Effect of Education on Attitude Towards Domestic Violence in Nigeria: An Exploration Using Propensity Score Methodology

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Abstract

Propensity Score Methodology (PSM) was used to investigate the effect of education on attitude towards domestic violence (ATDV) among men and women in Nigeria.

A total of 14,495 and 33,419 records were extracted for men and women respectively from the 2016-2017 Multiple Indicator Cluster Survey (MICS) in Nigeria. The outcome variable was ATDV. The study framework described the role of education on ATDV in the light of demographic characteristics, socioeconomic profile, and lifestyle. Selection bias was checked among the levels of education using the multinomial logit regression. Propensity scores (PS) and PS weights were generated for the treatment variable and average treatment effects (ATE) of ATDV were estimated using logistic regression that combined regression adjustment and inverse-probability weight. Descriptive statistics, odds ratios and 95%CI were presented.

The mean age of men and women were 30.8 ± 10.2 years and 29 ± 9.4 years respectively. About 22% men and 35% women justified domestic violence (DV) respectively. Selection bias was found between the covariates and level of education ($p < 0.05$). PSM effectively corrected the selection bias (SD diff ≈ 0, Variance ratio ≈ 1). Men (AOR = 0.84, 95% CI: 0.78, 0.92) and women (AOR=0.94, 95%CI: 0.80, 2.22) who have attained tertiary level of education were less likely to justify DV in comparison to their uneducated counterparts.

Tertiary education was protective for ATDV among men and women. The use of PSM effectively controlled for selection bias in estimating the effect of education on ATDV. PSM will enable researchers make causal inference from non-experimental/cross-sectional studies in situations where randomized control trials are not feasible.

Keywords: propensity score, attitude towards domestic violence, treatment effect, selection bias

1. Background

1.1 Introduction

Experimental studies remain the gold standard when the measurement of a causal relationship is of interest. Scholars solely rely on Randomized Control Trials (RCT) to make causal inference in various fields of research. However, randomization, manipulation, and intervention are impossible in some research especially in evaluating the effect of programs (Oliver et al., 2002). For instance, it will be unethical for a researcher to deny some set of people access to education programs because of research. Similarly, it will be unacceptable for a researcher to expose some women to violence and watch if their access to maternal health care will be poorer than those who were not exposed to violence (Kean, Lock, & Howard-Lock, 1991; Sayar et al., 2019). However, analysis of observational data is an option, but the generalizability and the reliability of such findings are questionable especially in studies where a causal factor is of interest. The major problem of a non-experimental study is "selection bias" which is known as the systematic difference between the treatment (exposed) and control (non-exposed) group based on any number of covariates This systematic difference (selection bias) was corroborated by Shadish in a study where study participants who self-selected themselves into the training group performed better than those who were randomly assigned to the same training group (Shadish, Luellen, & Clark, 2006). Findings from Shadish study confirmed the claim of Rosenbaum and Rubin that participants who were not randomly assigned to treatment will tend to give a better report on the treatment or the

exposure.

All efforts to adjust and correct for selection bias such as structural equation modeling (SEM) and adjusted regression showed no improvement (Cepeda, Boston, Farrar, & Strom, 2003). Only the use of PSM can effectively control for the selection bias (Arikan, van de Vijver, & Yagmur, 2018). Many studies have used PSM to address the problem of selection bias in quasi-experimental and cross-sectional study designs (Feng, Zhou, Zou, Fan, & Li, 2012; Rubin, 1997; Shadish et al., 2006; Yang, Imbens, Cui, Faries, & Kadziola, 2016; Yaya, Gunawardena, & Bishwajit, 2019). PSM is a statistical method that has proven useful for evaluating treatment effects when using non-experimental or observational data (Guo & Fraser, 2015). PSM is used when researchers need to assess the effect of covariates on the outcome variable using survey data, census, administration data, and other observational data without any intervention by random assignment rules (Rubin, 1997).

Domestic violence (DV) was defined as "any use of physical, sexual, psychological or economic violence of one family member, irrespective of person's age, gender or any other personal circumstance of the victim or the perpetrator of violence" (DHS, 2018). Attitude towards domestic violence (ATDV) has been identified as an indicator of the degree of social acceptance of DV and a known predictor of victimization and perpetration of DV. People's ATDV determines whether such violent acts will be reported or not (NBS, 2017; Okenwa-Emegwa, Lawoko, & Jansson, 2016). A higher proportion of men (25%) and women (35%) justified DV for reasons like, "wife burns the food", "argues with him", "goes out without telling him", "neglects the children", or "refuses sexual intercourse with him" (NDHS, 2018; Okenwa-Emegwa et al., 2016). The magnitude, extent, and predictors of ATDV against women have been examined among men and women (Fawole, Aderonmu, & Fawole, 2005; Okenwa-Emegwa et al., 2016). Factors such as Islamic religion, residency in the northern region, the South-South region, low levels of education, and low household wealth index have been reported to influence the justification of DV. Of the reported associated factors of DV and ATDV, studies have implicated education, but majority of the evidence was been based on observational studies which have limitations when it comes to "causal inference". It is on this premise that the present study is aimed at employing PSM to investigate the effect of education on ATDV.

Further, the use of PSM to estimate the effect of drug use on violent behaviors while adjusting for selection bias among students in South-West Nigeria showed that drug use was associated with the likelihood of violent behavior. (Yusuf, Akinyemi, Adedokun, & Omigbodun, 2014). Also, IPV has been linked as a risk factor for maternal health care utilization and poor pregnancy outcome using PSM (Yaya et al., 2019).

Studies have shown that a higher level of education was protective against the risks of DV among men and women (Bates, Schuler, Islam, & Islam, 2004; Koenig, Ahmed, Hossain, & Mozumder, 2003; Okenwa-Emegwa et al., 2016; Wang, 2016). Since ATDV is an indicator of the degree of social acceptance of DV and a known predictor of victimization and perpetration of DV (NBS, 2017), Since ATDV is an indicator of the degree of social acceptance of DV and a known predictor of victimization and perpetration of DV, it is important to investigate whether education will also be a protective factor for ATDV among the general population to be able to make policies that will protect current and potential victims of domestic violence and enhance a protective ATDV among the perpetrators.

We aimed to examine the effect of education on ATDV among men and women in Nigeria using PSM. We hypothesized that PSM will improve the estimation of the effect of educational level on ATDV among men and women.

2. Materials and Methods

2.1 Study Design and Setting

We used the 2016-2017 Multiple Indicator Cluster Survey (MICS5), a cross-sectional study carried out among adults (men and women) of age 15 to 49 years in Nigeria. Nigeria is the most populous African country with an estimated population of about 206 million inhabitants consisting of 99.1 million females (Thomas & Crow, 2020; Worldometer, 2020). Nigeria has 36 states and a Federal Capital Territory (political divisions). Nigeria has more than 50 ethnic groups among which Yoruba, Hausa/Fulani, and the Igbo are the dominants. Also, Islam and Christianity are the predominant religions practiced.

2.2 Study Population and Sampling Procedures

The study population included men and women who are between the ages of 15 and 49. The survey used the sampling frame to determine the enumeration areas (EAs), local government areas (LGAs), states, and zones in Nigeria as prepared in the 2006 Population Census of the Federal Republic of Nigeria. Details of the sampling procedure were provided in the MICS5 report. (NBS, 2017). For this analysis, records of men and women who responded to the questions on ATDV were sorted, resulting to a total of 14,495 and 33,419 records of men and women respectively.

2.3 Study Variables

We used ATDV as the outcome variable. ATDV was categorized as "DV justified" and "DV not justified". ATDV was measured by asking the respondents the following question. In your opinion, is a husband justified for hitting or beating his wife in the following situations: If she goes out without telling him, if she neglects the children, If she argues with him, If she refuses to have sex with him, If she burns the food.

Any respondent who said yes to any of the five questions was said to have justified DV. Also, whosoever said no to all the five questions does not justify DV. The treatment variable was Educational level, while the covariates were age, religion, occupation type, residential type, geopolitical region, marital status, wealth index, ethnicity, number of children, age at first sex, alcohol use, tobacco use, and media use.

2.4 Data Analysis

We described the demographic characteristics, socio-economic, and lifestyle using frequency tables and percentages. Association between the treatment variable (educational level) and all the categorical variables were tested using the chi-square test. The PSM was thereafter used to estimate the effect of level of education on ATDV.

2.5 Techniques Used in Propensity Score Methods

The approach was in three stages. First, we checked for imbalance (selection bias) between the treatment variable and the covariates using multinomial regression. Each of the study covariates were used as the outcome variable in the model and the treatment variable (Educational level) as the explanatory variable in the model,

Multinomial equation

$$\log\left(\frac{\pi_{ij}}{\pi_{iJ}}\right) = \alpha_j + \chi_i \beta j$$

Where πij is the probability of a response of the dependent that is greater or equal to a given category (i=2…4), πiJ is the probability of the response less than the given category (i=1), αj is a constant and βj is a vector of regression coefficients, for j=1,2,…,J−1. Xi is a vector of the covariates. At the second stage, we estimated generalized PS expressed as which is the generalized PS of receiving treatment dose *d* for participants *k* with observed covariate X. The inverse of the PSW was obtained for participants. The inverse PSW is expressed as $\frac{1}{e(X_{k,d})}$ (Bergstra et al., 2019).

Stage three was achieved by using the "tebalance summary" on "stata MP 14" to check if the standardized difference of the weighted scores is close to zero and the variance ratio for the weighted scores are close to one for all the covariates (SD diff ≈ 0, Variance ratio ≈ 1). If the result obtained satisfied the above criterion (i.e SD diff ≈ 0, Variance ratio ≈ 1), then selection bias has been corrected (i.e covariates are balanced) otherwise the selection bias has not been corrected. Lastly, we used the "teffect ipw" command on stata MP 14 to estimate the effect of the treatment (level of education). The "teffect ipw" command conducted a logistic regression that combined regression adjustment and inverse-probability weights between the study outcome variable ATDV and the propensity weight of the treatment variable. This provided the average treatment effect (ATE) which measures the effect of the PSW of educational level on ATDV.

Also, the potential outcome means (PO mean) which measures the effect of education on ATDV without the use of PS (Feng et al., 2012; Lu, Guo, & Li, 2020). Data were weighted to reflect educational level differentials in the population of men and women. Descriptive statistics, odds ratios, and 95%CI were presented. All analyses were conducted at 5% level of significance using stata MP 14 (StataCorp, 2015).

3. Results

3.1 Respondents Profile

Information about the socio-economic, demographic characteristics of men and women were presented in Tables 1 and 2. Men had a mean age of 29 years (SD=10 years). Of the 14,495 men who participated in this study, 22% justified DV. About 10.7% had no education while 17.3% had tertiary education. Close to half (48.2%) of the respondents were married. More than half (53.1%) of the respondents had no children, and about 32.7% used alcohol. Also, 97.3% do not smoke and most of them (56.6%) had media exposure. Also, 32.6% were residents of urban areas and 13.4% were from the South-West region. There was a preponderance (38.8%) of Hausa men in this study, 13.4% were Yorubas, and majority (44.8%) of the respondents were rich.

The mean age of female participants was 29 ± 9.4 years. Also, 34.5% justified DV and 10.8% of the women have

attained the tertiary level of education. There was a preponderance of married women (70.7%) in this study and 28.1% had no children. Further, 18.6% used alcohol while almost all (99.6%) don't engage in cigarette smoking. More than a half (59.8%) were exposed to media and 32.0% were urban dwellers.

Table 1. Demographic Characteristics of men and women

Variables	Men		Women	
	Frequency (n=14495)	Percentage (%)	Frequency	Percentage (%)
Age				
15-19	3283	22.6	6312	18.9
20-24	2257	15.6	5569	16.7
25-29	2070	14.3	5835	17.5
30-34	2018	13.9	5211	15.6
35-39	1883	13.0	4343	13.0
40-44	1684	11.6	3564	10.7
45-49	1300	9.0	2585	7.7
Age Mean(SD)	29.1(10.0)		29(9.4)	
Education				
None	1552	10.7	4687	14
Primary	3443	23.8	12125	36.3
Secondary	6995	48.3	13006	38.9
Tertiary	2505	17.3	3601	10.8
Ethnicity				
Hausa	5555	38.3	13093	39.2
Igbo	1856	12.8	4715	14.1
Yoruba	1886	13	4234	12.7
Other ethnic group	5198	35.9	11377	34
Geopolitical Zones				
North central	2978	20.5	6767	20.2
North east	2338	16.1	4942	14.8
North west	3753	25.9	9124	27.3
South east	1381	9.5	3595	10.8
South-South	2109	14.5	4642	13.9
South west	1936	13.4	4349	13
Residence				
Urban	4722	32.6	10703	32
Rural	9773	67.4	22716	68
Marital status				
Married	6983	48.2	23569	70.7
Divorced/ widowed	225	1.6	8356	25.1
Single	7279	50.2	1400	4.2

Table 2. Respondents' profile

Variables	Men		Women	
	Frequency (n=14495)	Percentage (%)	Frequency (n=33419)	Percentage (%)
Parity				
None	7703	53.1	9395	28.1
1 – 2	2186	15.1	7327	21.9
3 – 4	2004	13.8	7376	22.1
more than 4	2602	18	9321	27.9
Total	14495	100	33419	100
Wealth index				
Poor	5138	35.4	12080	36.1
Average	2858	19.7	6612	19.8
Rich	6499	44.8	14727	44.1
Total	14495	100	33419	100
Alcohol				
Yes	4738	32.7	6229	18.6
No	9757	67.3	27189	81.4
Total	14495	100	33418	100
Tobacco use				
Yes	398	2.7	119	0.4
No	14097	97.3	33299	99.6
Total	14495	100	33418	100
Media Exposure				
No	6294	43.4	19978	59.8
Yes	8201	56.6	13441	40.2
Total	14495	100	33419	100

3.2 Selection Bias

The result from the multinomial logit model that was fitted to check for selection bias in the data was presented in the supplementary tables. The results revealed that selection bias was present in the data ($p < 0.05$).

3.3 Weighted Propensity Scores

Table 3 shows the standardized difference and variance ratio of the weighted PS for men and women. The standardized difference of the weighted scores is close to zero and the variance ratio is close to one. This implied that selection bias has been addressed with the use of PSM. Also, the similarities in the trends for each level of education presented in Figures 1 and 2 implied a good overlap in the estimated PS for educational level among men.

Table 3. Weighted propensity scores for men

	Men						Women					
	Primary		Secondary		Tertiary		Primary		Secondary		Tertiary	
	SD	VR	SD	VR	SD	VR	SD	VR	SD	VR	SD	VR
Variable												
Residence												
Rural	-0.37	1.58	-0.39	1.59	-0.37	1.58	-0.18	1.14	-0.13	1.11	-0.22	1.17
Marital status												
Divorced/widowed	-0.13	0.42	-0.13	0.42	-0.16	0.34	0.12	1.13	0.03	1.04	0.06	1.06
Single	0.58	1.48	0.63	1.49	0.59	1.48	0.06	1.68	0.1	2.13	0.1	2.23
Wealth index												
Poor	-0.36	1.24	-0.31	1.21	-0.39	1.28	-0.08	0.89	-0.07	0.89	-0.19	0.71
Middle	0.06	0.99	0.03	0.1	1.3	1.1	0.16	1.31	0.18	1.35	0.21	1.4
Rich	0.07	0.97	0.57	0.7	0.04	0.4	-0.85	1.16	0.04	1.06	0.08	1.1
Parity												
1-2	-0.53	0.55	-0.53	0.55	-0.59	0.49	0	0.99	0.03	1.04	-0.07	0.9
3-4	-0.38	0.6	-0.42	0.55	-0.45	0.52	0	1	0.01	1.02	-0.07	0.9
>4	0.31	1.96	0.27	1.84	0.41	2.24	-0.09	0.91	-0.06	0.95	0.09	1.07
Alcohol												
No	0.56	1	0.62	0.97	0.66	0.94	-0.85	1.12	0.04	1	0.14	1.03
Smoke												
No	-0.15	3.81	-0.17	4.33	-0.1	2.74	0	0.92	-0.02	1.45	-0.02	1.51
Media use												
No	-0.36	0.75	-0.37	0.75	-0.35	0.76	0.13	1.3	0.09	1.21	0.1	1.24

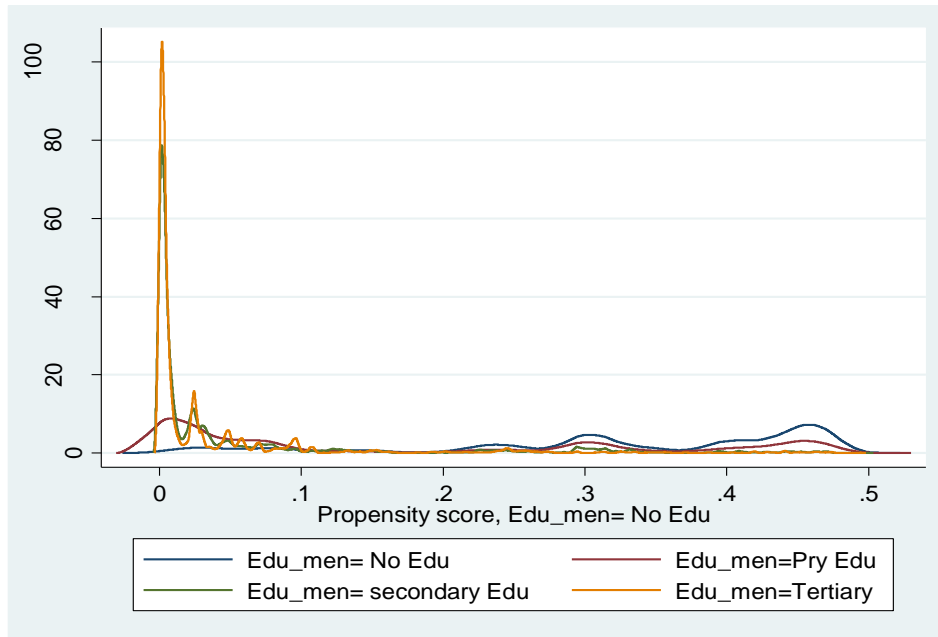SD = Standard difference, VR= Variance Ratio

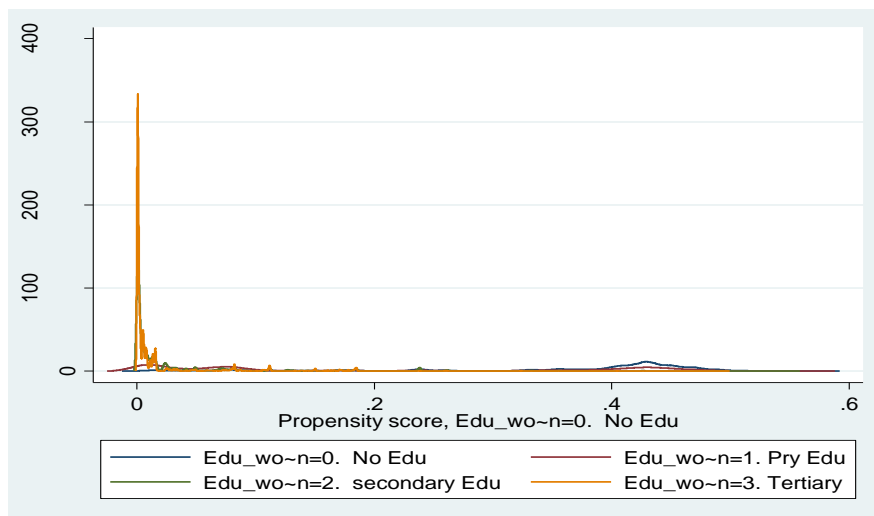Figure 1. Overlap plot for the propensity score of level of education (Men)

Figure 2. Overlap plot for the propensity score of level of education (Women)

No Edu (blue line): This represents the uneducated

Pry Edu (pink line): Those who have attained primary level of education

Secondary Edu (Green line): Those who have attained secondary level of education

Tertiary Edu (Green line): Those who have attained tertiary level of education

3.4 Treatment Effect for Attitude Towards Domestic Violence Among Men

The result from the multivariate analysis was presented in table 4. In comparison with uneducated men, those who have attained a tertiary level of education (AOR = 0.84, 95% CI: 0.78, 0.92) were less likely to justify DV. Similarly, the Yorubas (AOR = 1.12, 95% CI: 0.96, 1.31) were more likely to justify DV relative to Hausa men. The same pattern was observed for men from the rich wealth quintile (AOR = 1.07, 95% CI: 0.99, 1.17) compared to poor men. Also, men who were exposed to media (AOR = 1.02, 95% CI: 1.00, 1.03) were more likely to justify DV relative to their unexposed counterparts.

Women who have attained a tertiary level of education (AOR = 0.94, 95% CI: 0.80, 2.22) were less likely to justify DV compared to their uneducated counterparts. Similarly, Yoruba women (AOR = 0.99, 95% CI: 0.84, 1.17) were less likely to justify DV relative to Hausa women and rich women (AOR = 0.91, 95% CI: 0.81, 1.02) were less likely to justify DV

compared to poor women.

Table 4. Treatment effect for attitude towards domestic violence among men and women

Logistic regression that combined regression adjustment and inverse-probability weighting						
	Men			Women		
	AOR	95% CI		AOR	95% CI	
Variables		Lower	Upper		Lower	Upper
Education						
None	ref					
Primary	0.94	0.87	1.03	1.03	0.88	2.41
Secondary	0.92	0.85	1.00	1.04	0.88	2.42
Tertiary	0.84	0.78	0.92	0.94	0.8	2.22
Residence						
Urban	ref					
Rural	1.05	1.03	1.07	1.04	1.02	1.06
Ethnicity						
Hausa	ref					
Igbo	1.04	0.9	1.2	1.07	0.96	1.18
Yoruba	1.12	0.96	1.31	0.99	0.84	1.17
Others	1.07	1.00	1.15	0.99	0.92	1.07
Marital Status						
Married	ref					
Single	1.06	0.97	1.16	0.95	0.83	1.08
Widowed/divorced	1.02	0.95	1.09	0.99	0.94	1.03
Parity						
None	ref					
1-2	1	0.96	1.05	1.04	1.02	1.07
3-4	1.12	0.97	1.28	1.06	1.02	1.1
>4	1.03	0.94	1.13	1.05	1.01	1.09
Media use						
Yes	1.02	1.00	1.03	1.02	1.01	1.04
No	ref					
Wealth index						
Poor	ref					
Average	1.07	0.99	1.17	0.96	0.86	1.08
Rich	1.06	0.97	1.16	0.91	0.81	1.02

AOR= Adjusted odds ratio for the treatment effects

4. Discussion

The exigency of policies that will enhance protective ATDV among the general population necessitated the investigation of the role of education on ATDV. A powerful statistical technique that is capable of providing better estimates was explored in this study.

The effect of education on ATDV was assessed among men and women in Nigeria using nationally representative data. We used ATDV as the main outcome variable, education as the treatment variable, while the explanatory variables were demographic characteristics, Socioeconomic profile, lifestyle, and others. Selection bias was detected in the data which led to the use of PSM since it's capable of minimizing selection bias in the data. The effectiveness of PSM has been established in previous studies (Yang et al., 2016; Yaya et al., 2019; Yusuf et al., 2014). This study showed that a lower proportion of men justified DV compared to women. Although, the prevalence of ATDV was higher than that of Ukraine and Ghana, but almost similar to that of Moldova and Namibia (Sardinha & Catalan, 2018). The disparity in the descriptive findings could be a consequence of the differences in the attributes of the countries, such as cultural beliefs and level of campaign against DV in the different countries. Arisi and Oromareghake reported that some cultures in Nigeria considered women as inferior beings, only beneficial in the kitchen, for pleasure and temptation (Arisi & Oromareghake, 2011). Also, it was known as common practice among men that women must kneel to beg their husbands when they are mistreated by their husbands (Arisi & Oromareghake, 2011). Krause also corroborated the findings by further explaining that some cultures considered those acts of wife-beating as a legitimate requital for a

wife's defiance rather than seeing it as violence (Krause, Gordon-Roberts, VanderEnde, Schuler, & Yount, 2016). A higher proportion of women justified DV in this study. These findings were similar to that of a report in Palestine. The study buttressed that victims of DV are usually restrained from justifying DV to avoid marital separation as it could affect the children and their sustenance (Haj-Yahia, 2005).

Our results showed that only men who had primary education, secondary education, and tertiary education were less likely to justify DV, this is contrary to the previous finding where men who had primary and secondary education justified DV (Okenwa-Emegwa et al., 2016). This study and the previous study used a nationally representative data and the definitions of ATDV were similar, but the disparity could be as a result of the differences in the methods of analysis i.e the PSM that was used for this study has addressed the selection bias in the data thereby providing a better estimate (Cepeda et al., 2003). This paper has its limitations. The PSM is only capable of adjusting for selection bias. This method may not be capable of addressing other forms of bias, such as measurement bias. However, this limitation does not erode the strength of this study as it added to knowledge about statistical methodology and alternatives to improve findings from non-experimental studies.

Education played a crucial role in ATDV among men and women in Nigeria. Tertiary education was protective for ATDV among men and women. The use of PSM effectively controlled for selection bias in estimating the effect of education on ATDV. PSM will enable researchers to make causal inferences from non-experimental/ cross-sectional studies in situations where randomized control trials are not feasible.

List of abbreviations

Attitude towards domestic violence (ATDV)

PSM: Propensity Score Methodology

MICS: Multiple Indicator Cluster Survey

PS: Propensity scores

ATE: Average treatment effects

DV: Domestic violence

RCT: Randomized Control Trials

SEM: Structural equation modeling

NDHS: Nigerian Demographic and Health Survey

EAs: Enumeration areas

PO mean: Potential outcome means

UNICEF: United Nations International Children's Emergency Fund

Competing interests

We do not have any competing interests.

Ethical approval and consent to participate

Secondary data was used for this study. Informed consent and ethical approval were obtained for the primary data collection by United Nations International Children's Emergency Fund (UNICEF). Every confidential information and personal identifier has been excluded from the dataset before it was made available for this study. As a result, the confidentiality and anonymity of the respondents are guaranteed. Also, permission to use the MICS 2016/2017 dataset was requested and granted by UNICEF.

Acknowledgements

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