	Arya (2018)	Hughes (2019)	Fanaroff (2021)	Kassavin (2024)
Population	Patients with incident symptomatic PAD Identified with: ICD-9 Codes Database: Veteran's Health Administration Corporate Data Warehouse N = 155,647 Date Range: 2003-2014	Patients admitted with critical limb ischemia (secondary to PAD) Identified with: N/A Database: National Inpatient Sample Database N= 162,249 Date Range: 2005-2014	Medicare patients with lower extremity amputation due to PAD Identified with: ICD-9 & ICD-10 Codes Database: Medicare 100% Hospital Data Claims & Annual Medicare Beneficiary Summary filed N = 188,995 Date Range: 2010-2018	Patients who underwent amputation from circulatory system disorders Identified with: Diagnosis Related Groups Database: Healthcare Cost and Utilization Project State Inpatient Database N = N/A* Date Range: 2017
Exclusion Criteria	PAD code in the previous 3 years (2000-2002)	Patients who underwent revascularization and major amputation (same hospitalization) Patients with acute limb ischemia	Toe/forefoot amputations Non-PAD related amputations Rural zip codes	Upper limb and toe amputations
Study Design	Retrospective Cohort Study	Retrospective Cohort Study	Retrospective Cohort Study	Retrospective Population-Based Cross-Sectional Study
SES Markers Used	Median Household Income of most recent Zip Code Tabulation Area Neighborhood Poverty Percentage Area Deprivation Index (ADI)	Median Household income (classified by NIS predetermined quartile)	ZIP Code's Median Household income Distressed Communities Index (DCI) Proportion dual-eligible	County US Census Bureau Social Determinants of Health (SDOH) data obtained from University of Wisconsin Population Health Institute County Health Rankings and Roadmaps, Dartmouth Atlas of HC, US Census Bureau
Exposure of Interest	Race and SES	Income and Insurance Type	SES	Social Determinants of Health
Data Analysis	Cumulative Incidence Function curves Case-specific Cox proportional Hazards regression models	T-tests Multivariate logistical regression	Zero inflated negative binomial mode Multivariable Zero-inflated negative binomial regressions	Analysis of Variance Regression analysis Standard coefficients Multivariate linear Regression
Outcomes	Incident Major Amputation (TT/TF)	Major Amputation Open/endovascular revascularization	Major lower extremity amputation (excluding toe and forefoot)	Amputation secondary to circulatory system disorders (excluding UE and toe)
Key Findings	Unadjusted associations of Race and SES with Amputation and mortality: - White patients in the high SES category had the lowest amputation risk.	Black people overrepresented in the amputation group: - 26% of the pts going through amputation, 15% of the patients going through revascularization	Compared to Zip codes in the bottom quartile of amputation rate, the top quartile ZIP codes were:	Compared to counties in lowest amputation quartile, counties in highest quartile had: - More Black residents (27% to 7.9%, p<.001)

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- Amputation risks at 1,3,5, 10 years were highest for Black patients in the <u>low-SES group.</u>
- Risk in the highest group (Black, Low-SES) being double that of the lowest group at each time point.

Adjusted Associations of Race and SES with Amputation and Mortality:

- Low SES in adjusted model associated with <u>12% greater risk of amputation versus high SES.</u>
- Neighborhood poverty (HR:1.16) and ADI (HR: 1.12 for ADI-2) had similar association with increased amputation risk when used as a measure of SES in adjusted Cox models (instead of median income by ZCTA).

Predicted Amputation Risk by Race, SES< DM, CKD< PAD severity:

- <u>For all races, higher SES was associated with fewer amputations</u>

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Statistically significant decrease in odds ratios for amputation as a person progressed from one household MHI quartile to another (increasing MHI)

- Compared to private insurance patients, Medicaid, Medicare, and uninsured patients at the lowest quartiles were 2-3x more likely to undergo an amputation

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- Higher mean proportion of Black residents (17.5% vs. 4.4%, P<0.001)
- Lower average median income ($42,046 vs $55,448; P<0.001)
- Higher mean DCI score (68.9 vs 42.2; P<0.001)

Adjusted for clinical and demographic comorbidities:

- $10,000 decrease in household income associated with 5.8% (95% CI, 5.4%-6.3%) increase in amputations per 100,000 beneficiaries (P100B)
- Difference of 23 amputations per $10,000 decrease in household income
- 10-point increase in DCI associated with a 4.3% increase in amputations (P100B)

Metropolitan areas

- A $10,000 decrease in household income associated with a 4.4% increase in amputations (P100B)
- 10 point increase in DCI associated with 3.8% increase in amputations (P100B)

In large metropolitan areas, >1 clusters of high amputation rate ZIP codes co-

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- Higher rates of poverty (15.8% vs 10%, p<.001)

Unadjusted Associations Between Amputation Rate and SDOH:

County amputation rates significantly associated with prevalence of:

- Poverty (β, 0.46 [95% CI, 0.16-1.53]; P<0.001)
- Median household income had a statistically significant association with amputation (β, -0.0013 [-0.0010 to -0.0009]; P<0.001)

Adjusted association between amputation rate and SDOH

Multivariate regression analysis found:

- AA race significantly associated with amputation rate (0.06 [0.00-0.12]; P = 0.03)

Statistically significant associations between amputation rates and unemployment and poverty.

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			localized with low SES neighborhoods within the urban code	
Limitations	Limited to data available to them VA data only, 97.9% men, 82.6% white – threat to external validity, not representative of population High number of patients with unspecified disease severity	Unable to evaluate delayed presentation which could have predisposed patients to amputation Population not clearly defined Inability to tell how these patients were selected for amputation vs revascularization Zip codes assume everyone in that zip code belong to its income bracket Inpatient only Potential errors in coding or sampling – threat to internal validity Significant statistical power which could have led to statistically significant differences for small changes – threat to internal validity	Only Medicare/caid beneficiaries – threat to external validity, not representative of population Administrative data subject to miscoding – threat to internal validity Not all amputations associated with PAD	Single year evaluated Did not specifically include only patients with PAD Data for amputation rates limited to ¾ of the counties (restricted ability to draw conclusions about geographic variability) University of Wisconsin Pop. Health Institutes drew information from multiple sources with disparate methods No info on disease severity Sample size not reported *Data retrieved as HCUP SID county hospital discharge for amputation divided by Clarita's county population estimate = "rate of hospital discharge for amputation per 100,000 population"[7]
Author's Conclusion	Results showed the "independent impact of race and SES on lifetime risk of amputation in incidence PAD patients".[4] Low SES "increases the risk of amputation for each race and risk subgroup".[4]	Low income, Medicaid, and uninsured status are associated with "significantly higher odds of receiving a leg amputation as opposed to revascularization".[5]	The "burden of major limb amputation falls within urban metropolitan areas that are majority Black with low markers of SES".[6] After adjusting for clinical/demographic factors, Zip codes with low SES had higher amputation rates.[6]	Counties in higher rates of amputation quartiles were more likely to have a higher percentage of Black residents and residents living in poverty. US counties in higher amputation rate quartiles were found to be associated with more Black residents and more residents living in poverty.[7]
Study Quality	Medium	Medium	Medium	Medium

Applicability to Clinical Question	Applicable to clinical question because authors investigated how race and socioeconomic status independently affected the risk of amputation in individuals with PAD.	Applicable to the clinical question because authors investigated the effect that income and insurance had on the likelihood of major leg amputation in individuals with critical limb ischemia.	Applicable to clinical question because authors investigated the rate of lower extremity amputation in patients with PAD who are living in metropolitan areas.	Applicable to clinical question because authors examined association between SDOH and amputation rates in persons with circulatory system disorders.
	The article was published within the last 10 years, the research takes place in the United States, and the study is an observational retrospective cohort study.	The article was published within the last 10 years, the research takes place in the United States, and the study is an observational retrospective cohort study.	The article was published within the last 10 years, the research takes place in the United States, and the study is an observational retrospective cohort study.	The article was published within the last 10 years, the research takes place in the United States, and the study is an observational population-based cross-sectional study.
	Arya (2018)	**Hughes (2019)**	**Fanaroff (2021)**	**Kassavin (2024)**