Original Article

Impact Of Socio-Economic Factors On Postpartum Haemorrhage in Three Health Centres In Dili, Timor Leste- Cross-Sectional Study

Alcinda Pinto Fernandes[1], Novida Ariani[2], Diadjeng Setya Wardani[2], Hermes Peguinho[3], Zelita Fernandes da Silva[4], João Francisco Lela da Silva[5]

[1] Faculty of Medicine, Universitas Brawijaya, Malang City, East Java, Indonesia
[2] Midwifery Department, Faculty of Medicine, Universitas Brawijaya, Malang City, East Java, Indonesia
[3] Head of Gynaecology and Obstetrics Department, University Hospital of Coimbra (H.U.C.), Coimbra, Portugal
[4] Independent Public Health Researcher, Dili, Timor-Leste
[5] Nursing Officer, Health Post of Buanurac/Ossú, Viqueque Municipality Health Service, Timor Leste

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Correspondence
Alcinda Pinto Fernandes, Faculty of Medicine, Universitas Brawijaya, Malang City, East Java, Indonesia.

Email
Alcindaf65@gmail.com

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ABSTRACT

Background: Postpartum haemorrhage (PPH) is a leading cause of maternal mortality in low- and middle-income countries, including Timor-Leste. Socioeconomic factors may significantly influence the risk of PPH, yet limited local evidence is available. This study aimed to analyse the influence of education, occupation, and household income on the incidence of PPH in three Community Health Centres (CHCs) in Dili City, Timor-Leste.

Methods: A cross-sectional study was conducted from January to December 2024, involving 130 postpartum mothers who delivered at CHC Comoro, CHC Becora, and CHC Vera-Cruz. Inclusion criteria were postpartum mothers aged ≥19 years, vaginal delivery at ≥37 weeks gestation, and complete medical records, including maternal and child health books or Liziu, and family socioeconomic data. Exclusion criteria included mothers with incomplete records or those who underwent medical interventions such as oxytocin induction or vacuum extraction. Data were collected retrospectively from medical records, KIA books, and antenatal care cohorts. Socioeconomic variables (education, occupation, household income) were categorised using standardised criteria. Data were analysed using chi-square tests and simple logistic regression to estimate odds ratios (OR) and 95% confidence intervals (CI). This report follows the STROBE guidelines for observational studies.

Results: Most mothers (84.6%) were aged 19–34 years, and 61.5% had high-risk obstetric factors. Among respondents, 54.6% had high education, 62.3% were employed in the non-formal sector, and 64.6% had household income at or below the national minimum wage (USD 115). Only household income was significantly associated with PPH (OR = 3.309; 95% CI: 1.429–6.465; p = 0.006), indicating that mothers from low-income families had over three times higher risk of PPH. Education and occupation were not significantly associated with PPH.

Conclusion: Household income is a significant socioeconomic determinant of postpartum haemorrhage in Dili, Timor-Leste. Strengthening community-based interventions targeting low-income families, including improved access to maternal health services and socioeconomic support is recommended to reduce PPH incidence

Keywords: Socioeconomic status, Postpartum haemorrhage, Household income, Community Health Centre, Timor-Leste

Implications for Practice:

- Integrate socioeconomic screening into routine antenatal care to identify pregnant women at higher risk of postpartum haemorrhage (PPH), particularly those from low-income households.
- Develop targeted education and support programs for low-income families to raise awareness and preparedness related to maternal complications like PPH.
- Advocate for policy reforms addressing wage and social support systems to reduce socioeconomic disparities affecting maternal health outcomes.

Introduction

Postpartum haemorrhage (PPH) remains a major cause of maternal mortality worldwide, particularly in low- and middle-income countries (LMICs). Despite advances in prevention and management, timely detection and intervention remain challenging, especially in resource-limited settings (World Health Organisation, 2023). Globally, over 90% of maternal deaths occur in LMICs, with approximately 27% directly attributed to PPH (World Health Organisation, 2025b).

Timor-Leste faces a particularly severe burden. The most recent maternal mortality ratio stands at 423 per 100,000 live births (INETL, 2022). According to WHO data cited by Tatoli newspaper (2024), Timor-Leste has the highest maternal mortality rate in Southeast Asia (Sousa, 2024b). Local health facility data in Dili show PPH prevalence ranging from 0.04% to 5.36%, yet underreporting is likely due to limitations in routine health information systems (EIS CHC Becora, 2024; EIS CHC Comoro, 2023; EIS CHC Vera-Cruz, 2024).

International research has established that risk factors for PPH include advanced maternal age, multiparity, anaemia, and socioeconomic disadvantage (Borovac-Pinheiro et al., 2021; Mitta et al., 2023). However, most of these studies are from high- or middle-income countries. Evidence from Timor-Leste and similar contexts is scarce, making it difficult to design interventions that reflect local realities.

Socioeconomic hardship in Timor-Leste is compounded by low minimum wages and rising food prices, which restrict families' ability to access quality healthcare (Soares, 2025). Protests by private sector workers and recent government debates on wage policy highlight the urgency of addressing these issues (Governu Timor-Leste, 2012; Sousa, 2024a).

The Social Determinants of Health framework emphasises that education, employment, and income fundamentally shape health outcomes by influencing access to services, health literacy, and decision-making (Braveman & Gottlieb, 2014; World Health Organisation, 2008, 2017). Yet, few studies in Timor-Leste have examined how these factors specifically relate to PPH risk.

This lack of local evidence creates a critical gap. Without understanding the influence of socioeconomic factors on PPH in Timor-Leste, policymakers and clinicians cannot develop targeted, effective strategies to reduce maternal mortality. Therefore, this study aims to analyse the association between education, occupation, and household income with PPH incidence in three major community health centres in Dili, Timor-Leste.

Methods

Study Design

This study employed an analytical observational design with a cross-sectional approach. The research was conducted using secondary data collected from three Community Health Centres (CHCs) in Dili City, Timor-Leste—CHC Comoro, CHC Becora, and CHC Vera-Cruz. The data covered the period from January to December 2024.

Participants

The study population included all postpartum mothers who gave birth at the three selected CHCs during the study period. Inclusion criteria were: (1) age 19 years or older; (2) vaginal delivery at a gestational age of ≥37 weeks; (3) complete secondary data available from medical records and Liziu (Timor-Leste's maternal and child health book), including socioeconomic information; and (4) delivery at one of the three CHCs in Dili. Exclusion criteria were incomplete medical records, multiple pregnancies, or deliveries involving medical interventions such as oxytocin induction or vacuum extraction. A total sampling technique was used, resulting in 130 eligible respondents (65 with postpartum haemorrhage [PPH] and 65 without PPH).

Instruments

Data were extracted from three main sources: (1) medical records, (2) Liziu, and (3) antenatal care (ANC) cohort registers. Socioeconomic variables were categorised as follows: Education level: High (Diploma–Doctorate) vs. Low (≤ Senior High School). Employment type: Formal vs. Non-formal. Household income: Above minimum wage (> USD 115) vs. At or below minimum wage (≤ USD 115)

PPH diagnosis was determined based on clinical documentation and defined as blood loss of ≥500 mL within 24 hours postpartum, following ICD-11 code JA43. Other clinical variables, such as parity and haemoglobin status, were categorised according to institutional or national guidelines.

Data Collection

Trained enumerators conducted data extraction from secondary sources, ensuring all personal identifiers were removed. Data were reviewed for completeness, consistency, and accuracy before analysis.

Data Analysis

Univariate analysis was conducted to describe the distribution of each variable. Chi-square tests were used in bivariate analysis to assess associations between socioeconomic factors and the occurrence of PPH. In addition, simple logistic regression was performed to calculate odds ratios (ORs) and 95% confidence intervals (CIs) for each socioeconomic predictor. All statistical procedures were performed using SPSS version 25. This study followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines.

Ethical Considerations

This study received ethical approval from the Research Ethics and Technical Committee of Timor-Leste (INSPTL-RETC) under Reference No: 255/INSP-TL/UEPD-AL/IV/2025. All secondary data were anonymised, kept confidential, and used solely for academic research purposes.

Results

Table 1 presents the demographic and socioeconomic characteristics of the respondents. The majority of postpartum mothers (84.5%) were within the safe age range of 19-34 years, while 15.4% were classified as high-risk due to being under 19 or over 35 years old. Regarding parity, 51.5% of respondents fell into the high-risk category (having one child or five or more children), suggesting a considerable proportion of mothers potentially facing increased delivery complications. Socioeconomically, 54.6% of families had attained higher education (diploma to doctorate), while 45.4% had lower educational attainment (no schooling up to senior high school). Most family breadwinners (62.3%) were employed in

the informal sector, and 64.6% of families reported household incomes at or below the national minimum wage of USD 115.

As shown in Table 1, the incidence of postpartum haemorrhage (PPH) was higher among mothers with lower education (52.5%) compared to those with higher education (47.9%), and among those in informal employment (55.6%) compared to formal employment (40.8%). Similarly, mothers from households earning ≤ USD 115 experienced a higher rate of PPH (56.1%) than those from families earning above this threshold (43.8%).

However, statistical analysis revealed that only household income was significantly associated with PPH (OR 3.309; 95% CI: 1.429-6.465; p = 0.006). This indicates that mothers from low-income families had more than three times the risk of experiencing PPH compared to those from higher-income families.

In contrast, neither education level (OR 1.205; 95% CI: 0.604–2.405; p = 0.725) nor employment type (OR 1.813; 95% CI: 0.883–3.719; p = 0.147) were statistically significant predictors of PPH, despite the observed differences in proportions.

These findings highlight household income as the key socioeconomic determinant of PPH in the study setting. Economic constraints may limit mothers' access to quality healthcare, worsen nutritional status, and delay timely management of delivery complications. While lower education and informal employment were associated with higher PPH rates descriptively, these associations were not statistically significant, possibly due to indirect effects or limited sample size.

This analysis was based on bivariate methods and did not control for potential confounding factors such as age, parity, or other clinical conditions. Therefore, the results should be interpreted with caution. Future studies are recommended to employ multivariate analyses with larger and more diverse samples to obtain more robust estimates.

Interventions should prioritise improving the economic status of families to reduce the incidence of PPH. Further research should use multivariate designs and broader populations to clarify the role of socioeconomic and clinical factors in PPH risk.

Table 1. Comparison of Maternal and Socioeconomic Characteristics Between PPH and Non-PPH Groups and Their Association with Postpartum Haemorrhage (PPH) in Dili, Timor Leste, 2024

Variable	Category	PPH *(n = 65)*	No PPH *(n = 65)*	Total (N = 130)	OR (95% CI)	p-value
Maternal Age	19–34 years	55	55	110	-	-
	<19 or ≥35 years	10	10	20	-	-
Parity	Low Risk (2–4)	32	31	63	-	-
	High Risk (1 or ≥5)	33	34	67	-	-
Education Level	High (Diploma–Doctorate)	34	37	71	Ref	-
	Low (≤ Senior High School)	31	28	59	1.205 (0.604, 2.405)	0.725
Employment Type	Formal	29	20	49	Ref	-
	Non-formal	36	45	81	1.813 (0.883, 3.719)	0.147
	> USD 115	31	15	46	Ref	-

Variable	Category	PPH *(n = 65)*	No PPH *(n = 65)*	Total (N = 130)	OR (95% CI)	p-value
Household Income	≤ USD 115	34	50	84	3.309 (1.429, 6.456)	0.006

Note: OR and p-value are only presented for variables analysed with simple logistic regression. Abbreviations: OR = Odds Ratio; CI = Confidence Interval; Ref = Reference category.

Discussion

This study provides the first empirical evidence on the influence of socioeconomic factors on the prevalence of postpartum haemorrhage (PPH) in three primary healthcare service areas of Dili, Timor-Leste, contributing valuable local data for national maternal health strategies (Williams et al., 2024). Among the socioeconomic variables examined, only household income showed a significant association with PPH. Mothers with incomes at or below the national minimum wage (USD 115) (Government of Timor-Leste, 2012) were 3.3 times more likely to experience PPH compared to those with higher incomes. This finding aligns with the Social Determinants of Health (SDOH) framework, which emphasises income as a key determinant of healthcare access, nutritional status, and maternal outcomes (Braveman & Gottlieb, 2014; World Health Organisation, 2008, 2017).

The results suggest that in urban Timor-Leste, household income may be a stronger predictor of PPH risk than education level or employment type. This highlights the need to integrate socioeconomic risk assessments and financial support mechanisms into maternal health programs to target vulnerable populations effectively.

These findings also resonate with concerns expressed by private sector workers regarding the inadequacy of the minimum wage to meet basic family needs (Soares, 2025), which can directly impact maternal and child health, critical indicators of healthcare system performance and social equity (OECD, 2023; World Health Organization, 2025b, 2025c). Consequently, the risk of maternal complications such as PPH may increase in low-income families (World Health Organisation, 2023).

The study further supports recent government initiatives to raise the minimum wage for private sector workers (Sousa, 2024a; Ximenes, 2025), underscoring the importance of improving household economic conditions as part of comprehensive strategies to reduce maternal health risks.

In contrast to previous studies that identified low education and informal employment as significant risk factors for PPH (Bruno et al., 2021; Olonade et al., 2019), this study did not find significant associations for these variables. This discrepancy may reflect local contextual factors, cultural practices, or differences in healthcare access in Timor-Leste (Ameh et al., 2022; Erickson & Carlson, 2022).

The practical implications of these findings are clear: addressing socioeconomic disparities should be a priority in maternal health programs. Implementing economic risk screening during antenatal care and establishing financial protection schemes for pregnant women from low-income families could help reduce PPH incidence (Habonimana & Batura, 2021; Kota et al., 2023).

However, this study has several limitations. The cross-sectional design precludes causal inference, as exposure and outcome were measured simultaneously (Setia, 2016). The geographic scope was limited to three urban CHCs in Dili, which may reduce generalizability to rural or other settings (Bruno et al., 2021; Delie et al., 2024). Additionally, the use of simple logistic regression without adjustment for

potential confounders such as maternal age, parity, anaemia, and access to emergency obstetric care may bias the estimated associations (Getahun et al., 2024; Ifeadike et al., 2018). Therefore, results should be interpreted with caution.

Future research should employ multivariate analyses with larger and more diverse samples across multiple districts. Mixed-methods studies could also provide deeper insights into sociocultural and economic factors influencing maternal health risks (Asif et al., 2022; Olonade et al., 2019).

Additionally, enhancing antenatal education programs could help improve maternal health outcomes by providing accurate information and countering misinformation, particularly during public health emergencies (Samsi et al., 2023). Evidence suggests that innovative educational approaches, such as audiovisual and tele-education methods, can effectively improve pregnant women's knowledge and attitudes regarding key health behaviours (Rahayuningsih & Kristinawati, 2023; Wardani et al., 2024). In particular, audiovisual media are more effective than traditional leaflets in increasing knowledge, attitudes, and practices related to pregnancy care. While this study suggests a potential link between household income and postpartum haemorrhage risk, further research is needed to determine the most effective policy and programmatic interventions for the local context.

Relevance to Clinical Practice

The findings of this study offer significant contributions to improving patient care and guiding clinical decision-making. Specifically, the results demonstrate that postpartum haemorrhage (PPH) risk is significantly associated with household income, suggesting that integrating socioeconomic risk assessments into routine antenatal care can enhance early identification of at-risk pregnant women. This approach enables clinicians to tailor interventions more effectively, thereby reducing maternal morbidity and mortality. Moreover, the study reinforces the importance of considering socioeconomic status (SES) and other social determinants of health in clinical decision-making, encouraging closer monitoring, targeted counselling, and timely referrals for low-income patients. These findings also support the revision of current antenatal care protocols to systematically incorporate SES as a standardised element of risk assessment, promoting more equitable and consistent maternal health practices. From an operational standpoint, identifying socioeconomic risk factors allows healthcare systems to allocate resources more efficiently, reducing preventable complications and enhancing patient safety. Lastly, the study underscores the need for broader policy actions—such as increasing the minimum wage and providing financial protection for low-income pregnant women—as well as expanding health education initiatives and healthcare provider training focused on addressing social vulnerabilities in maternal health.

Conclusion

This study demonstrates that household income is the only socioeconomic factor strongly associated with the risk of postpartum haemorrhage (PPH) in three primary healthcare service areas in Dili, Timor-Leste. Mothers from families earning at or below the national minimum wage faced a substantially higher risk of experiencing PPH compared to those from higher-income families. These findings highlight the critical influence of economic conditions on maternal health outcomes and underscore the importance of

addressing socioeconomic disparities within maternal health programs.

Based on these results, it is recommended that maternal health services in Timor-Leste incorporate socioeconomic risk assessments, particularly regarding household income, into routine antenatal care. Developing financial protection programs for pregnant women from low-income families may help reduce the incidence of PPH and improve overall maternal health. Policymakers are encouraged to review minimum wage regulations and strengthen social welfare systems to address broader economic challenges that adversely affect maternal health. Future research should employ multivariate analyses with larger and more diverse samples from both urban and rural areas. Additionally, mixed-methods approaches are suggested to gain a deeper understanding of how social, cultural, and healthcare factors interact to influence PPH risk, thereby informing the design of more effective and contextually appropriate interventions.

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CrediT Authorship Contributions Statement

Alcinda Pinto Fernandes: Conceptualisation, Investigation, Data Curation, Formal Analysis, Writing Original Draft.
Novida Ariani: Methodology, Supervision, Writing Review & Editing.
Diadjeng Setya Wardani: Validation, Project Administration, Writing Review & Editing.
Hermes de Rosa Valentim Peguinho: Resources, Supervision, Writing Review & Editing.
Zelita Fernandes da Silva, L.: Investigation.
João Francisco Lela da Silva, B.Enf.: Investigation.

Conflicts Of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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