

# Testing for Obstructive Sleep Apnea by Area Socioeconomic Deprivation in Six Million Adults

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## Introduction

### What is Obstructive Sleep Apnea?

Obstructive sleep apnea (OSA) is the most common sleep-related breathing disorder. OSA can occur when the throat muscles relax and block the airway while sleeping and it causes people to repeatedly stop breathing throughout the night. OSA is linked to multiple comorbid conditions such as obesity, cardiovascular disease, and diabetes.

### What is Area Socioeconomic Deprivation?

Area socioeconomic deprivation, as measured by the Area Deprivation Index (ADI), is associated with numerous adverse health and economic outcomes such as cardiovascular risk, hospital readmissions, and Alzheimer's disease. The composite ADI score is usually ranked on a scale of 1-100 and is based on 17 health disparities indicators including income, education, employment, and housing. It is used to rank relative disadvantage across communities and is a widely utilized key social determinant of health and a validated marker of health risk. The purpose of this study was to determine the association between the ADI and OSA testing and diagnosis.

In this study, we explore the relationship between the ADI and the prevalence of both testing and subsequent diagnosis for OSA. This analysis can help shed light on factors such as access to testing in different areas of socioeconomic deprivation and can help determine areas to provide more care.

## The Dataset

Our data source was the All-Payer Claims Database (APCD) for the Wisconsin Health Information Organization from 2017-2022 and linked to the publicly available ADI at the census block level.

The APCD includes claims data (e.g., healthcare visits, procedures, pharmacy information) from health insurers, employers, and Medicaid.

## Methodology

Sociodemographic variables were extracted from APCD including race, gender, and age.

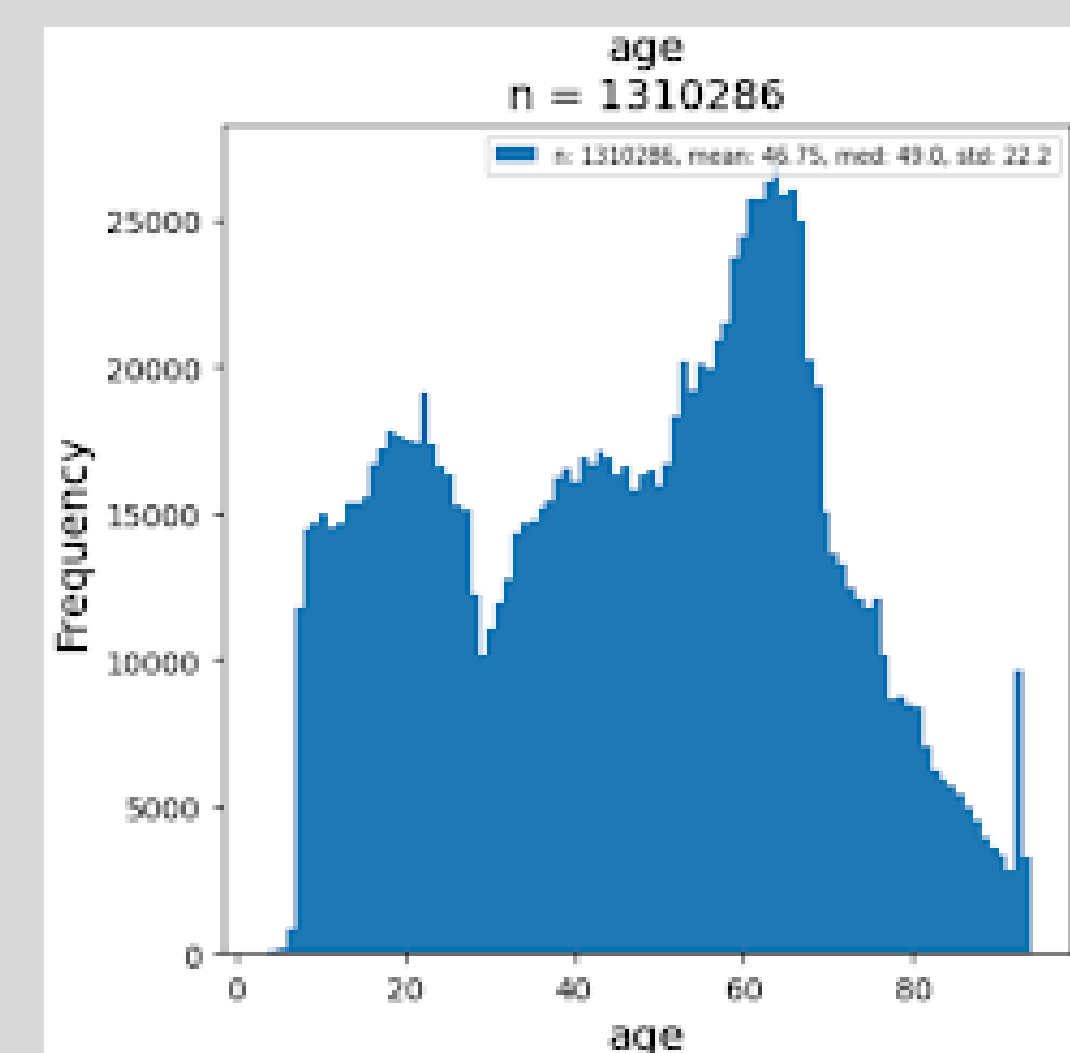
Inclusion criteria included continuous enrollment coverage for a minimum of 12-months prior to the date of OSA diagnosis (defined by ICD code G47.33) and a diagnostic sleep test, defined by CPT codes for attended polysomnograms (PSG) or home sleep apnea tests (HSATs).

ADI was measured at both state and national levels. Lower ADI is associated with areas of lower socioeconomic deprivation.

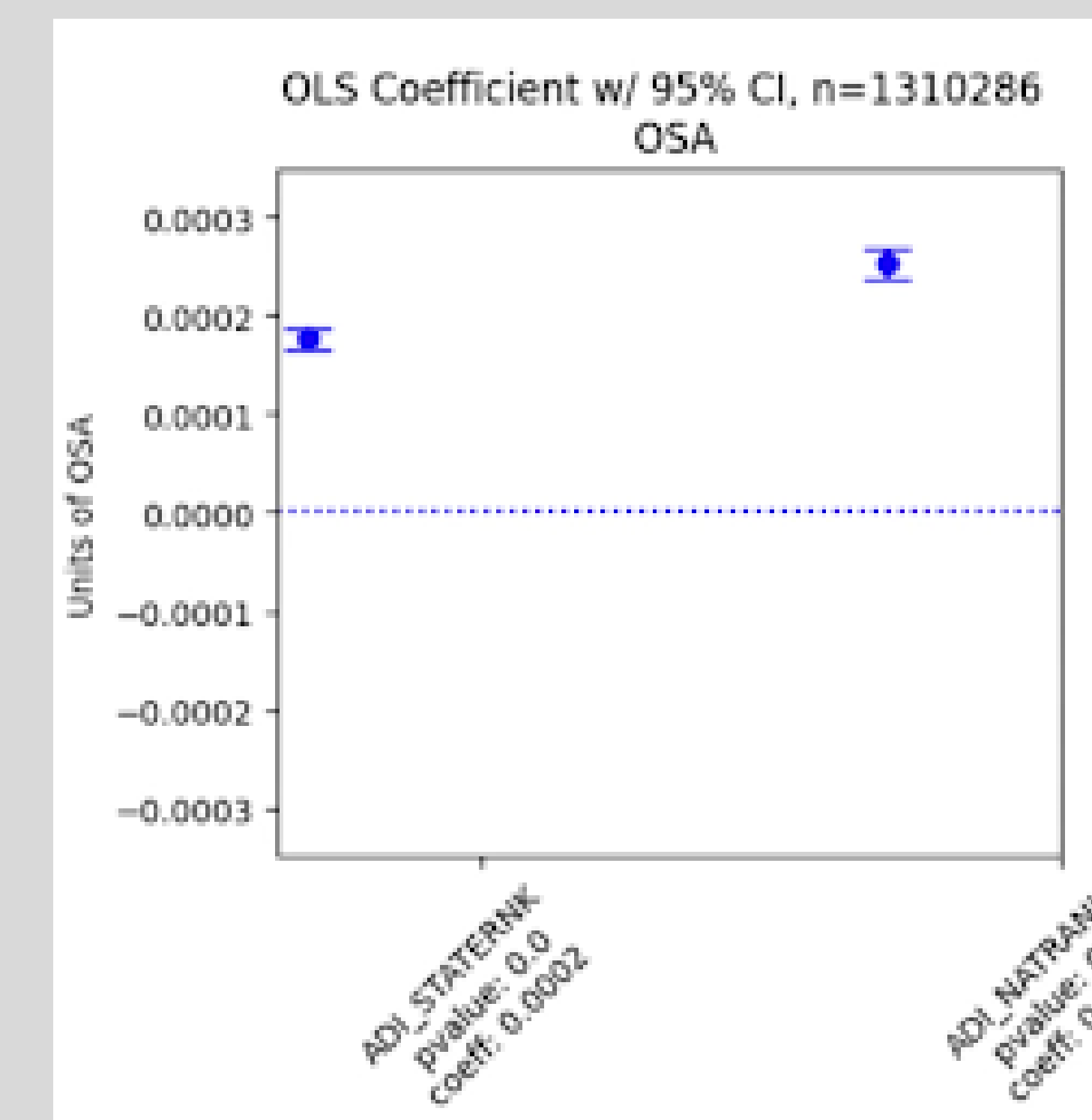
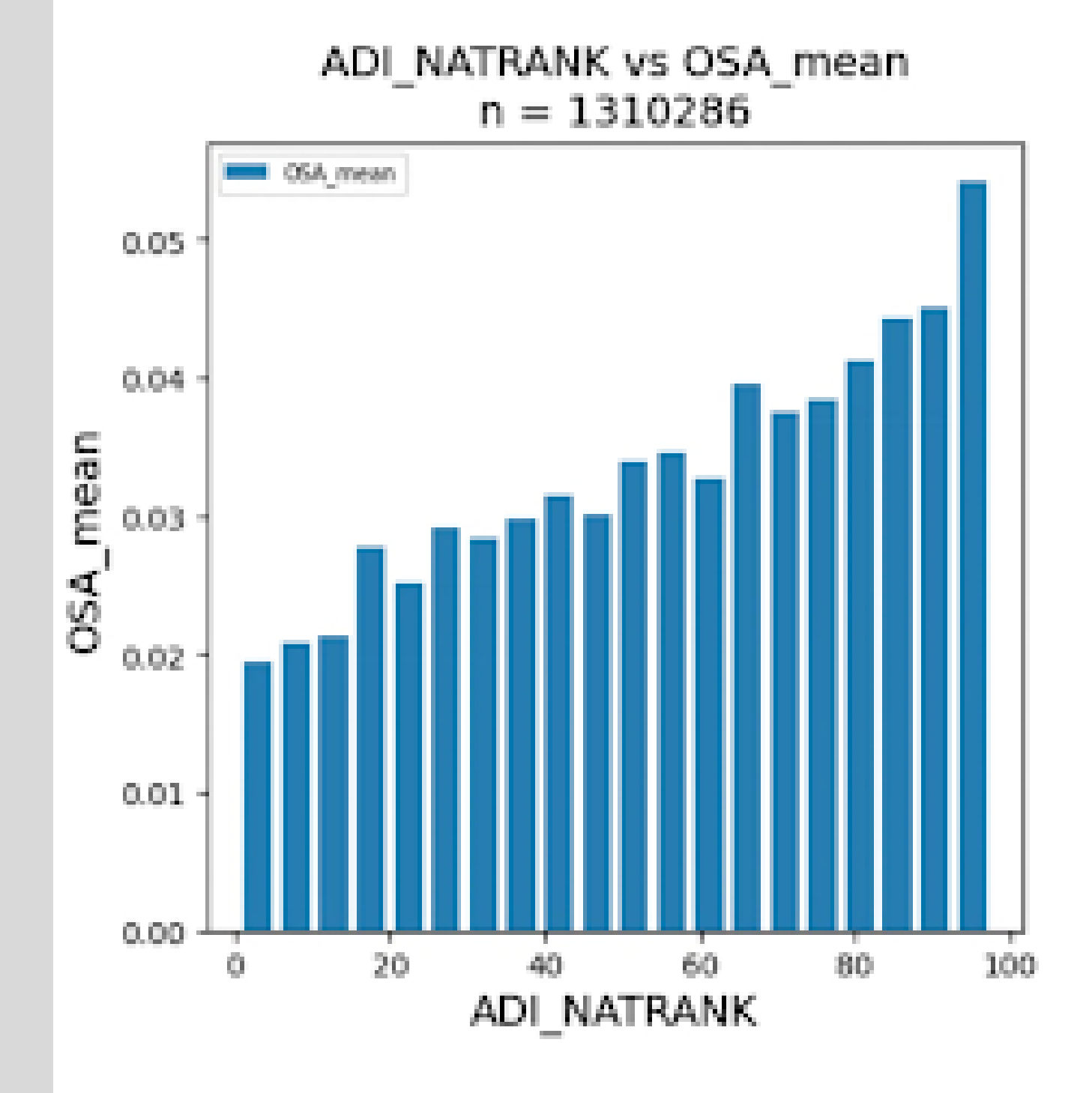
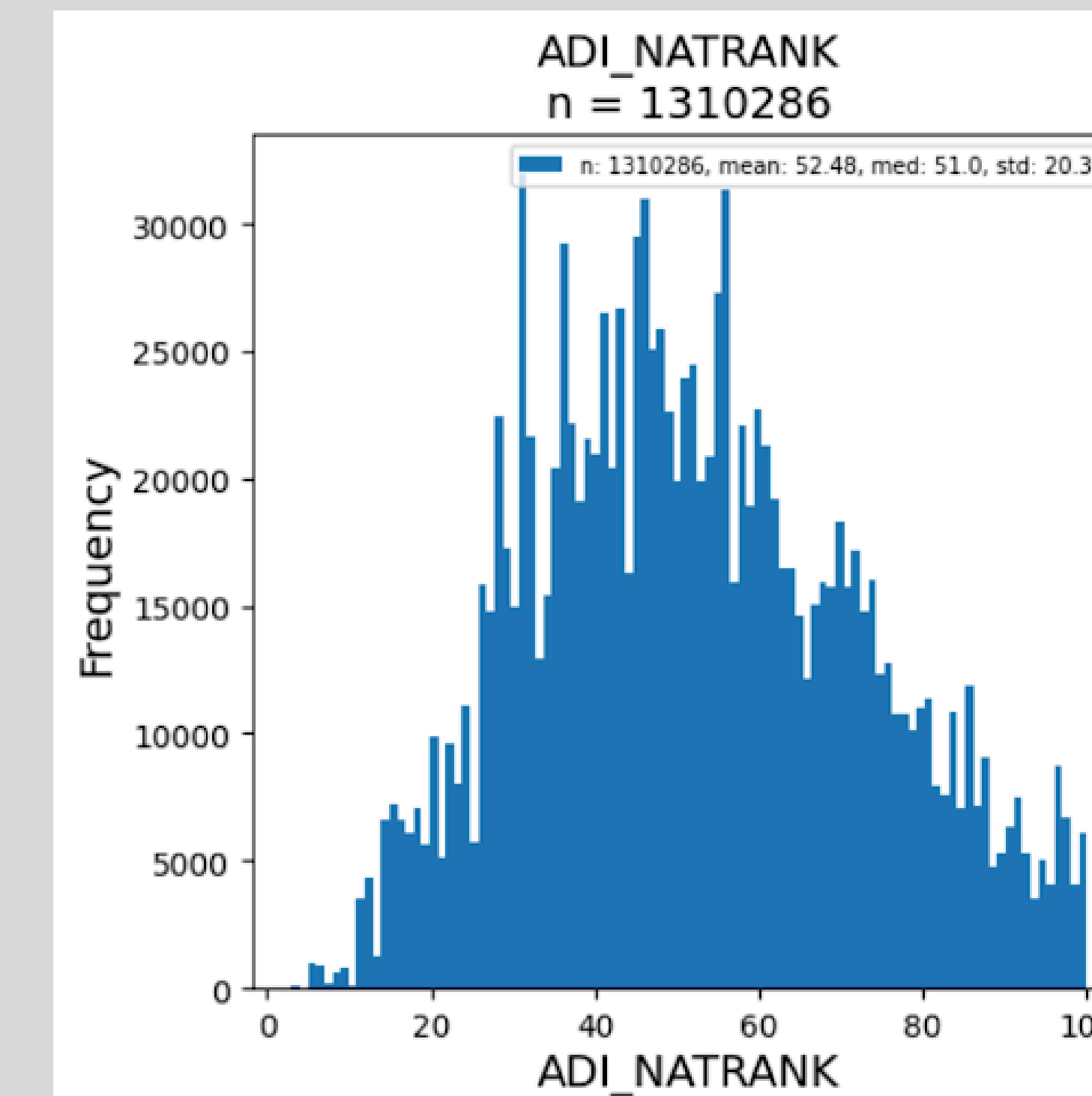
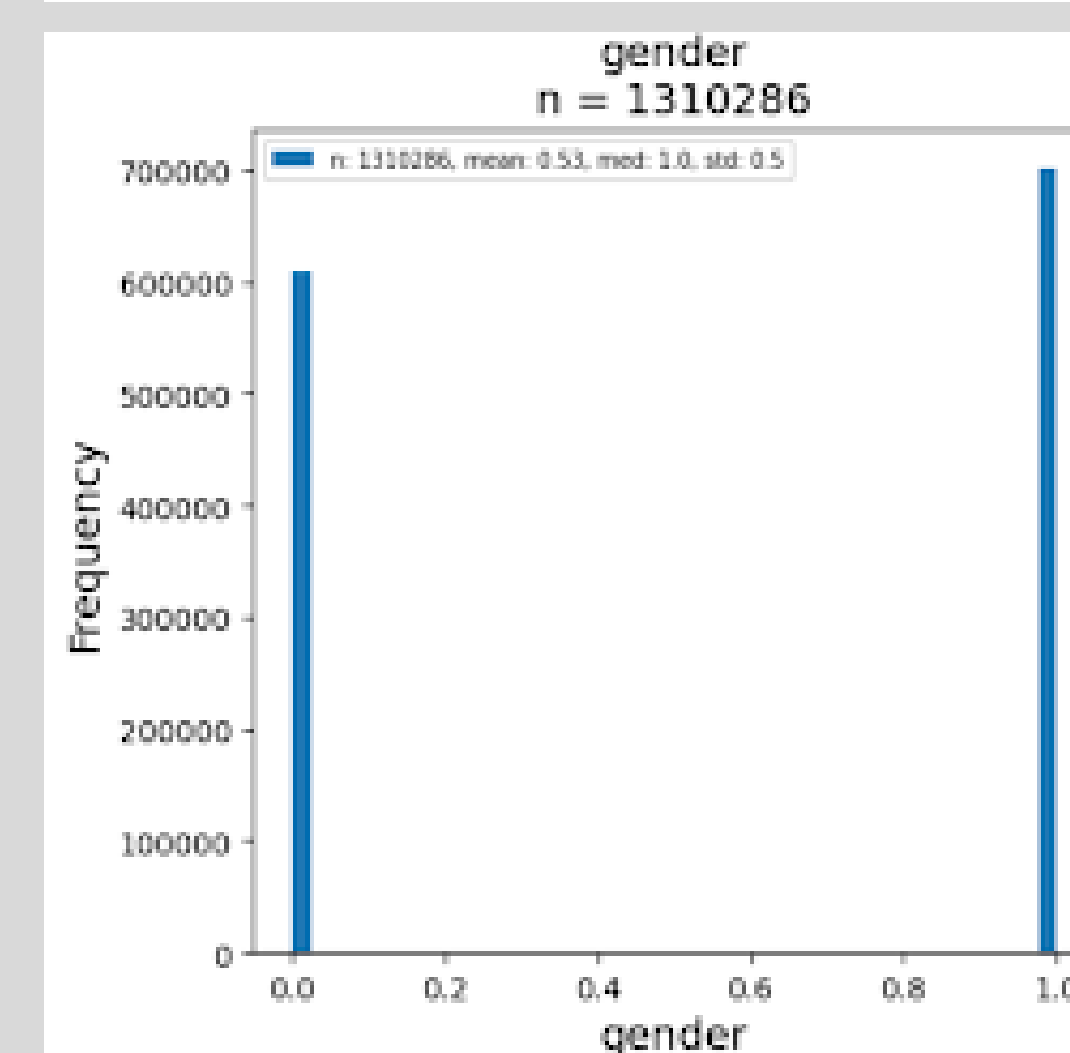
Rates of OSA testing and subsequent diagnosis were compared between individuals with OSA across the entire range of ADI scores using ordinary least squares (OLS) regression analysis.

## The Dataset

On the top, find the overall age distribution for the research.



On the bottom, find the overall gender distribution for the research, with a slightly larger group of males compared to females.



## Results

Of the n=1,310,286 participants (53% female, mean age=46.75[SD=22.2], National-ADI=52.4[SD=20.2]) that were linked and included in the final sample, n=154,821 underwent diagnostic testing for OSA, and n=43,601 were subsequently diagnosed with OSA (45% women, age=56.24 [SD=16.2], National-ADI=55.95 [SD=20.88]).

Diagnostic testing for OSA was significantly, positively associated with socioeconomic deprivation based on National-ADI (slope: 0.0002, p< 0.005) and State-ADI (slope: 0.0003, p< 0.005). The highest rates of OSA testing were observed in areas of socioeconomic disadvantage (>4.5%: ADI-decile 90-100). Conversely, the lowest OSA testing rates were observed in areas of socioeconomic advantage (<2%: ADI-decile 0-10). Relative to individuals in socioeconomically advantaged areas (low-ADI), individuals in disadvantaged areas (high-ADI) were approximately 3% more likely to be tested for OSA.

## Conclusions

Area socioeconomic deprivation measured by ADI is associated with a small but significant increase in OSA testing. Individuals in areas with higher socioeconomic advantage were less likely to be tested for OSA.

## Future Work

Future research should seek to increase access to OSA care in areas of socioeconomic disadvantage to improve sleep health equity and reduce global health disparities. We should seek to understand why individuals in disadvantaged areas have a higher testing rate and diagnosis than those in more advantaged areas.