

East Tennessee State University

Digital Commons @ East Tennessee State University

Appalachian Student Research Forum

2023 ASRF Schedule

Apr 25th, 1:40 PM - 2:00 PM

Uptake of Eye Screening Services Among People Living with Diabetes in the US; Examining the Role of Health Insurance Coverage in Access to Care

Kusse Toitole

East Tennessee State University

Melissa White

East Tennessee State University

Shimin Zheng

East Tennessee State University

Nathan Hale

East Tennessee State University

Follow this and additional works at: <https://dc.etsu.edu/asrf>

Toitole, Kusse; White, Melissa; Zheng, Shimin; and Hale, Nathan, "Uptake of Eye Screening Services Among People Living with Diabetes in the US; Examining the Role of Health Insurance Coverage in Access to Care" (2023). *Appalachian Student Research Forum*. 139.
<https://dc.etsu.edu/asrf/2023/schedule/139>

This Oral Presentation is brought to you for free and open access by the Events at Digital Commons @ East Tennessee State University. It has been accepted for inclusion in Appalachian Student Research Forum by an authorized administrator of Digital Commons @ East Tennessee State University. For more information, please contact digilib@etsu.edu.

**Uptake of Eye Screening Services Among
People Living with Diabetes in the US;
Examining the Role of Health Insurance
Coverage in Access to Care**

Appalachian Student Research Forum

April 25, 2023

**Kusse Toitole (MD), Melissa White (DrPH), Shimin
Zheng (PhD), Nathan Hale (PhD)**



**EAST TENNESSEE STATE
UNIVERSITY**

OUTLINE

- INTRODUCTION
- METHODS
- RESULTS
- DISCUSSION AND CONCLUSION
- REFERENCES
- ACKNOWLEDGMENT



INTRODUCTION

- CDC (2019): 37.1 million (14.7%) US adults (≥ 18 yrs) had diabetes
- Diabetic retinopathy - leading cause of blindness
- NCHS (2016-2017), 4.1% of adults ≥ 45 yrs lost vision due to diabetic retinopathy
- Diabetic retinopathy > 16 million people with diabetes by 2050



INTRODUCTION cont...

- Annual routine eye exam prevent 95% of vision loss caused by diabetes. (ADA)
- ~50% of people with diabetes do not receive the recommended annual eye screening exams (CDC)
- Economic, social, and health system factors influence eye screening
- Adherence with annual eye exams not improved over the past decade (2005-2016, NHANES)

Jotte A, et al, 2022

Eppley SE, et al 2019



INTRODUCTION cont...

- Scarcity of literature assessing the specific role of health insurance
- Lack of insurance coverage associated with low adherence in follow up eye exam
- Some studies showed no association between eye exam and health insurance
- **Aim of the study:** to assess if having health insurance had an impact on eye screening

Song A, et al, 2022

Kuo J, et al, 2022



METHODS

- **Data source:** 2021 BRFSS (National)
- **Study population:** Adults ≥ 18 years who self-reported living with diabetes.
- **Outcome measure:** eye exam (≥ 1 in past 1 yr)
- **Main predictor variable:** health insurance
- **Covariates (Andersen Model):**
 - age - income - course - hgbA1C
 - sex - employ - retinopathy - feet check
 - race - home - HTN - physician visit
 - edu - provider - county - insulin



METHODS cont...

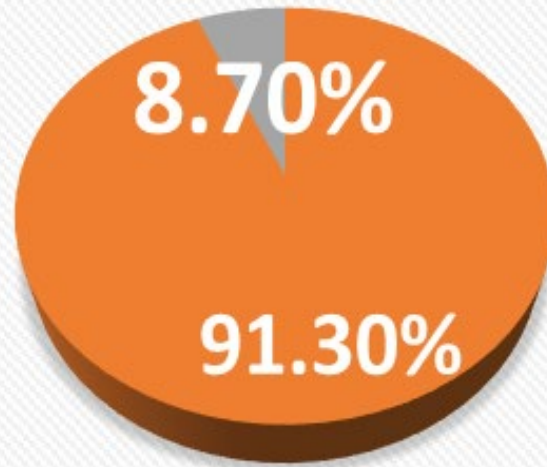
- Chi-square analysis, bivariate analysis and multivariable logistic regression with OR and 95% CI, p-value 0.05
- Eye screening \Leftarrow health insurance
- Eye screening \Leftarrow covariates
- Adjusting for other covariates \gg eye screening and health insurance



RESULTS

Health Insurance Access

N = 57,616



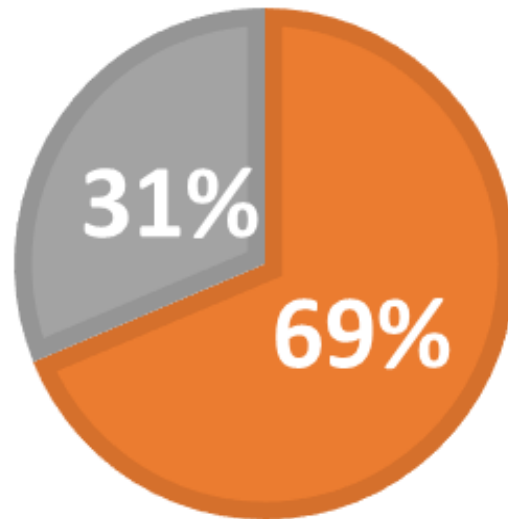
Yes No



RESULTS cont...

ANNUAL EYE EXAM STATUS AMONG ADULTS
LIVING WITH DIABETES IN THE US, N=57,616

■ Yes ■ No



RESULTS cont...

		Eye Exam	
		Yes	No
Health Insurance	Yes	14,492 (68.6%)	6,249 (31.4%)
	No	762 (44.8%)	688 (55.2%)
OR = 2.69		95%CI: 2.122 - 3.416	
		P-value: 0.000	



RESULTS cont...

	Eye Exam		Unadjusted OR	P-Value
	Yes	No		
Age (yrs)				
18-34	211 (42.7%)	255 (57.3%)	Reference	
35-54	2,229 (58%)	1,608 (42%)	1.86 (1.294-2.661)	0.001
55-64	3,409 (64.9%)	1,864 (35.1%)	2.48 (1.740-3.536)	0.000
>65	9,405 (73.9%)	3,210 (26.1%)	3.81 (2.687-5.398)	0.000
Income (\$)				
<25,000	2,853 (59.9%)	1,713 (40.1%)	Reference	
25,000 up to <50,000	3,894 (66.5%)	1,794 (33.6%)	1.33 (1.112-1.582)	0.002
>=50,000	5,325 (71%)	2,008 (29%)	1.64 (1.385-1.940)	0.000
Not Sure	3,182 (64.8%)	1,422 (35.2%)	1.23 (1.030-1.480)	0.022



RESULTS cont...

- Adjusting for other covariates, the odds of having an eye exam were 1.58 times higher among adults with insurance than those without (aOR=1.58, 95%CI=1.191-2.094)
- In multivariable analysis, association seen in;
 - age
 - sex
 - other race
 - college edu
 - income
 - home
 - provider
 - course
 - retinopathy
 - hgbA1C
 - feet check
 - physician visit



RESULTS cont...

	Eye Exam		Adjusted OR	P-Value
	Yes	No		
Health Insurance				
Insured	14,492 (68.6%)	6,249 (31.4%)	1.58 (1.191-2.094)	0.001
Not Insured	762 (44.8%)	688 (55.2%)	Reference	
Age (yrs)				
18-34	211 (42.7%)	255 (57.3%)	Reference	
35-54	2,229 (58%)	1,608 (42%)	1.53 (1.069-2.198)	0.020
55-64	3,409 (64.9%)	1,864 (35.1%)	2.04 (1.403-2.972)	0.000
>65	9,405 (73.9%)	3,210 (26.1%)	2.96 (1.991-4.410)	0.000
Income (\$)				
<25,000	2,853 (59.9%)	1,713 (40.1%)	Reference	
25,000 up to	3,894 (66.5%)	1,794 (33.6%)	1.16 (0.958-1.414)	0.127
>=50,000	5,325 (71%)	2,008 (29%)	1.26 (1.017-1.562)	0.035
Not Sure	3,182 (64.8%)	1,422 (35.2%)	1.11 (0.906-1.371)	0.307



Discussion

- Health insurance strong predictor of eye exam > other study, NHANES (2005-2016)
- Increased eye exam in older age, similar to another study at academic primary care clinic
- In general individuals with a good socio-economic status are more likely to have an eye exam

Eppley MS, et al, 2019

Kuo J, et al, 2020



Discussion cont...

- Insurance is an underpinning factor
- Improving access to insurance can potentially enhance service uptake
- Implications for addressing other socioeconomic and health system factors



REFERENCES

1. CDC. Prevent Diabetes Complications. Last Reviewed: December 19, 2022. <https://www.cdc.gov/diabetes/managing/diabetes-vision-loss.html>
2. ADA. Look Closer at Eye Health. Accessed on March 20, 2022. <https://diabetes.org/diabetes/eye-health>
3. Jotte A, Kooi W Vander, French DD. Factors Associated with Annual Vision Screening in Diabetic Adults: Analysis of the 2019 National Health Interview Survey. *Clin Ophthalmol*. 2023;17(February):613–21.
4. Eppley SE, Mansberger SL, Ramanathan S, Lowry EA. Characteristics Associated with Adherence to Annual Dilated Eye Examinations among US Patients with Diagnosed Diabetes. *Ophthalmology* [Internet]. 2019;126(11):1492–9. Available from: <https://doi.org/10.1016/j.ophtha.2019.05.033>
5. Song A, Johnson NA, Mirzania D, Ayala AM, Thompson AC, Muir KW. Factors Associated with Ophthalmology Referral and Adherence in a Teleretinal Screening Program: Insights from a Federally Qualified Health Center. *Clin Ophthalmol*. 2022;16(August):3019–31.
6. Kuo J, Liu JC, Gibson E, Rao PK, Margolis TP, Wilson B, et al. Factors Associated with Adherence to Screening Guidelines for Diabetic Retinopathy Among Low-Income Metropolitan Patients. *Mo Med* [Internet]. 2020;117(3):258–64. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/32636560><http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC7302017>



ACKNOWLEDGMENT

- Advisors: Dr Hale, Dr White, Dr Zheng
- ETSU
- Office of Research and Sponsored Programs



Thank You!

