

## **Neighborhood Socioeconomic Deprivation Impacts Orthopaedic Outcomes but is Poorly Studied: Results of a Systematic Review**

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**INTRODUCTION:** Postoperative care is rarely dependent on the individual alone, but rather family support, food scarcity, accessibility (including mode of transportation), and local medical care availability. It can reasonably be inferred and has been demonstrated previously that neighborhood socioeconomic disparity has an independent influence on surgical outcomes beyond individual indicators of socioeconomic vulnerability. The ADI, which encompasses 17 socioeconomic factors and is calculated on the area code level, is a validated metric of relative socioeconomic disparity that ranks census-level districts from 0 (low disparity) to 100 (high disparity). High ADI scores have been previously associated with aspects of patient presentation and baseline patient-reported outcome scores. However, fewer works have focused on the ADI's association with surgical outcomes. This review assessed currently described relationships between ADI and surgical outcome, particularly in an orthopaedic surgery population.

### **METHODS:**

A systematic review was performed using PubMed, Embase, and Web of Science using the search terms "social deprivation" and "outcome." After eliminating duplicates, 1,266 papers were collected. Titles were reviewed, and irrelevant papers were excluded, resulting in the inclusion of 129 abstracts. After reviewing the abstracts, 84 papers were eliminated because they studied outcomes in countries other than the US, and 28 papers were eliminated because they did not discuss surgical outcomes. An additional 4 papers were identified as meta-analyses and excluded. Fourteen papers were eligible for full-text review, of which 6 met our inclusion criteria, which were: 1) papers written in English; 2) the ADI was used to examine surgical outcomes in adults  $\geq 18$  years of age, and 3) the study sample must have come from the United States. Papers were assessed using the Newcastle-Ottawa Quality Assessment Scale. Analysis was performed as descriptive only due to the heterogeneity of the patient populations of the included works.

**RESULTS:** A total of six papers met our search criteria, of which two focused on orthopaedic surgery outcomes. All six papers were considered "high quality," with Newcastle-Ottawa scores between 7-9 out of 9. Three papers scored 8/9 points: two lost a point due to poor cohort diversity, and one lost a point due to missing controls for secondary outcomes. One paper scored 7/9, losing points due to a greater than 15% loss to follow-up rate and missing controls for secondary outcomes. Four of the six included papers reported a correlation between higher ADI scores and worse postoperative outcomes. These results are summarized in the table. The two works from orthopaedic surgery associated a higher ADI with slower fracture healing and increased healthcare resource utilization. One study focused on the outcomes of intramedullary nailing of the tibial shaft associated a higher ADI with a lower postoperative score, delayed radiographic healing, and an increased risk of surgical site infection. The second orthopaedic study reported that those patients with a higher ADI were more likely to require a nonhome discharge and a greater length of hospital stay following total hip replacement compared with patients with a lower ADI.

**DISCUSSION AND CONCLUSION:** While the quality of the existing literature that discusses the relationship between ADI and surgical outcomes is high, it is scarce overall, particularly within orthopaedic surgery. The present work suggests that community socioeconomic disparity impacts surgical outcomes, warranting a greater discussion of this factor in addition to individual indicators of socioeconomic vulnerability. This distinctiveness highlights the potential differences between individual vs. systematic deprivation, which warrants further historical and prospective analyses.

Article name	Outcome measured	Dependent variable	Outcome
Area deprivation index score is associated with lower rates of long term follow-up after upper extremity vascular injuries	general outcomes in upper vasculature injuries	Lowest quartile ADI compared with highest three	No significant change in outcomes, but lower rates of follow up in lowest ADI
Neighborhood socioeconomic disadvantage associated with increased healthcare utilization after total hip arthroplasty	Type of discharge post-surgery	ADI quintile	81-100 ADI quintile had an odds ratio of 1.82 for non-home discharge when compared to reference group (21-40ADI)
The effect of social deprivation on fracture-healing and patient-reported outcomes following intramedullary nailing of tibial shaft fractures	RUST score, PROMIS score, and radiology	ADI thirds	Most deprived group had lower RUST scores and slower evidence of healing via radiology. PROMIS scores were lower in most deprived group only at first followup
The association of preoperative frailty and neighborhood-level disadvantage outcome in patients with newly diagnosed high grade glioma	median survival	ADI thirds	Most deprived neighborhoods had shorter survival and were less likely to receive standard care
Predicting access to postoperative treatment after glioblastoma resection: an analysis of neighborhood-level disadvantage using the ADI	Odds of receiving gross total resection and survival	ADI thirds	Most deprived group was less likely to receive gross total resection, but length of survival was not significantly different
neighborhood-level social disadvantage and risk of delirium following major surgery	CAM severity score	ADI quartile	Higher ADI is associated with increased CAM severity score with odds ratio of 2.0