

Title: Socioeconomic Differences in Robotic Total Knee Arthroplasty Utilization: Which Patient Populations Are Receiving Technology Assisted Care?

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INTRODUCTION: The utilization of robotic-assisted total knee arthroplasty (RA-TKA) systems has increased significantly over the past 10 years and is expected to continue rising as these technologies advance and become more accessible. This study aimed to assess the utilization of RA-TKA across communities of varying socioeconomic status, as measured by Area Deprivation Index (ADI).

METHODS: The ADI scores for zip codes nationwide were grouped into 2 groups, high ADI scores (81-100), and other ADI scores (1-80). Using these ADI groups in conjunction with a large national insurance claims database, RA-TKA and non-robotic TKA utilization from 2017 to 2023 was compared.

RESULTS: This study identified 645,920 primary TKAs from 2017 to 2023 consisting of a female / male ratio equivalent to the baseline population. Overall, RA-TKA utilization increased from 2017 to 2019, levelled off in 2020-2021, and then marginally decreased through 2023. Despite the increase in RA-TKA utilization, patients in high ADI communities consistently received the robotic TKA surgical technique at significantly lower rates than lower ADI cohorts ($p < 0.0001$). In high ADI communities, RA-TKA utilization ranged from 0.67% to 1.75% between 2017 and 2023 and increased until 2019 (1.75%) before lowering (2020-2023). The most significant gap between robotic utilization in high ADI vs. low ADI communities was in 2022 (0.95% and 26.36%, respectively).

DISCUSSION AND CONCLUSION: This study highlights a noticeable disparity between a patient's socioeconomic status, assessed by their ADI, and access to advanced surgical technology like RA-TKA systems. Despite advances in surgical technology, as seen with RA-TKA systems, these benefits may be more accessible to less deprived communities. Patients from communities with higher ADI index scores are underrepresented in receiving robotic-assisted surgery, and these findings bring to attention the need to implement targeted efforts in promoting equitable access for these patient populations.

SIGNIFICANCE/RELEVANCE: Patients in high ADI index areas utilized RA-TKA less than those in low ADI index areas, despite growth since 2017, highlighting a widening socioeconomic gap in access to advanced surgical technology.

Year	High ADI (>80)	Other ADI (≤80)
2017	0.69%	11.08%
2018	1.36%	19.94%
2019	1.75%	29.51%
2020	1.46%	27.35%
2021	1.25%	26.71%
2022	0.95%	26.36%
2023	0.67%	18.82%