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# Distressed Communities Index and Utilization of Total Hip Replacement in Maryland

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## ABSTRACT

***Background:*** *Neighborhood socioeconomic status (nSES) is a critical determinant of healthcare access and outcomes. The Distressed Communities Index (DCI) is a composite measure of economic well-being, yet its association with orthopedic surgical utilization remains unclear.*

***Objective:*** *This study examines the relationship between DCI and the utilization of total hip replacement (THR) in Maryland, as well as its impact on post-surgical outcomes, including prolonged hospital stay and readmission rates.*

***Methods:*** *We conducted a retrospective analysis using the Maryland State Inpatient Database (2016–2020). Adults aged 18 to 90 years undergoing THR were included. Multiple imputation was employed to address missing data, and logistic regression models were used to assess the association between DCI and THR utilization, extended hospital stay, and 30-day readmission rates. Models were adjusted for demographic and clinical covariates.*

***Results:*** *Among the 61,228 THR cases, the majority were White (74.2%) and female (58.9%), with a mean age of 72.5 ± 14.2 years. Individuals from the most socioeconomically distressed neighborhoods were significantly less likely to undergo THR compared to those from more affluent areas (OR=0.89, 95% CI 0.86- 0.92, p <0.001). Additionally, patients from highly distressed communities had a higher likelihood of experiencing prolonged hospital stays post- surgery (OR=1.13, 95% CI 1.04- 1.23, p=0.04). However, no significant association was found between DCI and 30-day readmission rates following THR.*

***Conclusion:*** *Our findings suggest that socioeconomic disadvantage, as captured by the DCI, is associated with disparities in THR utilization and post-surgical hospital stay in Maryland.*

## Keywords

Distressed Communities Index (DCI), Community economic distress, Socioeconomic disparities, Health disparities Maryland.

## Introduction

Total hip arthroplasty (THA) is a very common procedure in the United States, with projected increase up to 70% in the next fifteen years [1,2]. THA has proved to provide substantial pain relief and functional improvement to individuals with end-stage osteoarthritis (OA) [3,4]. With an aging national population and increasing prevalence of OA, the demand for THA is rising. Despite its widespread benefits, access to THA remains inequitable, especially for residents of socioeconomically underserved areas [5]. Prior studies show that Maryland patients with lower neighborhood socioeconomic status (nSES) and those covered by Medicaid are less likely to undergo elective joint replacement and experience worse postoperative outcomes when they do [6,7].

Metrics such as the Distressed Communities Index (DCI), Social Vulnerability Index (SVI), and the Area Deprivation Index (ADI) perform equally well to measure economic well-being and community-level barriers to care [8]. Moreover, in 2012, Maryland introduced Maryland Health Enterprise Zones, made up of communities with limited access to healthcare. Individuals from these zones were more likely to return to the emergency department and were less likely to be immediately discharged home after total joint arthroplasty (TJA) [6]. In Maryland, disparities in TKA are most pronounced in low-volume hospitals, which Medicaid patients are more likely to attend, and that Medicaid status remains a strong independent predictor of mortality for this procedure [9]. Outside of orthopedics, Maryland residents from more distressed communities had substantially higher odds of having community-acquired pneumonia (CAP) than their counterparts [10]. These mentioned studies support the hypothesis that neighborhood poverty in the state of Maryland is a barrier to adequate surgical access. While many studies have explored disparities in TKA and general surgical access, relatively few have focused on THA-specific access in distressed communities. In states like Maryland, failure to address THA inequities may worsen long-term hip OA disability in vulnerable populations.

## Methods

### Study Design and Dataset

We conducted a retrospective cohort study using the Maryland State Inpatient Database (SID) from January 1, 2016, to December 31, 2020. The SID, developed by the Healthcare Cost and Utilization Project (HCUP), contains de-identified, encounter-level data on all inpatient hospitalizations within the state [11]. This dataset includes patient demographics, comorbidities, insurance status, procedure codes, discharge outcomes, and residential ZIP codes, making it well-suited for evaluating health care utilization and outcomes across socioeconomic strata [11].

### Study Population

The study population comprised adult patients aged 18 to 90 years who underwent total hip replacement (THR) during the study period, identified using International Classification of Diseases, 10th Revision (ICD-10) procedure codes.

### Inclusion and Exclusion Criteria

Inclusion criteria were all inpatient encounters for THR among Maryland residents between 2016 and 2020. Patients were excluded if they (1) were younger than 18 or older than 90 years, (2) had missing or invalid ZIP code data (needed to assign Distressed Communities Index [DCI] scores), or (3) had incomplete data for covariates included in regression modeling.

### Exposure Variable

The primary independent variable was neighborhood socioeconomic distress, measured by the DCI. The DCI is a composite indicator of economic well-being that incorporates seven community-level metrics: percentage of adults without a high school diploma, housing vacancy rate, proportion of prime-age adults not working, proportion of residents living below the federal poverty level, median income relative to state or metropolitan benchmarks, and changes in employment and business establishments [12,13]. ZIP code–level scores range from 0 (least distressed) to 100 (most distressed) and are categorized into 5 levels: prosperous, comfortable, mid-tier, at-risk, and distressed.

### Outcome Variables

The study examined three primary outcomes:

1. **THR Utilization –** likelihood of undergoing THR among the inpatient population.
2. **Prolonged Hospital Stay –** defined as length of stay greater than the median among THR recipients.
3. **30-Day Readmission –** defined as hospital readmission for any cause within 30 days of discharge following THR.

### Covariates

Patient-level covariates included age (18–44, 45–64, ≥65 years), sex, race/ethnicity (non- Hispanic White, non-Hispanic Black, Hispanic, and other), insurance type (Medicare, Medicaid, private, self-pay, or other), smoking status, obesity category, and comorbidity burden (0, 1–2, or ≥3 comorbidities). Clinical comorbidities included hypertension, diabetes mellitus, and HIV/AIDS. Socioeconomic covariates included household income quartiles by ZIP code. Geographic variables included urbanicity (rural, small town, suburban, and urban).

### Statistical Analysis

Baseline characteristics were summarized using descriptive statistics, with group comparisons performed using Pearson chi-square tests. Multivariable logistic regression was used to estimate the association between DCI categories and each study outcome (THR utilization, prolonged hospital stay, and 30-day readmission). Models were adjusted for all covariates listed above.

Odds ratios (ORs) with 95% confidence intervals (CIs) were reported, with prosperous communities serving as the reference group. All statistical tests were 2-sided, and $P<.05$ was considered statistically significant. Analyses were performed using Stata, version 16 (StataCorp, College Station, TX).

### Results – Baseline Characteristics

Among 2,884,598 individuals in the Maryland State Inpatient Database from 2016 to 2020, a total of 61,228 (2.1%) underwent total hip replacement (THR). Compared with those who did not undergo THR, patients receiving THR were significantly older (mean age >64 years, 73.4% vs 35.7%; $P<.001$) and more frequently female (58.9% vs 56.8%; $P<.001$). Racial distribution also differed markedly: White patients comprised nearly three-quarters of the THR group (74.2% vs 53.9%), whereas Black (22.7% vs 33.5%) and Hispanic (1.2% vs 6.8%) patients were underrepresented ($P<.001$ for all).

Insurance status varied substantially across groups. The majority of THR patients were covered by Medicare (75.8% vs 39.7%), with markedly lower representation of Medicaid beneficiaries (6.4% vs 25.0%) and those with private insurance (15.9% vs 31.0%)

**Table 1:** Baseline Characteristics of Patients Undergoing Total Hip Replacement in Maryland, 2016–2020.

| Variables | | Total population (N= 2,884,598) | Total Hip Replacement (n= 61,228) | Others (n= 2,823,370) | Chi-Square | p-value |
|---|---|---|---|---|---|---|
| **Age (Years)** | 18-44 | 1,093,791 (37.92%) | 2,374 (3.88%) | 1,091,417 (38.66) | 4.30E+04 | <0.001 |
| | 45-64 | 737,426 (25.56%) | 15,652.5 (22.68%) | 723,537 (25.63) | | |
| | >64 | 1,053,381 (36.52%) | 44,965 (73.44%) | 1,008,416 (35.72%) | | |
| **Sex** | Male | 1,243,906 (43.13%) | 25,173 (41.12%) | 1,218,733 (43.18%) | 1.03E+02 | <0.001 |
| | Female | 1,639,944 (56.87%) | 36,045 (58.88%) | 1,603,899 (56.82%) | | |
| **Race/ethnicity** | White | 1,551,208 (54.31%) | 45,129 (74.19%) | 1,506,079 (53.88%) | 1.10E+04 | < 0.001 |
| | Black | 949,606 (33.25%) | 13,785 (22.66%) | 935,821 (33.48%) | | |
| | Hispanics | 191,712 (6.71%) | 724 (1.19) | 190,988 (6.83%) | | |
| | Other | 163,722 (5.73%) | 1,192 (1.96%) | 162,530 (5.81%) | | |
| **Insurance** | Self-Pay | 41,586 (1.45%) | 154 (.25%) | 41,432 (1.47%) | 3.30E+04 | <0.001 |
| | Medicare | 1,165,035 (40.50%) | 46,359 (75.79%) | 1,118,676 (39.74%) | | |
| | Medicaid | 706,268 (24.55%) | 3,902 (6.38%) | 702,366 (24.95%) | | |
| | Private | 881,817 (30.66%) | 9,694 (15.85%) | 872,123 (30.98%) | | |
| | Other | 81,764 (2.84%) | 1,056 (1.73%) | 80,708 (2.87%) | | |
| **Distressed Communities Index** | Prosperous | 388,706 (25.02%) | 10,565 (31.87%) | 378,141 (24.87%) | 1.30E+03 | <0.001 |
| | Comfortable | 417,384 (26.86%) | 9,657 (29.13%) | 407,727 (26.81% | | |
| | Mid-Tier | 344,199 (22.15%) | 5,905 (17.82%) | 338,294 (22.25%) | | |
| | At-Risk | 182,326 (11.73%) | 3,119 (9.41%) | 179,207 (11.79%) | | |
| | Distressed | 221,105 (14.23%) | 3,900 (11.77%) | 217,205 (14.28%) | | |
| **Current smokers** | Yes | 495,217 (17.17%) | 18,012 (29.42%) | 477,205 (16.90%) | 6.60E+03 | <0.001 |
| | No | 2,389,381 (82.83%) | 43,216 (70.58%) | 2,346,165 (83.10%) | | |
| **Hypertension** | Yes | 923,504 (32.01%) | 31,516 (51.47%) | 891,988 (31.56%) | 1.10E+04 | <0.001 |
| | No | 1,961,094 (67.99%) | 29,712 (48.53%) | 1,931,382 (68.41%) | | |
| **Diabetes Mellitus** | Yes | 483,351 (16.76%) | 11,031 (18.02%) | 472,320 (16.73%) | 71.1998 | <0.001 |
| | No | 2,401,247 (83.24%) | 50,197 (81.98%) | 2,351,050 (83.27%) | | |
| **HIV/AIDS** | Yes | 39,624 (1.37%) | 799 (1.30%) | 38,825 (1.38%) | 2.1781 | 0.14 |
| | No | 2,844,974 (98.63%) | 60,429 (98.70%) | 2,874,545 (98.62%) | | |
| **Household Income** | Quartile I | 354,213 (12.39%) | 6,395 (10.53%) | 347,818 (12.43%) | | |
| | Quartile II | 359,318 (12.57%) | 6,944 (11.43%) | 352,374 (12.59%) | | |
| | Quartile III | 885,300 (30.97%) | 16,700 (27.49%) | 868,600 (31.04%) | | |
| | Quartile IV | 1,260,175 (44.08%) | 30,712 (50.55%) | 1,229,463 (43.94%) | | |
| **Obesity Class** | Non-Obese | 2,456,082 (85.14%) | 50,212 (82.01%) | 2,405,870 (85.21%) | 906.2671 | <0.001 |
| | Obesity Class I | 131,615 (4.56%) | 4,007 (6.54%) | 127,608 (4.52%) | | |
| | Obesity Class II | 118,591 (4.11) | 3,363 (5.49%) | 115,228 (4.08%) | | |
| | Obesity Class III | 178,310 (6.18%) | 3,646 (5.95%) | 174,664 (6.19%) | | |
| **Comorbidity Score** | No Comorbidities | 1,101,008 (38.17%) | 5,963 (9.74%) | 1,095,045 (38.79%) | 2.10E+04 | <0.001 |
| | 1-2 Comorbidities | 520,914 (18.06%) | 15,493 (25.30%) | 505,421 (17.90%) | | |
| | ≥3 Comorbidities | 1,262,676 (43.77%) | 39,772 (64.96%) | 1,222,904 (43.31%) | | |
| **Urbanicity** | Rural | 115,774 (7.45%) | 3,200 (9.65%) | 112,574 (7.40%) | 494.5075 | <0.001 |
| | Small Town | 98,409 (6.33%) | 2,397 (7.23%) | 96,012 (6.31%) | | |
| | Suburban | 1,062,832 (68.41%) | 22,799 (68.78%) | 1,040,033 (68.40%) | | |
| | Urban | 276,705 (17.81%) | 4,750 (14.33%) | 271,955 (17.89%) | | |

(*P*<.001). Socioeconomic context, measured by the Distressed Communities Index (DCI), also showed significant disparities: individuals from prosperous or comfortable neighborhoods accounted for 61.0% of THR cases, compared with 51.7% of the non-THR group. Conversely, residents from mid-tier, at-risk, or distressed communities were less likely to undergo THR (39.0% vs 48.3%; *P*<.001).

Comorbidity burden and behavioral risk factors further differentiated the cohorts. THR patients more frequently reported hypertension (51.5% vs 31.6%) and current smoking (29.4% vs 16.9%) (*P*<.001). A higher proportion of THR patients had ≥3 comorbidities (65.0% vs 43.3%; *P*<.001), though the prevalence of diabetes mellitus was only modestly higher (18.0% vs 16.7%; *P*<.001). Rates of obesity were slightly higher among THR patients (18.0% vs 14.8%; *P*<.001).

Geographic distribution also differed. Patients undergoing THR were somewhat more likely to reside in rural (9.7% vs 7.4%) and small-town settings (7.2% vs 6.3%), but slightly less likely to live

in urban areas (14.3% vs 17.9%) (*P*<.001). Household income was skewed toward higher quartiles among THR patients, with more than half in the highest quartile (50.6% vs 43.9%; *P*<.001).

Taken together, patients undergoing THR were disproportionately older, White, Medicare- insured, from more affluent or less distressed communities, and carried a higher burden of comorbidity compared with those who did not undergo THR.

## Results – Association Between Distressed Communities Index and THR Utilization

In multivariable logistic regression models adjusting for demographic, clinical, socioeconomic, and comorbidity characteristics, neighborhood socioeconomic distress as measured by the Distressed Communities Index (DCI) was significantly associated with reduced likelihood of undergoing THR (Table 2). Compared with patients residing in prosperous communities, those from comfortable (adjusted odds ratio [aOR], 0.93; 95% CI, 0.90–0.96; *P*<.001), mid-tier (aOR, 0.87; 95% CI, 0.84–0.90; *P*<.001), at-risk (aOR, 0.83; 95% CI, 0.80–0.86; *P*<.001), and distressed (aOR, 0.89; 95% CI, 0.86–0.92; *P*<.001) neighborhoods were significantly less likely to undergo THR. The association displayed a graded pattern, with progressively lower odds of THR utilization observed as community distress increased. Patients from at-risk neighborhoods exhibited the largest reduction in odds, followed closely by those from mid-tier and distressed areas (Table 2).

## Results – Association Between Distressed Communities Index and Prolonged Hospital Stay

In adjusted analyses, higher levels of neighborhood socioeconomic distress were associated with greater odds of prolonged hospital stay following THR (Table 3). Compared with patients from prosperous communities, those from mid-tier neighborhoods had significantly higher odds of extended hospitalization (adjusted odds ratio [aOR], 1.09; 95% CI, 1.02–1.16; *P*=.007), as did those from distressed neighborhoods (aOR, 1.13; 95% CI, 1.04–1.23; *P*=.004). Patients residing in comfortable (aOR, 1.06; 95% CI, 1.00–1.12; *P*=.064) and at-risk neighborhoods (aOR, 1.08; 95% CI, 1.00–1.16; *P*=.066) demonstrated a trend toward higher risk of prolonged hospital stay, although these associations did not reach statistical significance. The findings suggest a graded association between increasing neighborhood distress and likelihood of extended hospitalization, with the strongest effects observed among individuals living in distressed communities (Table 3).

**Table 2:** Association Between Distressed Communities Index and Total Hip Replacement Utilization in Maryland.

| Distressed Communities Index | Odds Ratio | Std. Err. | t | 95% CI | | P Value |
|---|---|---|---|---|---|---|
| Prosperous | Reference | | | | | |
| Comfortable | 0.929 | 0.013 | -5.29 | 0.903 | 0.955 | <0.001 |
| Mid-Tier | 0.869 | 0.015 | -8.21 | 0.84 | 0.900 | <0.001 |
| At-Risk | 0.830 | 0.016 | -9.95 | 0.8 | 0.862 | <0.001 |
| Distressed | 0.887 | 0.017 | -6.4 | 0.855 | 0.921 | <0.001 |

Multivariable logistic regression models estimating the association between neighborhood socioeconomic distress, measured by the Distressed Communities Index (DCI), and total hip replacement (THR) utilization. Models were adjusted for age, sex, race/ethnicity, insurance status, comorbidities, smoking, obesity, household income, and urbanicity. Odds ratios (ORs) are reported relative to residents of prosperous communities (reference group). CI indicates confidence interval.

**Table 3:** Association Between Distressed Communities Index and Prolonged Hospital Stay Following Total Hip Replacement.

| Distressed Communities Index | Odds Ratio | Std. Err. | t | 95%CI | | P Value |
|---|---|---|---|---|---|---|
| Prosperous | Reference | | | | | |
| Comfortable | 1.057 | 0.031 | 1.9 | 0.997 | 1.121 | 0.064 |
| Mid-Tier | 1.089 | 0.033 | 2.78 | 1.024 | 1.158 | 0.007 |
| At-Risk | 1.076 | 0.042 | 1.88 | 0.995 | 1.164 | 0.066 |
| Distressed | 1.133 | 0.046 | 3.09 | 1.044 | 1.23 | 0.004 |

Multivariable logistic regression models estimating the association between neighborhood socioeconomic distress, measured by the DCI, and prolonged hospital stay (defined as >median length of stay) among patients undergoing total hip replacement in Maryland, 2016–2020. Models were adjusted for age, sex, race/ethnicity, insurance status, comorbidity burden, smoking, obesity, household income, and urbanicity. Odds ratios (ORs) are reported relative to residents of prosperous communities (reference group). CI indicates confidence interval.

## Results – Association Between Distressed Communities Index and 30-Day Readmission

After adjustment for demographic, clinical, and socioeconomic factors, no consistent association was observed between neighborhood socioeconomic distress and 30-day hospital readmission following THR (Table 4). Compared with patients from prosperous neighborhoods, those from comfortable (adjusted odds ratio [aOR], 0.94; 95% CI, 0.86–1.02; *P*=.13), mid-tier (aOR, 0.93; 95% CI, 0.85–1.02; *P*=.12), and distressed (aOR, 0.96; 95% CI, 0.87–1.05; *P*=.33) communities did not differ significantly in odds of readmission. Patients residing in at-risk neighborhoods demonstrated significantly lower odds of readmission (aOR, 0.84; 95% CI, 0.76–0.93; *P*=.001). However, this finding did not follow the graded pattern observed in analyses of THR utilization and length of stay, suggesting that readmission risk may not be systematically influenced by neighborhood socioeconomic distress (Table 4).

Multivariable logistic regression models estimating the association between neighborhood socioeconomic distress, measured by the Distressed Communities Index (DCI), and 30-day hospital readmission after total hip replacement in Maryland, 2016–2020. Models were adjusted for age, sex, race/ethnicity, insurance status, comorbidity burden, smoking, obesity, household income, and urbanicity. Odds ratios (ORs) are reported relative to residents of prosperous communities (reference group). CI indicates confidence interval.

**Table 4:** Association Between Distressed Communities Index and 30-Day Readmission Following Total Hip Replacement.

| Distressed Communities Index | Odds Ratio | Std. Err. | t | 95% CI | | P Value |
|---|---|---|---|---|---|---|
| Prosperous | Reference | | | | | |
| Comfortable | 0.938 | 0.039 | -1.54 | 0.863 | 1.019 | 0.129 |
| Mid-Tier | 0.929 | 0.044 | -1.57 | 0.845 | 1.021 | 0.123 |
| At-Risk | 0.836 | 0.043 | -3.44 | 0.755 | 0.927 | 0.001 |
| Distressed | 0.955 | 0.046 | -0.97 | 0.869 | 1.049 | 0.333 |

## Discussion

This study examined the association between neighborhood socioeconomic status, measured by the Distressed Communities Index (DCI), and the utilization and outcomes of total hip replacement (THR) among individuals with osteoarthritis in Maryland. Several important findings emerged. First, residents of the most prosperous neighborhoods had the highest incidence of undergoing THR, and with each increasing level of neighborhood socioeconomic distress, there was a corresponding reduction in the likelihood of receiving THR. Second, while there was no significant relationship between DCI and prolonged hospital stay overall, individuals residing in the poorest neighborhoods were significantly more likely to experience hospitalizations exceeding the median length of stay. Third, no association was observed between DCI and the risk of readmissions following THR, except that residents of at-risk neighborhoods demonstrated a 17% reduction in readmission risk compared to residents of the most prosperous neighborhoods.

### Utilization of THR and Neighborhood Socioeconomic Status

Our finding that residents of more prosperous neighborhoods had the highest incidence of THR is consistent with existing literature documenting disparities in access to elective orthopedic procedures [7,14]. Previous studies have shown that individuals in higher socioeconomic strata are more likely to undergo THR, reflecting differences in healthcare access, specialist availability, insurance coverage, and health literacy [7,14]. Wealthier neighborhoods often have greater proximity to hospitals with orthopedic programs, shorter wait times, and higher provider density, which collectively enhance access to surgical interventions [14]. In contrast, residents of distressed communities may face significant structural barriers, including; limited access to subspecialty care, inadequate insurance coverage, and transportation challenges which reduce the likelihood of receiving elective surgery, even when clinically indicated [15,16]. Moreover, the observed gradient, where the risk of THR declines progressively with worsening neighborhood socioeconomic status, highlights the influence of social determinants of health. This finding suggests that disparities in THR utilization are not restricted to the extremes of wealth and poverty but represent a continuum, where each step down the socioeconomic ladder is associated with reduced likelihood of surgical intervention. This pattern underscores the need for policies that address inequities at multiple levels of neighborhood distress, rather than focusing solely on the most disadvantaged populations.

### Length of Stay and Neighborhood Context

Interestingly, there was no overall association between DCI and prolonged hospital stay following THR, with the exception of residents from the poorest neighborhoods who experienced the highest risk of extended hospitalization. This suggests that while socioeconomic status may not broadly influence inpatient recovery duration, extreme socioeconomic disadvantage may exacerbate post-operative challenges.

Several mechanisms may explain this finding. Patients from the most distressed neighborhoods may present with more advanced disease, greater comorbidity burden, or worse baseline functional status, necessitating longer recovery times [14,17]. Additionally, socioeconomic deprivation may limit access to post-acute care resources, such as physical therapy, rehabilitation centers, or adequate home support, thereby prolonging hospital stays [18,19]. Hospitals serving poorer communities may also have fewer resources to facilitate rapid discharge planning compared to those serving more affluent areas [15,20]. These findings reinforce the importance of targeted interventions to improve perioperative care and discharge support for patients from the most socioeconomically disadvantaged neighborhoods.

### Readmissions and Socioeconomic Status

Contrary to expectations, we found no significant association between DCI and readmissions following THR in the general population. This finding differs from some prior studies that reported higher readmission rates among socioeconomically disadvantaged patients [21]. However, a notable exception emerged: residents of at-risk neighborhoods had a 17% reduction in the risk of readmission compared to those from the most prosperous neighborhoods.

This counterintuitive finding may be explained by several factors. First, hospitals serving socioeconomically vulnerable populations may have implemented more robust transitional care programs to minimize avoidable readmissions [22]. Second, residents of at-risk communities may be less likely to seek readmission due to barriers such as cost concerns, limited transportation, or mistrust of the healthcare system. In such cases, patients may choose to manage complications outside of formal healthcare settings, which could artificially lower readmission rates [21,23].

Third, the heterogeneity within “at-risk” neighborhoods may mean that some communities benefit from safety-net programs, community health resources, or academic medical center partnerships that reduce readmission risk [22,24]. Further investigation is warranted to better understand this finding and its implications for equity in post-acute care.

### Public Health and Policy Implications

The results of this study have important implications for both clinical practice and health policy. The reduced utilization of THR among residents of distressed neighborhoods highlights persistent inequities in access to elective orthopedic surgery. These disparities not only affect individual patients but also contribute to

broader public health inequities, as untreated hip osteoarthritis is associated with chronic pain, reduced mobility, diminished quality of life, and increased risk of disability [24].

The finding that residents of the poorest neighborhoods experience prolonged hospital stays emphasizes the need for enhanced perioperative and discharge planning support for these patients [23]. Programs that integrate social services, rehabilitation, and community-based support could help mitigate prolonged hospitalization and ensure smoother transitions of care [20,22,23]. Additionally, efforts to strengthen post-acute care infrastructure in disadvantaged neighborhoods are critical to reducing length of stay disparities [23,24].

### Strengths and Limitations

This study has several strengths, including the use of a large, population-based dataset that allowed for robust examination of neighborhood socioeconomic status using the DCI. By focusing on Maryland, a state with diverse urban, suburban, and rural communities, we were able to capture a wide range of socioeconomic contexts and their association with THR utilization and outcomes.

Nonetheless, some limitations warrant consideration. First, the use of administrative data may not capture clinical nuances such as disease severity, patient preferences, or surgeon-level factors influencing surgical decision-making. Second, while the DCI is a comprehensive measure of neighborhood distress, it may not fully account for individual-level socioeconomic factors such as income, education, or occupation, which also influence access to care. Third, unmeasured confounding, such as; differences in hospital characteristics, provider practice patterns, or regional healthcare infrastructure may have influenced our findings. Finally, the observed lower readmission risk among at-risk neighborhoods should be interpreted with caution, as it may reflect underutilization of care rather than true differences in outcomes.

## Conclusion

In summary, this study found that neighborhood socioeconomic status, as measured by the DCI, plays a significant role in shaping the utilization of THR in Maryland. Residents of prosperous neighborhoods are most likely to undergo THR, with progressively reduced utilization as neighborhood socioeconomic distress increases. While DCI was not broadly associated with prolonged hospital stay or readmissions, patients from the poorest neighborhoods were more likely to have extended hospitalizations, and residents of at-risk neighborhoods exhibited a paradoxical reduction in readmission risk.

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