

# Demographic Evolution in Total Knee Arthroplasty: A Retrospective Study from 2013–2023

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**INTRODUCTION:** Total knee arthroplasty (TKA) is the most frequently performed elective surgery in the U.S., with utilization projected to grow significantly due to the aging population and increasing rates of osteoarthritis. Prior studies have reported variable trends in patient age, obesity, and racial composition across regions. This study evaluates longitudinal demographic trends in patients undergoing primary TKA at a single private academic institution in Houston, Texas—a uniquely diverse region—to determine shifts in patient age, BMI, sex, race/ethnicity, and socioeconomic status (SES).

**METHODS:** A retrospective cohort analysis was conducted on patients undergoing primary TKA between January 1, 2013 and December 31, 2023. Data was extracted from the institution’s electronic medical records (Epic Hyperspace). Patients undergoing unicompartmental or revision arthroplasty were excluded. Demographic variables included age, BMI, legal sex, race, ethnicity, and SES (measured using CDC Social Vulnerability Index percentiles). Trends over time were analyzed using the Mann-Kendall test for monotonic trends, with statistical significance set at  $p < 0.05$ .

**RESULTS:**

A total of 10,139 patients were included. Mean age increased significantly from 65.82 to 67.44 years ( $\tau=0.71$ ,  $p=0.003$ ), with a corresponding proportional increase in patients aged 65–80 years (from 49.48% to 54.95%,  $p=0.029$ ) and a decrease in those aged 50–65 (from 42.33% to 37.47%,  $p=0.02$ ). Patients  $\leq 50$  and  $>80$  years did not show significant trends. Females represented 60.96% of the cohort; no significant trend was observed over time. The proportion of White patients decreased significantly from 84.11% to 77.00% ( $\tau=-0.75$ ,  $p=0.002$ ). Hispanic representation increased from 8.61% to 20.05% ( $\tau=0.64$ ,  $p=0.008$ ), and American Indian/Alaska Native patients increased from 0.37% to 1.17% ( $\tau=0.62$ ,  $p=0.01$ ). No significant trends were found for Black or Asian patients. Mean BMI remained stable ( $\tau=-0.16$ ,  $p=0.533$ ), as did the distribution among BMI subgroups ( $<30$ ,  $30-39.9$ ,  $\geq 40$ ). A non-significant increase was observed in patients from the most socially vulnerable quartile (from 23.86% to 27.64%,  $p=0.087$ ), while the least vulnerable quartile declined from 40.53% to 34.47% ( $p=0.062$ ).

**DISCUSSION AND CONCLUSION:**

The observed demographic shifts in this metropolitan cohort differ from national trends, particularly with regard to increasing patient age and greater representation of Hispanic and American Indian/Alaska Native patients. The aging trend may reflect improved perioperative care, delayed surgery until Medicare eligibility, or selective patient optimization. The racial/ethnic trends may suggest improvements in healthcare access for minority groups in this region. In contrast to prior reports of increasing obesity in TKA patients, BMI remained stable, potentially due to preoperative weight management protocols. SES trends were less conclusive but hinted at sustained or increasing access for patients in high-vulnerability communities.

From 2013 to 2023, the TKA population at this urban institution became older and more racially diverse, particularly with rising Hispanic and American Indian/Alaska Native representation. BMI remained stable and females consistently represented the majority of patients. These trends underscore the importance of regional demographic monitoring to inform surgical planning, patient education, and health equity efforts. Future research should investigate causal factors driving these trends and assess whether similar shifts are occurring nationally.

