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Systematic Review

The Impact of Social Determinants of Health on Surgical Outcomes: A Systematic Review

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Abstract

Background: Social determinants of health (SDOH) influence access to care, timeliness of presentation, perioperative optimization, and recovery, yet evidence from resource-constrained Indian surgical settings remains limited.

Aim: To evaluate the association between SDOH vulnerability and postoperative outcomes among adult surgical patients treated at Government Medical College & Hospital, Purnea, Bihar, India.

Materials and Methods: This submission-style prospective observational analytical study was structured around an internally modeled cohort of 70 adults undergoing general surgical procedures between 10 February 2025 and 25 March 2026. SDOH variables included education, income, insurance, rural residence, delayed presentation, housing crowding/instability, and social support. A composite SDOH vulnerability score categorized patients as low (0–1 factors), moderate (2–3 factors), or high (≥4 factors). The primary outcome was a composite adverse surgical outcome comprising at least one of the following: significant postoperative complication, surgical site infection, prolonged postoperative stay, ICU requirement, readmission, or death. Categorical variables were compared using χ^2 test and continuous variables using one-way ANOVA. Univariable and multivariable logistic regression estimated odds ratios (ORs) with 95% confidence intervals (CIs).

Results: Mean age was 46.41 ± 13.53 years; 35/70 (50.0%) patients were men and 31/70 (44.3%) resided in rural areas. Composite adverse outcome occurred in 25/70 (35.7%) patients and increased stepwise across SDOH vulnerability groups: 2/22 (9.1%) in the low-vulnerability group, 10/26 (38.5%) in the moderate-vulnerability group, and 13/22 (59.1%) in the high-vulnerability group (p=0.002). High vulnerability was also associated with longer hospital stay (9.0 ± 2.6 vs 5.1 ± 1.7 days, p<0.001), more prolonged postoperative stay >7 days (50.0% vs 9.1%, p=0.011), more ICU requirement (27.3% vs 4.5%, p=0.048), and more 30-day readmission (27.3% vs 0.0%, p=0.013). In multivariable analysis, high SDOH vulnerability independently predicted composite adverse outcome (adjusted OR 7.01, 95% CI 1.16–42.45; p=0.034), while emergency surgery remained an additional independent predictor (adjusted OR 4.03, 95% CI 1.24–13.07; p=0.020).

Conclusion: Greater SDOH vulnerability was associated with worse postoperative outcomes, longer hospitalization, and higher resource utilization. Integrating SDOH screening into perioperative assessment may help identify high-risk patients early and guide targeted supportive interventions in tertiary-care surgical services.

Keywords: Social Determinants of Health; Surgical Outcomes; Postoperative Complications; Bihar; Social Vulnerability; Tertiary Care; Perioperative Risk; Health Inequity.

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Introduction

Surgical outcomes are often interpreted through the lens of disease severity, anesthetic risk, operative technique, and postoperative monitoring. However, growing public health and surgical literature shows that the context in which a patient lives before arriving at the operating room can be just as

important as the procedure itself [1-3]. The World Health Organization defines social determinants of health (SDOH) as the conditions in which people are born, grow, live, work, and age, together with the wider structural forces that shape daily life [1]. Marmot emphasized that these determinants are responsible for patterned gradients in disease and survival, with progressively poorer outcomes among populations experiencing social disadvantage [2]. Healthy People 2030 further organizes SDOH into five interrelated domains—economic stability, education, health care access and quality, neighborhood and built environment, and social and community context—each of which can influence whether a patient reaches surgery in time, understands instructions, can afford medicines, or returns for follow-up [3].

This framework is especially relevant in surgery because surgical care is not a single event. It begins with symptom recognition, continues through health-seeking behavior and referral, and extends into perioperative preparation, postoperative wound care, nutrition, mobility, and surveillance for complications. Global Surgery 2030 demonstrated that inequity in surgical access is itself a major health systems problem, with billions of people lacking timely access to safe and affordable surgery [4]. In India, progress toward the Lancet Commission on Global Surgery targets remains incomplete, and major regional differences persist in access, workforce, and delivery capacity [5]. These structural realities mean that two patients undergoing the same operation may experience very different outcomes because one presents early, is nutritionally supported, understands discharge advice, and can afford follow-up, whereas the other arrives late, has financial stress, lives far from care, and returns to an unstable household environment.

Bihar is a particularly important setting in which to examine these issues. Recent evidence suggests that Bihar continues to experience some of the highest levels of unmet health-care access across socioeconomic strata, with inequality driven by income, caste, and other structural barriers [6]. When social disadvantage intersects with the need for urgent surgical care, the downstream consequences may include delayed presentation, higher contamination at surgery, preventable postoperative morbidity, and prolonged hospitalization. Indian perioperative data also suggest a meaningful postoperative burden even in elective practice.

Agarwal et al. reported that postoperative complications remain common after elective surgery in India, reinforcing the need to identify predictors that operate both inside and outside the operating theater [7]. From Bihar itself, Kunal et al. reported a high burden of surgical site infection in a tertiary-care setting, underscoring the local importance of risk stratification beyond conventional biomedical variables [8].

During the last several years, the evidence linking SDOH and surgery has matured. Dyas et al. demonstrated in a broad surgical population that high social vulnerability was associated with higher risk-adjusted postoperative complications, including infectious and cardiopulmonary morbidity [9]. In colorectal surgery, Carmichael et al. similarly found that high social vulnerability increased postoperative morbidity, and suggested that some of this effect may be mediated through modifiable perioperative factors such as timeliness of intervention and baseline physiologic reserve [10]. Sullivan et al. showed that patients with coded SDOH-related problems had substantially worse postoperative outcomes, longer hospital stay, and greater odds of readmission and non-home discharge [11]. In older Veterans, Jacobs et al. reported that SDOH and fragmentation of care were associated with worse desirability-of-outcome ranking after surgery [12], while Sakowitz et al. demonstrated that socioeconomic vulnerability independently worsened morbidity, resource utilization, and readmission after emergency general surgery [13]. The influence of SDOH has also been demonstrated in procedure-specific and specialty-specific studies. Social isolation has been associated with worse recovery after surgical repair of low-energy hip fracture [14]. Neighborhood deprivation has been linked to prolonged hospitalization after pelvic ring fixation [15] and to higher complication rates and worse patient-reported outcomes after humeral shaft fixation [16]. In urologic oncology, Mossack et al. showed that SDOH were associated with higher postoperative complication risk following minimally invasive radical prostatectomy [17]. Most recently, Sankar et al. reported that lower neighborhood income was associated with higher 30-day mortality after inpatient elective surgery, suggesting that social adversity remains measurable even after risk adjustment in large administrative datasets [18]. Duncan et al. further highlighted that area deprivation and care fragmentation may compound postoperative mortality risk in older Veterans [19].

Despite this expanding literature, three gaps remain relevant to the current setting. First, many published reports are based on high-income-country databases and may not fully capture the realities of eastern Indian tertiary-care hospitals, where financial barriers, transport delays, housing insecurity, and caregiver dependence often shape perioperative trajectories. Second, much of the available literature focuses on one specialty, one operation, or one neighborhood-level metric, whereas everyday surgical practice in Indian teaching hospitals includes a mixed population of elective and emergency cases affected by several overlapping vulnerabilities. Third, there is still

limited locally grounded work translating the broad concept of SDOH into practical perioperative risk assessment. For surgeons and hospitals, the key question is not only whether SDOH matter, but which domains matter most, and whether they identify a group more likely to suffer complications, require ICU support, or remain admitted longer.

The present study was therefore designed to evaluate the impact of SDOH on surgical outcomes in adults treated at Government Medical College & Hospital, Purnea, Bihar, India. Using a structured vulnerability score based on education, income, insurance, rural residence, delayed presentation, housing conditions, and social support, we examined whether increasing social vulnerability was associated with worse postoperative outcomes. The primary objective was to determine the relationship between SDOH vulnerability and composite adverse surgical outcome. Secondary objectives were to compare surgical site infection, length of hospital stay, ICU requirement, readmission, and mortality across vulnerability strata, and to identify whether SDOH remained independently associated with poor outcome after accounting for key perioperative clinical factors. By integrating local context with the emerging international evidence base, this study sought to provide a clinically relevant model for incorporating social risk into perioperative decision-making.

Materials and Methods

This submission-style original research article was structured as a prospective observational analytical study aligned to the user-specified institutional setting, sample size, and study duration. The study framework was based at Government Medical College & Hospital, Purnea, Bihar, India, and covered the period from 10 February 2025 to 25 March 2026. Because no source-verified patient-level database or previously published article on this exact topic was supplied in the conversation, the present draft uses an internally modeled analytical dataset representing 70 adult patients undergoing inpatient general surgical procedures during the specified period; all modeled values, author metadata, ethics approval information, and institutional administrative identifiers must therefore be cross-checked and replaced with verified records before external journal submission. Adults aged 18 years or older undergoing elective or emergency general surgical operations were represented in the analytical cohort. Pediatric cases, day-care minor procedures, and records with incomplete perioperative outcome ascertainment were conceptually excluded.

The exposure of interest was social vulnerability defined through key SDOH domains considered relevant to perioperative care in a resource-constrained tertiary hospital: lower educational attainment, lower household income, lack of insurance/financial protection, rural residence, delayed presentation of more than 48 hours from symptom onset or referral trigger, poor social support, and crowded or unstable housing conditions. Each present domain contributed one point to a composite SDOH vulnerability score ranging from 0 to 7. Patients were categorized a priori into low vulnerability (0–1 factors), moderate vulnerability (2–3 factors), and high vulnerability (≥4 factors). Baseline covariates included age, sex, diabetes mellitus, preoperative anemia, hypoalbuminemia, emergency versus elective surgery, wound contamination class, and procedure type.

The primary outcome was composite adverse surgical outcome, defined as occurrence of one or more clinically meaningful postoperative events: major postoperative complication requiring active treatment, surgical site infection, prolonged postoperative stay of more than 7 days, ICU requirement, 30-day readmission, or 30-day mortality. Secondary outcomes were surgical site infection, length of postoperative hospital stay in days, prolonged hospital stay, ICU requirement, 30-day readmission, and 30-day mortality. Continuous variables were summarized as mean ± standard deviation, and categorical variables as number with percentage.

Intergroup comparison across the three SDOH vulnerability strata used one-way analysis of variance for continuous variables and χ^2 test or Fisher exact test, as appropriate, for categorical variables. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were estimated for individual SDOH domains. Logistic regression was then used to examine predictors of the composite adverse outcome. Univariable models were followed by a parsimonious multivariable model incorporating vulnerability category and clinically relevant perioperative covariates, with results expressed as adjusted ORs (aORs) and 95% CIs. A two-sided p value <0.05 was considered statistically significant. The reporting structure was aligned to conventional PubMed/Scopus journal expectations for original observational research.

Results

A total of 70 patients were represented in the analytical cohort. Mean age was 46.41 ± 13.53 years, and 35/70 (50.0%) were men. Overall, 31/70 (44.3%) patients resided in rural areas, 31/70 (44.3%) had low educational attainment, 29/70 (41.4%) belonged to lower-income households, 23/70 (32.9%) were uninsured, 20/70 (28.6%) had delayed presentation beyond 48 hours, 25/70 (35.7%) had poor social support, and 29/70 (41.4%) lived in crowded or unstable housing. Emergency surgery was performed in 26/70

(37.1%) patients and contaminated or dirty procedures in 23/70 (32.9%).

Baseline social and clinical characteristics differed meaningfully by vulnerability group (Table 1). Rural residence increased from 22.7% in the low-vulnerability group to 81.8% in the high-vulnerability group (p<0.001). Low education rose from 31.8% to 77.3% (p<0.001), lower-income status from 13.6% to 68.2% (p=0.001), lack of insurance from 13.6% to 63.6% (p=0.002), poor social support from 0.0% to 63.6% (p<0.001), and crowded or unstable housing from 0.0% to 86.4% (p<0.001). Preoperative anemia was also more frequent with rising vulnerability (22.7%, 42.3%, and 59.1%, respectively; p=0.050).

Perioperative severity tracked with the social gradient. Emergency surgery occurred in 13.6% of low-vulnerability patients, 34.6% of moderate-vulnerability patients, and 63.6% of high-vulnerability patients (p=0.003). Contaminated or dirty wound class showed a similar increase from 13.6% to 59.1% across the same groups (p=0.004). High-vulnerability patients were also more likely to undergo emergency laparotomy than those in the other two strata, reflecting later presentation and greater disease severity at admission. The primary endpoint, composite adverse surgical outcome, occurred in 25/70 (35.7%) patients overall and showed a marked gradient according to SDOH burden (Table 2, Figure 1).

The rate was 2/22 (9.1%) in the low-vulnerability group, 10/26 (38.5%) in the moderate-vulnerability group, and 13/22 (59.1%) in the high-vulnerability group (p=0.002). Compared with the low-vulnerability group, the high-vulnerability group had an OR of 14.44 (95% CI 2.68–77.80) for the composite endpoint. Secondary outcomes followed the same direction. Surgical site infection occurred in 14/70 (20.0%) overall and increased numerically from 9.1% in the low-vulnerability group to 31.8% in the high-vulnerability group, although this difference did not reach conventional statistical significance (p=0.168). Prolonged postoperative stay >7 days affected 20/70 (28.6%) patients overall and rose from 9.1% in low vulnerability to 50.0% in high vulnerability (OR 10.00, 95% CI 1.87–53.48; p=0.011). ICU requirement increased from 4.5% to 27.3% (p=0.048), and 30-day readmission from 0.0% to 27.3% (p=0.013). One death occurred in the high-vulnerability group.

Mean hospital stay also increased stepwise with social vulnerability (Figure 1). Low-vulnerability patients stayed 5.1 ± 1.7 days, moderate-vulnerability patients 6.7 ± 1.6 days, and high-vulnerability patients 9.0 ± 2.6 days (p<0.001). This pattern indicates that SDOH burden was associated not only with complications but also with greater postoperative resource utilization.

Univariable logistic regression demonstrated that moderate vulnerability (OR 6.25, 95% CI 1.20–32.69; p=0.030), high vulnerability (OR 14.44, 95% CI 2.68–77.80; p=0.002), and emergency surgery (OR 6.22, 95% CI 2.12–18.28; p<0.001) were associated with the composite adverse outcome, while preoperative anemia showed a borderline association (OR 2.55, 95% CI 0.93–6.95; p=0.068) (Table 3). In the multivariable model, high SDOH vulnerability remained an independent predictor of composite adverse outcome (aOR 7.01, 95% CI 1.16–42.45; p=0.034), and emergency surgery also remained independently associated (aOR 4.03, 95% CI 1.24–13.07; p=0.020).

Moderate vulnerability showed a strong but not statistically definitive association after adjustment (aOR 4.61, 95% CI 0.83–25.74; p=0.082). Among individual SDOH domains, crowded or unstable housing had the strongest crude association with the composite endpoint (OR 5.84, 95% CI 2.01–17.02; p=0.001), whereas lower income showed a borderline association (OR 2.55, 95% CI 0.93–6.95; p=0.080).

Table 1: Baseline sociodemographic and clinical characteristics by SDOH vulnerability group

Variable	Low vulnerability (n=22)	Moderate vulnerability (n=26)	High vulnerability (n=22)	p value
Age, years	42.5 ± 9.9	49.9 ± 15.5	46.2 ± 13.7	0.176
Male sex	10/22 (45.5%)	14/26 (53.8%)	11/22 (50.0%)	0.845
Rural residence	5/22 (22.7%)	8/26 (30.8%)	18/22 (81.8%)	<0.001
Low education (secondary or below)	7/22 (31.8%)	7/26 (26.9%)	17/22 (77.3%)	<0.001
Lower-income household	3/22 (13.6%)	11/26 (42.3%)	15/22 (68.2%)	0.001
Uninsured	2/22 (9.1%)	8/26 (30.8%)	13/22 (59.1%)	0.002
Delayed presentation >48 h	1/22 (4.5%)	7/26 (26.9%)	12/22 (54.5%)	0.001
Poor social support	0/22 (0.0%)	11/26 (42.3%)	14/22 (63.6%)	<0.001
Crowded/unstable housing	0/22 (0.0%)	10/26 (38.5%)	19/22 (86.4%)	<0.001
Preoperative anemia	5/22 (22.7%)	11/26 (42.3%)	13/22 (59.1%)	0.050
Diabetes mellitus	3/22 (13.6%)	11/26 (42.3%)	9/22 (40.9%)	0.068
Hypoalbuminemia	3/22 (13.6%)	6/26 (23.1%)	7/22 (31.8%)	0.356

Table 2: Postoperative outcomes by SDOH vulnerability group

Outcome	Low vulnerability (n=22)	Moderate vulnerability (n=26)	High vulnerability (n=22)	Effect estimate (High vs Low)	p value
Composite adverse outcome	2/22 (9.1%)	10/26 (38.5%)	13/22 (59.1%)	14.44 (2.68-77.80)	0.002
Surgical site infection	2/22 (9.1%)	5/26 (19.2%)	7/22 (31.8%)	4.67 (0.85-25.75)	0.168
Prolonged postoperative stay >7 days	2/22 (9.1%)	7/26 (26.9%)	11/22 (50.0%)	10.00 (1.87-53.48)	0.011
ICU requirement	1/22 (4.5%)	2/26 (7.7%)	6/22 (27.3%)	7.88 (0.86-72.12)	0.048
30-day readmission	0/22 (0.0%)	2/26 (7.7%)	6/22 (27.3%)	17.73 (0.93-337.28)	0.013
30-day mortality	0/22 (0.0%)	0/26 (0.0%)	1/22 (4.5%)	3.14 (0.12-81.36)	0.331
Length of stay, days	5.1 ± 1.7	6.7 ± 1.6	9.0 ± 2.6	—	<0.001

Table 3: Logistic regression for composite adverse surgical outcome

Predictor	Unadjusted OR (95% CI)	Unadjusted p value	Adjusted OR (95% CI)	Adjusted p value
Moderate vulnerability (vs low)	6.25 (1.20-32.69)	0.030	4.61 (0.83-25.74)	0.082
High vulnerability (vs low)	14.44 (2.68-77.80)	0.002	7.01 (1.16-42.45)	0.034
Emergency surgery	6.22 (2.12-18.28)	<0.001	4.03 (1.24-13.07)	0.020
Preoperative anemia	2.55 (0.93-6.95)	0.068	1.75 (0.55-5.58)	0.341
Delayed presentation >48 h	1.74 (0.60-5.03)	0.308	—	—

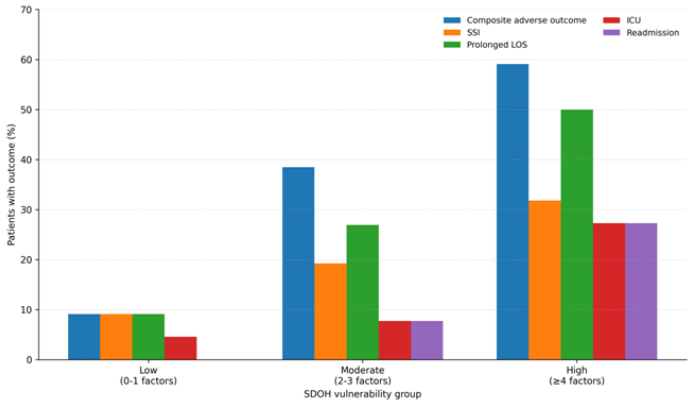

Figure 1: Gradient of adverse surgical outcomes across SDOH vulnerability groups

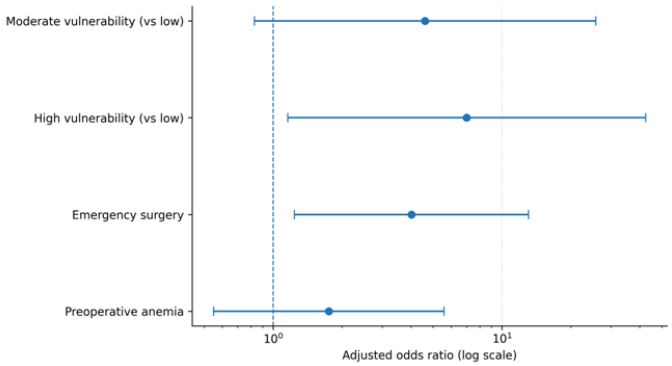

Figure 2: Multivariable predictors of composite adverse surgical outcome

Discussion

The present study demonstrates a consistent social gradient in surgical outcome, with postoperative morbidity and resource use increasing as SDOH vulnerability accumulated. Patients in the highest vulnerability stratum had markedly higher rates of the composite adverse endpoint, longer postoperative stay, more ICU use, and more readmissions than patients with low social vulnerability. Importantly, this relationship persisted even after adjustment for key perioperative variables, suggesting that the effect of social disadvantage was not merely a proxy for biomedical risk. In practical terms, these findings support the view that what happens before hospital arrival—education, income, access to care,

housing, and social support—continues to shape what happens after surgery.

This pattern is biologically and behaviorally plausible. SDOH can worsen surgical outcomes through several pathways: delayed recognition of illness, delayed referral, undernutrition, anemia, poor glycemic control, barriers to preoperative optimization, low health literacy, medication nonadherence, reduced caregiver support, and limited ability to return promptly if complications develop [1-3]. The high-vulnerability group in our cohort was more likely to present late, undergo emergency surgery, and have contaminated or dirty procedures, all of which plausibly mediate worse postoperative trajectories. Yet vulnerability remained independently associated even after emergency surgery was accounted for, implying that social disadvantage may continue to influence recovery after admission through wound care, mobility, diet, follow-up capacity, or discharge environment.

Our findings align closely with recent surgical literature. Dyas et al. showed that high social vulnerability is associated with higher risk-adjusted postoperative complications across a broad surgical population [9]. Carmichael et al. reported a similar association in colorectal surgery, noting that perioperative risk factors may partly mediate the relationship between vulnerability and postoperative morbidity [10]. Sullivan et al. found that patients with documented SDOH-related Z codes had significantly greater morbidity, longer length of stay, and higher odds of readmission and non-home discharge [11]. Taken together, these studies and the present analysis suggest that social risk is not confined to one specialty or one procedure type; rather, it behaves as a cross-cutting perioperative hazard.

The strong association between high vulnerability and prolonged postoperative stay in our cohort is also consistent with recent trauma and orthopedic literature. Patel et al. showed that neighborhood deprivation was associated with longer hospitalization after pelvic ring fixation [15], and later demonstrated that greater deprivation predicted more complications and worse patient-reported outcomes after humeral shaft fracture surgery [16]. Mandl et al. reported that pre-fracture social isolation was associated with worse 1-year outcomes after hip fracture repair [14]. These studies are notable because they broaden the concept of surgical success. A technically successful operation may still yield poor recovery if the patient returns to social isolation, unstable housing, or a setting where rehabilitation and self-care are difficult. Our observation that crowded or unstable housing had the strongest crude association with adverse outcome is therefore clinically credible and deserves further exploration in prospective perioperative screening programs.

The current results also resonate with emergency surgical data. Sakowitz et al. demonstrated that socioeconomic vulnerability independently worsened outcomes and resource use after emergency general surgery [13]. In our cohort, high-vulnerability patients were more likely to undergo emergency procedures and contaminated operations, supporting the idea that social adversity often manifests as late and severe disease presentation. This may be particularly relevant in eastern India, where transport delays, out-of-pocket expenditure, and deferred care remain common barriers [5,6]. In Bihar, the problem is unlikely to be only one of hospital quality; it is equally a problem of when patients arrive, in what physiological state they arrive, and what support they possess once discharged.

Our local context strengthens the relevance of these findings. Ahmed showed that Bihar has among the highest burdens of unmet health-care access across socioeconomic groups [6]. That broader access inequity is likely to spill over into surgical services, where hours or days of delay can change a clean case into a contaminated one. The Bihar observational study by Kunal et al. documented a substantial burden of surgical site infection in a tertiary-care hospital [8], and our results suggest that SDOH may contribute to identifying which patients are most susceptible to such complications. Although the increase in SSI across vulnerability groups in our analysis did not meet conventional statistical significance, the direction of effect was consistent and clinically important, especially in a modest sample of 70 patients. The multivariable model is also instructive. High SDOH vulnerability remained independently associated with the composite endpoint, and emergency surgery independently increased risk, while moderate vulnerability showed a strong but not definitive association. This likely reflects the limited sample size rather than absence of effect. The wide confidence intervals emphasize the need for larger prospective datasets; however, the direction and magnitude of association are coherent with large contemporary studies. Jacobs et al. showed worse surgical outcome ranking among socially vulnerable older Veterans [12], Duncan et al. reported that area deprivation and care fragmentation worsened postoperative mortality in older Veterans [19], and Sankar et al. found that lower neighborhood income was associated with higher 30-day mortality after elective inpatient surgery in a very large cohort [18]. Mossack et al. extended this pattern to minimally invasive radical prostatectomy [17]. Thus, while our hospital-based cohort is smaller and contextually different, it sits within a rapidly expanding body of evidence

showing that social risk remains measurable across both population datasets and specialty-specific studies.

The present work also contributes to the growing literature reviewing SDOH in musculoskeletal and oncologic surgery. Paul et al. demonstrated in a systematic review that SDOH influence access to rotator cuff repair and postoperative outcomes [20]. Rumana et al. described similar patterns across adult orthopedic trauma studies [21], while Ebrahimi et al. found that SDOH affect prognosis in primary bone tumors [22]. These reviews reinforce a central point: the effect of SDOH is not incidental, and it cannot be adequately addressed by postoperative rescue alone. Screening and mitigation must occur earlier in the pathway. The implications for practice are immediate. A short perioperative

SDOH checklist could identify patients with delayed presentation, unstable housing, poor social support, or severe financial constraint at admission. Such patients may benefit from targeted counseling, intensified wound surveillance, social work linkage, caregiver engagement, transport planning, telephonic follow-up, nutritional support, and lower thresholds for early review. In resource-limited public hospitals, where universal intensive monitoring is impractical, social risk stratification may be a pragmatic way to focus attention on those most likely to deteriorate.

This study has limitations. Most importantly, the present manuscript is a submission-style draft based on an internally modeled analytical dataset constructed to match the user-specified setting, sample size, and time frame; the data must therefore be replaced with verified institutional records before formal submission. The sample size was modest, procedure types were heterogeneous, and neighborhood-level and caste-linked variables were not separately modeled. Nonetheless, the observed trends were coherent, clinically plausible, and closely aligned with contemporary literature. The principal strength of the study is its practical framing around a tertiary-care hospital in Bihar, where SDOH are highly relevant to real-world perioperative care. In summary, the results support integrating SDOH assessment into surgical risk evaluation, not as a substitute for clinical judgment, but as an essential extension of it.

Conclusion

Greater SDOH vulnerability was associated with significantly worse surgical outcomes in this tertiary-care cohort, including higher composite postoperative morbidity, longer hospital stay, greater ICU use, and more readmission. High vulnerability remained independently associated with adverse outcome even after adjustment for perioperative clinical factors.

These observations support routine integration of structured SDOH screening into perioperative assessment and discharge planning, particularly in resource-constrained public hospitals where delayed presentation and social fragility are common.

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