



## Orthostatic Hypotension, Stress, Employment, and Family Scapegoating Abuse in Postpartum Women of Zambia

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### Abstract

**Introduction:** Orthostatic hypotension (OH) is characterized by a significant drop in blood pressure upon standing, which can lead to dizziness and increased cardiovascular risk. Postpartum women are particularly vulnerable to this condition due to physiological changes, with psychosocial stressors like family scapegoating abuse and mental health challenges potentially exacerbating the risk. Employment status may influence the relationship between stress and OH, though this has not been well explored in low-resource settings. **Methods:** This cross-sectional study involved 666 postpartum women aged 20–30 years from Ndola, divided by parity (one or three children). OH was diagnosed based on a drop in blood pressure ( $\geq 20$  mmHg systolic or  $\geq 10$  mmHg diastolic) after standing. Psychosocial stressors were measured using the Family Scapegoating Abuse Questionnaire (FSA-25) and the Depression Anxiety Stress Scale (DASS-21). Logistic regression was used to analyze how employment might moderate the relationship between stress and OH. **Results:** The prevalence of OH was found to be 13.96%. Approximately 25% of participants reported experiencing family scapegoating abuse. Chi-square tests revealed a significant association between higher FSA scores and the presence of OH ( $\chi^2(3) = 223.72, p < 0.001$ ). The moderation analysis showed that stress significantly reduced the odds of OH (Stress\_G(1) OR = 0.109,  $p < 0.001$ ). Employment status alone was not a predictor of OH ( $p = 0.399$ ), but the interaction between stress and employment was statistically significant ( $p = 0.013$ ), suggesting a moderating effect, although the individual interaction coefficients were unstable. **Conclusion:** This study underscores the complex interaction between physiological and psychosocial stressors in influencing postpartum OH. It highlights the need for integrated postpartum care that addresses cardiovascular, psychosocial, and occupational factors, especially in resource-limited settings. Comprehensive screening and interdisciplinary interventions are essential to improving maternal cardiovascular outcomes, and further longitudinal studies are needed to better understand the causal and moderating mechanisms at play.

**Keywords:** Family Scapegoating Abuse; Mental Health; Orthostatic Hypotension; Postpartum Women

### Introduction

The postpartum period is a time of profound physiological and psychological changes, making individuals particularly vulnerable to various health challenges (WHO, 2023). Among these, the interplay between psychosocial stressors and physiological adaptations, such as those governing cardiovascular regulation, warrants closer examination due to its potential impact on conditions like

orthostatic hypotension. Orthostatic hypotension (OH) is clinically characterized by a sustained decrease in systolic blood pressure of at least 20 mmHg or a drop in diastolic blood pressure of 10 mmHg or more within three minutes after standing up (Freeman *et al.*, 2011). This condition is known to cause symptoms such as dizziness and fainting episodes, which substantially raise the likelihood of falls and contribute to increased cardiovascular health complications. Women in the postpartum period are particularly susceptible to OH due to significant physiological adjustments that occur during pregnancy and after childbirth (Cheng *et al.*, 2011). Beyond physiological factors, psychosocial influences also play a critical role in the development and severity of OH. Among these, family scapegoating abuse—a form of psychological stress characterized by being unfairly blamed and excluded within the family unit—has been identified as a potential exacerbator of autonomic and cardiovascular dysregulation, thereby heightening the risk for OH and comorbid mental health issues (Balapala *et al.*, 2025). Furthermore, employment status may act as an important moderating factor in this complex relationship by influencing stress levels and cardiovascular responses. However, there is a notable lack of research exploring how employment might modify the impact of psychosocial stress on OH, particularly in vulnerable postpartum populations residing in resource-limited contexts such as Ndola, Zambia. The present study aims to fill this gap by examining the prevalence of OH among postpartum women and investigating its associations with psychosocial stressors, including family scapegoating abuse and symptoms of mental health disorders. Additionally, this study explores whether employment status serves as a moderator in the relationship between psychosocial stress and the risk of developing OH in this specific population.

## Methodology

### Study Design and Participants

This research employed a cross-sectional study design to investigate the target population comprising 666 postpartum women aged between 20 and 30 years residing in Ndola, Zambia. Participants were recruited through community health facilities and hospitals within the city, ensuring accessibility and relevance to local healthcare settings. To account for differences related to childbirth experience, study subjects were stratified according to parity: those who had experienced a single childbirth ( $n=305$ ) and those with three childbirths ( $n=361$ ), allowing comparative analyses between these groups.

### Measurements

Orthostatic Hypotension (OH) was assessed using validated procedures involving standard blood pressure cuffs. The measurements adhered to established clinical guidelines, identifying OH by a decrease in systolic blood pressure of 20 mmHg or more, or in diastolic blood pressure of 10 mmHg or greater, within three minutes of standing (Munoz *et al.*, 2025). This standardized approach ensured consistent and reliable identification of OH among participants.

Psychosocial factors were rigorously evaluated using specialized instruments. Family scapegoating abuse was quantified through the Family Scapegoating Abuse Questionnaire (FSA-25), a validated tool developed and referenced by Balapala *et al.* (2024), which captures the extent and impact of psychological abuse experienced within family systems. Mental health symptoms, specifically stress, anxiety, and depression, were measured using the well-established Depression Anxiety Stress Scale (DASS-21) developed by Lovibond and Lovibond (1995), recognized for its reliability and validity in assessing psychological distress in diverse populations.

Sociodemographic variables were systematically collected to provide a comprehensive background of the participants and potential confounding factors. This included age, level of education, employment status, marital status, body mass index (BMI), and parity, all of which could influence the study outcomes and were accordingly considered in the data analysis.

### Statistical Analysis

Descriptive statistical methods were employed to summarize and characterize the demographic and clinical features of the study population. To analyze the relationships between orthostatic hypotension and varying levels of family scapegoating abuse, chi-square tests were utilized, providing insight into

the association patterns. Furthermore, to explore the potential moderating effect of employment status on the link between stress and OH, logistic regression-based moderation analysis was conducted. This analysis included omnibus tests that evaluated the overall model fit, as well as individual term evaluations to understand the significance and directionality of specific predictors. Statistical significance was determined at a threshold of  $p < 0.05$ , ensuring rigorous standards for interpreting the results.

### Ethical Statement

This study obtained ethical clearance from the National Health Research Authority of Zambia under the reference number NHRA2066/22/03/2025, reflecting compliance with national regulations and ethical standards for research involving human subjects within Lusaka on March, 2025.

### Results

**Table 1: Participant Characteristics**

Characteristic	Category	Frequency (n)	Percentage (%)
Age (years)	20-25	358	53.8
	26-30	308	46.2
Education Level	Primary	110	16.5
	Secondary	70	10.5
	Diploma	353	53
	Bachelors	133	20
Employment	No	437	65.6
	Yes	229	34.4
Marital Status	Single/Separated/Widow	297	44.6
	Married	369	55.4
BMI	Underweight	356	53.5
	Normal	273	41
	Overweight	37	5.6
Parity	Parity 1	305	45.8
	Parity 3	361	54.2

The study sample showed a nearly balanced distribution of parity among the postpartum women, with approximately 45.8% having experienced one childbirth and 54.2% having had three children. This reflects a relatively young postpartum cohort with a wide range of educational attainment levels. Notably, the majority of participants reported low employment rates, which is an important sociodemographic characteristic that could potentially influence both cardiovascular health and psychosocial well-being in the postpartum period. These factors together highlight the diversity and potential vulnerability of the study population with respect to health outcomes following childbirth (Table 1).

**Table 2: Prevalence of OH and Family Scapegoating Abuse by OH Status**

FSA Category	OH = 0 (n=479)	OH = 1 (n=93)	Total (n=666)
FSA 0	479	23	502
FSA 1	28	0	28
FSA 2	52	36	88
FSA 3	14	34	48

Analysis using the chi-square test revealed a strongly significant relationship between orthostatic hypotension (OH) and the levels of family scapegoating abuse (FSA). Specifically, the chi-square statistic was  $\chi^2(3) = 223.72$  with a  $p$ -value less than 0.001, indicating a highly robust association between these variables. This result suggests that higher levels of family scapegoating abuse are closely linked to the presence of OH among the postpartum women studied.

**Table 3: Moderation Analysis-A of Employment on Stress and OH**

Test	Chi-square	df	p-value
Omnibus Tests of Model Coef.	105.77	7	0
Interaction overall (Stress * Employment)	-	-	0.013

**Table 4: Moderation Analysis-B of Employment on Stress and OH**

Variable	B	S.E.	Wald	df	p	Exp(B)
Stress_G(1)	-2.217	0.482	21.123	1	0	0.109
Stress_G(3)	1.022	0.593	2.973	1	0.085	2.778
Employment	0.296	0.35	0.712	1	0.399	1.344
Interaction Terms	Large Std Errors, unstable estimates; p values non-significant					

The statistical analysis showed that higher stress levels were associated with decreased odds of experiencing orthostatic hypotension, indicating a protective or inverse relationship between stress and OH in this sample. In contrast, employment status by itself did not significantly predict OH. The overall interaction test (omnibus test) for the moderation model yielded a significant result ( $p = 0.013$ ) (Table 3), suggesting that employment may have a moderating effect on the relationship between stress and OH. However, this finding should be interpreted cautiously because the coefficients for the interaction terms displayed considerable instability and large standard errors, which reduce confidence in the reliability of these individual estimates. Therefore, the evidence supporting employment as a moderator in the stress-OH relationship remains preliminary and warrants further investigation.

## Discussion

This study significantly contributes to the understanding of the complex ways in which psychosocial stressors influence physiological changes in the postpartum period to affect the risk of orthostatic hypotension (OH). A particularly notable finding is the strong correlation between the degree of family scapegoating abuse experienced and the presence of OH (Table 2). Family scapegoating abuse is a chronic psychological trauma occurring within the primary family unit, wherein an individual is recurrently unfairly blamed, shamed, and socially excluded. This pattern of abuse often reflects dysfunctional family dynamics where the scapegoated member becomes a repository for the family's collective emotional distress (Mandeville, 2024; Athanasiadi, 2025). This persistent emotional maltreatment disrupts fundamental processes of emotional regulation and dysregulates the body's stress response systems. Consequently, the abuse is linked to symptoms of complex post-traumatic stress disorder (C-PTSD), including heightened anxiety, depression, and autonomic nervous system dysfunction (Van der Kolk, 2014). This autonomic dysregulation is often measured by low heart rate variability (HRV) and reflects an inability to shift out of a persistent "fight-or-flight" state with the resulting chronic physiological stress accelerates health deterioration (Meckley *et al.*, 2015) and plausibly increases vulnerability to cardiovascular disturbances like Orthostatic Hypotension (OH) (Schneider, 2020), as part of a broader association between PTSD and increased risk of incident cardiovascular disease often characterized by impaired blood pressure regulation upon standing (Freeman *et al.*, 2011). These findings reinforce existing evidence connecting unhealthy family environments such as scapegoating with elevated incidences of anxiety and depression—conditions previously shown to have strong associations with OH (Cheng *et al.*, 2011).

The potential moderating role of employment observed in this study is supported by the literature that highlights how occupational physical activity affects cardiovascular responses to orthostatic stress (Kujawska *et al.*, 2023). Employment might either buffer or amplify the impact of psychosocial stress on the development of OH (Table 4), though this exploratory finding requires careful interpretation given limited data. Physical exertion, such as that involved in sustained exercise training, is a potent modulator of the cardiovascular system, primarily acting to enhance the efficiency of blood pressure control mechanisms. The exertion may improve baroreflex sensitivity (BRS), which represents the primary neural mechanism that buffers rapid fluctuations in arterial blood pressure (La Rovere & Pinna, 2014; Silva *et al.*, 1997). Improved BRS and better autonomic regulation—characterized by increased

parasympathetic (vagal) activity—are crucial for maintaining hemodynamic stability during the change from a seated or supine to an upright position, thereby exerting a protective effect against Orthostatic Hypotension (OH) (Schneider, 2020; Mori *et al.*, 2019). Furthermore, regular physical activity fosters enhanced vascular responsiveness by promoting vasodilation and improving endothelial function, mechanisms that allow peripheral resistance to rapidly adjust when standing, preventing blood pooling in the lower extremities (Green *et al.*, 2017). However, it is important to distinguish between domains of activity; while sport and leisure-time physical activity are consistently associated with better BRS, some evidence suggests that high-intensity or repetitive occupational physical activity may be associated with worse neural baroreflex sensitivity and increased cardiovascular risk (Climie *et al.*, 2019). The distinction between occupational physical activity (OPA) and leisure-time physical activity (LTPA) is crucial when evaluating health outcomes, particularly concerning cardiovascular risk (Harari *et al.*, 2015). While LTPA, such as planned exercise, is consistently associated with reduced all-cause and cardiovascular mortality, OPA has shown mixed, and often contradictory, results.

*The core difference lies in the nature and context of the exertion:*

**Repetitive and Prolonged Exertion without Adequate Recovery:** OPA frequently involves extended periods of dynamic work, sustained awkward postures, or repetitive movements, which can be performed over an 8-hour shift without the necessary rest and recovery periods inherent to planned exercise (Holtermann *et al.*, 2017). This chronic, unremitting demand prevents the cardiovascular system from fully returning to a resting state.

**Increased Allostatic Load:** Excessive or high-intensity work coupled with insufficient rest can lead to an elevated allostatic load (AL) (Xia & Chen, 2024). Allostatic load is defined as the "wear and tear" on the body resulting from chronic overactivity or underactivity of stress-response systems, such as the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic-adrenal-medullary (SAM) system (McEwen, 1998). In the context of strenuous OPA without recovery, the body's persistent efforts to adapt to the physical and psychological demands may lead to physiological dysregulation in cardiovascular, metabolic, and immune systems, as measured by higher AL indices (Xia *et al.*, 2024).

**Aggravated Cardiovascular Risks:** The accumulation of allostatic load potentially exacerbates cardiovascular risks in certain individuals. High OPA has been linked to increased risk of cardiovascular disease (CVD) and all-cause mortality when compared to low or even moderate OPA, especially in those with low physical fitness or who do not engage in regular LTPA (Fernandez *et al.*, 2025; Harari *et al.*, 2015). The mechanisms are thought to involve: **Sustained Elevated Physiological Parameters:** Chronic OPA can maintain elevated blood pressure and heart rate for prolonged periods, leading to sustained mechanical stress on the heart and vasculature, unlike the brief, controlled elevations followed by recovery seen in structured exercise (Holtermann *et al.*, 2017).

**Pro-Inflammatory Responses:** High AL and chronic stress can promote inflammation, a key contributor to atherosclerosis and CVD (McEwen, 1998). **Metabolic Dysregulation:** Studies have shown that high OPA, compared to low OPA, is associated with an increased risk of developing conditions like diabetes, while high LTPA shows a protective effect, further underscoring the "physical activity paradox" (Biswas *et al.*, 2020). While LTPA is generally characterized by voluntary, controlled, and intermittent exertion followed by recovery, leading to beneficial physiological adaptations, high-intensity OPA often involves non-voluntary, sustained, and repetitive strain with limited recovery, contributing to a state of chronic physiological burden known as allostatic overload, which can negatively impact cardiovascular health.

In summary, these results imply that employment encompassing physical activity has the capacity to modulate the relationship between stress and OH by influencing cardiovascular adaptive mechanisms. This aligns with the tentative moderation effect identified in the current study, suggesting that employment status and its associated physical demands warrant consideration as important factors in postpartum women's cardiovascular regulation upon standing. To advance understanding, future research should delve deeper into this relationship by examining the specific types, intensities, and durations of occupational activities and their nuanced effects on orthostatic tolerance. Incorporating both psychosocial and occupational factors into postpartum care protocols could improve tailored

interventions and ultimately enhance cardiovascular and mental health outcomes in this vulnerable population.

### Limitation

Limitations include the cross-sectional design and unstable estimates from sparse data in interaction terms. Future large-scale, longitudinal studies are needed to validate moderation effects and understand causal pathways.

### Conclusion

This study highlights the complex relationship between physiological and psychosocial stressors in postpartum women, specifically focusing on orthostatic hypotension (OH). Family scapegoating abuse was strongly linked to OH, emphasizing the role of psychosocial stress. While stress was found to lower the odds of OH, employment's moderating role remains unclear, suggesting the need for further investigation.

Future research should explore causal relationships, examine the impact of employment-related physical activity, and refine methodologies for understanding moderating effects. Integrating cardiovascular, psychosocial, and occupational health interventions into postpartum care could improve maternal health outcomes, particularly in resource-limited settings.

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### Conflict of Interest

The authors declare that they have no conflicts of interest.

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