e-ISSN: 2722-3558

Sriwijaya Journal of Surgery

[SJS]

https://sriwijayasurgery.com

Determinants of In-Hospital Mortality Following Pelvic Ring Fractures: A 4.5-Year Analysis from a Developing Country's Trauma Center

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ARTICLE INFO

Keywords:

Developing country

Mortality

Pelvic fracture

Risk factors

Sociodemographic factors

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All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.37275/sjs.v8i2.135

A B S T R A C T

Introduction: Pelvic ring fractures are calamitous injuries with high mortality. While clinical risk factors are well-defined in high-income countries, there is a scarcity of data from low- and middle-income countries (LMICs), where socioeconomic factors may critically influence survival. This study sought to explore the sociodemographic and clinical factors associated with in-hospital mortality following pelvic fractures at a tertiary trauma center in Indonesia. **Methods:** A retrospective cohort study was performed on all patients (N=31) admitted with traumatic pelvic fractures to Dr. Mohammad Hoesin General Hospital between January 2021 and June 2025. Data on patient demographics, socioeconomic variables, injury mechanisms, and clinical management were analyzed. The primary outcome was in-hospital mortality. Given the exploratory nature of the study and the small sample size, bivariate analysis using Pearson's Chi-Square and Fisher's Exact tests was conducted to identify potential associations. **Results:** The overall in-hospital mortality rate was 9.7% (3 of 31 patients). The cohort was primarily young adults (61.3% aged 20-59 years) injured in traffic accidents (87.1%). The only variable found to have a statistically significant association with mortality was occupation. All three fatalities occurred in patients from the informal employment sector, corresponding to a 37.5% mortality rate within this subgroup (p=0.008). No significant association was found for established clinical predictors, including Young-Burgess fracture classification (p=0.736), a finding likely attributable to the study's limited statistical power. **Conclusion:** This study, though limited by its sample size, identified a powerful association between informal sector employment and mortality after pelvic fracture. This finding generates the critical hypothesis that in an LMIC setting, socioeconomic vulnerability is a paramount driver of poor outcomes, likely mediated through delays in care and presentation with more severe physiological derangement. These results underscore the need for a socio-clinical approach to trauma care and highlight a crucial area for future, more definitive research.

1. Introduction

Pelvic ring fractures, resulting from the violent transfer of energy to the human body, represent a pinnacle of surgical challenge in modern traumatology. These injuries, most often sustained in motor vehicle collisions or falls from height, involve more than mere skeletal damage; they signify a profound disruption of a critical anatomical and physiological nexus.[1] The pelvis provides structural integrity to the axial skeleton, shields abdominopelvic viscera, and anchors a dense network of major vascular and neural structures.[2] Its traumatic failure is thus frequently accompanied by life-threatening hemorrhage and a high incidence of devastating associated injuries, culminating in significant morbidity and mortality rates that range from 5% to over 30% in the global literature. The pathophysiology of early mortality in pelvic trauma is a well-understood but formidable cascade, primarily driven by acute hemorrhagic shock.[3] The mechanical disruption of the

pelvic ring can expand the retroperitoneal space, negating its natural tamponade effect and permitting concealed exsanguination from the cancellous surfaces of fractured bone and, more critically, from the sheared presacral and internal iliac venous plexuses.[4] This massive volume loss rapidly triggers the "lethal triad" of trauma: hypothermia from exposure and infusion of cool fluids, acidosis from tissue hypoperfusion and anaerobic metabolism, and coagulopathy as the enzymatic clotting cascade fails in the cold, acidic environment.[5] This self-perpetuating cycle is the central adversary in the initial management of these patients.

Consequently, a vast body of research, predominantly from high-income countries (HICs), has been dedicated to identifying predictors of mortality to refine resuscitation protocols and guide surgical decision-making.[6] This research has consistently identified several key risk factors: anatomical factors, such as mechanically unstable fracture patterns (APC-II/III, VS) defined by the Young-Burgess classification, which are directly linked to greater hemorrhage; clinical factors, such as hemodynamic instability upon presentation; and physiological factors, captured by scoring systems like the Injury Severity Score (ISS), which quantifies the patient's total injury burden.[7] However, this established paradigm is built on data from well-resourced trauma systems. A profound knowledge gap persists for low- and middle-income countries (LMICs), which bear a disproportionately high burden of global traumatic injury. In nations like Indonesia, the context of trauma is fundamentally different. Rapid industrialization and motorization have created an epidemic of high-energy road traffic injuries, particularly among young adults. These patients, while often possessing the physiological reserve of youth, encounter a healthcare landscape beset by unique challenges. The "three delays" model of care—delays in seeking care, reaching a facility, and receiving adequate care—is highly relevant. Prolonged pre-hospital transport, especially from extensive rural areas, is common. Access to advanced diagnostics, comprehensive blood banking, and specialized surgical expertise may be limited, particularly outside of major urban centers.

In such settings, it is plausible that a patient's socioeconomic reality becomes a dominant factor in their survival.[8] Social determinants of health—the conditions in which people live and work—may exert a powerful influence. Occupation in unregulated, high-risk sectors can increase trauma exposure, while limited education and health literacy can delay the recognition of a life-threatening injury.[9] Most critically, financial barriers and the lack of comprehensive health insurance can create devastating delays in seeking and receiving care, allowing the pathophysiology of shock to progress to an irreversible state. It is in this complex interplay between injury, physiology, and socioeconomic context that the battle for survival is often decided.[10] The novelty of this study lies in its dedicated analysis of mortality predictors for pelvic ring fractures within a tertiary trauma center in a developing Southeast Asian nation. By examining a comprehensive set of both clinical and sociodemographic variables, this research provides a rare and critical perspective from a healthcare environment where socioeconomic realities may exert a powerful influence on patient survival, potentially challenging the primacy of purely anatomical injury classifications established in high-income country literature. The primary aim of this exploratory study was, therefore, to identify potential sociodemographic and clinical factors associated with in-hospital mortality among patients with traumatic pelvic ring fractures treated at Dr. Mohammad Hoesin General Hospital in Palembang, Indonesia. We hypothesized that in this setting, indicators of socioeconomic vulnerability would emerge as significant potential predictors of mortality, generating a crucial foundation for future, more definitive research.

2. Methods

A retrospective cohort study was conducted to analyze patients with traumatic pelvic fractures. The study was set at Dr. Mohammad Hoesin General Hospital in Palembang, the capital city of South

Sumatra, Indonesia. This institution functions as the province's primary tertiary referral hospital and academic medical center, providing the highest level of trauma care for a large and diverse population from both the urban metropolis and surrounding rural regions. The study protocol received ethical exemption from the hospital's Institutional Review Board (No.DP.04.03/D.XVIII.06.08/ETIK/191/2025), and it was performed in adherence to the ethical principles outlined in the Declaration of Helsinki. Given the retrospective nature of the data collection, the requirement for individual patient consent was waived by the ethics committee. The study population consisted of all patients admitted to Dr. Mohammad Hoesin General Hospital with a primary diagnosis of a traumatic pelvic fracture between January 1st, 2021, and June 30th, 2025. Potential cases were identified by querying the hospital's electronic medical record system and the departmental orthopedic surgery registry using relevant International Classification of Diseases, Tenth Revision (ICD-10) codes for pelvic fractures. The sole inclusion criterion for the study was admission to the hospital with a radiologically confirmed diagnosis of an acute traumatic fracture involving the pelvic ring. The only exclusion criterion was the presence of medical records that were incomplete or inaccessible to the extent that key demographic or clinical variables could not be reliably extracted. During the study period, all identified patients met the inclusion criteria and had sufficiently complete records for analysis; therefore, no patients were excluded.

A standardized data abstraction form was meticulously designed to ensure consistent and comprehensive data collection from patient medical records. A primary investigator, trained in medical record review, performed the data extraction. To maintain data integrity, a second investigator independently audited a random 10% sample of the abstracted records, with any discrepancies resolved by consensus review of the source document. The primary outcome variable was in-hospital mortality, a binary variable defined as death from any cause occurring during the index hospitalization for the pelvic fracture. The independent variables, considered as potential predictors, were organized into two domains: 1 Sociodemographic Variables: Age: Captured as a continuous variable and subsequently categorized for analysis into three clinically relevant groups: adolescent (10–19 years), adult (20–59 years), and elderly (≥60 years); Gender: Documented as male or female; Education Level: The highest level of formal education achieved, categorized as Primary School, Junior High School, or Senior High School; Occupation: Classified into three distinct socioeconomic groups: Formal Sector (individuals with stable employment, such as government or private company employees), Informal Sector (individuals with less stable employment, such as merchants, day laborers, construction workers, and drivers), and Not Working (a heterogeneous group including housewives, students, and the unemployed); Residence: Defined by the location of the traumatic incident, categorized as occurring within the urban limits of Palembang city or in the surrounding rural/regional areas outside Palembang. 2. Clinical Variables: Mechanism of Injury: Classified based on the narrative description in the medical record as traffic accident, fall from height, blunt force/crush injury, or a low-energy fall; Fracture Classification: All pelvic ring fractures were classified by an orthopedic surgeon based on initial radiographic imaging according to the Young-Burgess classification system. This system categorizes fractures based on the injury vector into Anteroposterior Compression (APC) types I-III, Lateral Compression (LC) types I-III, or Vertical Shear (VS), reflecting the degree of mechanical instability; Associated Injuries: Recorded as a simple binary variable (yes/no) indicating the presence of any other significant traumatic injury documented in the patient's record; Type of Management: Categorized as operative if the patient underwent any surgical procedure for pelvic stabilization (external fixation, ORIF) or non-operative if managed with conservative measures like bed rest and traction.

All abstracted data were entered and managed in a secure database. Statistical analysis was conducted using IBM SPSS Statistics for Windows, Version 26.0 (Armonk, NY: IBM Corp). Descriptive statistics, including frequencies and percentages, were used to characterize the study cohort. The primary analysis involved bivariate tests to explore associations between each independent variable and the outcome of in-hospital mortality. The Pearson Chi-Square test was used for this purpose. In instances where any cell in the contingency table had an expected frequency of less than five, the Fisher's Exact test was substituted to ensure statistical accuracy. For 2x2 contingency tables, Odds Ratios (OR) and their corresponding 95% confidence intervals (CI) were calculated. A p-value of less than 0.05 was set as the threshold for statistical significance.

3. Results

Figure 1 provides a comprehensive and immediate overview of the patient cohort, effectively summarizing the critical demographic characteristics and the ultimate in-hospital outcome of the 31 individuals with pelvic ring fractures included in this study. The most striking and clinically significant piece of information is the overall in-hospital mortality rate, which stands at a substantial 9.7%. This means that nearly one in every ten patients admitted with this injury did not survive their hospitalization. While the vast majority of patients (90.3%, n=28) ultimately survived, this mortality figure immediately frames pelvic ring fractures not as simple orthopedic injuries, but as life-threatening emergencies with a considerable risk of a fatal outcome. This baseline mortality provides the crucial context for understanding the demographic factors that characterize this cohort. The demographic profile reveals that the burden of this injury falls overwhelmingly on the young and economically productive members of society. As illustrated in Figure 1, the cohort is predominantly composed of adults between 20 and 59 years of age (61.3%), with adolescents (10-19 years) comprising another significant portion (35.5%). This age distribution strongly suggests that the primary etiology of these fractures is not fragility from old age, but rather high-energy trauma, a fact that is consistent with the manuscript's data on traffic accidents being the leading mechanism. The gender distribution is nearly equal, with a slight male predominance (51.6% male vs. 48.4% female). This near-parity is notable, suggesting that exposure to the high-risk activities leading to these injuries is not confined to one gender in this population, likely reflecting widespread participation in daily transport and economic activities. Perhaps one of the most informative demographic details presented in Figure 1 is the geographic origin of the patients. A significant majority of the cohort, nearly two-thirds (64.5%), were from rural areas outside the main city. This finding is critical, as it implies that a large proportion of these critically injured patients faced potentially prolonged pre-hospital transport times and logistical challenges in reaching the definitive care offered at this tertiary trauma center. This geographic disparity in patient origin points towards access to care as a potentially powerful, unmeasured variable that could significantly influence the clinical trajectory and ultimate survival of these patients, providing a crucial lens through which all other findings should be viewed. In synthesis, Figure 1 effectively establishes the profile of the typical patient in this study: a young adult from a rural area who, after sustaining a severe pelvic fracture, faces a nearly 10% chance of dying in the hospital.

Figure 2 provides a powerful clinical narrative, moving from the cause of injury to its anatomical consequences and the necessary therapeutic response. The primary and most dominant piece of information is the mechanism of injury. As shown in Figure 2, a staggering 87.1% of all pelvic fractures were the result of traffic accidents. This single data point is the cornerstone of the entire clinical picture, immediately establishing the etiology as overwhelmingly high-energy.

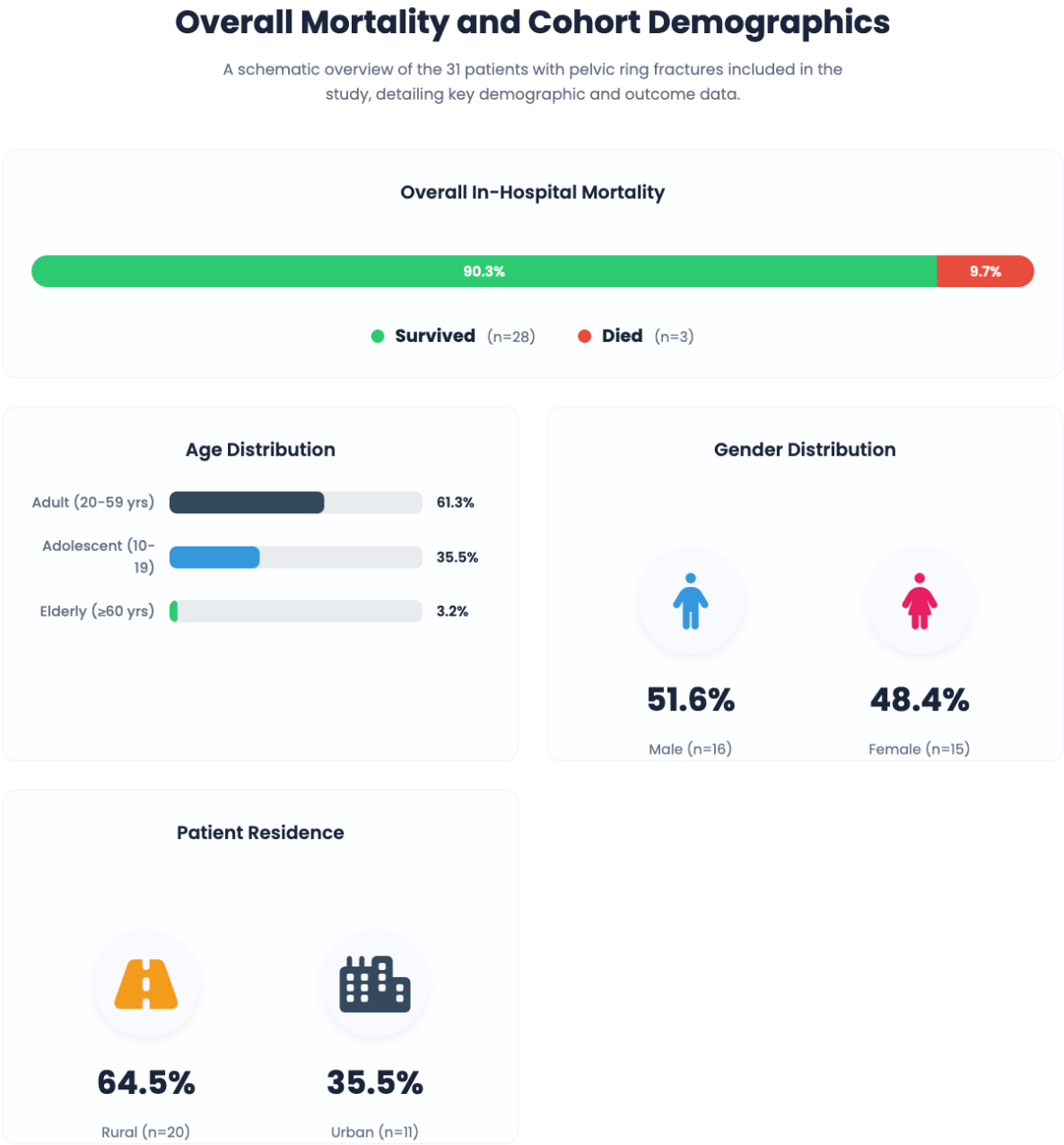

Figure 1. Overall mortality and cohort demographics.

It frames the cohort not as patients with miscellaneous injuries, but as victims of violent, high-velocity impacts. This prevalence of road trauma sets the expectation for complex, multi-system injuries and moves the clinical focus from a simple fracture to a major physiological insult. The Young-Burgess Fracture Classification data details the anatomical destruction wrought by these high-energy events. The distribution of fracture patterns reveals a broad spectrum of pelvic instability. While more stable patterns like Lateral Compression (LC) I and Anteroposterior Compression (APC) II are the most frequent individual types (each at 25.8%), the cumulative burden of mechanically unstable fractures is substantial. When combined, the more severe patterns (LC II, LC III, APC II, APC III, and Vertical

Shear) constitute a significant majority of the cases. This anatomical data, as presented in Figure 2, confirms that these are not minor injuries; they are severe disruptions of the pelvic ring that carry a high risk of hemorrhage and long-term disability. Perhaps the most clinically sobering data point in the figure is the revelation that 100% of the patients had significant associated injuries, classifying the entire group as a "Polytrauma Cohort." This is a critical finding. It fundamentally shifts the clinical perspective from treating a broken pelvis to managing a critically ill patient with multiple life-threatening injuries. The pelvic fracture, in this context, is merely one component of a devastating constellation of trauma that could involve the head, chest, abdomen, and limbs. This universal presence of polytrauma, shown so starkly in Figure 2, underscores the complexity of patient management and is a key factor in understanding the cohort's overall mortality risk. Finally, the management type is the logical clinical consequence of the preceding data. With a cohort defined by high-energy mechanisms and severe, multi-system injuries, it is clinically consistent that a majority of patients (64.5%) required operative intervention. This high rate of surgery reflects the necessity of restoring pelvic stability, not only for the healing of the fracture itself but as a critical component of the overall resuscitation and mobilization of a severely injured patient. In synthesis, Figure 2 masterfully illustrates a clear and grim clinical pathway: high-energy road traffic accidents lead to severe, unstable pelvic disruptions in the context of universal polytrauma, necessitating a high rate of complex surgical management.

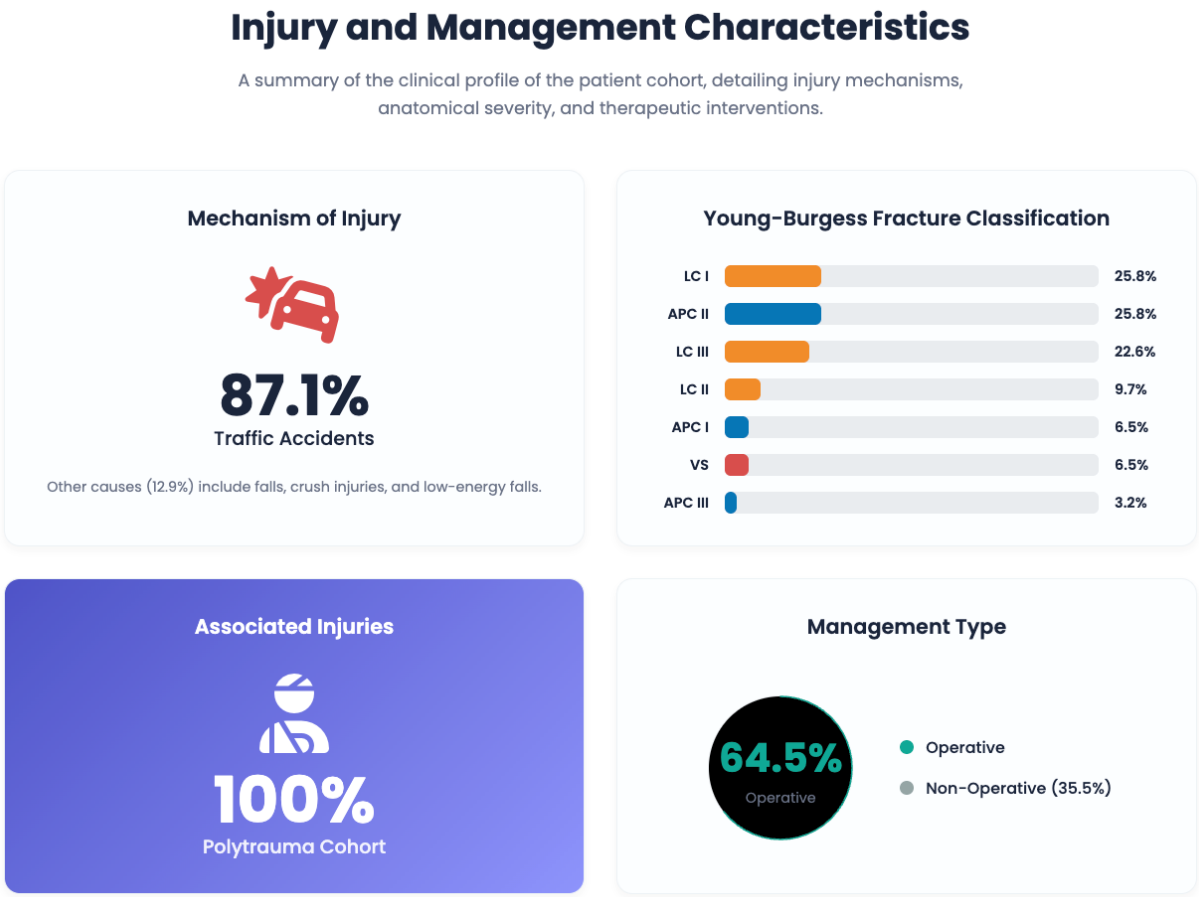

Figure 2. Injury and management characteristics.

Figure 3 presents the central and most compelling findings of this study, offering a stark visual narrative about the factors associated with in-hospital mortality. Figure 3 clearly illustrates a dramatic disparity in outcomes: the mortality rate among patients employed in the informal sector was an alarming 37.5%. This is contrasted sharply with a 0% mortality rate for patients in both the formal sector and the "not working" category. This is not a subtle trend; it is a dramatic life-or-death difference. The inclusion of the statistically significant p-value (p = 0.008) anchors this visual observation in rigorous scientific evidence, confirming that this association is highly unlikely to be due to random chance. This part of the figure does more than just present data; it tells a powerful story about socioeconomic vulnerability. It visually argues that in this cohort, the most dangerous risk factor for a patient with a pelvic fracture was not the nature of their injury, but the nature of their employment. Complementing this primary result is the Analysis of Other Factors (Non-Significant). This section is crucial for providing scientific context and honesty. As clearly summarized in Figure 3, a range of other, more traditional clinical and demographic variables—including the patient's age, gender, residence, the mechanism of their injury, the anatomical severity of their fracture, and the type of management they received—were not found to have a statistically significant association with mortality. The graphical representation using horizontal bars provides an intuitive at-a-glance comparison of the mortality rates within these subgroups. For instance, one can quickly see that the mortality rate was higher in urban residents (18.2%) than in rural residents, but the accompanying p-value (0.281) immediately informs the viewer that this difference was not statistically significant. This transparent presentation of the non-significant findings is critical; it prevents over-interpretation of minor trends and reinforces the exceptional nature of the significant finding related to occupation. Figure 3 masterfully communicates the core statistical narrative of the study: while many factors were considered, only one—a patient's socioeconomic standing as defined by their occupation—emerged as a powerful and statistically significant predictor of death.

4. Discussion

This exploratory study from a tertiary trauma center in Indonesia provides a compelling, if preliminary, window into the complex determinants of survival after pelvic ring fracture in an LMIC setting. The principal finding—that employment in the informal sector was the only factor significantly associated with in-hospital death—is a profound and sobering observation.[11] It suggests that in this environment, the socioeconomic circumstances of a patient's life may project a stronger signal for mortality than the anatomical details of their injury. The stark finding that all fatalities occurred among informal sector workers serves as a powerful illustration of the theory of social determinants of health in the context of acute surgical care.[12] "Occupation" in this analysis should not be viewed as a direct causal factor but rather as a powerful proxy variable for a host of intertwined socioeconomic disadvantages. The informal sector in Indonesia, as in many LMICs, is defined by precarity: inconsistent wages, a lack of formal contracts, and a near-total absence of social safety nets like employer-provided health insurance or paid sick leave. This economic vulnerability can directly translate into delayed access to care, which is a critical modulator of outcome in hemorrhagic shock.[13] A day laborer or small merchant who sustains a severe injury faces an immediate and catastrophic financial dilemma. The fear of incurring debilitating hospital bills and the certainty of losing income for every hour not worked can lead to a fatal delay in the decision to seek professional medical help.

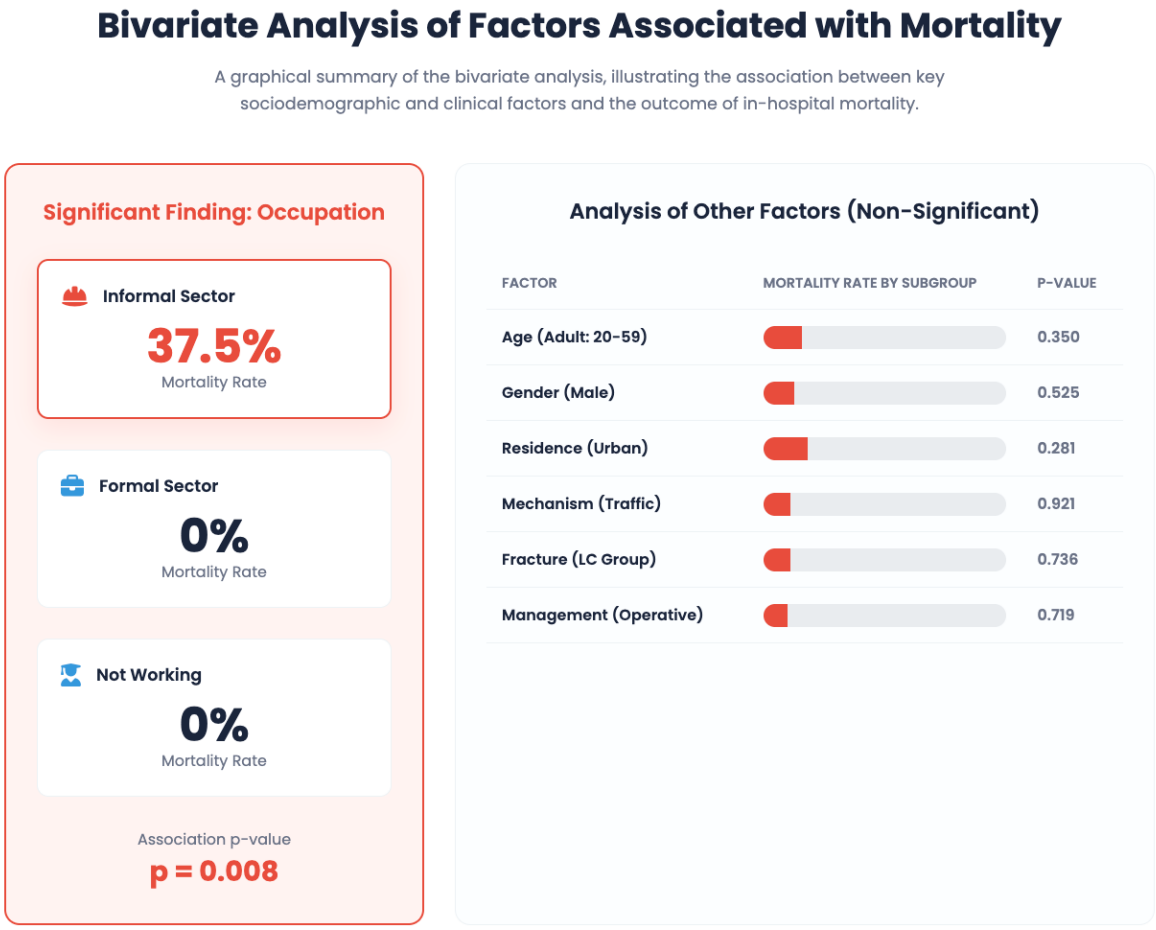

Figure 3. Bivariate analysis of factors associated with mortality.

This phenomenon, often termed "financial toxicity," may lead patients to first attempt local or traditional remedies, or to postpone transport until their condition becomes undeniably critical. This delay is the crucial window during which the pathophysiology of trauma can progress from a potentially reversible state to one of irreversible shock.[14] Furthermore, occupation is linked to health literacy and social capital. Individuals with lower educational attainment, who are disproportionately represented in the informal sector, may have a less acute understanding of the life-threatening nature of a pelvic fracture. Once at the hospital, they may lack the social network and navigational skills to effectively advocate for themselves within a complex and potentially overwhelming medical bureaucracy. While our study could not measure these factors directly, they represent plausible mechanisms that connect a patient's social standing to their clinical trajectory.

The temporal element introduced by care delays is central to understanding our findings from a pathophysiological perspective.[15] A pelvic fracture is an ongoing event, not a static one. From the moment of injury, the clock is ticking as blood silently fills the retroperitoneum. The physiological decompensation follows a predictable and lethal path. Systemic hypoperfusion from blood loss leads to cellular oxygen debt and a switch to anaerobic metabolism, generating lactate and causing a profound metabolic acidosis. This acidic state, combined with the hypothermia induced by environmental exposure and resuscitation with cool fluids, cripples the coagulation cascade. Clotting factors, which are enzymes, function optimally only within a narrow physiological range of

temperature and pH. In the cold, acidic trauma patient, they function poorly, leading to a dilutional and consumptive coagulopathy. This is the lethal triad of trauma. A patient who presents to the hospital hours after their injury is not merely dehydrated; they are acidotic, hypothermic, and coagulopathic.[16] Their blood will not clot, their heart function is depressed by acidosis, and their cellular machinery is failing. At this point, even the most aggressive in-hospital resuscitation may be futile. Our finding suggests that patients from the informal sector may be disproportionately arriving at the hospital at this advanced, irreversible stage of shock. Their mortality is not sealed by the fracture pattern itself, but by the unmitigated physiological destruction that occurs during the delay between injury and effective resuscitation. It is also plausible that this population possesses a diminished physiologic reserve due to chronic stressors like malnutrition or arduous physical labor, making them less resilient to the traumatic insult and accelerating their decline.[17]

The finding that the Young-Burgess classification was not associated with mortality is perhaps as informative as the finding that occupation was. In countless large-scale studies from HICs, mechanically unstable patterns are powerful predictors of death. Our study's failure to replicate this finding should not be interpreted as evidence that fracture anatomy is irrelevant in the Indonesian context. Instead, it is a textbook example of a Type II statistical error stemming from a critically underpowered sample. With only 31 patients and three deaths, the study had virtually no statistical power to detect a true association unless the effect size was astronomically large. The non-significant p-value (p=0.736) represents an "absence of evidence," not an "evidence of absence." However, this statistical limitation may also hint at an underlying clinical reality. The prognostic utility of an anatomical classification system is highest in a health system that can deliver a rapid and graded response.[18] In an optimized system, a patient identified with a VS fracture immediately triggers a maximal response—a trauma team activation, a massive transfusion protocol, and mobilization of surgical or interventional radiology resources. If systemic constraints—such as long transport times or limited resources—impose a uniform delay or a ceiling on the level of care for all severe trauma patients, the fine prognostic distinctions between different unstable fracture patterns may be washed out. In such a scenario, the primary determinant of survival shifts from the specific anatomical injury to the patient's intrinsic ability to tolerate a prolonged period of shock. This does not invalidate the classification system's importance but highlights that its predictive power is dependent on the health system in which it is applied.

Figure 4 serves as the conceptual and explanatory heart of this manuscript, moving beyond statistical association to propose a scientifically plausible narrative of causation. The "High-Energy Trauma" component, represented by the icon of a car crash, immediately grounds the discussion in the reality of the cohort. These are not minor injuries; they are the result of immense kinetic forces, a fact substantiated by the manuscript's data showing that the vast majority of cases were due to traffic accidents. This initial physical insult is the direct cause of the anatomical disruption—the fractured pelvic ring, the torn ligaments, and the sheared blood vessels. It is the genesis of the primary threat to life: hemorrhage. From a purely biomedical perspective, this is the beginning and end of the story. However, the model powerfully argues that this is only half of the equation. Positioned alongside the physical trauma is the "Socioeconomic Vulnerability," defined here by employment in the informal sector. This is the manuscript's most critical and novel insight, and Figure 4 visualizes it as an insult of equal importance to the physical one. This is not just a demographic descriptor; it is an active risk factor. This vulnerability represents a complex web of disadvantages: a likely lack of formal health insurance, precarious income that is lost the moment a patient stops working, potentially lower health literacy, and reduced social capital to navigate a complex medical system.

Figure 4. The hypothesized pathophysiological cascade to mortality.

A patient with a severe pelvic fracture is at high risk; a patient with a severe pelvic fracture and socioeconomic vulnerability is at profoundly higher risk.[19] This initial stage masterfully reframes the clinical problem, insisting that we cannot understand the patient's prognosis without understanding their

life. Financial toxicity—the fear of catastrophic healthcare costs—can lead to a fatal hesitation in seeking care. Low health literacy may cause a patient or their family to underestimate the severity of the injury, hoping it will resolve without expensive medical intervention. And logistical barriers, particularly for the rural majority of the cohort, can turn what should be a rapid transit to a trauma center into a prolonged and dangerous journey. The delay is the point at which social determinants of health are transmuted into a tangible, physiological threat. Every minute that passes with an unstable, bleeding pelvic fracture is a minute in which the patient's physiological reserves are being depleted, and their body is sliding further down the slope towards irreversible shock. This stage is, in essence, the "ticking clock" of trauma, a clock that this model argues ticks faster and more dangerously for the socioeconomically vulnerable. The patient, having lost body heat from environmental exposure and the administration of room-temperature fluids, becomes cold. This is more than a simple drop in temperature; it is a catastrophic failure of homeostasis. As the body cools, the enzymes that drive the coagulation cascade—the complex series of protein interactions that form a blood clot—begin to function poorly. The ongoing hemorrhage leads to profound tissue hypoperfusion. Cells, starved of oxygen, switch to anaerobic metabolism, producing lactic acid as a byproduct. This accumulation of acid in the blood lowers the body's pH, creating a state of metabolic acidosis. This acidic environment further cripples the coagulation enzymes and also depresses the contractility of the heart muscle, worsening the shock. Coagulopathy is the final common pathway and the point of no return. Fueled by the hypothermia and acidosis, and exacerbated by the consumption of clotting factors at the injury site and their dilution by resuscitation fluids, the patient's blood loses its ability to clot.[20] This trauma-induced coagulopathy means that even if the source of bleeding is surgically addressed, the patient will continue to ooze from all surfaces, a condition that is almost universally fatal. The hypothermia worsens the coagulopathy, the coagulopathy worsens the hemorrhage, the hemorrhage worsens the acidosis, and the acidosis worsens both the coagulopathy and cardiac function. This is the death spiral of trauma. The model's key argument is that the socioeconomically vulnerable patient is far more likely to be deep within this spiral upon arrival at the hospital, not because their initial injury was necessarily worse, but because the delay in their care gave this vicious cycle precious, uninterrupted time to accelerate. The patient who has been subjected to the dual insult of severe trauma and social vulnerability, who has experienced a critical delay in care, and who has consequently descended into the irreversible physiological collapse of the lethal triad, is the patient who is most likely to die. Figure 4 is far more than a simple diagram. It is the intellectual core of the manuscript. It provides a compelling, scientifically grounded, and narratively powerful explanation for the study's surprising statistical findings. It visualizes the invisible forces that shape a trauma patient's destiny, arguing that the patient's journey to the hospital door is as important as the care they receive once inside. It transforms a statistical correlation into a human story, a story of how poverty and disadvantage can amplify a physical injury into a fatal event. It is a hypothesis that demands further investigation and a powerful call to action for a more equitable and socially aware approach to the practice of trauma surgery.

The study relied on data not collected for research purposes. This introduced the risk of missing data and inconsistent documentation, particularly for nuanced physiological parameters that are critical in trauma research. The sample size of 31 is the most significant limitation. It severely restricts the reliability of the statistical tests and is the most likely reason for the failure to detect associations for known clinical risk factors, leading to a high probability of Type II error. The lack of consistently recorded data to calculate the ISS or to analyze admission physiology (lactate, base deficit, Glasgow Coma Scale) is a critical flaw. Without adjusting for the overall injury burden (ISS) and the patient's physiological state on arrival, the observed

association with occupation is susceptible to significant and unmeasured confounding. Due to the low number of outcome events (n=3), performing a multivariable logistic regression to control for confounding was not statistically feasible. This means the association reported for occupation is unadjusted and should be interpreted with extreme caution as an observation rather than a proven determinant. The findings are from a single tertiary hospital and may not be generalizable to other parts of Indonesia or other LMICs with different trauma systems and patient demographics.

5. Conclusion

In this exploratory, retrospective analysis of pelvic fracture patients at a major Indonesian trauma center, employment in the informal sector was the only factor found to have a statistically significant association with in-hospital mortality. This powerful signal, observed despite the study's significant methodological limitations, suggests that socioeconomic vulnerability may be a paramount driver of survival after severe injury in this setting. While traditional anatomical risk factors like the Young-Burgess classification were not found to be significant predictors, this is likely a reflection of the study's low statistical power rather than a true absence of effect. This research does not provide definitive answers, but it raises critical questions and generates a vital hypothesis: that in environments with systemic challenges to healthcare access, a patient's social context may mediate their outcome by influencing their time to presentation and their physiological state on arrival. It challenges us to move beyond a purely biomedical model of trauma risk and to embrace a more holistic, socio-clinical approach. The findings underscore the urgent need for future, larger, and more robust prospective studies to confirm this association and to elucidate the precise mechanisms through which social determinants of health lead to fatal outcomes in the surgically ill.

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