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Women's intimate partner violence victimization and healthcare access barriers in Nigeria: the moderating role of education

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Abstract

Background This study examined how women's educational attainment influences healthcare access in the context of intimate partner violence (IPV) in Nigeria. It explored whether IPV and education independently predict healthcare access barriers and whether education moderates the IPV–barriers relationship, thereby clarifying education's role in autonomy and healthcare access.

Methods Data were drawn from the 2018 Nigeria Demographic and Health Survey and included a weighted sample of 7,553 women aged 15–49 years. Four perceived barriers of needing permission, obtaining money for treatment, distance to facilities, and going alone were assessed alongside measures of IPV and education. Weighted logistic regression models tested the main and moderating effects of IPV and education, adjusting for relevant sociodemographic covariates.

Results The respondents' mean age was approximately 33 with a standard deviation of 8.23. Women experiencing IPV were significantly more likely to report barriers related to permission (AOR = 1.37, $p < .001$), financial constraints (AOR = 1.76, $p < .001$), and distance (AOR = 1.26, $p < .001$). Secondary (AOR = 0.54, $p < .01$) and higher education (AOR = 0.13, $p < .01$) attenuated the effect of IPV on permission barriers, while the same educational levels (AOR = 0.75, $p = .042$) reduced IPV-related financial barriers.

Conclusions IPV substantially heightens barriers to women's healthcare access, whereas education serves a protective role, particularly for autonomy-related barriers such as permission and financial constraints. As the first national-level analysis in Nigeria to demonstrate education's moderating role in the IPV–healthcare link, this study highlights the need for integrated health and education policies that empower women, promote IPV screening, and address structural and cultural barriers to care.

Keywords Gender-based violence, Women's autonomy, Education, Health service utilization, Access inequalities, Sub-Saharan africa

1 Introduction

Intimate partner violence (IPV), predominantly perpetrated by men against women, continues to pose a significant public health challenge both in Nigeria and worldwide. It encompasses acts of physical, sexual, or psychological harm inflicted by a current or

former intimate partner, with global estimates indicating that one in three women has experienced physical or sexual IPV at some point in her life [45]. Regional data from 26 Sub-Saharan African countries, collected through Demographic and Health Survey (DHS) methods, reveal the highest lifetime prevalence of IPV globally. Among women in the region, 30.6% report experiencing physical IPV, 30.2% emotional IPV, and 12.6% sexual IPV. Overall, 42.6% of women have experienced at least one form of IPV [26]. In Nigeria, national statistics indicate a lifetime IPV prevalence of 30% among partnered women [28]. IPV not only contributes to direct injury and psychological trauma but also exacerbates barriers to essential healthcare access, particularly during pregnancy and in the pursuit of routine medical treatment [15, 16, 18, 29].

Feminist theory conceptualizes IPV as a manifestation of patriarchal norms that reinforce male dominance and limit women's autonomy [14], whereas empowerment theory emphasizes women's agency and access to resources as critical tools for resistance [46]. IPV is often used as a mechanism of control, sustaining gendered power imbalances and subordinating women within intimate relationships [40]. Education disrupts these dynamics by enhancing women's knowledge, bargaining power, decision-making capacity, and economic independence, thereby reducing vulnerability to IPV and strengthening healthcare-seeking behavior [9, 41]. Collectively, these frameworks illustrate how education can serve as a transformative mechanism in addressing both IPV and structural barriers to healthcare access.

Crucially, rather than relying on composite scores, our present study disaggregates four distinct barriers of needing permission, securing financial resources, distance to facilities, and reluctance to attend alone, because each reflects different dimensions of constraint and may respond to different types of intervention [2, 13, 19, 22, 31] Previous studies have identified IPV and women's education as independent predictors of healthcare access [7, 30]. Evidence suggests that education may enhance women's awareness of health rights, decision-making autonomy, and negotiation capacity [4], while low educational attainment is often linked to greater IPV exposure and structural barriers that restrict healthcare access [7, 27]. However, education can also provoke resistance or backlash from male partners, particularly when women attain higher education than their spouses, potentially intensifying relationship conflict and IPV risk [6]. IPV survivors often face layered obstacles, including restricted autonomy, financial dependence, and psychological distress that hinder timely utilization of maternal and reproductive health services [35, 43, 11, 8]. While both IPV and women's education are recognized as independent predictors of healthcare access, limited empirical research has examined their combined or moderating effects on specific barriers to care. This study offers novel insights by presenting the first nationally representative analysis of Nigerian women that examines how IPV and education interact to influence healthcare access. Unlike previous research that treats education as a covariate, this study investigates its moderating role in the IPV–barriers relationship. Additionally, by disaggregating healthcare access barriers rather than relying on composite measures, the analysis provides a more in-depth and policy-relevant understanding of how intersecting inequalities shape women's ability to seek care.

1.1 Study hypotheses

1. *Main Effect of IPV* Women who have experienced any form of IPV will have higher odds of reporting each perceived barrier to healthcare access (needing permission, obtaining money for treatment, distance to facilities, and reluctance to attend alone) compared to women with no IPV experience.
2. *Main Effect of Education* Higher educational attainment will be associated with lower odds of reporting each of the four healthcare access barriers.
3. *Moderating Effect of Education* Educational attainment will moderate the association between any IPV and healthcare access barriers, such that the negative impact of IPV will be weaker among women with higher education levels.

1.2 Sampling

The 2018 Nigeria Demographic and Health Survey (NDHS) employed a stratified two-stage sampling design. Stratification was by state and urban–rural residence, covering all 36 states and the Federal Capital Territory. In the first stage, 1,400 enumeration areas (EAs) were selected with probability proportional to size. In the second stage, after a complete household listing in each EA, 30 households per cluster were selected using systematic sampling, resulting in about 42,000 households nationwide. All women aged 15–49 years in selected households were eligible for interview, and sampling weights were applied to account for unequal probabilities of selection and nonresponse.

1.3 Procedure

The survey targeted all women aged 15 to 49 who were residing in the selected households, including both permanent residents and visitors who had stayed overnight. From this group, one eligible woman per household was selected to complete the domestic violence module using a computer-based random selection method. Data collection occurred between August and December 2018. In clusters affected by security-related delays, fieldwork was temporarily suspended and resumed once conditions stabilized, without substituting clusters, thereby maintaining the integrity and coverage of the sample. Field operations were closely supervised through numerous monitoring visits by the core NDHS team and state coordinators from the National Population Commission (NPC). Monitors adhered to strict field guidelines, and weekly check reports from completed interviews were used to track progress and provide feedback to field teams. The survey questionnaires were initially developed in English and translated into three major local languages of Hausa, Yoruba, and Igbo, using translation and back-translation procedures to ensure accuracy and cultural relevance.

1.4 Ethical considerations

This study was based on a secondary analysis of publicly available, de-identified data from the 2018 Nigeria Demographic and Health Survey (NDHS). The 2018 NDHS received ethical approval from the Institutional Review Board (IRB) of Inner City Fund (ICF) International, USA (FWA00000845), and the National Health Research Ethics Committee of Nigeria (NHREC/01/01/2007). Because the dataset is fully anonymized and accessible upon request from the DHS Program, no additional local Institutional Review Board (IRB) approval was required for the present analysis.

1.5 Analytic sample

The 2018 NDHS interviewed 7,599 ever-married women aged 15–49 years, achieving household and individual response rates of 99.4% and 99.3%, respectively. All respondents completed the Domestic Violence (DV) module. After excluding 46 women due to missing data or refusal to answer key questions, the final analytic sample comprised 7,553 women. DHS sampling weights were applied to account for unequal selection probabilities and nonresponse, and all regression analyses were conducted using this weighted sample, which is nationally representative of ever-married women aged 15–49 years in Nigeria.

1.6 Outcome

Perceived barriers to healthcare access were assessed using four self-reported indicators from the 2018 NDHS women's questionnaire: (a) obtaining permission to visit a health facility, (b) securing money for treatment, (c) distance to the nearest facility, and (d) the need for accompaniment when visiting a facility. These items represent distinct dimensions of autonomy and access, reflecting familial or interpersonal restrictions (permission), economic challenges (financial resources), geographic or transportation constraints (distance), and social or safety concerns (accompaniment). Consistent with DHS coding conventions, responses were dichotomized as *"not a big problem"* (coded 0) and *"a big problem"* (coded 1), with the latter indicating the presence of the barrier. Each barrier was analyzed as a separate outcome to preserve the unique contributions of different types of constraints rather than combining them into a composite score. As a robustness check, we conducted sensitivity analyses by examining the distribution of responses and testing alternative coding specifications. These analyses confirmed that the substantive results were not sensitive to the dichotomization approach.

1.7 Any IPV

Experience of intimate partner violence was assessed using the standardized NDHS Domestic Violence Module, adapted from the Revised Conflict Tactics Scales (CTS2) [36]. Women were asked about their lifetime experiences of physical, sexual, and emotional violence perpetrated by a current or most recent partner. Physical IPV included acts such as pushing, slapping, punching, kicking, or being threatened with a weapon. Sexual IPV referred to being forced into unwanted sexual intercourse or other sexual acts. Emotional IPV captured experiences of humiliation, insults, or threats. Each IPV domain was coded dichotomously (0 = no, 1 = yes). A composite variable, "any IPV," was then created to indicate whether a woman had experienced at least one of these forms of violence. Internal consistency for the composite scale was acceptable (Cronbach's $\alpha = 0.73$). Reliability statistics for the subdomains were also satisfactory: physical IPV ($\alpha = 0.74$), sexual IPV ($\alpha = 0.70$), and emotional IPV ($\alpha = 0.71$). For the primary analysis, IPV was modeled as a binary measure ("any IPV"). In preliminary analyses, the subdomains (physical, sexual, emotional) were examined separately to describe potentially distinct patterns. Women who reported more than one type of IPV were coded as 'positive' on the composite 'any IPV' variable. In addition, they were counted in the prevalence estimates for each specific subdomain of IPV (physical, sexual, or emotional) that they experienced.

Education (Moderator). Educational attainment was measured using the highest level of schooling completed, as reported in the 2018 NDHS women's questionnaire. The variable was coded as a four-level categorical measure: no formal education (0), primary education (1), secondary education (2), and higher education (3). For regression analyses, education was modeled as a categorical moderator, with "no formal education" serving as the reference group. This coding approach aligns with prior DHS-based studies and allows for the assessment of non-linear effects across distinct educational stages, rather than assuming a uniform ordinal or continuous progression. Treating education as categorical is particularly important in the Nigerian context, where transitions between levels of schooling often reflect structural and socioeconomic thresholds with potentially different implications for autonomy and IPV-related outcomes.

Covariates. Covariates were selected a priori based on prior IPV and healthcare access literature. These included: age (15–24 [reference], 25–34, 35–44, ≥ 45), employment status (not employed [reference] vs. employed), household wealth index (low [reference], middle, high), place of residence (urban [reference] vs. rural), and husband's alcohol consumption (no [reference] vs. yes).

1.8 Analytic technique

Descriptive statistics, including weighted frequency distributions, were used to assess the distribution of key variables. Bivariate logistic regression analyses examined associations between predictors and the four indicators of perceived healthcare barriers. These results provided initial insights and informed the multivariate models. All analyses were conducted in SPSS version 28, using the Complex Samples module. Weighted descriptive statistics were obtained through *Crosstabs* and *Frequencies*, while *Complex Samples Logistic Regression* was used for multivariate analyses, with the plan file specifying weights, clustering, and stratification. Missing data were minimal (< 1%) and handled through listwise deletion, consistent with DHS analytic practice. For multivariate models, covariates were selected a priori based on established evidence from IPV and healthcare access literature; they were not chosen stepwise. The included covariates were age, employment status, household wealth index, place of residence, and husband's alcohol consumption. All covariates were found to be significant in the bivariate analyses and were included in the final adjusted models to control for potential confounding effects. Logistic regression models were estimated hierarchically in three steps: (1) covariates, (2) main effects of IPV (predictor) and education (moderator), and (3) the interaction term (IPV × education). Both IPV and education were grand-mean centered before interaction term construction. Four separate survey-weighted logistic regression models were estimated for each outcome: (a) needing permission to seek healthcare, (b) obtaining money for treatment, (c) distance to health facilities, and (d) reluctance to attend healthcare alone. Significant interactions were probed using simple slopes analysis, with results expressed as odds ratios (OR) and 95% confidence intervals (CI). Predicted probabilities were computed from the final adjusted logistic regression models using marginal standardization in SPSS Complex Samples. These probabilities illustrate the relative likelihood of each outcome across levels of education and IPV exposure, holding covariates constant. Model stability and statistical power were evaluated using the events-per-variable (EPV) criterion. With an average of approximately 2,518 healthcare access barrier events and eight predictors, including the main independent variable (IPV), moderator

(education), interaction term, and five covariates. The EPV exceeded 10, satisfying the recommended threshold for logistic regression stability. Multicollinearity was assessed using variance inflation factors (VIF), and all predictors had VIF values below 2, indicating no multicollinearity concerns. Assumptions for logistic regression were met, including absence of influential outliers (based on Cook's distance and leverage values) and correct model specification. Model adequacy was further confirmed using the Hosmer–Lemeshow goodness-of-fit test and Nagelkerke pseudo R^2 statistics. Statistical significance was set at $p < .05$.

2 Results

2.1 Sample characteristics

The analytic sample comprised 7,553 married women aged 15–49 years (M = 32.91, SD = 8.10), drawn from the 2018 Nigeria Demographic and Health Survey. A total of 46 women were excluded due to missing data, yielding the final weighted analytic sample. Most participants were employed and lived in rural areas, with educational attainment and household wealth showing substantial variability. Nearly one-third of women reported experiencing at least one form of IPV, and financial constraints were the most commonly reported barrier to healthcare access. Full demographic and outcome distributions are presented in Table 1.

2.2 Bivariate logistic regression

Table 2 highlights several consistent patterns. Structural advantages, including higher education, greater household wealth, and urban residence were strongly protective against all perceived barriers to healthcare (all $p < .001$). Education showed a clear dose–response effect, with primary, secondary, and higher education each associated with progressively lower odds of reporting barriers (all $p < .001$). Similarly, women in the richest wealth quintile experienced markedly fewer access problems compared to those in the poorest group (all $p < .001$). Age effects were evident: women aged 25–34 and those over 45 reported fewer permission and autonomy-related barriers compared to women aged 15–24 ($p < .01$). Employment status had more modest associations, reducing permission ($p = .027$) and going alone barriers ($p = .026$), but not financial or distance-related barriers. Partner alcohol use showed mixed effects, lowering odds for permission and going alone barriers (both $p < .01$) but slightly increasing financial barriers ($p = .044$). In contrast, IPV was consistently associated with greater odds of reporting permission ($p < .001$), financial ($p < .001$), and distance barriers ($p < .001$), though not autonomy barriers related to going alone ($p = .162$). Overall, the results suggest that socioeconomic and structural resources buffer women against healthcare access barriers ($p < .001$ across indicators), whereas IPV significantly amplifies them.

2.3 Main findings

2.3.1 Getting permission to go to health facility

The overall logistic regression model predicting the perceived barrier of obtaining permission to access healthcare was statistically significant, $\chi^2(14) = 187.18$, $p < .001$. The 14 degrees of freedom reflect the total number of parameters estimated in the model, including dummy-coded categories of the eight substantive predictors. This indicates that the predictors collectively contributed to a significantly improved model fit

Table 1 Frequencies and percentages of sociodemographic Characteristics, intimate partner violence Experience, and perceived barriers to healthcare access among women aged 15–49 in the 2019 Nigeria demographic and health survey (*N* = 7,553)

Variable	Category	Frequency (*n*)	Percent (%)
Age group	15–24	1,447	19.2
	25–34	3,075	40.7
	35–44	2,259	29.9
	> 45	771	10.2
Employment status	Not employed	2,178	28.8
	Employed	5,375	71.2
Wealth status	Poor	3,004	39.8
	Rich	4,549	60.2
Place of residence	Rural	4,326	57.3
	Urban	3,226	42.7
Husband/partner drinks alcohol	No	5,963	79.0
	Yes	1,590	21.0
Highest educational level	No education	3,233	42.8
	Primary	1,199	15.9
	Secondary	2,384	31.6
	Higher	737	9.8
Any experience of IPV	No	5,325	70.5
	Yes	2,228	29.5
Perceived barrier: getting permission to go	Not a big problem	6,680	88.4
	Big problem	873	11.6
Perceived barrier: getting money for treatment	Not a big problem	4,054	53.7
	Big problem	3,498	46.3
Perceived barrier: distance to health facility	Not a big problem	5,491	72.7
	Big problem	2,062	27.3
Perceived barrier: not wanting/unable to go alone	Not a big problem	6,430	85.1
	Big problem	1,123	14.9

The table presents weighted frequencies, percentages, and cumulative percentages for key sociodemographic, contextual, and perceived barrier variables among women aged 15–49 years from the 2018 Nigeria Demographic and Health Survey (NDHS). Percentages are based on valid weighted responses (*N* = 7,553). Variable categories reflect coded groupings as defined in the NDHS. "Big problem" responses denote perceived significant barriers to accessing healthcare. Cases with zero or negative weights or missing data were excluded from the analysis

compared with the null model.The model demonstrated an explanatory power, with Pseudo-R^2 values of Cox & Snell R^2 = 0.024 and Nagelkerke R^2 = 0.048, indicating that approximately 2.4%–4.8% of the variance in the outcome was explained by the predictors. The Hosmer–Lemeshow test indicated an adequate model fit, as the result was not statistically significant (χ^2 = 16.110, df = 8, p = .09), suggesting that the model's predictions did not significantly deviate from the observed outcomes. Table 3 presents the hierarchical logistic regression results examining the main and interaction effects of education and IPV on women's reported difficulty in obtaining permission to seek healthcare.

2.3.2 Main effects (Block 2)

Education demonstrated a clear protective pattern. Compared to women with no formal education, those with primary (AOR = 0.66, 95% CI [0.58, 0.74]), secondary (AOR = 0.64, 95% CI [0.57, 0.72]), and higher education (AOR = 0.38, 95% CI [0.32, 0.45]) had significantly lower odds of reporting permission-related barriers (all p < .001). Conversely, women who had experienced any form of IPV were substantially more likely to report such barriers (AOR = 1.37, 95% CI [1.25, 1.50], p < .001).

Table 2 Bivariate logistic regression of predictors of four healthcare access barriers among women in Nigeria (*N* = 7,553)

	Getting permission to go to health facility		Getting money needed to get treatment		Distance to health facility		Not wanting to go to health facility alone	
Predictor	**OR (95% CI)**	**SE**	**OR (95% CI)**	**SE**	**OR (95% CI)**	**SE**	**OR (95% CI)**	**SE**
Age								
25–34 vs. 15–24	0.747 (0.619–0.901)**	0.096	0.903 (0.796–1.023)	0.064	0.812 (0.706–0.933)**	0.071	0.741 (0.627–0.875)***	0.085
35–44 vs. 15–24	0.845 (0.695–1.028)	0.100	0.878 (0.770–1.003)	0.068	0.903 (0.780–1.044)	0.074	0.729 (0.611–0.871)***	0.091
>45 vs. 15–24	0.635 (0.478–0.845)**	0.146	1.065 (0.894–1.268)	0.089	0.963 (0.794–1.167)	0.098	0.585 (0.453–0.756)***	0.131
Respondent currently working (Employed)	0.842 (0.724–0.980)*	0.077	0.965 (0.873–1.066)	0.051	0.961 (0.860–1.074)	0.057	0.856 (0.747–0.982)*	0.070
Wealth (Rich)	0.567 (0.492–0.653)***	0.072	0.454 (0.414–0.499)***	0.048	0.331 (0.298–0.367)***	0.053	0.412 (0.362–0.469)***	0.066
Residence (Urban)	0.511 (0.438–0.596)***	0.078	0.525 (0.478–0.576)***	0.047	0.438 (0.393–0.489)***	0.056	0.400 (0.346–0.461)***	0.073
Husband/Partner drinks alcohol (Yes)	0.668 (0.552–0.809)***	0.098	1.120 (1.003–1.252)*	0.057	0.996 (0.880–1.128)	0.063	0.756 (0.641–0.893)**	0.084
Primary (Yes)	0.571 (0.461–0.707)***	0.109	0.767 (0.672–0.876)***	0.068	0.622 (0.537–0.722)***	0.075	0.579 (0.478–0.702)***	0.098
Secondary (Yes)	0.514 (0.434–0.610)***	0.087	0.549 (0.493–0.611)***	0.055	0.450 (0.398–0.509)***	0.063	0.548 (0.471–0.637)***	0.077
Higher (Yes)	0.276 (0.195–0.390)***	0.177	0.250 (0.208–0.301)***	0.094	0.294 (0.236–0.365)***	0.112	0.292 (0.216–0.394)***	0.154
Any IPV experience (Yes)	1.404 (1.211–1.628)***	0.076	1.935 (1.750–2.139)***	0.051	1.422 (1.276–1.585)***	0.055	1.103 (0.961–1.265)	0.070

Bivariate logistic regression models were fitted separately for each predictor variable to determine their associations with the outcome. For categorical predictors, the reference categories were: Age group = 15–24 years; Employment status = Not employed; Wealth = Poor; Residence = Rural; Husband/partner drinks alcohol = No; Highest educational level = No education; Experience of intimate partner violence (IPV) = No. B regression coefficient (log odds), *SE* standard error; 95% CI 95% confidence interval for Exp (B); Sig. = p-value. Statistical significance is indicated by asterisks: $p < .05$; $p < .01$; $p < .001$. Sample size = 7,553 women aged 15–49 years from the 2018 Nigeria Demographic and Health Survey

2.3.3 Interaction effects (Block 3)

The inclusion of IPV × education terms improved the model slightly (Nagelkerke R^2 = 0.030). The moderating effect of education was significant for secondary (AOR = 0.54, 95% CI [0.35, 0.84]) and higher education (AOR = 0.13, 95% CI [0.04, 0.43]), suggesting that education buffered the negative impact of IPV on healthcare autonomy. Predicted probabilities indicated that women with higher education and no IPV exposure had about a 7% probability of facing permission barriers, compared to 18% among IPV survivors with no education, illustrating education's substantial protective effect.

2.3.4 Slope analysis

The slope analysis indicates that the association between highest educational level and the likelihood of reporting that obtaining permission to visit a health facility is a "big problem" is moderated by the presence of IPV. Women with higher education showed a lower baseline likelihood of experiencing permission barriers compared to those with no or primary education. The interaction effect between IPV and education was statistically significant, Wald = 17.51, df = 3, $p = .001$, indicating that the negative impact of IPV on health-seeking autonomy was stronger among women with lower education levels. Specifically, the odds of reporting permission as a big problem were significantly higher for

Table 3 Hierarchical binary logistic regression predicting four indicators of perceived barriers to healthcare access by any IPV and educational attainment (*N* = 7,553)

	Getting permission to go to health facility		Getting money needed for treatment		Distance to health facility		Not wanting to go to health facility alone	
Predictor	**AOR (95% CI)**	**SE**	**AOR (95% CI)**	**SE**	**AOR (95% CI)**	**SE**	**AOR (95% CI)**	**SE**
Block 2								
Education – primary	0.657 (0.518–0.833)***	0.117	0.868 (0.729–1.032)	0.075	0.802 (0.681–0.945)*	0.084	0.776 (0.631–0.955)*	0.106
Education – secondary	0.637 (0.531–0.763)***	0.108	0.707 (0.629–0.795)***	0.070	0.744 (0.636–0.871)***	0.080	0.895 (0.739–1.085)	0.098
Education – higher	0.379 (0.270–0.535)***	0.193	0.365 (0.301–0.442)***	0.107	0.584 (0.456–0.749)***	0.127	0.577 (0.413–0.806)**	0.171
Any IPV (yes)	1.372 (1.165–1.615)***	0.078	1.764 (1.587–1.960)***	0.054	1.263 (1.125–1.417)***	0.059	1.002 (0.868–1.157)	0.073
R^2 change	**0.022**		**0.042**		**0.012**		**0.11**	
Block 3								
Education – primary	0.736 (0.591–0.916)*	0.143	0.840 (0.706–1.000)*	0.088	0.81(0.66–0.98)*	0.71	0.694 (0.539–0.894)*	0.129
Education – secondary	0.785 (0.663–0.929)	0.124	0.806 (0.717–0.906)**	0.079	0.808 (0.663–0.984)*	0.101	0.875 (0.703–1.089)	0.112
Education – higher	0.537 (0.381–0.756)**	0.202	0.425 (0.352–0.512)***	0.119	0.794 (0.663–0.951)*	0.092	0.640 (0.447–0.915)*	0.183
Any IPV (yes)	1.744 (1.421–2.141)***	0.101	2.085 (1.778–2.445)***	0.081	0.593 (0.448–0.785)***	0.143	0.958 (0.791–1.160)	0.098
Any IPV × education – primary	0.730 (0.523–1.018)	0.229	1.100 (0.813–1.489)	0.154	1.339 (1.143–1.568)***	0.081	1.389 (0.924–2.089)	0.208
Any IPV × education – secondary	0.541 (0.388–0.754)***	0.189	0.647 (0.509–0.823)***	0.123	0.973 (0.706–1.342)	0.164	1.078 (0.774–1.500)	0.169
Any IPV × education – higher	0.126 (0.036–0.443)**	0.732	0.556 (0.359–0.861)**	0.223	0.822 (0.628–1.075)	0.137	0.512 (0.209–1.252)	0.456
R^2 change due to interaction	**0.028**		**0.048**		**0.013**		**0.12**	

AOR Adjusted Odds Ratio; CI=Confidence Interval, *IPV* Intimate Partner Violence. Reference categories: education (no education), any IPV (no). SE = standard error; 95% CI 95% confidence interval for Exp(B); Sig. = p-value. Statistical significance is indicated by asterisks: **p* <.05; ***p* <.01; ***p* <.001. All analyses were adjusted for covariates and weighted to account for the complex survey design. Sample size = 7,553 women aged 15–49 years from the [5] Nigeria Demographic and Health Survey

IPV survivors with no or primary education (B = 0.85, AOR = 2.34, p <.001,) compared to those with secondary or higher education (B = 0.32, AOR = 1.38, p =.042,). This suggests that higher educational attainment buffers the constraining influence of IPV on women's healthcare decision-making autonomy (Fig. 1).

2.4 Getting money needed for treatment

The overall logistic regression model predicting the perceived barrier of getting money needed for treatment was statistically significant ($\chi^2(14) = 594.88$, p <.001), indicating that the predictors collectively improved model fit over the null model. The model demonstrated an explanatory power, with Pseudo-R^2 values of Cox & Snell R^2 and Nagelkerke R^2 values were 0.076 and 0.101, respectively, suggesting the model explained approximately 7.6% – 10.1% of the variance in the outcome. The Hosmer–Lemeshow test indicated an acceptable fit ($\chi^2(8) = 8.69$, p =.369), with no significant difference between observed and predicted values. Overall, the model showed robust statistical significance, adequate calibration, and modest explanatory power in predicting financial barriers to treatment. Table 3 summarizes the hierarchical logistic regression results assessing the

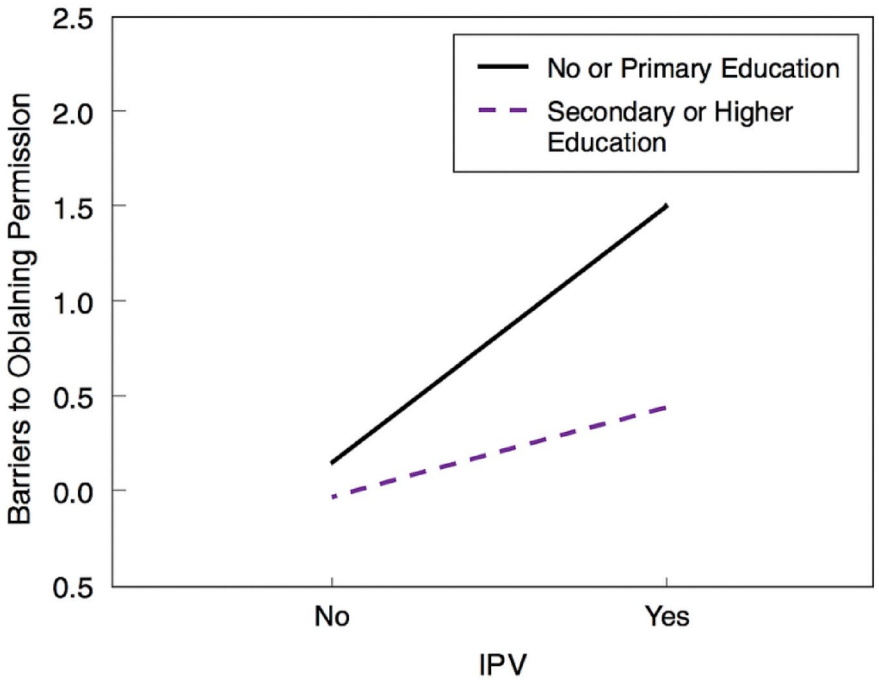

Fig. 1 Moderating Effect of Educational Attainment on the Association between Intimate Partner Violence (IPV) and Barriers to Obtaining Permission for Healthcare Access. Models are weighted to account for the complex survey design of the 2018 Nigeria Demographic and Health Survey (NDHS). All effects are adjusted for age, employment status, residence, household wealth, and husband's alcohol use. Reference category for education = No formal education

effects of education, IPV, and their interaction on women's reported difficulty in obtaining money for treatment.

2.4.1 Main effects (Block 2)

Both education and IPV were significant predictors of financial barriers (Nagelkerke R^2 = 0.042). Increasing education levels were associated with progressively lower odds of reporting such difficulty. Compared with women with no education, those with secondary (AOR = 0.71, 95% CI [0.63, 0.80]) and higher education (AOR = 0.37, 95% CI [0.30, 0.44]) had markedly reduced odds of experiencing financial barriers. Conversely, women exposed to IPV had substantially higher odds of reporting financial difficulty (AOR = 1.76, 95% CI [1.59, 1.96]), indicating that IPV is a significant risk factor for economic barriers to healthcare.

2.4.2 Interaction effects

Adding IPV × education terms improved model fit (Nagelkerke R^2 = 0.048). Education moderated the IPV effect, with secondary (AOR = 0.65, 95% CI [0.51, 0.82]) and higher education (AOR = 0.56, 95% CI [0.36, 0.86]) showing reduced IPV impact. Predicted probabilities showed that IPV survivors with no education had about a 30% probability of reporting financial barriers versus 12% among those with higher education, highlighting the mitigating role of education.

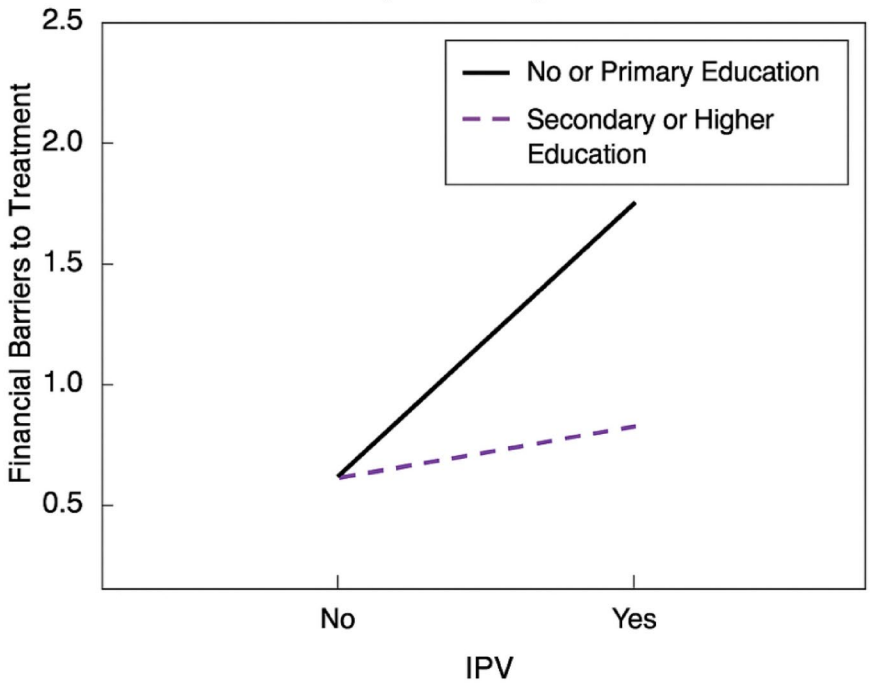

Fig. 2 Moderating Effect of Educational Attainment on the Association between Intimate Partner Violence (IPV) and Barriers to Obtaining Money for Treatment. Models are weighted to account for the complex survey design of the 2018 Nigeria Demographic and Health Survey (NDHS). All effects are adjusted for age, employment status, residence, household wealth, and husband's alcohol use. Reference category for education = No formal education

2.4.3 Slope analysis

The findings reveal that educational attainment significantly moderates the relationship between exposure to IPV and the likelihood of reporting financial barriers to treatment as a major problem. Specifically, IPV survivors with no or primary education were substantially more likely to report difficulty obtaining money for healthcare (B = 0.88, AOR = 2.41, $p < .001$) compared to those with secondary or higher education (B = – 0.29, AOR = 0.75, $p = .042$). These results underscore the protective role of education in mitigating the financial constraints associated with IPV, suggesting that higher educational attainment may buffer women against the economic vulnerabilities that hinder access to healthcare (Fig. 2).

2.5 Distance to health facility

The logistic regression model predicting perceived barriers related to distance from the health facility was statistically significant, $\chi^2(14) = 542.80$, $p < .001$, indicating that the set of predictors collectively contributed to a better model fit than the null model. The Pseudo-R^2 values—Cox & Snell $R^2 = 0.069$ and Nagelkerke $R^2 = 0.100$—suggest that the model accounted for approximately 6.9% to 10.0% of the variance in the outcome. Additionally, the Hosmer–Lemeshow goodness-of-fit test yielded a non-significant result, $\chi^2(8) = 18.85$, $p = .08$, indicating an adequate fit and no evidence of model mis-specification. Table 3 summarizes the hierarchical logistic regression examining the effects of education, IPV, and their interaction on women's likelihood of reporting distance to a health facility as a major problem.

2.5.1 Main effects (Block 2)

Both education and IPV were significant predictors (Nagelkerke R^2 = 0.012). Higher educational attainment was associated with lower odds of perceiving distance as a barrier. Compared with women with no education, those with primary (AOR = 0.80, 95% CI [0.68, 0.95]), secondary (AOR = 0.74, 95% CI [0.64, 0.87]), and higher education (AOR = 0.58, 95% CI [0.46, 0.75]) were significantly less likely to report distance as a big problem. In contrast, women who experienced IPV had greater odds of reporting distance as a barrier (AOR = 1.26, 95% CI [1.13, 1.42]), underscoring IPV as a risk factor for access-related difficulties.

2.5.2 Interaction effects

No significant interaction terms emerged, suggesting independent effects of IPV and education. Predicted probabilities indicated that IPV survivors with no education had about a 25% probability of reporting distance as a major problem, compared to 14% among women with higher education, showing education's general advantage regardless of IPV exposure.

2.6 Not wanting to go to health facility alone

The overall logistic regression model predicting the perceived barrier of not wanting to go to the health facility alone was statistically significant ($\chi^2(14) = 270.26$, $p < .001$), indicating that the predictors collectively improved model fit compared to the intercept-only model. The Pseudo-R^2 values of Cox & Snell R^2 and Nagelkerke R^2 values were 0.035 and 0.062, respectively, suggesting that the model explained approximately 3.5% – 6.2% of the variance in the outcome. The Hosmer–Lemeshow goodness-of-fit test indicated no evidence of poor fit ($\chi^2(8) = 12.74$, $p = .121$), implying that the predicted probabilities aligned well with the observed data. Overall, while the model's explanatory power was modest, it demonstrated good calibration and statistical significance, supporting its adequacy for examining factors related to this perceived barrier. Table 3 presents the hierarchical logistic regression analysis examining the effects of education, IPV, and their interaction on women's likelihood of reporting not wanting to visit a health facility alone.

2.6.1 Main effects (Block 2)

Both education and IPV were included as predictors (Nagelkerke R^2 = 0.011). Education showed a mixed pattern: women with primary education had lower odds of reporting this barrier (AOR = 0.78, 95% CI [0.63, 0.96]), and those with higher education were even less likely to report it (AOR = 0.58, 95% CI [0.41, 0.81]), while secondary education showed no significant association. IPV was not a significant predictor (AOR = 1.00, 95% CI [0.87, 1.16]).

2.6.2 Interaction effects

IPV × education did not reach significance (Nagelkerke R^2 = 0.013). Predicted probabilities indicated that IPV survivors with no education had about a 15% chance of reporting this barrier compared to 8% among those with higher education, suggesting that education independently promotes greater confidence in healthcare access.

3 Discussion

This study offers a novel exploration of education as a moderator between IPV and healthcare access barriers, using disaggregated barrier dimensions to enable more targeted interventions. Leveraging a large, nationally representative ever married Nigerian women sample, it provides context-specific insights that advance equity-focused health and gender policy development. This study reveals that IPV, combined with structural and cultural factors, significantly limits women's access to healthcare in Nigeria. Women facing IPV encounter compounded barriers like financial hardship, restricted mobility, and limited autonomy. By framing IPV within broader social and economic vulnerabilities, the research deepens understanding of how violence obstructs health equity and universal healthcare goals.

We hypothesized that experiences of IPV would be associated with a higher likelihood of perceiving barriers to accessing healthcare. These barriers specifically concern obtaining permission to visit a health facility, securing money for treatment, overcoming distance to a facility, and attending alone. We found evidence supporting our initial hypotheses. Our results are consistent with earlier research, primarily involving women in sub-Saharan Africa, which indicates that experiencing any form of IPV is linked to heightened challenges in accessing healthcare services [10, 32]. Abuse by husbands can significantly diminish women's autonomy and decision-making power, limiting their freedom of movement and ability to seek medical attention [42]. IPV may also drain financial resources, either through direct economic control or through indirect effects like unemployment or reduced income, further restricting access to healthcare [1]. Beyond these structural barriers, IPV undermines psychological resilience and self-confidence [32], intensifying existing cultural and social limitations such as needing family approval, facing transportation and distance issues, and feeling anxious or fearful about visiting health facilities alone. From a feminist theoretical perspective, these findings highlight how IPV operates within patriarchal power structures that normalize male control over women's bodies, mobility, and resources [14]. Such dynamics reflect broader gendered inequalities in health systems, where women's access to care is shaped not only by individual circumstances but also by entrenched social norms that privilege male authority. Our findings reflect the multifaceted nature of these barriers, as described in prior studies, showing that IPV imposes not only tangible economic and physical limitations but also deep-seated psychological and social challenges that collectively hinder healthcare access [34].

Exposure to IPV confers additional burden on pregnant women's healthcare access, with those abused during pregnancy nearly twice as likely to forgo postpartum services as non-abused counterparts [44]. By undermining independence, restricting mobility, and reducing financial resources, IPV amplifies barriers to care. Forgoing essential postpartum services poses serious risks to maternal and infant health, highlighting the urgent need to address IPV as a critical driver of perinatal healthcare inequities. Access to mental healthcare is also severely hindered by IPV, with survivors often unable to obtain needed services due to financial constraints [23]. The impact is particularly grave for women subjected to multiple forms of abuse, who face markedly elevated mental health risks. Compared with women with no history of abuse, they are nearly six times more likely to experience depression, almost ten times more likely to develop post-traumatic stress disorder, and over seventeen times more likely to report suicidal thoughts

or behaviors [17]. These disparities highlight the profound and cumulative psychological toll of IPV, underscoring the urgency of targeted interventions. The intersection of IPV and restricted healthcare access traps survivors in a cycle of unchecked abuse and worsening health outcomes. Urgent medical, psychological, and reproductive needs often go unmet due to financial constraints, social stigma, and patriarchal gatekeeping. In Nigeria, where help-seeking among IPV survivors remains rare [37], the risks of chronic illness, injury, and mortality are intensified. Addressing this crisis requires integrated interventions that both eliminate access barriers and foster safe, supportive avenues for seeking help.

A comparison of the magnitude of associations in our study suggest that IPV is most strongly associated with barriers related to obtaining permission and affording treatment, more so than other access challenges. This aligns with prior research and theoretical frameworks that highlight patriarchal dominance and financial dependence as key mechanisms through which IPV undermines women's healthcare autonomy [12, 20]. Abusive relationships often curtail decision-making power and economic independence, forcing women to rely on their partners for healthcare approval while lacking the financial means to seek care (WHO, [45]). These intertwined constraints pose more immediate obstacles than logistical issues such as travel or distance.

We also hypothesized that higher educational attainment would be associated with a lower likelihood of perceiving healthcare access barriers. Our findings are consistent with existing literature that education has independent and protective roles on barriers to healthcare access. The consistent association of educational attainment with reduced barriers across all four domains of healthcare access can be understood through frameworks emphasizing both resources and empowerment. Higher levels of education are closely linked to improved health literacy, which empowers women to recognize symptoms earlier, navigate healthcare systems more effectively, and appreciate the importance of timely medical care [33]. This cognitive advantage helps diminish perceived challenges in all aspects of access. From an economic standpoint, education often enhances employment prospects and raises household income [25], which alleviates financial burdens and enables women to afford necessary transportation and treatment costs. Education also facilitates broader social networks, providing vital informational and emotional support that eases psychological and logistical concerns surrounding attending healthcare facilities independently. In societies with patriarchal norms, education is further linked to greater household decision-making power and negotiation ability [3], which directly reduces the need for permission from spouses or family members. Collectively, these pathways explain why education independently and significantly lowers perceived barriers across diverse healthcare access challenges.

As hypothesized, education significantly moderated the relationship between IPV exposure and perceived barriers to healthcare access. Overall, higher education levels attenuated the adverse effects of IPV, particularly for barriers related to obtaining permission and securing financial resources, compared to more structural constraints such as distance to facilities or the need to attend healthcare alone. This pattern likely reflects that permission and finance related barriers are closely connected to women's autonomy, bargaining power, and control over household resources. These factors are strengthened through education, which enhances self-efficacy, communication skills, economic independence, and the capacity to challenge restrictive gender norms [24];

Wessells & Kostelny 2022. Conversely, mobility-related barriers are shaped by infrastructural limitations, safety concerns, and entrenched community norms [39]), which education alone cannot overcome without complementary structural and policy interventions. Notably, the moderating effect of higher education was most pronounced for permission-related barriers, underscoring the autonomy and empowerment benefits conferred by advanced schooling. Beyond improving cognitive and economic resources, extended education expands women's social networks through academic, professional, and community affiliations. These networks foster informational, emotional, and practical support, particularly critical for women experiencing husband-perpetrated violence. Such social connections can counteract isolation, facilitate help-seeking, and promote safer healthcare access. Consistent with empowerment theory [21], education functions as both a cognitive and social asset, enhancing autonomy, self-efficacy, and decision-making power, thereby enabling women to challenge restrictive norms, secure essential services, and mitigate the health consequences of IPV.

3.1 Limitations

This study has several limitations that warrant consideration. First, its cross-sectional design precludes causal inference, as the observed associations may be bidirectional, therefore, reverse causality cannot be ruled out. Second, because IPV and healthcare barriers were self-reported, responses may have been affected by recall and social desirability biases. Underreporting of IPV is also possible given the sensitive nature of the topic and persistent cultural stigma surrounding violence disclosure in household surveys such as the NDHS. Third, the exclusion of unmarried women may limit the representativeness of the findings, as unmarried or cohabiting women may experience different forms or dynamics of IPV and healthcare access barriers. Fourth, the small pseudo R^2 values (1–4%) suggest that while the models achieved statistical significance, they explain only a modest share of variance, indicating potential unmeasured confounders such as community norms, service availability, or partner characteristics that were not captured in the dataset. Fifth, the analysis did not account for possible clustering effects at the school or community level, which may have introduced unobserved contextual influences. Sixth, the use of lifetime IPV measures without temporal specificity restricts insights into the timing or cumulative effects of abuse. Seventh, the study measures did not capture relative educational or economic differences between partners, such as whether the woman was more educated or earned more than her spouse. This study acknowledges that while women's education plays a crucial moderating role in shaping the relationship between IPV and healthcare access barriers, differences in educational attainment and income between women and their spouses may equally influence household power relations, decision-making dynamics, and women's autonomy in seeking care. Although these spousal disparities were not examined in the present analysis, they represent an important area for future research to better understand the intersection of gender, education, and health equity. Lastly, an important contextual consideration is the sociocultural interpretation of healthcare access barriers across Nigeria. In particular, what is categorized in this study as barriers such as needing permission, obtaining money for treatment, distance to facilities, and reluctance to attend healthcare alone may reflect deeply rooted cultural and religious norms, especially within core Muslim northern households. In such contexts, these factors may not necessarily be perceived as

barriers but as accepted social expectations governing women's mobility and healthcare decisions. Future studies should therefore account for regional and cultural variations, particularly north–south differences in marital and gender relations, to better interpret these patterns within their sociocultural frameworks.

3.2 Policy and practice implications

This study highlights the critical role of women's education in reducing healthcare barriers associated with IPV and improving health autonomy in Nigeria. Translating these findings into practice requires coordinated action across education, health, community, and policy sectors.

3.2.1 Education sector

Expanding equitable access to secondary and tertiary education for girls should be a national priority. Government and development partners could strengthen scholarship programs, conditional cash transfers, and adult literacy initiatives targeting women in underserved regions. Embedding gender equality, health literacy, and decision-making skills into school curricula would further empower young women to exercise autonomy in health and family life.

3.2.2 Health sector

Health systems should integrate IPV screening and support into routine reproductive, maternal, and primary healthcare services (US Preventive Services Task Force 38. Training healthcare workers in trauma-informed and culturally sensitive care can improve early identification and management of IPV. Health facilities should provide confidential referral pathways linking survivors to psychosocial counseling, legal support, and financial empowerment services. Incorporating these into integrated care models can simultaneously promote recovery and economic independence.

3.2.3 Community engagement

Community-based programs, particularly through religious, traditional, and women's groups should promote awareness of women's rights, challenge discriminatory norms, and foster shared decision-making within households. Safe spaces and peer support networks can offer survivors psychosocial stability and pathways to seek help without stigma.

3.2.4 Policy level

Policymakers should strengthen enforcement of gender protection laws and embed IPV prevention within national health and education policies. Developing multisectoral monitoring and evaluation frameworks will ensure accountability, track outcomes, and guide resource allocation. Sustained investment in women's empowerment and gender-responsive budgeting remains essential to achieving equitable healthcare access and long-term social stability. Collectively, these measures can reduce women's economic and social dependence, enhance their capacity to seek healthcare safely, and advance progress toward gender equity in health and development.

4 Conclusion

This study provides novel evidence that women's education substantially moderates the adverse effects of IPV on healthcare access, highlighting education as both a protective and empowering resource. By separating barriers into distinct categories of permission, financial, and structural, this study moves beyond composite indicators and demonstrates that educational attainment more effectively mitigates constraints related to autonomy than those rooted in infrastructure. These insights necessitates the need for multisectoral action that integrates gender equity into both education and health policies. Expanding women's access to quality education, promoting safe learning environments, and embedding gender-transformative curricula can strengthen long-term resilience against IPV and related health inequalities. Within the health sector, improving provider sensitivity to IPV, institutionalizing confidential screening, and linking survivors to social and economic support systems can close persistent access gaps. At the community level, interventions that engage men, religious leaders, and traditional authorities to challenge restrictive gender norms remain critical.

Future research should build on these findings by employing longitudinal and mixed-methods approaches to clarify causal pathways and illuminate context-specific mechanisms linking education, IPV, and healthcare use. Strengthening the integration of social, behavioral, and system-level data will advance a more comprehensive understanding of how education functions as a lever for health equity and gender justice in Nigeria and similar contexts.

Author contributions

Author Contributions Adegbenga M. Sunmola: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft Preparation, Supervision, Correspondence. Luqman A. Morakinyo: Data Curation, and Data Analyses. Funlade Sunmola: Review & Editing, Visualization. Rasak Olajide: Review & Editing, Contextualization within Nigerian Public Health and Policy.

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Data availability

This study is based on secondary analysis of the 2018 Nigeria Demographic and Health Survey (NDHS), a publicly available dataset. The dataset can be accessed through the DHS Program website (https://dhsprogram.com) upon request and registration. No new data were generated for this study.

Declarations

Ethical approval and consent to participate

This study used secondary data from the 2018 Nigeria Demographic and Health Survey (NDHS), a publicly available dataset. Ethical approval for the NDHS was obtained from the National Health Research Ethics Committee of Nigeria and the Institutional Review Board of ICF International. All procedures followed were in accordance with the ethical standards of these institutions and with the 1964 Helsinki Declaration and its later amendments. Not applicable (secondary data analysis).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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