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The Influence of Diabetes on Peripheral Arterial Disease Comorbidities in the Central Appalachian Region between 2008 and 2018.

Moboni Mokikan
East Tennessee State University

Sylvester Olubolu Orimaye
East Tennessee State University

Adeola Olubukola Awujoola
East Tennessee State University

Olufeyisayo Opeyemi Odebunmi
East Tennessee State University

Adekunle Olumide Oke
East Tennessee State University

See next page for additional authors

Author Names
Moboni Mokikan, Sylvester Olubolu Orimaye, Adeola Olubukola Awujoola, Olufeyisayo Opeyemi Odebunmi, Adekunle Olumide Oke, Arsham Alamian, David Stewart, Liang Wang, Amy Poole, Terrie Walker, Gerald Blackwell, and Hadii Mamudu

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Moboni Mokikan, MPH

mokikan@etsu.edu

Department of Biostatistics and Epidemiology

College of Public Health

East Tennessee State University

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Orimaye SO[2]; Awujoola AO[1]; Odebunmi OO[2]; Oke AO[2]; Alamian A[1]; Poole A [2]; Stewart DW[3]; Wang L[1]; Blackwell G[5]; Walker T[5]; Mamudu HM[2]

1. Biostatistics and Epidemiology Department, College of Public Health, East Tennessee State University, Johnson City, TN.
2. Department of Health Services Management and Policy, College of Public Health, East Tennessee State University, Johnson City, TN.
3. Department of Pharmacy Practice, Bill Gaton College of Pharmacy, East Tennessee State University, Johnson City, TN.
4. Ballad Health, Johnson City, TN.

Background

- Over 100 million people in the United States (U.S.) have diagnosed diabetes or pre-diabetes.
- **People with diabetes are at a higher risk of developing atherosclerosis, which is the most common cause of PAD.**
- About **20–30%** of PAD patients in the U.S. have diabetes but little is known about PAD in rural central Appalachia.

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Peripheral Arterial Disease

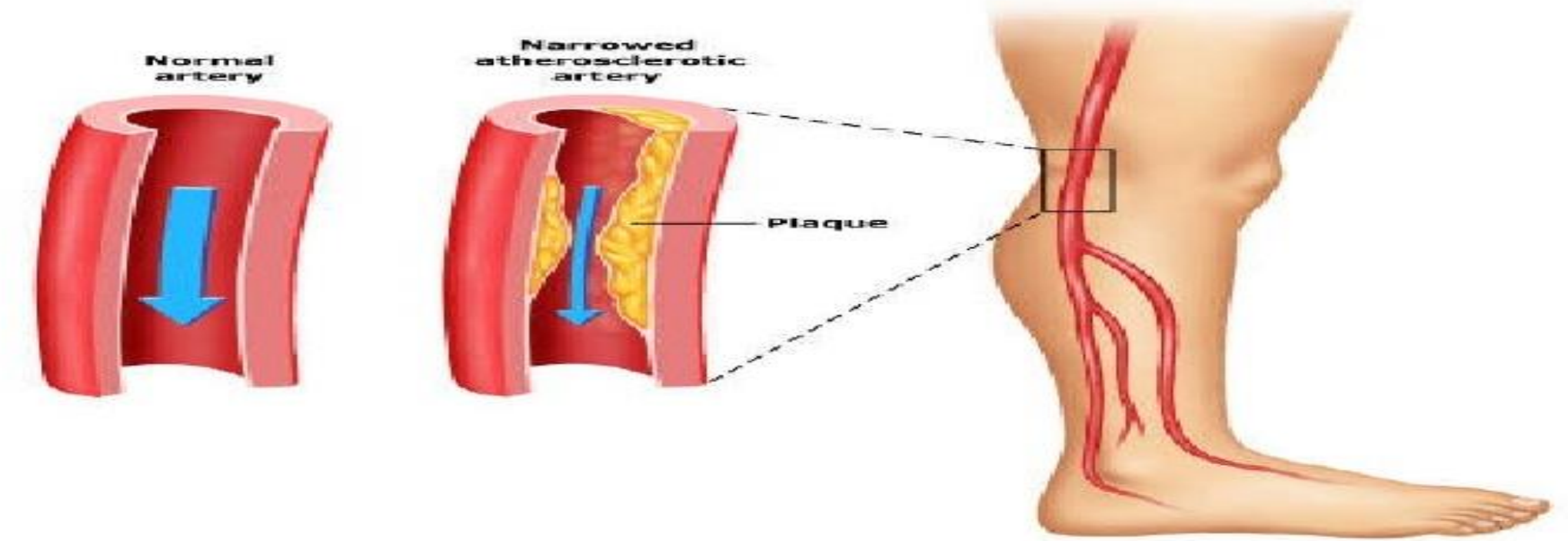


Figure 1: Map illustrating Diabetes in Appalachian region.

- The Appalachian region as a whole experiences excess mortality compared to non-Appalachian regions in the US
- Considerable differences in disease burden among age, gender or ethnic groups.
- Disease burden = **9.8 percent** experienced by the nation as a whole with
- Central **Appalachia** -13.5 % and
- North Central **Appalachia** -12.8 %
- reporting the highest percentages.

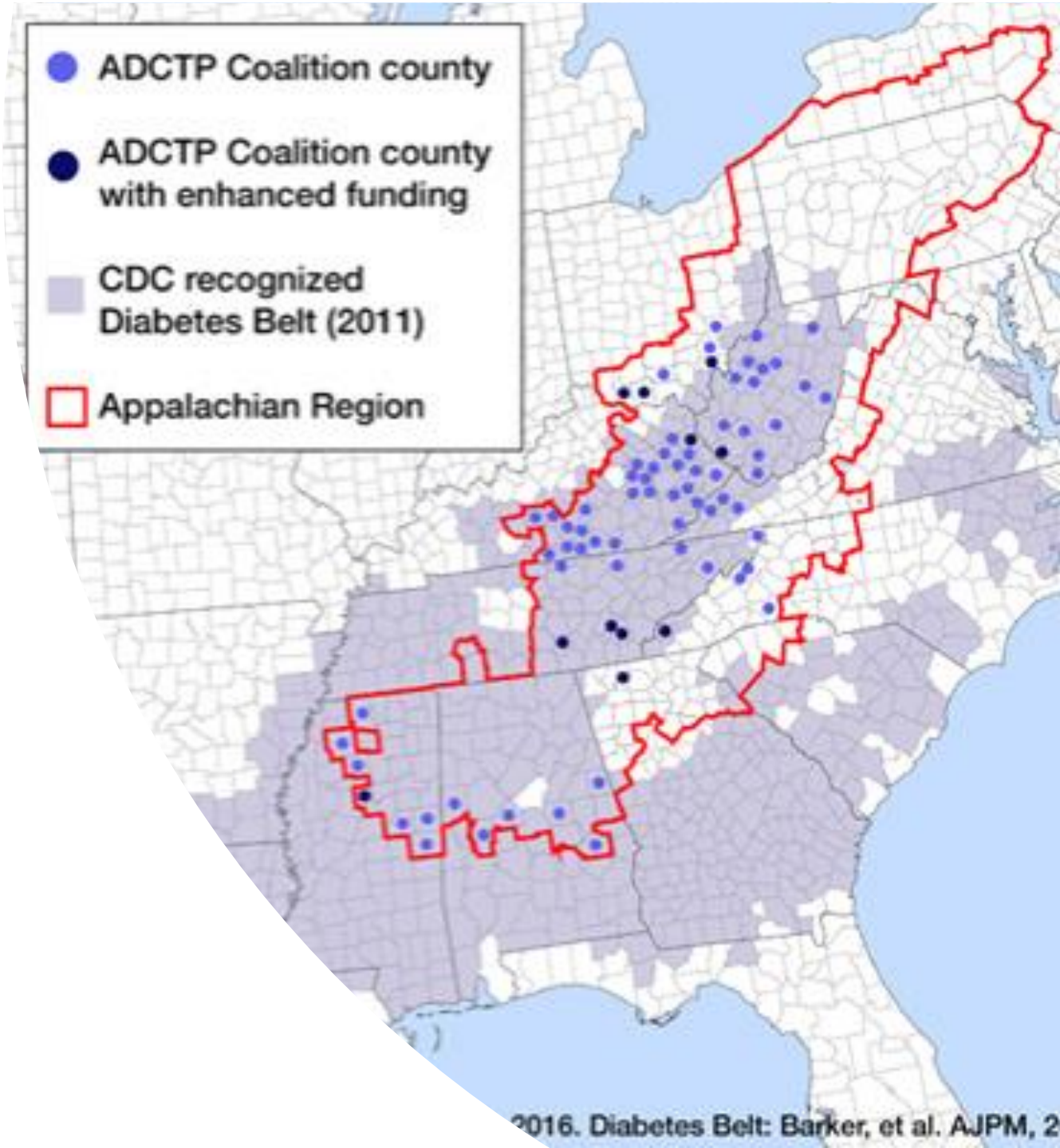
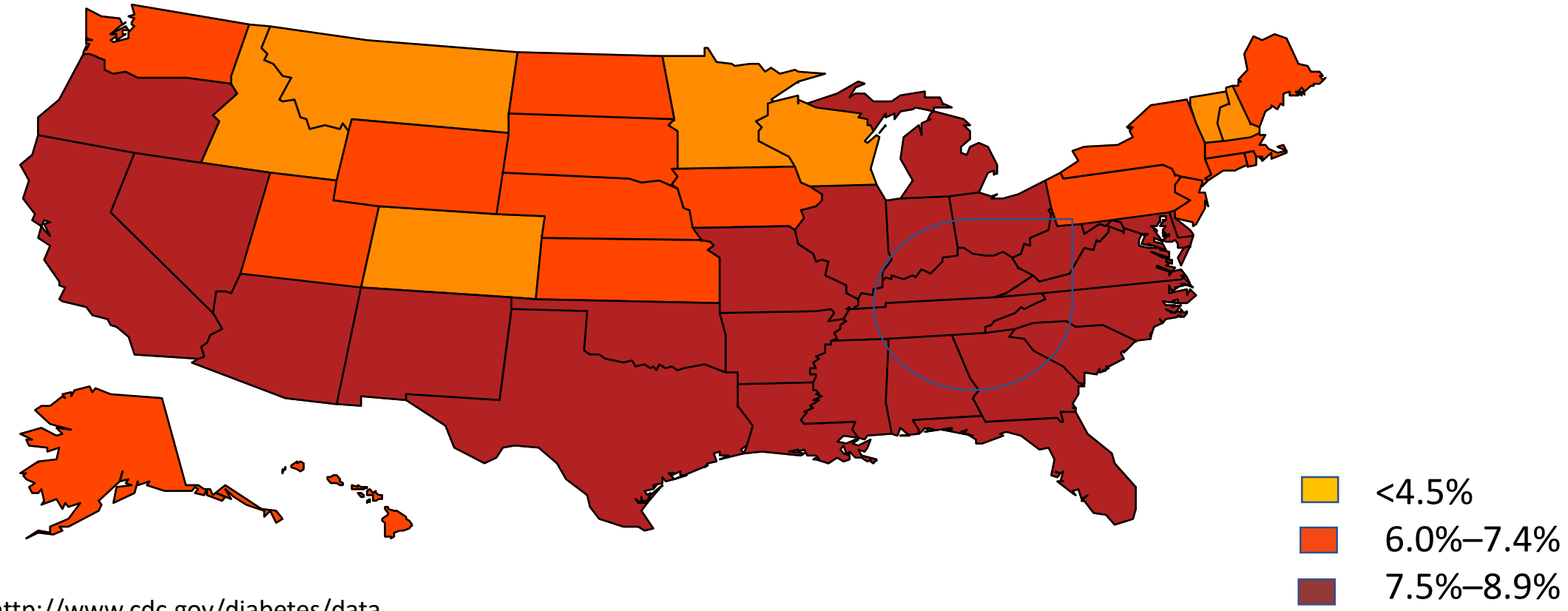


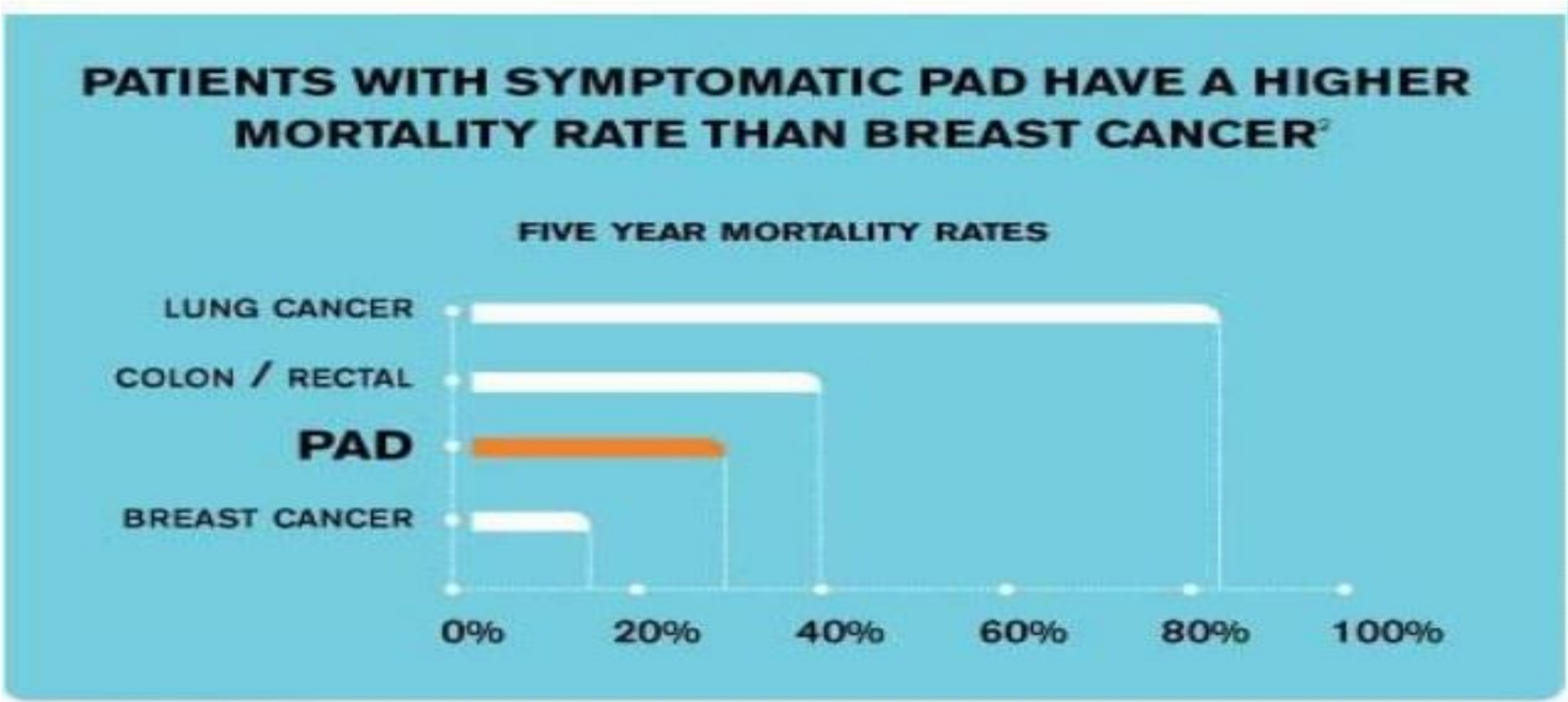
Figure 2: Age-Adjusted Prevalence of Diagnosed Diabetes Among US Adults 2015



http://www.cdc.gov/diabetes/data

CDC's Division of Diabetes Translation. United States Diabetes Surveillance System available at http://www.cdc.gov/diabetes/data

PATIENTS WITH SYMPTOMATIC PAD HAVE A HIGHER MORTALITY RATE THAN BREAST CANCER[2]



Definition: Mortality
A measure of the number of deaths in a population, in relation to the entire population, over a specific time period.

[2]Vascular Disease Foundation and the American Cancer Society

Purpose

- Therefore, this study aimed to examine the influence of **diabetes on PAD patient outcome** within the Central Appalachian region.

- If Diabetic risk factors are well controlled , could that improve overall PAD health outcomes?

Methodology

- **Study population:**

- 13,455 index cases were extracted from the Electronic Medical Records (EMR) using the ICD-9 and ICD-10 codes.

- Among all PAD cases in the study, 6153 cases were diabetics with males being 3472 and females being 2681.

- **Outcome:**

The outcome variable under study was the prevalence of diabetes in the study population

- **Risk factors and predictors:**

Myocardial Infarction (MI) history, hypertension, smoking status and hypercholesterolemia.

Socio-demographic variables considered in the study included gender, age, ethnicity and marital status

Covariates were Body Mass Index (BMI), Low density lipoproteins (LDL), High density lipoproteins (HDL), Total Cholesterol, and Triglycerides (TG).

- **Statistical Analysis:**

-**Multivariable logistic regression** was performed to examine potential risk factors of diabetes in PAD patients.

-**Independent T-tests** were used to compare the means among diabetics and non-diabetics with PAD.

NB: For all tables, B= regression coefficient Exp(B) = Odds Ratio CI = Confidence Interval, * Sig./ p-value < 0.05.

Results and discussions

Figure 3: Bar chart showing Diabetes in PAD and its prevalence in some comorbidities

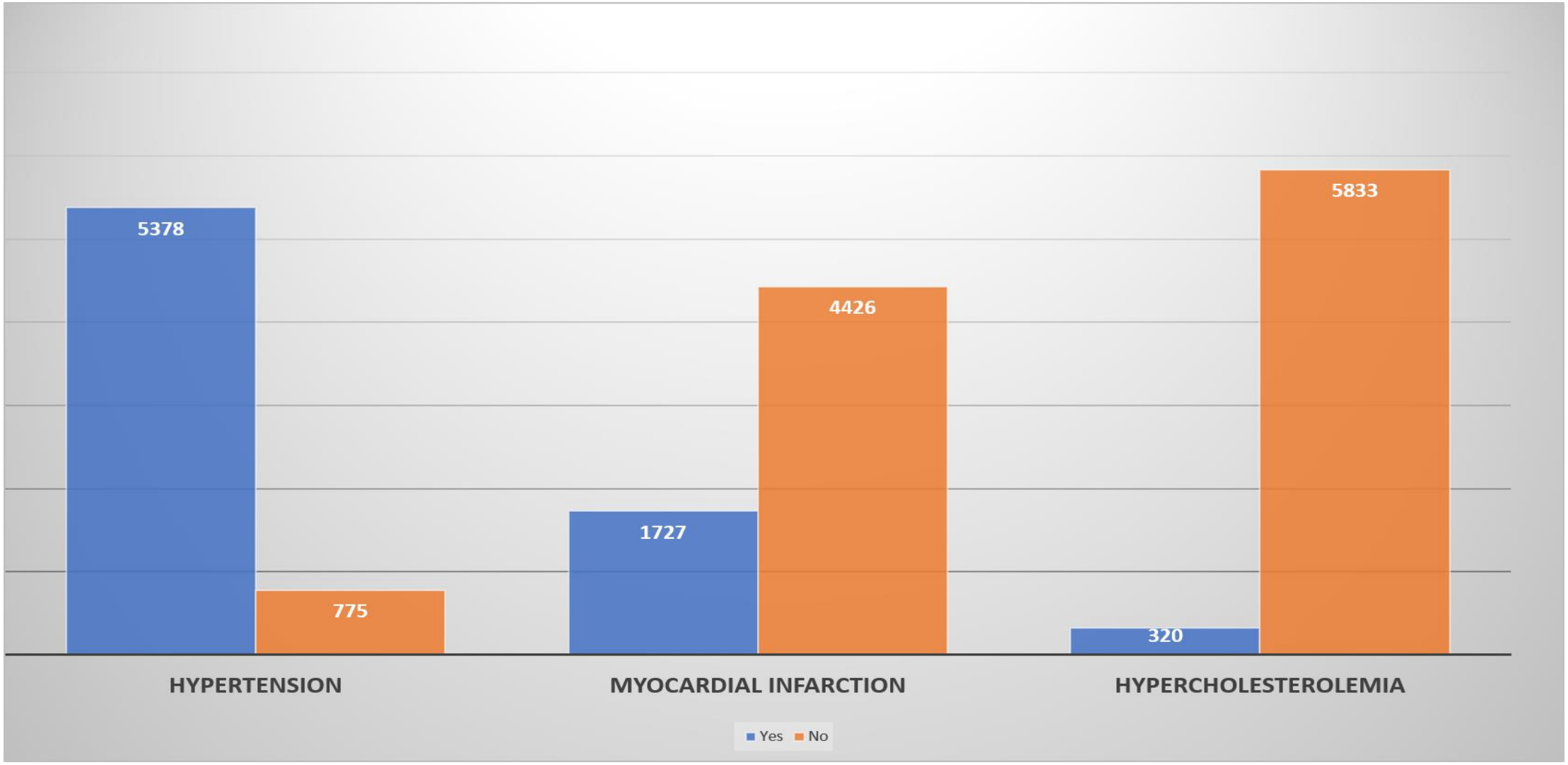


Table 1: **Statistical differences between Diabetes in PAD and Non-Diabetes PAD individuals and their association with some covariates. (Independent T-test)**

Characteristic		Sig. (2-tailed)	95% Confidence Interval of the Difference	
			lower	Upper
Age	Equal variances not assumed	0.159	-0.110	0.672
BMI	Equal variances not assumed	0.025	-13.013	-0.850
LDL Result	Equal variances not assumed	0.000	11.002	14.741
HDL Result	Equal variances not assumed	0.000	4.782	6.665
CHL Result	Equal variances Assumed	0.000	8.529	13.761
Triglycerides	Equal variances not assumed	0.000	-64.917	-46.297
MI History	Equal variances not assumed	0.000	-0.114	-0.086
Hypertension	Equal variances not assumed	0.000	-0.166	-0.140
Hypercholest-erolemia	Equal variances not assumed	0.000	-0.021	-0.007
Smoking Status	Equal variances not assumed	0.000	0.109	0.148

NB: For all tables, B= regression coefficient Exp(B) = Odds Ratio CI = Confidence Interval, * Sig./ p-value < 0.05.

- Significant predictors of the Independent T-test included
  - Age
  - Last BMI
  - LDL result
  - HDL result
  - Triglycerides
  - MI history
  - Hypertension
  - smoking status

Table 2: Statistical Analysis of Diabetes outcome in the presence of multiple predictors using multivariable logistic regression

- Significant predictors
  - BMI
  - HDL result
  - Triglycerides
  - MI history
  - Hypertension
  - smoking status

Characteristic	Sig.	OR	95% C.I. for Exp(B)	
			lower	Upper
EncounterAge	0.768	1.002	0.991	1.012
LastBMI	0.000	1.056	1.039	1.073
LDLResult	0.207	0.991	0.976	1.005
HDLResult	0.009	0.980	0.965	0.995
CHLResult	0.876	0.999	0.985	1.013
TriglyceridesEncMx	0.017	1.003	1.001	1.005
MIHistory	0.003	1.375	1.111	1.703
HypertensionRegistry	0.000	2.822	1.804	4.415
Hypercholesterolemia	0.521	1.091	0.837	1.421
Smoking Status	0.053	0.802	0.641	1.003

Table 3: Stratification by Gender: Females

				95% C.I.for EXP(B)	
	Characteristic	Sig.	OR	Lower	Upper
females	LastBMI	0.000	**1.071**	1.046	1.096
	HDLResult	0.152	**0.985**	0.966	1.005
	MIHistory	0.274	**1.163**	0.887	1.525
	HypertensionRegistry	0.002	**2.691**	1.457	4.971

Table 4: Stratification by Gender: Males

				95% C.I.for EXP(B)	
	Characteristics	Sig.	OR	Lower	Upper
males	TriglyceridesEncMx	0.044	**1.003**	1.000	1.006
	HypertensionRegistry	0.002	**2.691**	1.457	4.971
	Smoking Status	0.019	**0.706**	0.528	0.944

Table 5: Stratification by Hypertension

Hypertension Present		Sig.	OR	95% C.I.for EXP(B)	
				Lower	Upper
	LastBMI	0.000	**1.056**	1.038	1.073
	HDLResult	0.025	**0.982**	0.966	0.998
	TriglyceridesEncMx	0.014	**1.003**	1.001	1.006
	MIHistory	0.003	**1.379**	1.111	1.710

Table 6: Stratification by MI

MIHistory		Sig.	OR	95% C.I.for EXP(B)	
				Lower	Upper
Present	LastBMI	0.000	**1.074**	1.039	1.111
Absent	LastBMI	0.000	**1.052**	1.033	1.072
	TriglyceridesEncMx	0.018	**1.004**	1.001	1.007
	HypertensionRegistry	0.000	**2.938**	1.833	4.707

Conclusion

- **Diabetes** is a major risk factor for **PAD**.
- CVD risk factors are strongly associated with PAD comorbidities and are worsened in the presence of diabetes.
- **HDL** seemed to be negatively associated with the predictor variables and may be protective and Hypertension is strongly positively associated.
- We suggest that hospitals and health care systems should strongly control for the risk factors of diabetes and adopt a multi-risk-factor approach for improving health outcomes for PAD patients.

Acknowledgement

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