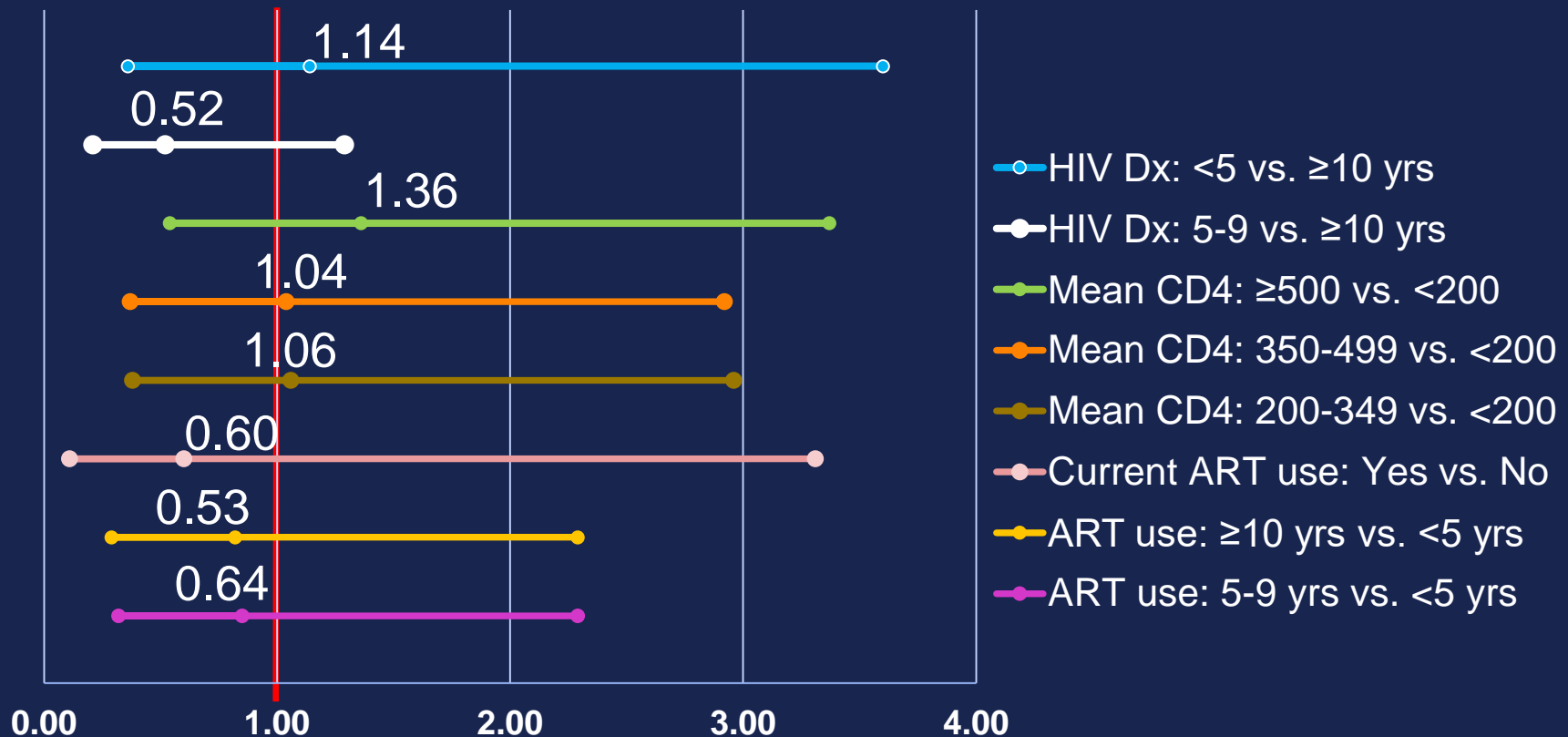
Multivariable model adjusted for age, race, birth sex, poverty, education, smoking, HIV Dx duration, CD4 count, current ART use, ART use duration, and BMI

# No significant association of HIV-related variables with T2DM odds



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Multivariable model adjusted for age, race, birth sex, poverty, education, smoking, HIV Dx duration, CD4 count, current ART use, ART use duration, and BMI



# Conclusions

- T2DM prevalence among PLWH is slightly higher than general population
- Significant predictors: Age and BMI
- PLWH <40 had lower odds of T2DM; overweight and obese PLWH had higher odds
- Long-term data on aging PLWH needed to identify modifiable risk factors for T2DM



# Implications

- Need for coordination of care between multiple providers
- Since PLWH are living longer, important to monitor age-related chronic diseases
- To improve outcomes, existing DM screening guidelines should be followed by providers
  - FBG and HbA1c obtained before and after starting ART<sup>1</sup>
- Explore improved tests for DM Dx and monitoring
  - Diagnostic limitations of HbA1c among PLWH<sup>2</sup>

<sup>1</sup>Aberg JA et al. Primary care guidelines for the management of persons infected with HIV: 2013 update by the HIV Medicine Association of the Infectious Diseases Society of America. *Clin Infect Dis* 2014;58:1–10.

<sup>2</sup>Eckhardt BJ, Holzman RS, Kwan CK, et al. Glycated Hemoglobin A(1c) as screening for diabetes mellitus in HIV-infected individuals. *AIDS Patient Care STDS* 2012;26:197–201.





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# Thank you!

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