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Weak Correlations and Strong Implications: Patient Age, Functional Status, and Caregiver Burden

Onomuighokpo Hillary Onome, MBBS

Department of Orthopaedics & Trauma Federal Medical Centre, Asaba, Delta State, Nigeria

Obohwemu Oberhiri Kennedy, PhD

Department of Health, Wellbeing & Social Care, Global Banking School/Oxford Brookes University, Birmingham, United Kingdom; and PENKUP Research Institute, Birmingham, United Kingdom

Ochei Oboratare, FWACP

Department of Community Medicine Delta State University Teaching Hospital (DELSUTH) Oghara, Delta State, Nigeria

Ucho Clitt Ejiroghene, MSC

Department of Community Medicine Delta State University Teaching Hospital (DELSUTH) Oghara, Delta State, Nigeria

Onodua Kindness Ogheneruona, MBBS

Department of Surgery [Ear, Nose & Throat (ENT)] Federal Medical Centre, Asaba, Delta State, Nigeria

Onyeogo Deborah Isioma, MBBS

Department of Internal Medicine (Nephrology) Delta State University Teaching Hospital (DELSUTH) Oghara, Delta State, Nigeria

Omofuoma Daniel, MBBS

Department of Internal Medicine Federal Medical Centre, Owo, Ondo State, Nigeria

Omokiti Diane, MBBS

Department of Surgery Federal Medical Centre, Asaba, Delta State, Nigeria

Corresponding Author: Obohwemu Kennedy Oberhiri, PhD

ABSTRACT: Background: Family caregivers often face significant physical, emotional, and financial challenges when caring for surgical patients. Caregiver burden, a critical aspect of healthcare, is influenced by various patient-related factors, including age, functional capacity, and illness severity. This study examines the relationships between caregiver burden, assessed using the Zarit Burden Index (ZBI), and patient characteristics among surgical patients in Delta State, Nigeria, with a focus on practical implications for caregiving strategies.

Methodology: The study utilized a cross-sectional design involving caregivers of surgical patients at two hospitals in Delta State, Nigeria. Data were collected through interviewer-administered questionnaires. Caregiver burden was evaluated using the ZBI, functional status was measured with the Palliative Performance Scale (PPS), and illness severity was categorized as mild, moderate, or severe.

Results: Weak correlations were observed between caregiver burden and patient age ($r = 0.218$, $p = 0.01$) as well as functional status ($r = -0.347$, $p = 0.01$). However, illness severity showed a strong association with caregiver burden ($p < 0.0001$), with caregivers of patients with severe conditions or low functional capacity experiencing the greatest burden.

Conclusion: Although some correlations are modest, the findings emphasize the need for targeted caregiving strategies. Interventions such as caregiver education, emotional support, and financial assistance are essential to mitigate the burdens faced by those caring for elderly or severely ill patients.

INTRODUCTION:

Family caregivers play a crucial role in supporting surgical patients, often facing considerable physical, emotional, and financial challenges. These challenges are closely linked to various patient-related factors, such as age, functional status, and the severity of the illness (Çıtlık et al., 2014; Güner et al., 2021). The role of family caregivers is indispensable in the healthcare system, particularly in the context of surgical patients who require extensive postoperative care. The multifaceted responsibilities of caregivers encompass a wide range of activities, including providing emotional support, assisting with daily living activities, and managing medical tasks. These responsibilities can be overwhelming, leading to significant caregiver burden.

Functional status, evaluated through instruments like the Palliative Performance Scale (PPS), gauges a patient's capacity to engage in daily activities and influences the intensity of caregiving required (Winn, 2023; Mirzaei et al., 2024; Moreno-Alonso et al., 2024). The PPS is a widely used tool that provides a comprehensive assessment of a patient's functional abilities, which is critical in determining the level of care needed. Studies have shown that patients with lower functional status require more intensive caregiving, which can increase the physical and emotional strain on caregivers (Gallagher et al., 2018; Andrade et al., 2021; Milton et al., 2022). Additionally, advanced age and severe health conditions typically heighten caregiver demands due to the presence of comorbidities, diminished independence, and the necessity for intricate care (Gallagher et al., 2018; Reynolds et al., 2022; Culberson et al., 2023).

The relationship between caregiver burden and patient-related factors has been extensively studied. Reinhard et al. (2008) found that caregiver burden is significantly associated with the patient's functional status, age, and severity of illness. Similarly, Çıtlık et al. (2014) reported that caregivers of patients with severe health conditions experience higher levels of stress and emotional exhaustion. Güner et al. (2021) further highlighted the financial challenges faced by caregivers, noting that the cost of medical care and the loss of income due to caregiving responsibilities can exacerbate financial strain.

Although prior research has examined these dynamics, the often-weak correlations can obscure the practical implications of the findings. For instance, while some studies have found significant associations between caregiver burden and patient-related factors, others have reported only modest correlations. This inconsistency in findings suggests that other variables, such as social support and coping mechanisms, may also play a crucial role in influencing caregiver burden. Therefore, it is essential to consider a holistic approach when examining the factors contributing to caregiver burden.

This study seeks to investigate the relationships between caregiver burden, patient age, functional status, and illness severity, with a particular emphasis on their significance for caregiving strategies in Nigeria. Nigeria presents a unique context for this study due to its diverse cultural and socioeconomic landscape. The healthcare system in Nigeria faces numerous challenges, including limited access to healthcare services, inadequate healthcare infrastructure, and a high burden of disease (Amedari & Ejidike, 2021; Abah, 2022; Aregbeshola & Folayan, 2022). These challenges can exacerbate the difficulties faced by caregivers, making it essential to develop effective caregiving strategies tailored to the Nigerian context.

In Nigeria, family caregivers play a vital role in supporting surgical patients, often facing significant physical, emotional, and financial challenges. The relationship between caregiver burden and patient-related factors, such as age, functional status, and illness severity, is complex and multifaceted. This study aims to provide a deeper understanding of these relationships and their implications for caregiving strategies in Nigeria. By addressing the unique challenges faced by caregivers in Nigeria, this research can contribute to the development of targeted interventions that alleviate caregiver burden and improve patient outcomes.

METHODOLOGY

Study Design

This study employed a cross-sectional design to explore the relationships between caregiver burden and patient-related factors among surgical patients in Delta State, Nigeria. The research was conducted in two prominent hospitals: a tertiary teaching hospital and a central hospital, both of which serve as major referral Centres in the region. This design was chosen for its suitability in identifying associations between variables at a specific point in time, allowing for a comprehensive understanding of caregiver burden in the context of surgical care.

Participants

The study population comprised 469 family caregivers of surgical patients receiving care at the selected hospitals. Inclusion criteria required participants to be primary caregivers, defined as those who provided the majority of the patient's care, and who had been actively involved in caregiving for at least one month prior to data collection. Caregivers were excluded if they were under 18 years of age, unable to provide informed consent, or had pre-existing conditions that could independently contribute to stress or burden. This sampling strategy ensured a representative cohort of caregivers directly impacted by the demands of surgical patient care.

Caregiver burden was assessed using the Zarit Burden Interview (ZBI), a widely validated 22-item tool designed to measure the physical, emotional, and financial strain experienced by caregivers (Zarit et al., 1980). The ZBI's comprehensive structure, which employs a Likert scale ranging from 0 (never) to 4 (nearly always), has been extensively utilized in caregiver research due to its reliability and validity across diverse settings. Functional status of the patients was evaluated using the Palliative Performance Scale (PPS), a tool designed to assess patient independence across five domains: ambulation, activity and evidence of disease, self-care, intake, and consciousness level (Victoria Hospice Society, 1996). This scale has proven effective in clinical and research contexts for categorizing functional impairment and predicting care needs. Illness severity was classified as mild, moderate, or severe based on clinical records, utilizing diagnostic data, laboratory findings, and physician assessments.

Data Collection and Analysis

Data were collected through interviewer-administered structured questionnaires, ensuring uniformity in data acquisition and minimizing potential biases associated with self-reporting. The questionnaires included items derived from the ZBI and PPS, alongside demographic and clinical variables. All data collectors were trained to standardize the interview process, ensuring consistency across the two study sites.

Statistical analysis was conducted using Pearson’s correlation coefficient to determine the relationships between caregiver burden, patient age, and functional status (PPS). The choice of Pearson’s correlation was guided by its suitability for assessing linear relationships between continuous variables. To evaluate the association between illness severity and caregiver burden, Analysis of Variance (ANOVA) was performed, as it effectively compares mean differences across multiple groups. A p-value threshold of less than 0.05 was established as the criterion for statistical significance. All statistical analyses were performed using SPSS software (Version 25), ensuring robust data handling and interpretation.

This methodology aligns with established practices in caregiver burden research, offering a rigorous framework for analyzing the interplay between patient characteristics and caregiver experiences. By employing validated instruments and appropriate statistical tools, the study provides a reliable basis for understanding the multifaceted challenges faced by family caregivers in surgical settings.

RESULTS

The analysis of caregiver burden in relation to patient-specific factors revealed several noteworthy correlations, emphasizing the multifaceted nature of the caregiving experience. The relationships between patient age, functional status, and illness severity with caregiver burden were examined using validated tools and statistical methods, providing insights into the dynamics of caregiving demands (Table 1).

Table 1: Correlation Between Patient Variables and Zarit Burden Index (ZBI)

Patient Variable	Frequency (n=469)	Mean ZBI (Â±SD)	p-value
Gender			0.27
Male	205	25.53 Â± 15.41	
Female	264	28.75 Â± 15.71	
Level of Education			0.308
No Formal Education	23	24.09 Â± 20.2	
Primary	66	24.97 Â± 13.8	
Secondary	138	28.72 Â± 12.8	
Tertiary	242	27.51 Â± 17.0	
Presence of Comorbidity			<0.0001
Yes	282	30.79 Â± 16.2	
No	187	25.06 Â± 14.9	
Severity of Illness			<0.0001
Mild	19	8.42 Â± 5.9	
Moderate	236	23.20 Â± 13.2	
Severe	214	33.58 Â± 15.8	
Type of Surgery			<0.0001
Minor	37	18.00 Â± 13.8	
Intermediate	260	24.28 Â± 14.5	
Major	172	33.97 Â± 15.3	

Regarding patient age, a weak positive correlation was observed between patient age and the burden experienced by caregivers (r = 0.218, p = 0.01) (Fig. 1). Caregivers tending to younger patients, particularly those under 18 years, reported lower levels of burden compared to those providing care for elderly patients aged 60 years and above. The higher burden associated with elderly patients is likely attributable to age-related health challenges, including reduced mobility, increased susceptibility to comorbidities, and the need for greater assistance with daily living activities. These findings are consistent with previous research, such as Khosravi et al. (2016), which demonstrated that aging patients often require more comprehensive support, thereby increasing the demands placed on their caregivers. This relationship underscores the importance of targeted interventions for caregivers of older adults, who may face unique physical and emotional challenges.

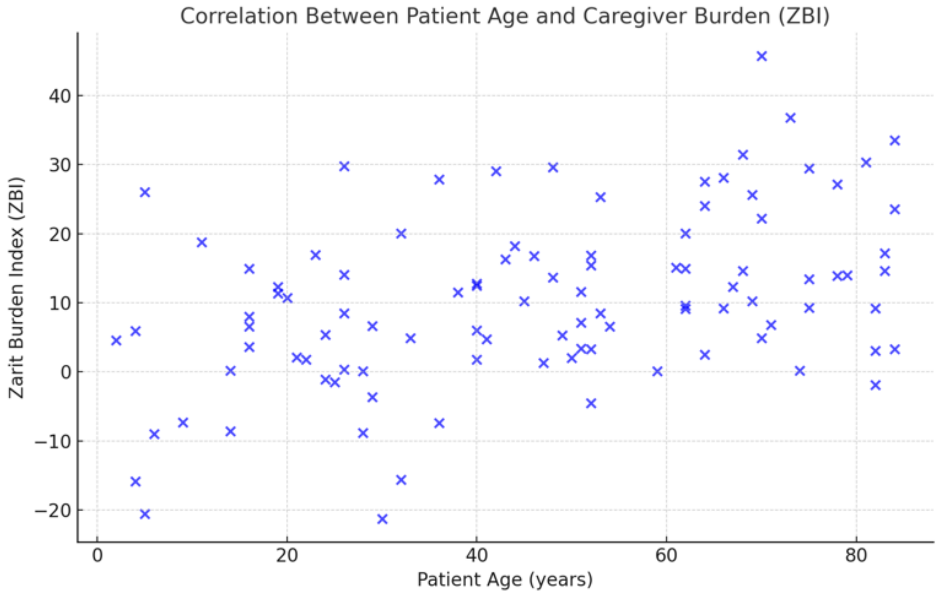

Figure 1: Correlation Between Patient Age and Zarit Burden Index (ZBI)

The scatter plot shows the weak positive correlation between patient age and ZBI (r = 0.218, p = 0.01).

The functional status of patients, as measured by the Palliative Performance Scale (PPS), was inversely related to caregiver burden, with a weak negative correlation identified (r = -0.347, p = 0.01) (Fig. 2). Lower PPS scores, indicative of diminished independence in areas such as mobility, self-care, and cognitive function, were associated with increased caregiver burden (Table 2). This finding aligns with previous studies, such as those by Glajchen (2012) and Xiao et al. (2020), which highlighted the significant physical and emotional toll exerted on caregivers by patients with reduced functional capabilities. The increased demands in caregiving for patients with lower functional status often involve complex medical care, assistance with basic daily activities, and heightened vigilance, all of which contribute to elevated levels of burden. These results underscore the critical need for support systems that address the practical and emotional needs of caregivers managing patients with impaired functional status.

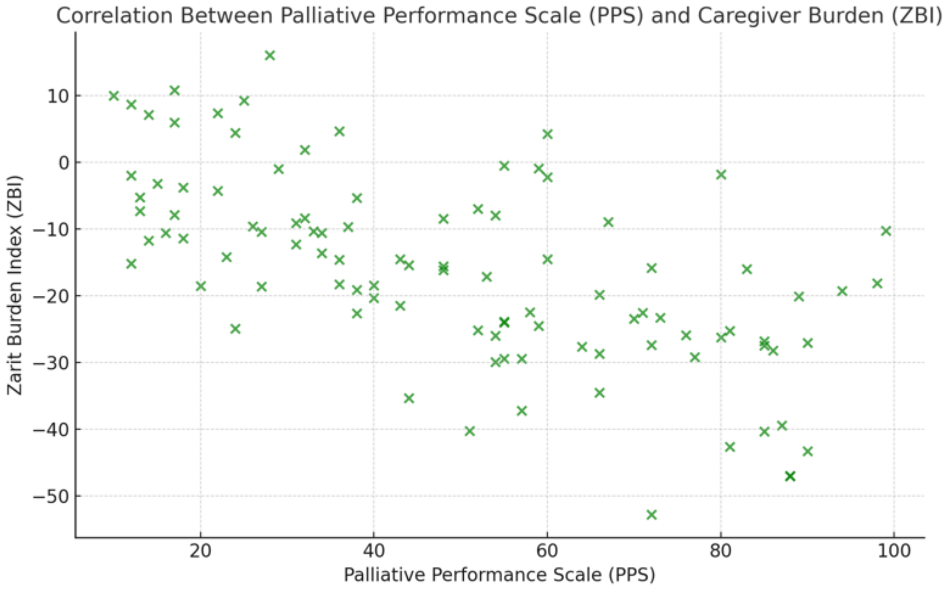

Figure 2: Correlation Between Palliative Performance Scale (PPS) and Caregiver Burden (ZBI)

The scatter plot illustrates the weak negative correlation (r = -0.347, p = 0.01).

Table 2: Palliative Performance Score (PPS) of Patients

Score (%)	Frequency (n=200)	Percent (%)
10	2	0.4
20	6	1.3
30	15	3.2
40	20	4.3
50	35	7.5
60	85	18.1
70	111	23.7
80	91	19.4
90	99	21.1
100	5	1.1

Illness severity emerged as the most significant factor influencing caregiver burden. A strong association was observed between the severity of the patient's condition and caregiver burden (p < 0.0001). Caregivers of patients classified as having severe illnesses reported the highest mean Zarit Burden Index (ZBI) scores (33.58 ± 15.8), followed by caregivers of patients with moderate (23.20 ± 13.2) and mild illnesses (8.42 ± 5.9) (Fig. 3). These findings are in alignment with Mercer et al. (2012), who noted that severe illnesses often necessitate intensive medical and personal care, leading to considerable physical, emotional, and financial strain on caregivers. The escalating burden associated with increased illness severity underscores the pressing need for targeted interventions, including specialized training for caregivers, financial assistance programs, and access to respite care, to mitigate the stressors inherent in such caregiving scenarios.

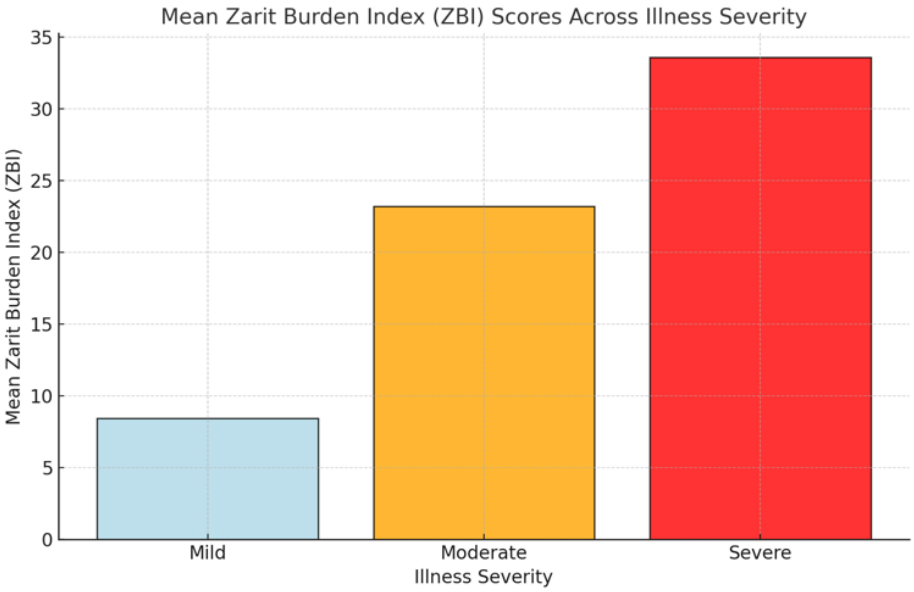

Figure 3: Distribution of ZBI Scores Across Illness Severity

The bar chart shows the highest burden for caregivers of severely ill patients.

These results thus highlight the complex interplay between patient characteristics and caregiver burden. The findings emphasize the necessity of tailoring interventions to address the specific needs of caregivers, particularly those managing elderly patients, individuals with significant functional impairments, or those with severe illnesses. By identifying the primary drivers of caregiver burden, healthcare systems can better allocate resources and design support mechanisms to improve the well-being of both caregivers and patients.

DISCUSSION

The findings of this study contribute to the growing body of literature examining the complex dynamics of caregiver burden in the context of surgical patients. Although the correlations between patient-specific factors and caregiver burden were statistically modest, the results offer critical insights into the experiences of caregivers and highlight the need for targeted interventions to address the challenges they face.

The relationship between patient age and caregiver burden, although weak, revealed that caregivers of older patients reported higher scores on the Zarit Burden Interview (ZBI). This trend aligns with existing literature, which has consistently shown that elderly patients, often dealing with multiple comorbidities and significant mobility limitations, place substantial physical, emotional, and financial demands on their caregivers (Khosravi et al., 2016; Gallagher et al., 2018; Reinhard et al., 2008). These findings underscore the necessity of providing tailored support to caregivers of older patients. Interventions such as respite care, which offers temporary relief from caregiving responsibilities, and training in physical assistance techniques can reduce the physical strain and injury risks associated with caregiving (Glajchen, 2012; Mercer et al., 2012; Kaminishi et al., 2024). Additionally, counselling services can help caregivers manage stress and anxiety, enhancing their overall well-being and ability to continue providing care (Khosravi et al., 2016; Gallagher et al., 2018; Bayly et al., 2021).

The weak negative correlation between the Palliative Performance Scale (PPS) and caregiver burden reflects the increased strain experienced by caregivers when patients have significant functional impairments. Patients with low PPS scores frequently require extensive assistance with daily living activities, such as bathing, feeding, and mobility, which can lead to physical exhaustion and emotional burnout among caregivers (Reinhard et al., 2008; Glajchen, 2012; Reis & Jesus, 2022). The findings suggest a need for strategically designed interventions to ease the caregiving burden. Assistive technologies, such as wheelchairs and lifting devices, can facilitate caregiving tasks, reducing the physical effort required (Mercer et al., 2012; Gallagher et al., 2018; Choi, Patterson & Chinho, 2024). Educational programs tailored for caregivers of dependent patients can improve caregiving skills and promote confidence in managing complex care needs (Glajchen, 2012; Cui et al., 2014; Gemito et al., 2024). Furthermore, the integration of professional home care services can distribute caregiving responsibilities more evenly, thereby mitigating caregiver burnout (Reinhard et al., 2008; Gallagher et al., 2018; Pérez et al., 2022).

Illness severity emerged as the most significant factor associated with caregiver burden, with caregivers of patients with severe illnesses reporting the highest ZBI scores. This finding corroborates previous studies indicating that the management of complex medical conditions requires not only technical expertise but also significant emotional resilience (Mercer et al., 2012; Gallagher et al., 2018; Reinhard et al., 2008). The heightened demands placed on caregivers in such scenarios necessitate robust support systems. Specialized training programs focused on managing advanced care needs, financial assistance to address income loss and caregiving expenses, and access to mental health resources are critical components of an effective support framework for caregivers of severely ill patients (Mercer et al., 2012; Gallagher et al., 2018; Cui et al., 2014).

Although the statistical correlations observed in this study were modest, they reveal important trends with practical implications. Weak correlations do not negate the tangible challenges faced by caregivers, particularly those managing the care of elderly, functionally impaired, or critically ill patients (Cui et al., 2014; Gallagher et al., 2018; Reinhard et al., 2008). These findings highlight the imperative for healthcare systems to develop and implement comprehensive strategies aimed at supporting caregivers. Such strategies should include caregiver education, the provision of financial assistance, and the establishment of accessible mental health resources to improve caregiving outcomes and enhance the quality of life for both caregivers and patients (Glajchen, 2012; Mercer et al., 2012; Cui et al., 2014). By addressing these critical needs, healthcare systems can foster resilience and sustainability within caregiving relationships, ultimately benefiting all stakeholders involved (Gallagher et al., 2018; Reinhard et al., 2008).

CONCLUSION

This investigation elucidates the complex dynamics between caregiver burden and patient-related factors. Despite the modest nature of the correlations, the implications for caregiving strategies are considerable. Customized interventions, such as caregiver education, financial aid, and mental health support, have the potential to reduce caregiver burden and enhance outcomes. Future studies should concentrate on assessing these interventions to optimize their effectiveness.

The findings underscore the necessity for a multifaceted approach to caregiver support, recognizing that caregiver burden is influenced by a constellation of factors including patient age, functional status, and illness severity. Tailored educational programs can equip caregivers with the necessary skills and knowledge to manage complex care needs, thereby reducing physical and emotional strain. Financial aid programs can alleviate the economic pressures associated with caregiving, enabling caregivers to focus more on providing quality care without the added stress of financial instability. Moreover, access to mental health resources is crucial in addressing the psychological toll of caregiving, offering caregivers the support needed to maintain their own well-being.

Future research should prioritize the evaluation of these interventions through rigorous, longitudinal studies to determine their long-term efficacy and sustainability. Such studies should also explore the potential for integrating technology-based solutions, such as telehealth services and digital health platforms, to provide continuous support and resources for caregivers. Additionally, examining the role of community-based support networks and their impact on caregiver resilience could offer valuable insights into creating more robust support systems.

Advancing our understanding of the interplay between caregiver burden and patient-related factors, and rigorously testing targeted interventions, can help develop more effective strategies to support caregivers. This approach will not only enhance the quality of life for caregivers but also improve patient outcomes, fostering a more resilient and sustainable caregiving environment.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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