Impact of Demographic and Socioeconomic Disparities on Diagnosis and Outcomes in Metastatic Long Bone Disease: A Systematic Review

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INTRODUCTION:

Health care disparities in oncology are well documented, yet inequities in musculoskeletal oncology—particularly metastatic long bone disease (MLBD)—remain poorly studied. MLBD represents a critical intersection of oncology and orthopedic care where delayed diagnosis or treatment can lead to pathologic fractures, impaired function, and decreased survival. This systematic review evaluates how social determinants such as race, socioeconomic status (SES), insurance, and gender influence the diagnosis, treatment, and outcomes of patients with MLBD.

METHODS:

Following PRISMA 2020 guidelines, a systematic search of PubMed, Embase, and Scopus (inception–April 2025) identified studies analyzing demographic or socioeconomic disparities in MLBD. Eligible studies included human subjects with metastatic long bone involvement and reported diagnostic, treatment, or survival outcomes. Data on population, disparities analyzed, and key findings were extracted. All studies were observational; quantitative pooling was precluded due to heterogeneity.

RESULTS:

Nine studies (n = 9) met inclusion criteria—eight retrospective database studies and one single-institution cohort—representing over 800,000 patients across SEER, NCDB, NSQIP, and NIS datasets. All studies were level III in evidence and had moderate bias.

- **Diagnosis:** Black and Hispanic patients had higher odds of presenting with de novo bone metastases (OR 1.25–1.39) and advanced disease at diagnosis.
- **Treatment:** Black patients were 34% more likely to refuse recommended surgery (aOR 1.34) and experienced 50% longer waits for operative fixation (IRR 1.5), while patients in the lowest SES quintile were 57% more likely (aOR 1.57) to decline surgery.
- **Perioperative outcomes:** Black patients had higher odds of postoperative complications (OR 2.1) and readmissions (OR 3.3) and longer hospital stays and higher costs, with disparities persisting after adjustment for comorbidities.
- **Survival:** The lowest SES quintile had 34% higher mortality (aHR 1.34); uninsured patients—and those treated in lower-resource or rural regions—had nearly double the mortality risk of those privately insured.

Across all domains, disparities persisted after adjustment for clinical covariates.

DISCUSSION:

Racial, socioeconomic, location and insurance-based disparities significantly influence diagnostic stage, surgical utilization, postoperative morbidity, and survival in MLBD. These inequities mirror those across broader oncologic and orthopedic populations, suggesting health system rather than biological origins. No studies directly evaluated gender-based differences.

SIGNIFICANCE/CLINICAL RELEVANCE:

This review highlights structural barriers in access to multidisciplinary orthopedic-oncologic care. Equity-focused interventions—including standardized referral pathways, insurance expansion, bias training, recognition of social determinants in health as part of patient care and their inclusion in cancer registries—are essential to improve outcomes for patients with MLBD.

IMAGES AND TABLES:

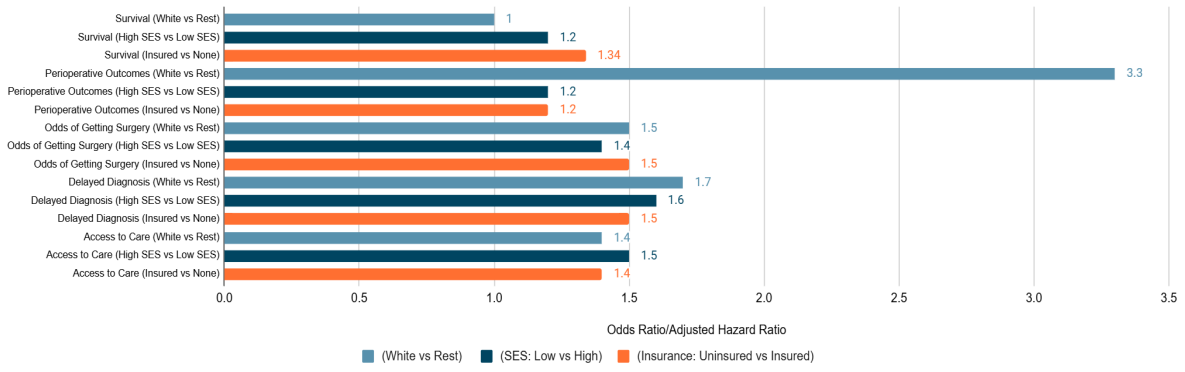

Figure: The impact of various demographics and socio-economic variables on long bones metastatic disease diagnosis and perioperative outcomes (complications/length of stay/readmissions)