PROPENSITY SCORE METHODOLOGY FOR EXAMINING THE EFFECT OF EDUCATION ON ATTITUDE TOWARDS DOMESTIC VIOLENCE IN NIGERIA

BY

ENIADE, OLANREWAJU DAVIES
B.Sc. Statistics (Ibadan)
MATRIC No.: 209404

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CERTIFICATION

I certify that this project was carried out under my supervision by ENIADE, Olanrewaju Davies of the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine, University of Ibadan.

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Professor Olufunmilayo I. Fawole **Dr Oyindamola B. Yusuf**

Supervisor **Supervisor**

DEDICATION

This project is dedicated, first and foremost to the Almighty God, who has been my strength, source of provision and savior. Also, to my late father, Mr. Israel Eniade. May his gentle soul rest in perfect peace, amen.

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Abstract

Background: Experimental studies remain the gold standard in making causal inference. However, using experimental studies to estimate the effect of education on attitude towards domestic violence (ATDV) was not feasible due to ethical issues. This challenge can be overcome using Propensity Score Methodology (PSM). The PSM is a statistical technique used in observational studies to estimate the effect of interventions by accounting for covariates that predicts the treatment. Therefore, PSM was used to investigate the effect of education on ATDV among men and women in Nigeria.

Methods: 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. ATDV was measured by asking the respondents the question, "In your opinion, is a husband justified for hitting or beating his wife if she, goes out without telling him, neglects the children, argues with him, refuses to have sex with him, or burns the food." Any respondent who says yes to any of the five options has justified domestic violence and whosoever that says no to all does not justify domestic violence.

The treatment variable was education while the covariates were age, residence, geopolitical zones, marital status, ethnicity, parity, wealth index, alcohol use and media exposure (use of television or radio). The descriptive statistics were presented and multinomial logit regression was used to assess selection bias among the levels of education. Propensity scores (PS) and PS weights were generated for the treatment variable and average treatment effects on ATDV were estimated using logistic regression that combined regression adjustment and inverse-probability weighting. Odds ratios and 95% confidence interval were presented.

Results: The mean age of men and women were 30.8±10.2 years and 29±9.4 years respectively. About 16% men had tertiary education while lower proportion (14%) of women had tertiary education. The proportion of men and women who justified DV was 22% and 34.5% respectively. There were more of uneducated men among Hausas (26.3%) compared to Igbo ($p<0.001$). Similarly, tertiary education was more pronounced among the Yoruba women (23.2%) compared to the lower proportion (3.9%) among Hausa women ($p<0.001$).

Result from the multinomial logit model showed the existence of selection bias between the covariates and level of education ($p<0.05$). After the estimation of PS, the selection bias was effectively corrected (SD diff ≈ 0, Variance ratio ≈ 1). Results from the PSM showed that the odds of ATDV decreased as level of education increased. Men (AOR = 0.84, 95% CI: 0.78, 0.92) and women (AOR=0.94, 95%CI: 0.80, 2.22) who attained tertiary education were less likely to justify DV in comparison to their uneducated counterparts.

Conclusion: 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 make causal inference from non-experimental/ cross-sectional studies in situations where randomized control trials are not feasible.

Keywords: Propensity score, ATDV, treatment effect, selection bias.

Word count: 499

List of abbreviations

ATDV: Attitude towards domestic violence

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

United Nations International Children's Emergency UNICEF: Fund

CHAPTER ONE

1.1 Background of the study

Experimental studies remain the gold standard when measurement of causal relationship is of interest. Scholars solely rely on Randomized Control Trials (RCT) to make causal inference in various fields of research. But the dilemma of experimental studies, especially in human research is the assignment of study participants to the control group which means a potential denial of study participants from receiving the treatment or services. This makes experimental design sometimes not achievable or desirable in human research due to ethical issues, cost implications, and others (Oliver *et al.*, 2002). For instance, it will be unethical for a researcher to deny some set of people access to education program because of research (Sayar *et al.*, 2019). This constraint led researchers to rely on quasi-experimental and observational studies, but the generalizability and the reliability of such findings are questionable especially in studies where causal factor is of interest.

The major problem of 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 (Rosenbaum and Rubin, 1984). This systematic difference (selection bias) was corroborated by Shadish in a study where study participants who self-selected themselves into training group performed better than those who were randomly assigned to the same training group (Shadish *et al.*, 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 better report on the treatment or the exposure. Efforts to adjust and correct for selection bias such as structural equation modeling (SEM), adjusted regression and Analyses of Covariance (ANCOVA) showed no improvement (Cepeda *et al.*, 2003). This concern led

researchers to explore a new analytical method that is useful and suitable for data analysis and to make causal inference.

1.1.1 Propensity Score Methodology

Propensity score methods was developed and confirmed to effectively control for selection bias (Arikan *et al.*, 2018). This is a statistical method that has proven useful for evaluating treatment effect when using non-experimental or observational data (Guo and Fraser, 2015). The use of OLS regression to estimate treatment effect leads to violation of the ignorable assumption of treatment and that it is a biased and inconsistent estimation. This has led to the development of a new method for evaluating the effect of treatment in observational studies and other non-experimental studies(Guo and Fraser, 2015). The 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 (Guo and Fraser, 2015).

According to Sir Ronald Fisher, the essence of an experimental study is to adjust for covariate and other confounders that may affect the treatment effect (Dhoot *et al.*, 2019). PSM then addresses the selection bias in observational data by obtaining the PS (probability of a study participant receiving treatment given the observed covariate). PSM will reduce all covariates to a one-dimensional score called PS. It is used to assess the expected effect of covariates (such as education) on an outcome variable (such as attitude towards violence) as if the covariate was randomly assigned to study group as it occurs in experimental studies. What PSM does is to determine what would have been the outcome of the study if the participant of the treatment group differs from the participant of the control group. In applying PSM, it is important to

evaluate the impacts of PSM on an individual that belongs to the treatment group. That is, what would have happened if the study participant did not receive the treatment (such as educational level), evaluation of the impact can be achieved by calculating the Average Treatment Effect for the treated (ATT) which is done by averaging the mean of the treatment on the treated participant.

Process of propensity score methods

Randomization

Conventionally, if Y_{i1} represent the subject receiving treatment (1) from unit i, and Y_{i0} represent the subject of unit i on the control arm (0). The treatment effect for a unit, τ_i, is defined as

$$\tau_i = Y_i - Y_{i1 0}.$$

The main treatment effect of concern in non-experimental study is the expected treatment effect over the treated population which is:

$$\tau = E(Y_{i1} | T_i = 1) - E(Y_{i0} | T_i = 1)$$

"Where T_i=1 in the first term is if the *i*-th unit was assigned to treatment and T_i=1 in the first term is if the *i*-th unit was assigned to control. The issue of unobservability is summarized by the fact that we can estimate $E(Y_{i1}|T_i=1)$, but not $E(Y_{i0}|T_i=1)$.

The difference, $\tau^e = E(Y|T=1) - E(Y|T=0)$, can be estimated, but is potentially a biased estimator of τ. Intuitively, the major bias of concern in non-experimental studies is if the characteristics of the treated unit are systematically different from the control units, then observing only Y_{i0} for the control group we do not correctly estimate Y_{i0} for the treated group. Randomization is to prevent this:

$$Y_{i1}, Y_{i0} \perp\!\!\!\perp T_i$$

$$\Rightarrow E(Y_{i1}|\ T_i = 0) = E(\ Y_{i0}|\ T_i = 1) = E(\ Y_i|\ T_i = 0)$$

Where $Yi = T_iY_{i1} + (1-T_i)Y_{i0}$ (the observed value of the outcome) and, ⫫ is the symbol for Independence. The treated and control groups do not systematically differ from each other, making the conditioning on T_i in the expectation unnecessary (this is referred to as the ignorable treatment assignment, in the terminology of Rubin 1977), and yielding $\tau\ |T=1 = \tau^e$."

The underlying Logic of statistical inference

The result of every treatment effect is always of interest to researchers in order to generalize whether the treatment is effective (1) or not effective (0) to the population which was represented by the sample.

A process of estimating an unknown population parameter from known sample statistics is known as "statistical inference".

The statistical inference of treatment effects has its root in randomized experimentation which was developed by Sir Ronald Fisher (1935/1971). This procedure for a randomization test is called a permutation tests (which is also regarded to as randomization test, re-randomization test, and exact test). This test includes: The Fishers exact test, the Mantel-Haenszel test, the Wilcoxin's rank-sum test and the Hodges and Leymann signed rank test which are all non-parametric tests that use randomization distributions as references.

This test makes several assumptions about the sample (such as: i. the sample is a true random sample from a well-defined population, ii. Each of the study participants has a known probability of receiving treatment. iii. Treatment assignment is strongly ignorable iv. The difference between observed and the potential outcome is constant. v. There is a stable unit treatment value and vi. There is a probability of receiving treatment overlap between the treated group and the control group. But practically, when generalizing, researchers sometimes discover that one or more of

the above assumptions are violated, and this situation led to the development of strategies that handles the estimation when the underlying assumptions are violated.

Statistical Inference for randomized experiment and Observational Studies

It was argued that much of the statistical inference in observational studies follow the logic of statistical inference for randomized experiments and it is also important to note that the assumptions of permutation test are crucial in statistical inference for observational studies.

Parametric test such as the Normal distribution, t distribution and F distribution are often used in testing the significance of treatment effect for randomized experiment; these tests are only approximation of a randomization distribution, not a parametric test per se (Rosenbaum, 2002).

When moving from randomized experiments to observational studies, achieving all the assumptions for a permutation test becomes challenging. Hence these situations can be handled by employing the logic of statistical inference by (Steiner, 2010)and from (Hirano and Imbens, 2004).

Rosenbaum's Framework

This is an extension of a permutation test to handle observational studies. Rosenbaum explained that in testing the null hypothesis of no treatment effect in studies that involve covariates, permutation approach is appropriate which will require an extra task of fitting a linear model or a generalized linear model, This model fitting that controls covariates will then provide information on the residuals for both treatment group and the control group after which a permutation test such as Wilcoxon's rank sum test or others test like Hodges Lehmann aligned

rank test will be applied to the model-fitted residuals. (Hirano and Imbens, 2004; Rosenbaum, 2002)

Overt Bias

"overt bias is the bias that can be seen in the data at hand take for instance, prior to treatment, treated subjects are observed to have lower incomes than controls" (Rosenbaum, 2002). This is comparable with hidden bias in observational studies except that hidden bias cannot be seen in data at hand. Propensity score matching can be performed with observational studies with overt bias and hidden bias, but careful attention must be paid in conducting a sensitivity analyses before generalizing the findings from the study to the population of study. Available sensitivity analyses that may be performed for this methodology are: McNemar's test, the Wicoxon's signed rank test, and the Hodges –Lehmann point and interval estimate and sign score method.

1.1.2 Modeling propensity scores for multiple Dose

This method is used when we want to estimate the impact of treatment dosage. For instance, the treatment variable educational level that consist of four categories of No education, Primary education, secondary and tertiary education are regarded as the dosage of education, that is, No education is the control arm, Primary education is one dose, secondary education is two doses and tertiary is three doses.

Two methods of dose modeling.

- Modeling doses with a single scalar balancing score
- Modeling doses with multiple balancing score

Modeling doses with a single scalar balancing score

This is done by generating the PS with ordered logistic regression; it is an extension of PS matching under a binary condition to accommodate matching on categories that are more than two.

Modeling doses with multiple balancing score

This is done by estimating the GPS using multinomial logit model,

This method was defined by Imbens as the conditional probability of receiving a particular level of the treatment dose given the observed covariates as the GPS.

The application of this method includes:

- Estimation of the GPS using the multinomial logit model
- Conducting an outcome analysis following the process of PS weighting by calculating the inverse of a specific GPS and defines the inversed PS as a sampling weight to be used for the outcome analysis.

Denoting $e(X_{k,d}) = pr(D=d|X=x)$ as the GPS of receiving treatment dose **d** for participant **k** with the observed covariates **x**, hence the inverse of the GPS $1/e(X_{k,d})$ is defined as a sampling weight for participant **k** which is the weight in the outcome analysis.

Generalized Propensity Score (GPS)

The GPS is the conditional probability of receiving a particular level of the treatment given the pre-treatment variables:

$$r(t, x) \equiv P\ r(T = t|X = x) = E[D(t)|X = x],$$

In terms of this notation the Rosembaum Rubbin (RR) definition of the PS is $e(x) = r(1, x)$. The GPS will be used in different ways. First, it defines a single random variable as a transformation

of the two random variables **T** and **X: r** (**T**,**X**). Second, it defines a family of random variables indexed by **t** as transformations of **X** alone: **r**(**t**, **X**), for all **t** ϵ **T** .

Similar to the standard PS, the GPS satisfies a balancing property by construction:

(Balancing Given the GPS)

D(t) ⫫ X r(t, X),

for all l t ϵ T .

Estimation stages

In the first step, the score r (t, x) is estimated.

In the second step, the conditional expectation β (t, r) = E[Y |T = t, r(T,X) = r] of the outcome given treatment level **t** and the probability of receiving the treatment received r(T,X) is estimated.

In the third step, the average response at treatment level **t**, β(t) = E[β(t, r(t, X)] is estimated as the average of the estimated conditional expectation, β(t, r(t, X) averaged over the appropriate distribution of the pre-treatment variables.

1.1.3 Assumptions of propensity score methodology

Assumption 1 (Overlap): The probability of receiving any level of treatment is said to be positive for all values of **x**:

$$P(w \mid x) > 0 \text{ for all } w, x.$$

This assumption is vital to the estimation of the average effect as the estimation of the average effect for every p (w | x) less than or equal to zero will be impossible in relative to others.

There are methods for constructing a subsample with better overlap which can be used when this assumption is not met.

Assumption 2 (Strong unconfoundness): This is an extension of the Rosembaum Rubin unconfoundedness for multiple dose treatment. It is referred to as strong unconfoundedness to distinguish it from the weaker condition of weak unconfoundedness.

Weak unconfoundedness

$(Y(0),Y(1))\perp T|X$

Our expectation when giving an intervention is that the outcome should depend on the intervention. The assumption of weak unconfoundness occurs when you give an intervention to an experimental unit and ignoring how they respond to treatment this is referred to as counterfactual. The violation of this assumption implies that you would be tending to assign treatments to those who would potentially benefit from it.(Yang *et al.*, 2016).

1.1.4 Estimates in Propensity Score Methodology

Types of Treatment Effect

There are seven methods of treatment effect often used by researchers, what differentiate one from the other is the estimation method.

Average Treatment Effect (ATE)

ATE is sometimes called average causal effect: it is the core effect that can be estimated by standard estimator ATE = $\tau = E(Y_1|W=1) - E(Y_0|W=0)$.

Intent to treat effect (ITT)

This type of treatment effect is employed to measure program effectiveness, ITT corresponds to ATE. "Statisticians affirm that when data are collected using randomized experiment, the difference between the treatment group mean and the control group mean on the outcome is an unbiased estimate of the ITT (Sobel, 2005).

Efficacy Effect (EE)

Efficacy measures the wellness of an intervention when it is implemented under the condition of ideal application, hence to measure the Efficacy Effect (EE) one has to carefully monitor the program implementation and take measures that will guarantee accuracy. "EE plays a major role in efficacy Subset Analysis (ESA) that measures impact on the basis of treatment to exposure or dose.

Average Treatment Effect for the Treated (TT)

As argued by Heckman (1992, 1996, 1997, and 2005) TT is of a substantive interest in deciding whether a policy is beneficial for the individual who are assigned or assigned themselves to treatment (Winship and Morgan, 1999)

$E [(Y_1 – Y_0)|X, W=1]$

Note that TT ≠ ATE.

Average Treatment Effect for the untreated (TUT)

This is an effect that is parallel to TT for the untreated

$E [(Y_1 – Y_0)|X, W=0]$

The estimation of TUT is not as important as that of TT, this is a direct application of Neyman-Rubin model. In policy research, estimation of TUT addresses (conditionally and unconditionally) the question of how extension of a program to nonparticipants as a group might affect their outcomes(Aakvik *et al.*, 2005).

Marginal Treatment Effect (MTE)

In some policy and practice situations, it is important to distinguish between marginal and average returns, a good example is the average student going to college may do better academically than the marginal student who is indifferent about going to school or not. This

treatment effect is useful in evaluating the impact of a program at the margins. It has been shown by Researchers that MTE plays a central role in organizing and interpreting a wide variety of evaluation estimators.(Heckman and Vytlacil, 2005).

Local Average Treatment Effect (LATE)

The framework for this treatment effect was outlined by Angrist et al. (1996) for causal inference where assignment to binary treatment is ignorable, but compliance with the assignment is not perfect so that the receipt of treatment is non-ignorable. LATE is defined as the average causal effect for compliers.

1.1.5 Estimating propensity score

There are several methods of estimating the PS (probability of receiving the treatment given the covariates), these methods include logistic regression, the probit model, and the discriminant analysis. Of these three methods, logistic regression is the prevailing approach (Cochran & Rubin, 1973; Rubin, 1980). Pontetial Outcome Mean (PO mean) is the mean which measures the effect of educational level on ATDV without using the PS.

1.2 Problem Statement

Globally, DV is a serious public health issue as it poses a direct threat to women's health, survival and wellbeing of children; it is also said to be a significant cause of mortality and morbidity such as injuries, chronic physical illness, poor sexual health, adverse prenatal outcomes, substance misuse, mental illness, and suicidal behavior (Devries *et al.*, 2013; Fawole

and Adeoye, 2015; WHO, 2013). Nigeria and other African countries are not free from the menace (Sardinha and Catalan, 2018).

Findings from WHO's multi-country study on women's health and domestic violence has shown that 15 to 71 percent of ever partnered women have been physically or sexually assaulted by an intimate partner sometimes in their lives, and their findings in 2017 also showed that 1 out of 3 (35%) women worldwide have experienced physical and/or sexual violence by an intimate partner (Sardinha and Catalan, 2018).

In some cultures in Nigeria, women are considered as inferior being. They considered women to be useful in the kitchen, for pleasure, temptation, and elimination. Women are even expected to go on their kneels to beg their husband when they are been beaten by their husband .(Arisi and Oromareghake, 2011).

Further, 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 behavior towards DV determines whether such violent acts will be reported or not (NBS, 2017; Okenwa-Emegwa *et al.*, 2016). Report showed that prevalence of DV justification is on the high side (35% and 25% among women and men respectively) in Nigeria (DHS, 2018).

1.3 Justification

Several studies have assessed factors that influence domestic violence among victims (Ameh *et al.*, 2007; Balogun *et al.*, 2012; Fawole *et al.*, 2005; Fawole *et al.*, 2018; Oseyemwen *et al.*, 2019; Oyediran and Isiugo-Abanihe, 2005; Umana *et al.*, 2014). But limited studies have assessed the attitude towards violence among the general population. Literature shows that some

cultures accept domestic violence and that it is a plague that has continually besieged societies in Nigeria (Arisi and Oromareghake, 2011).

So, it is important to identify the factors influencing the acceptance of DV among the general population so as to be able to make policies that will protect current and potential victims of DV and reduce acceptance of DV in the general population. Studies have shown that primary and higher levels of education are protective against the risks of domestic violence among men and women in rural Bangladesh (Koenig *et al.*, 2003). According to studies conducted on domestic violence, women with more education are less vulnerable to domestic violence (Bates *et al.*, 2004; Okenwa-Emegwa *et al.*, 2016; Wang, 2016). Since education has been identified as a protective factor against domestic violence, this study will determine whether education will also be a protective factor for ATDV in the presence of other covariates.

Furthermore, limited studies have used PSM in estimating factors influencing ATDV (Yaya *et al.*, 2019; Yusuf *et al.*, 2014). PSM will address observational bias by obtaining the PS of the treatment using the "multiple doses balancing scores" of a multinomial Logit model to conduct the weighting and model the doses (Educational level) thereby providing a better estimate of the effect of education on ATDV among men and women in Nigeria.

1.4 General Objective

The genaral objective of this study is to examine the effect of education on ATDV among men and women in Nigeria using PSM.

1.4.1 Specific Objectives

- To check for systematic difference (selection bias) in the treatment category and the control group.

- To generate the propensity scores of the effect of education level on ATDV using multinomial logit regression,
- To evaluate the effect of the treatment (education status) on ATDV

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Propensity Score Methodology

The PSM is a novel statistical technique that shows improved estimates when evaluation of treatment is of concern in non-experimental and observational studies.

It becomes a huge success when researchers are able to determine the effect of a particular factor on the other factor of interest. The use of OLS regression to estimate the treatment effect leads to violation of the ignorable assumption of treatment. The use of OLS is a biased and inconsistent estimation. This led to the development of a new method for evaluating the effect of treatment in observational studies and other non-experimental studies (Guo and Fraser, 2015).

A study conducted reveals that the use of logistic regression and other Ordinary Least Square methods of estimation to determine the risk factors have less accurate estimate in terms of bias, precision, empirical coverage probability, empirical power, and robustness when non-experimental or cross-sectional study is used (Cepeda *et al.*, 2003).

Rubin presented the application of propensity score matching, weighting and sub-classification on tobacco litigation using an observational data. This study also proposed a diagnostic table to aid the use of PS analysis, which is useful when many covariates are to be considered. Rubin also recommended refinements for the estimation of the standard error and confidence intervals obtained from the PS (Rubin, 2001). A study conducted on the effectiveness of individual treatment in the multiple –treatment IMPACT clinical trial to compare PS Analysis for Binary treatment level (PS regression adjustment) and multiple treatment level (Propensity score weighting) revealed that the two methods were effective (Feng *et al.*, 2012). Another study illustrated the implementation of propensity score weighting to estimate the impact of a

motivational interviewing-based health coaching on patient activation measure scores in a chronically ill group of individuals and the study found out that propensity core weight is efficient in removing imbalance of pre-intervention characteristics between treated and non-treated individuals(Linden *et al.*, 2010).

2.2 Application of propensity score methods in public health

PSM was used in estimating the effect of drug use on violent behaviors among students in Southwest Nigeria. It was found out that drug use was high among students whose parents had no formal education, those who were brought up by their grandparents, those who live with their fathers only, those whose parents were divorced and those who used alcohol and missed classes. It was also concluded in the study that PSM strengthens the evidence of the association between drug use and violent behaviors. It was highlighted that PSM methodology compensates for selection bias and a useful tool for estimating the relationship between drug use and violence in cross-sectional studies (Yusuf *et al.*, 2014).

PSM was used to estimate "Association between intimate partner violence and utilization of facility delivery services in Nigeria. This study has added to the fact that Intimate Partner Violence (IPV) is associated with poor maternal healthcare utilization and poor pregnancy outcomes. It was further highlighted in the study that low socioeconomic status and lack of maternal autonomy can reduce women's access to healthcare facilities during their pregnancy (Yaya *et al.*, 2019).

2.3 Domestic violence

Domestic violence is a serious public health issue as it poses a direct threat to women's health, survival and wellbeing of children; it is also said to be a significant cause of mortality and morbidity such as injuries, chronic physical illness, poor sexual health, adverse prenatal outcomes, substance misuse, mental illness, and suicidal behavior.(Devries *et al.*, 2013; Ellsberg *et al.*, 2008; Fawole and Adeoye, 2015; Kishor and Johnson, 2004; V. WHO *et al.*, 2013).

According to WHO, Domestic violence is measured by asking if the respondent has ever been a victim of physical, sexual or psychological harm, including physical aggression, sexual coercion, psychological abuse and controlling behavior by an intimate partner or ex-partner.(WHO, 2013). Findings from WHO's multi-country study on women's health and domestic violence has shown that 15 to 71 percent of ever partnered women have been physically or sexually assaulted by an intimate partner sometimes in their lives, and their findings in 2017 also showed that 1 out of 3 (35%) women worldwide have experienced physical and/or sexual violence by an intimate partner (García-Moreno *et al.*, 2005) .

In some cultures in Nigeria, women are considered as inferior being. They considered women to be useful in the kitchen, for pleasure, temptation, and elimination. Women are even expected to go on their kneels to beg their husband when they are been beaten by their husband .(Arisi and Oromareghake, 2011)

The rarity of information on the prevalence of DV in Nigeria was addressed by a study titled prevalence and correlates of intimate partner violence towards female undergraduates and postgraduate students in a tertiary institution. Result from the mentioned study showed a

significant life-time prevalence of IPV of 42% (35% percent among postgraduate and 44% percent among undergraduate), 42% experienced psychological IPV, 80% experienced physical IPV and 7% experienced sexual IPV in their lifetime. The study also revealed that the prevalence of IPV was high of which smoking and alcohol were identified as risk factors (Umana *et al.*, 2014). Also, another study conducted among civil servants in Ibadan, Nigeria revealed that prevalence of wife beating was 31.3%.(Fawole *et al.*, 2005).

In furtherance, the Centre for Law Enforcement Education (CLEEN Foundation) reports that 1 in every 3 respondents admitted to being a victim of domestic violence. The survey conducted by CLEEN in Nigeria in 2014 revealed that there is a nationwide increase in domestic violence ranging from 21% in 2011 to 30% in 2013 (Alemika, 2013)

A recent hospital based study unveiled a high (80%) prevalence of IPV among women attending general practice clinic in Nigeria. Those who experience sexual abuse were 56.4%, physical abuse 46.7% and psychological abuse 31.9% (Oseyemwen *et al.*, 2019).

The factors associated with gender-based violence among men and women were determined in some selected states in some selected states in Nigeria, the findings showed that 26% and 12% have experienced physical and sexual violence respectively and that married female respondents were more likely to be a victim of physical violence than single respondents. The study also revealed that males who do not drink alcohol have lower risk of perpetrating sexual violence. Young age, income, being divorced or separated, and prior victimization, formal education were as well identified to be risk factors for domestic violence among females and males in this study (Oladepo *et al.*, 2011).

2.4 Attitude towards domestic violence

ATDV has been identified as an indicator of the degree of social acceptance of domestic violence and a known predictor of victimization and perpetration of domestic violence. People's ATDV determines whether such violent acts will be reported or not (NBS, 2017; Okenwa-Emegwa *et al.*, 2016).

A study carried out in 49 low and middle-income countries revealed 36.4% prevalence of DV justification across the 49 countries. Further information provided in the findings from this study was that Women were more likely than men to justify DV in Sub-Saharan Africa and South (east) Asia. Also, political conflict and limited economic rights for women were associated with higher levels of DV acceptance amongst women and men. Men in more democratic countries were less likely to justify DV. Amongst women, higher national female literacy rates predicted lower levels of justification. There were higher levels of DV acceptance amongst women and a wider aggregate gender difference in countries with a larger representation of women in national level (Sardinha and Catalan, 2018).

In Bangladesh, 32% justified wife beating. Women attitude to wife beating was linked to healthcare seeking behavior as DV justification was associated with the likelihood of low contraceptive use, poor antenatal care, utilization of delivery at health care facilities, delivery care and postnatal care (Khan and Islam, 2018).

A study among Ethiopia women revealed that refusal of wife beating was higher in urban (54.2%) but much lower in the rural (24.5%). Factors such as age, number of living children, region of residence, marital commitment, religion, and educational attainment were identified drivers of this refusal of wife beating in Ethiopia (Gurmu and Endale, 2017).

Among young people in Ghana, 32% of young women and 19% of young men justified wife-beating. This pattern of DV justification among women in Ghana were reported to be influenced by younger age, wealth index, low educational status, religion, the region of residence, ethnicity, frequency of reading newspaper and frequency of listening to radio. But, wealth index, region of residence and frequency of reading newspaper were the associated factors reported for DV justification among young men, acceptance of wife-beating was significantly influenced (Anaba *et al.*, 2021).

The Nigerian Demographic and Health Survey (NDHS) reports showed that 35 percent of women and 25 percent of men tolerate domestic violence in Nigeria (DHS, 2018).

The magnitude, extent, and predictors of attitude of physical intimate partner violence (IPV) against women were examined among men and women in a study conducted in Nigeria. The study revealed that higher number of women were tolerant to domestic violence, but a higher proportion of men on the poorest wealth quintile, the uneducated and those who had secondary education were reported to be justified by the violence perpetrated against women for reasons like; wife burns the food, argues with him, goes out without telling him, neglects the children, or refuses sexual intercourse with him.(Okenwa-Emegwa *et al.*, 2016).

Another study added to the body of knowledge on the extent of attitude towards DV in urban areas of Nigeria. The study reported 80.9% and 63.5% high level of gender-equitable attitude towards wife beating among the respondents and their neighbors respectively. The study further revealed 13.7% increase in the prevalence of high level of gender-equitable attitude towards wife beating between the year 2011 and 2014 (Okigbo *et al.*, 2014).

A recent study among married women in Nigeria reported 37% prevalence of DV justification and further identified lower educational attainment and inter-spousal differences in income as influencing factors of DV justification (Eze-Ajoku *et al.*, 2020).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The Federal Republic of Nigeria, is located next to Niger in the north, Chad in the Northeast, Cameroon in the East, and Benin in the West are the area studied. The climatic condition of Nigeria is equatorial in south, tropical in center, arid in north with calculated area of 356,669 square miles and total number of households of 28,197,085. According to 2006 Census, Nigerian population was 140,431,790, with 71,345,488 males and 69,086,302 females. The total population was then estimated to be 203,452,505 in 2018 and the sex ratio was calculated to be 1.03 (Worldometers, 2018).

Nigeria consists of several social groups having different cultural traits. Nigeria has about 250 ethnic groups, and the most populous and politically influential are: Hausa and Fulani (29%), Yoruba (21%), Igbo (18%), Ijaw (10%), Kanuri (4%), Ibibio (3.5%), and Tiv (2.5%).

The nation Nigeria consists of 36 states in addition to the Federal Capital (FCT). These states are categorized into six geopolitical zones which are: North-Central, North-East, North-West, South-East, South-South, and South-West.

3.2 Study Design

This study makes use of the dataset from a cross sectional study conducted in 2016-2017 through MICS which was sponsored by Bill and Melinda Gates Foundation. The primary objectives of 2016 to 2017 MICS in Nigeria is to provide up-to-date information for assessing

the current situation of children and women in Nigeria. The survey provides data for the critical assessment of the interventions (progress) that is going on in different program areas, and towards goals established in the post Millennium Declaration.

Also, for other internationally agreed goals to serve as a basis for actions to be taken in the future, and to unveil the areas that require more attention. This survey was conducted to contribute to the generation of baseline data for the Sustainable Development Goals (SDGs), to supply data that is required for monitoring progress, to as well identify variations among various groups to enhance evidence based actions aimed at social inclusion of the most vulnerable.

3.3 Study Population

Men and women in Nigeria who were between the ages of 15 and 49 were the study population for the MICS 2016-2017 survey.

3.4 Inclusion Criteria

Men and women between the ages of 15 to 49 who consented to participate were included in the study.

3.5 Exclusion Criteria

Men and women who refused to provide information about their ATDV were excluded from this study

3.6 Sample Size

Records of respondents who provided answers to questions on ATDV were extracted from the MICS dataset. A total of 14,495 records of men and 33419 records of women was used for this study.

3.7 Sampling procedures

A sample of sixty (60) Enumeration Areas (EAs) and sixteen (16) households per EAs were selected in 34 states and the FCT Abuja which results to a total sample size of 960 households in each of these states. In each of these states, selection of six (6) replicates that contain ten (10) EAs/clusters was done from the master sample of the second round of National Integrated Survey of Households (***NISH2***). But for Lagos and Kano States, 40 EAs were selected from each senatorial district from the NISH2 master sample, selecting a total of 120 EAs and 1,920 sample households in each of the two states to have a total sample of 37,440 households in Nigeria. The sixteen (16) households that were selected from each EAs was to minimize the design effects.

3.8 Description of Variables and codes

The analysis of this study was in four stages: the first was to check for imbalance between the treatment variable and the covariates, the second stage generated the PS for educational level, and the third stage was to check if the selection bias has been corrected and the last stage was to estimate the effect of education on ATDV.

Table 1: Description of the variable

SN	Variables	Description
	Independent Variable Educational Level	0 = No education, 1 = Primary Education 2 = Secondary Education 3 = Tertiary Education
	Dependent Variables	Each of these variables will be slotted in the position of the dependent variable in the model.
1	Age	1 = 15-19, 2 = 20-24, 3 = 25 – 29, 4= 30 – 34, 5 = 35 – 39 6= 40 – 44, 7 = 45 -49
2	Religion	1 = Christian, 2 = Islam, 3 = others
4	Residential type	1= Urban 2 = Rural
5	Geopolitical Region	1 = North-Central, 2 = North-East, 3= North-West, 4 = South-East, 5 = South-South, 6= South-West.
6	Marital status	1 = single, 2= Married, 3= Divorced, 4= widows
7	Wealth index	1 = Poorest, 2 = Second , 3 = Middle, 4 = Fourth, 5 = Richest
8	Ethnicity	1 = Hausa, 2 = Igbo, 3 = Yoruba, 4 = others
9	No of children (Parity)	1 = 1 – 2, 2 = 3 – 4, 3 = > = 5
11	Alcohol use	1= Yes, 2 = No
12	Tobacco use	1 = Yes, 2 =No
13	Media use (exposure to television, radio, or news paper)	1= Yes , 2= No

For the second stage, the outcome variable here was level of education which was in four categories, No education, Primary Education, Secondary Education and Tertiary Education. Other covariates were Age, Religion, Occupation type, Residential type, Geopolitical Region, Marital status, Wealth index, Ethnicity, No of children, Age at first sex, Alcohol use, Tobacco use, media use.

Stage three was achieved by running a "tebalance summary" command on "Stata MP 14" to check if the if the selection bias has been corrected. For this stage, the outcome variable remained level of education and the covariates were Age, Religion, Occupation type, Residential type, Geopolitical Region, Marital status, Wealth index, Ethnicity, No of children, Age at first sex, Alcohol use, Tobacco use, media use.

For the last stage, the outcome variable was ATDV which consists of two categories (category 1: domestic violence Justified and Category 0: domestic violence 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:

[A] If she goes out without telling him? (YES/NO)

[B] if she neglects the children? (YES/NO)

[C] If she argues with him? (YES/NO)

[D] If she refuses to have sex with him? (YES/NO)

[E] If she burns the food? (YES/NO)

Any respondent who says yes to any of the five questions above justified domestic violence and whosoever that says no to all the five questions does not justify domestic violence and the independent variable which is referred to as treatment variable in propensity terms was the PS that were generated for educational level (that is No education, Primary education, Secondary education and Tertiary education). All Men and women between ages of 15 to 49 were included in this study.

3.9 Different methods of propensity score methodology

PSM has several methods of application which are matching, weighting and Sub-classification. This has to do with the number of categories of the treatment variable. The method includes:

Matching: this includes Greedy matching, optimal matching and Fine balance. These methods are only applicable to treatments having two categories. For instance, if the study is to examine the impact of workshop training (which can be categorized as "participated: Yes or No") on the performance of health workers, this method of matching can be applied to this instance and then proceeded to the post-matching analysis such as Multivariate Analysis, Stratification, Computing Indices of Covariate Imbalance for Greedy matching and Hodges-Lehmann Aligned Rank Test , Regression Adjustment using Hodges-Lehmann, Aligned Rank scores for Optimal Matching. (Guo and Fraser, 2015).

Weighting: This method is applicable to treatment variable with two or more categories. A good example of such variable is Educational level: No formal education, Primary education, Secondary education and Tertiary education. (Guo and Fraser, 2015).

Sub-classification: In some cases, treatment groups may be different systematically with respect to some significant characteristics, for this reason the treatment group and control group may not be directly comparable. One common method of controlling for systematic differences requires grouping units into subclasses based on observed characteristics, and then directly comparing only treated and control units who fall in the same subclass. Obviously such a procedure can only control the bias due to imbalances in observed covariates. (Rosenbaum and Rubin, 1984).

3.10 Technical terms in Propensity Score Methodology

These are terms used in experimental studies and adapted into PS Analysis (Shenyang et al 2010).

Treatment

This is used to refer to the variable of which the effect is being measured on the outcome variable. For example, level of education.

Treatment group

This is a group that received treatment. For instance, in this study, study participants that have Primary Education, Secondary Education and Tertiary Education are the Treatment groups.

Control group: This refers to the group that doesn't receive the treatment. For instance, study participants with no-education are the control group.

Dose: This is used to refer to the levels of treatments.

ATE: Average Treatment Effect (this is the core treatment effect (measures whether the PSM is beneficial to all study participants).

TT: Average Treatment Effect for the treated (This measures whether the PS has effect on individual in the treatment group).

(ATE and ATT reveal whether the treatment has effect on the outcome).

3.11 Methods of statistical analysis

Stages of analysis in this study include:

Imbalance check before propensity score

For the first stage, a bivariate multinomial regression was performed to check for imbalance (selection bias), in this case each of the study covariate was used as the outcome variable in the model and the treatment variable for this study (educational level) was put in the position of the explanatory variable in the model. That is:

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

Where π_{ij} is the probability of a response of the dependent that is greater or equal to a given category (i=2…4), π_{iJ} is the probability of the response less than the given category (i=1), α_j is a constant and β_j is a vector of regression coefficients, for j=1,2,…,J−1. X_i is a vector of the covariates.

Generating the Propensity Score

At the second stage, we estimated generalized PS expressed as $e\,(x_{k,d}) = pr\,(D = d|X = x)$ which is the generalized PS of receiving treatment dose d for participants k with observed covariate X and inverse of the PSW were obtained for participants k. The inverse PSW was expressed as $\frac{1}{e\,(X_{k,d})}$.

This was to predict the probability that a selected study participant will fall into either the category of no education, primary education, secondary education or tertiary education.

Imbalance check on the propensity scores

The third stage involved checking if the PSW are free of selection bias by running a "tebalance summary" on Stata MP 14. If the standardized difference of the weighted scores are close to zero

and the variance ratio for the weighted scores are close to one for the covariates (SD diff ≈ 0, Variance ratio ≈ 1), this implies that the selection bias has been addressed.

Examining the effect of education on attitude towards domestic violence

The "teffect ipw" command was used 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 provide 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 attitude toward domestic violence without the use of PS. Data were weighted to reflect educational level differentials in the population of men and women.

Stata 14 Statistical package (StataCorp, 2015) was used for data manipulation and analysis in this study. Socio-economic, demographic and other available variables were presented using frequency and percentage distribution. Association between the treatment variable (educational level) and all the categorical variables were tested using the chi-square test.

3.16 Ethical Consideration

Secondary data was used for this study and ethical approval was obtained for the primary data collection by MICS. Every confidential variables and personal identifier have been excluded from the MICS dataset. 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.

CHAPTER FOUR

4.0 RESULTS

Participants characteristics

This chapter consists of the descriptive statistics of the variables, the association between the dependent variables and the independent variable, the test for balancing, and the Average treatment effect.

4.1 Socio-economic, demographic characteristics and lifestyle of men

The socio-economic and demographic characteristics of the respondents were presented in Table 2 and 3 respectively. Men had a mean age of 29 years (SD=10 years). Of the 14495 men who participated in this study, 22% justified domestic violence and 10.7% had no education while 17.3% had tertiary education. Close to half (48.2%) of the respondents were married and very few (1.6%) were either divorced or widowed. More than half (53.1%) of the respondents had no children, and about 32.7% uses alcohol. Also, 97.3% do not smoke cigarette and most of them (56.6%) had media exposure. Also 32.6% were residents of urban area while about 20.5% of the respondents were from the North-central region, 16.1% from North-East region, 25.9% from North-west region, 9.5% from South-East region, 14.5% from South-South region and 13.4% from South-west region. There was a preponderance (38.8%) of Hausa men in this study, leaving 12.8% to Igbo, 13.4% to Yoruba and 35% to other ethnic groups. Majority (22.8%) of the respondents belong to the richest wealth quintile.

Table 2: Demographic Characteristics of men

Variables	Frequency (n)	Percentage (%)
Age		
15-19	3283	22.6
20-24	2257	15.6
25-29	2070	14.3
30-34	2018	13.9
35-39	1883	13.0
40-44	1684	11.6
45-49	1300	9.0
Age Mean(SD)	29.1(9.95)	
Education		
None	1552	10.7
Primary	3443	23.8
Secondary	6995	48.3
Tertiary	2505	17.3
Ethnicity		
Hausa	5555	38.3
Igbo	1856	12.8
Yoruba	1886	13.0
Other ethnic group	5198	35.9
Geopolitical Zones		
North central	2978	20.5
North east	2338	16.1
North west	3753	25.9
South east	1381	9.5
South-South	2109	14.5
South west	1936	13.4
Residence		
Urban	4722	32.6
Rural	9773	67.4
Marital status		
Currently married	6983	48.2
Not married	7504	51.8

Table 3: Lifestyle and socio-economic Characteristics of men

Variables	Frequency	Percentage
Parity		
None	7703	53.1
1 – 2	2186	15.1
3 – 4	2004	13.8
more than 4	2602	18.0
Wealth index		
Poorest	2481	16.7
Second	2963	19.5
Middle	3000	19.8
Fourth	3276	21.6
Richest	3463	22.8
Alcohol		
Yes	4738	32.7
No	9757	67.3
Smoke		
Yes	398	2.7
No	14097	97.3
Media Exposure		
No	6294	43.4
Yes	8201	56.6

4.2 Bivariate relationship between men's profile and level of education

A chi square test of independence was performed to examine the relationship and distribution of overlap between all the covariates and the treatment variable (educational level). The result showed that level of education increased across age group. For instance, 9.7% of men who were 15 – 19 years were not educated, compared to the higher proportion (17.1%) of age 45 – 49 years who had tertiary education. Also, higher proportion (14.6%) of uneducated men resides in the rural area. Uneducated men were more (32.8%) in the North-west compared to south-east (0.0%). There were more of uneducated men among Hausa (26.3%) compared to Igbo (0.2%). It was also observed that most (21.1%) of the uneducated men had more than four children. In furtherance, higher percentage (33.2%) of the uneducated men were in the poorest category of wealth index compared to the 1.1% in the richest category. Significant associations existed between level of education and age ($p<0.001$), residence ($p<0.001$), geopolitical zones ($p<0.001$), ethnicity ($p<0.001$), parity ($p<0.001$), alcohol use ($p<0.001$), tobacco use ($p<0.001$) and media use ($p<0.001$). Also, the significant association in the bivariate results ($p<0.05$) before PS weighting revealed that the covariates distributions were not sufficiently overlapped between the treatment doses (primary education, secondary education and tertiary education) and "no education".

Table 4: Bivariate relationship between men's profile and level of education

Variables	None	Pry	Secondary	Tertiary	X^2	p-value
Age					1700	<0.001
15 – 19	347(9.7)	702(19.6)	2456(68.4)	85(2.4)		
20 – 24	179(7.5)	375(15.8)	1373(57.7)	451(19.0)		
25 – 29	215(10.0)	406(18.9)	966(45.0)	562(26.2)		
30 - 34	234(11.3)	496(23.9)	835(40.2)	511(24.6)		
35 – 39	239(12.3)	556(28.7)	720(37.2)	423(21.8)		
40 – 44	244(14.1)	598(34.6)	578(33.4)	309(17.9)		
45 – 49	223(16.9)	483(36.5)	391(29.6)	226(17.1)		
Residence					1600	<0.001
Urban	174(3.6)	572(11.7)	2704(55.3)	1440(29.5)		
Rural	1507(14.6)	3044(29.6)	4615(44.8)	1127(11.0)		
Geopolitical zone					3500	<0.001
North-C	132(4.2)	812(25.5)	1614(50.7)	626(19.7)		
North-E	253(10.3)	998(40.7)	884(36.1)	317(12.9)		
North-W	1289(32.8)	862(21.9)	1295(32.9)	489(12.4)		
South-E	0(0.0)	301(20.3)	953(64.4)	227(15.3)		
South-S	1(0.1)	325(15.0)	1423(65.5)	424(19.5)		
South-W	6(0.3)	318(16.2)	1150(58.7)	484(24.7)		
Marital Status					979	<0.001
Currently married	1021(14.6)	2215(31.7)	2509(35.9)	1238(17.7)		
Not married	531(7.1)	1224(16.3)	4482(59.7)	1267(16.9)		
Ethnicity					2900	<0.001
Hausa	1546(26.3)	1757(29.7)	1887(31.9)	720(12.2)		
Igbo	3(0.2)	382(19.4)	1227(62.4)	354(18.0)		
Yoruba	9(0.5)	274(14.3)	1105(57.7)	527(27.5)		
Others	123(2.3)	1203(22.3)	3100(57.5)	966(17.9)		
Parity					1400	<0.001
None	644(7.8)	1393(17.0)	4808(58.5)	1375(16.7)		
1 – 2	233(10.0)	530(23.8)	976(43.8)	500(22.4)		
3 – 4	249(12.1)	617(30.0)	789(38.4)	400(19.5)		
> 4	565(21.1)	1076(40.2)	746(27.9)	292(10.9)		

Table 5: Bivariate relationship between men's profile and level of education

Variables	None	Pry	Secondary	Tertiary	X^2	p-value
Wealth Index					5500	<0.01
Poorest	828(33.4)	1078(43.5)	533(21.5)	42(1.7)		
Second	558(18.8)	1100(37.1)	1121(37.8)	184(6.2)		
Middle	206(6.9)	739(24.6)	1738(57.9)	317(10.6)		
Fourth	70(2.1)	480(14.7)	2087(63.7)	639(19.5)		
Richest	19(0.6)	219(6.3)	1840(53.1)	1385(40.0)		
Alcohol use					994	<0.001
Yes	16(0.3)	999(20.5)	2842(58.4)	1007(20.7)		
No	1665(16.1)	2615(25.4)	4476(43.4)	1560(15.1)		
Tobacco-use					18	<0.001
Yes	50(12.2)	86(21.0)	174(42.4)	100(24.4)		
No	1627(11.0)	3520(23.9)	7139(48.4)	2461(16.7)		
Media use					2200	<0.001
No	1159(18.4)	2259(35.9)	2442(38.8)	434(6.9)		
Yes	393 (4.8)	1184(14.4)	4553(55.5)	2071(25.3)		

4.3: Imbalance among men's level of education

The result from a multinomial logit model to check for imbalance (selection bias) among the covariates was presented in Table 6. Among men, tertiary education was significantly associated with Age group 20 to 24 (RRR: 10.29, 95% CI:7.67, 13.80), rural residents (RRR: 0.09, 95% CI 0.08, 0.11), the rich (RRR: 14.06, 95% CI 8.20, 24.53), north-east region (RRR: 0.26, 95%CI 0.21, 0.34), single men (RRR: 3.47, 95%CI 1.84, 6.56), Yoruba ethnic group (RRR: 12.73, 95%CI 6.67, 24.43), men who have more than four children (RRR: 0.24 95%CI 0.20, 0.29), men who do not drink alcohol (RRR: 0.01 95%CI 0.01, 0.02) and men who don't use media at all (RRR 0.02: 95%CI 0.01, 0.02). Since the confidence interval does not include one ($p < 0.05$), it showed that there is selection bias in each of the following covariates, Age, Residence, Wealth index, Geopolitical zone, Marital status, Ethnicity, Parity, Alcohol intake and media use.

Table 6: Imbalance among men's level of education

Covariates	Treatment variable	RRR	95% CI	
Age ref(15 -19)	**Level of Education**		**lower**	**upper**
20-24	None			
	Pry	1.04	0.83	1.29
	Secondary	1.08	0.89	1.31
	Tertiary	10.29	7.67	13.8
25-29	None			
	Pry	0.93	0.76	1.15
	Secondary	0.63	0.53	0.76
	Tertiary	10.67	8.03	14.18
30-34	None			
	Pry	1.05	0.86	1.28
	Secondary	0.5	0.42	0.61
	Tertiary	8.91	6.72	11.83
35-39	None			
	Pry	1.15	0.94	1.4
	Secondary	0.43	0.35	0.51
	Tertiary	7.23	5.43	9.61
40-44	None			
	Pry	1.21	1	1.47
	Secondary	0.33	0.28	0.4
	Tertiary	5.17	3.87	6.91
45-49	None			
	Pry	1.07	0.87	1.31
	Secondary	0.25	0.2	0.3
	Tertiary	4.14	3.06	5.59
Residence ref(urban)				
Rural	None			
	Pry	0.61	0.51	0.74
	Secondary	0.2	0.17	0.23
	Tertiary	0.09	0.08	0.11
Wealth index ref(poorest)				
Second	None			
	Pry	2.76	2.3	3.3
	Secondary	13.11	10.94	15.7
	Tertiary	3.34	2.25	4.32
Middle	None			
	Pry	5.27	4.03	6.88
	Secondary	4.32	3.65	6.18
	Tertiary	1.96	1.09	2.46
Fourth	None			
	Pry	8.85	5.49	14.27

	Secondary	1.44	0.51	2.48
	Tertiary	14.06	8.2	24.53
Richest	None			
	Pry	2.76	2.3	3.3
	Secondary	13.11	10.94	15.7
	Tertiary	3.34	2.25	4.32
Geopolitical zone base (North central)				
North east	None			
	Pry	0.64	0.51	0.81
	Secondary	0.29	0.23	0.36
	Tertiary	0.26	0.21	0.34
North west	None			
	Pry	0.11	0.09	0.13
	Secondary	0.08	0.07	0.1
	Tertiary	0.08	0.06	0.1
South East	None			
	Pry	9.35	2.52	14.64
	Secondary	15.35	5.12	20.11
	Tertiary	9.82	8.66	15.52
South-south	None			
	Pry	5.86	0.36	3.86
	Secondary	1.44	0.25	8.31
	Tertiary	8.45	1.45	6.59
South-west	None			
	Pry	8.62	3.76	19.72
	Secondary	15.67	6.89	35.64
	Tertiary	17.01	7.44	38.88
Marital status base (Married)				
Divorced/widowed	None			
	Pry	2.08	1.1	3.9
	Secondary	3.93	2.16	7.15
	Tertiary	3.47	1.84	6.56
Single	None			
	Pry	1.01	0.89	1.13
	Secondary	3.22	2.89	3.6
	Tertiary	1.78	1.57	2.03
Ethnicity base(Hausa)				
Igbo	None			
	Pry	11.01	3.9	34.5
	Secondary	3.99	1.7	10.01
	Tertiary	23.3	8.04	791.7
Yoruba	None			
	Pry	26.79	13.74	52.22
	Secondary	10.59	5.02	19.51
	Tertiary	12.73	6.67	24.43

Other ethnic group	None			
	Pry	8.61	7.06	10.49
	Secondary	20.65	17.04	25.03
	Tertiary	16.86	13.7	20.75
Parity base(None)				
1-2	None			
	Pry	1.1	0.92	1.32
	Secondary	0.59	0.5	0.69
	Tertiary	1.05	0.87	1.26
3-4	None			
	Pry	1.15	0.96	1.36
	Secondary	0.42	0.36	0.5
	Tertiary	0.75	0.63	0.9
More than 4	None			
	Pry	0.88	0.77	1.01
	Secondary	0.18	0.15	0.2
	Tertiary	0.24	0.2	0.29
Alcohol base(yes)				
No	None			
	Pry	0.03	0.02	0.04
	Secondary	0.02	0.01	0.02
	Tertiary	0.01	0.01	0.02
Smoke base(Yes)				
No	None			
	Pry	1.26	0.88	1.79
	Secondary	1.26	0.91	1.73
	Tertiary	0.76	0.54	1.07
Media exposure (yes)				
No	None			
	Pry	0.49	0.38	0.63
	Secondary	0.07	0.06	0.09
	Tertiary	0.02	0.01	0.02

4.4: Men's weighted propensity scores

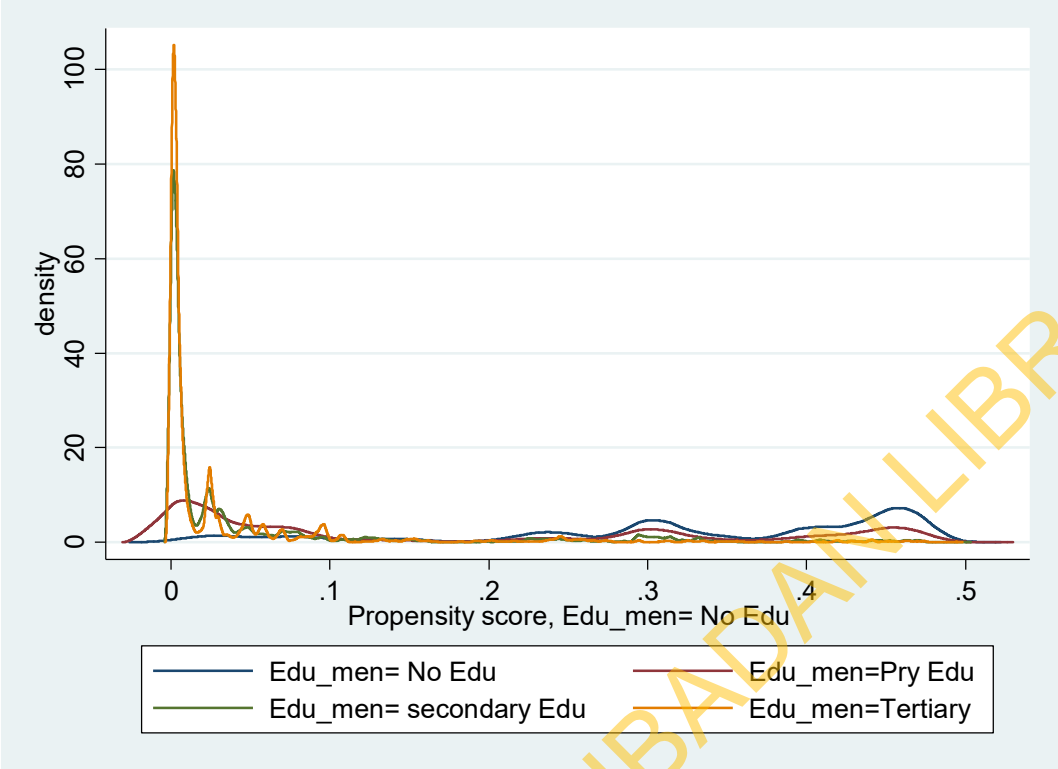
After checking and confirmation of the presence of selection bias in the data, the propensity score and the propensity score weight was generated using "quietly teffect" command in stata 14 so as to correct for selection bias, the result of the propensity score and propensity score weight was presented in table 7. The result showed that the propensity score weighting on the estimated propensity balanced the covariate (that is, selection bias was corrected) as the standardized difference for the weighted are all close to zero, and the variance ratio are all close to one. Also, the similarity in the trends for each level of education presented in figure 1 showed that there is a good overlap in the estimated propensity scores for educational level among men.

Table 7: Men's weighted propensity scores

	Primary				Secondary				Tertiary			
Variable	SD Raw	SD Weighted	VR Raw	VR Weighted	SD Raw	SD Weighted	VR Raw	VR Weighted	SD Raw	SD Weighted	VR Raw	VR Weighted
Residence												
Rural	-0.18	-0.37	1.47	1.58	-0.66	-0.39	2.52	1.59	-1.12	-0.37	2.66	1.58
Marital status												
Divorced/widowed	0.07	-0.13	1.98	0.42	0.08	-0.13	2.04	0.42	0.10	-0.16	2.50	0.34
Single	0.01	0.58	1.01	1.48	0.61	0.63	1.05	1.49	0.31	0.59	1.12	1.48
Wealth index												
Second	0.57	-0.36	1.77	1.24	1.60	-0.31	1.81	1.21	2.55	-0.39	1.26	1.28
Middle	-0.21	0.27	1.14	1.24	-0.97	0.24	0.92	1.22	-1.44	0.23	0.51	1.22
Fourth	0.07	-0.02	1.15	0.95	-0.15	-0.01	0.69	0.99	0.02	-0.10	1.05	0.80
Richest	0.11	-0.09	1.26	0.82	-0.17	-0.13	0.60	0.73	-0.04	0.04	0.91	1.07
Parity												
1-2	0.04	-0.53	1.08	0.55	0.00	-0.53	1.00	0.55	0.17	-0.59	1.35	0.49
3-4	0.06	-0.38	1.12	0.60	-0.12	-0.42	0.76	0.55	0.01	-0.45	1.02	0.52
>4	-0.09	0.31	0.93	1.96	-0.61	0.27	0.41	1.84	-0.58	0.41	0.45	2.24
Alcohol												
No	-0.85	0.56	28.82	1.00	-1.10	0.62	33.92	0.97	-1.11	0.66	34.01	0.94
Smoke												
No	0.04	-0.15	0.80	3.81	0.04	-0.17	0.81	4.33	-0.05	-0.10	1.27	2.74
Media use												
No	0.14	-0.36	1.34	0.75	0.45	-0.37	2.07	0.75	0.38	-0.35	1.94	0.76

SD = Standard difference, VR= Variance Ratio

Figure 1: Overlap plot for the propensity score of men's level of education



4. 5 Treatment effect for attitude towards domestic violence among men

After correcting for the selection bias, results from the binary logistic regression fitted on the weighted propensity scores was presented in table 8. In comparison with uneducated men, men who have attained primary education (OR=0.94, 95%CI: 0.87, 1.03), secondary education (OR=0.92, 95%CI: 0.85, 1.00) and tertiary education (OR = 0.84, 95% CI: 0.78, 0.92) were less likely to justify domestic violence. Also, the PO mean showed that men who had no education (OR=1.36, 95%CI: 1.25, 1.48) were more likely to justify DV compared to their educated counterparts.

Table 8: Treatment effect for attitude towards domestic violence among men

logistic regression that combined regression adjustment and inverse-probability weighting				
(ATE)	**OR**	**p-value**	**95% CI**	
Variables			**Lower**	**Upper**
Education				
None	**ref**			
Primary	0.94	0.173	0.87	1.03
Secondary	0.92	0.059	0.85	1
Tertiary	0.84	<0.0001	0.78	0.92
PO Mean				
Educated				
Not educated	1.39	<0.0001	1.25	1.48

4.6 Socio-economic, Demographic characteristics and lifestyle of women

Women had a mean age of 29 ± 9.4 years and about 34.5% justified domestic violence. Information about the socio-economic and demographic characteristics of women were presented in table 9 and 10. About 14.0% had no education, 36.3% had primary education and 39.1 % had secondary education. There was a preponderance of married women (69.8%) in this study. Lower proportion (27.7%) had no children and about 18.3% uses alcohol while almost all (99.6%) don't engage in cigarrete smoking. More than a half (60.1%) uses media, 32.3% were urban dwellers and a higher proportion of the respondents (20.6%) were from North-central. Also, the proportion of Hausa women was higher (38.9%) and 43.8% were rich.

Table 9: Attitude towards violence and demographic characteristics of women

Variable	Freq (n)	Percentage (%)
Attitude towards violence		
Justified	11526	34.5
Not Justified	21893	65.5
Total	33419	100
Age group		
15 – 19	6312	18.9
20 – 24	5569	16.7
25 – 29	5835	17.5
30 – 34	5211	15.6
35 – 39	4343	13.0
40 – 44	3564	10.7
45 – 49	2585	7.7
Total	33419	100.0
Age Mean (SD)	29(9.4)	
Educational level		
None	4687	14.0
Primary	12125	36.3
Secondary	13006	38.9
Tertiary	3601	10.8
Total	33419	100.0
Marital Status		
Married	23569	70.7
Single	8356	25.1
widow/ divorced	1400	4.2
Total	33325	100.0
Parity		
None	9395	28.1
1 to 2	7327	21.9
3 to 4	7376	22.1
5 to 7	9321	27.9
Total	33419	100.0
Residence		
Urban	10703	32.0
Rural	22716	68.0
Total	33419	100.0
Geopolitical zone		
North-C	6767	20.2
North-E	4942	14.8
North-W	9124	27.3
South-E	3595	10.8

South-S	4642	13.9
South-W	4349	13.0
Total	33419	100.0
Ethnicity		
Hausa	13093	39.2
Igbo	4715	14.1
Yoruba	4234	12.7
Others	11377	34.0
Total	33419	100.0

Table 10: Socio-economic & Lifestyle characteristics of women

Variables	Frequency (n)	Percentage (%)
Wealth Index		
Poorest	5855	17.03
Second	6646	19.33
Middle	6812	19.82
Fourth	7178	20.88
Richest	7885	22.94
Total	34376	100
Alcohol use		
Yes	6229	18.6
No	27189	81.4
Total	33418	100.0
Tobacco use		
Yes	119	0.4
No	33299	99.6
Total	33418	100.0
Media exposure		
Yes	19978	59.8
No	13441	40.2
Total	33419	100.0

4.7 Bivariate relationship between women's profile and level of education

A chi square test of independence was performed to examine the relationship and distribution of overlap between all the covariates and the treatment variable (educational level). The result showed that the proportion of uneducated women differed by residential area. For instance, 6% of urban residents were not educated compared to 17.7% rural residents. No education was more pronounced (41.1%) in the North-West compared to South-East and South-South. There were more of uneducated women among Hausa (32.5%) compared to Yoruba women (0.2%). It was also observed that having higher number of children (>4) was common (22.3%) among uneducated women in relative to lower proportion (4.5%) who had higher education. In furtherance, higher proportion (33.2%) of the uneducated women belong to the poorest category of wealth index compared to the 1.1% in the richest category. Significant associations existed between level of education and age ($p<0.001$), residence ($p<0.001$), geopolitical zones ($p<0.001$), ethnicity ($p<0.001$), parity ($p<0.001$), alcohol use ($p<0.001$), tobacco use ($p<0.001$) and media use ($p<0.001$). Also, the significant association in the bivariate results ($p<0.05$) before PS weighting revealed that the covariates distributions were not sufficiently overlapped between the treatment doses (primary education, secondary education and tertiary education) and "no education".

Table 11: Bivariate relationship between women's profile and level of education

Variable	No	Primary	Secondary	Tertiary	Test	p-value
Age					3400	<0.0001
15 – 19	697(10.2)	1553(22.8)	4380(64.4)	175(2.8)		
20 – 24	754(13.2)	1651(28.9)	2610(45.6)	706(12.3)		
25 – 29	922(15.5)	2025(34.1)	2168(36.5)	818(13.8)		
30 - 34	837(15.8)	1981(37.4)	1685(31.8)	793(15.0)		
35 – 39	658(15.0)	2015(45.9)	1185(27.0)	533(12.1)		
40 – 44	542(15.0)	1846(51.2)	848(23.5)	369(10.2)		
45 – 49	390(14.9)	1397(53.2)	576(21.9)	262(10.0)		
Residence					4800	<0.001
Urban	659(6.0)	2081(19.0)	5834(53.2)	2391(21.8)		
Rural	4141(17.7)	10387(44.4)	7618(32.5)	1265(5.4)		
Geopolitical zone					12000	<0.001
North-C	369(5.3)	3152(45.0)	2704(38.6)	788(11.2)		
North-E	623(12.0)	3067(58.7)	1251(24.0)	282(5.4)		
North-W	3800(41.1)	3418(36.5)	1774(18.9)	384(4.1)		
South-E	1(0.0)	738(20.3)	2344(64.3)	562(15.4)		
South-S	1(0.0)	1118(23.7)	2930(62.0)	679(14.4)		
South-W	6(0.1)	975(22.2)	2449(55.8)	961(21.9)		
Marital Status					5900	<0.001
Married	4399(18.4)	10674(44.7)	6666(27.9)	2152(9.0)		
Single	292(3.3)	1169(13.1)	6158(68.9)	1319(14.8)		
Widow/divorced	99(7.0)	586(41.2)	565(39.1)	171(12.0)		
Ethnicity					10000	<0.001
Hausa	4390(32.5)	6072(44.9)	2533(18.7)	530(3.9)		
Igbo	18(0.4)	914(19.1)	2989(62.5)	860(18.0)		
Yoruba	10(0.2)	934(21.7)	2360(54.9)	999(23.2)		
Others	382(3.3)	4548(38.7)	5570(47.3)	1267(10.8)		
Parity					5900	<0.001
None	595(5.9)	1706(17.0)	6269(62.5)	1462(14.6)		
1 – 2	994(13.4)	2520(34.0)	2942(39.7)	962(13.0)		
3 – 4	1100(14.7)	3093(41.4)	2476(33.1)	808(10.8)		
> 4	2111(22.3)	5149(54.5)	1765(18.7)	424(4.5)		
Wealth Index					15000	<0.001
Poorest	1945(33.2)	3437(58.7)	450(7.7)	23(0.4)		
Second	1618(24.4)	3589(54.0)	1391(20.9)	48(0.7)		
Middle	843(12.4)	2840(41.7)	2881(42.3)	248(3.6)		
Fourth	309(4.3)	1822(25.4)	4273(59.5)	774(10.8)		
Richest	85(1.1)	780(9.9)	4457(56.5)	2563(32.5)		
Poorest	1945(33.2)	3437(58.7)	450(7.7)	23(0.4)		

Alcohol use					2300	<0.0001
Yes	6(0.1)	1571(25.0)	3635(57.7)	1085(17.2)		
No	4794(17.1)	10897(38.8)	9816(35.0)	2571(9.2)		
Tobacco use					22	<0.0001
Yes	5(4.2)	41(34.2)	48(40.0)	26(21.7)		
No	4795(14.0)	12427(36.3)	13403(39.1)	3630(10.6)		
Media use					1100	<0.0001
Yes	551(4.1)	2571(19.1)	7489(55.7)	2830(21.1)		
No	4136(20.7)	9554(47.8)	5517(27.6)	771(3.9)		

4.8 Imbalance among educational level of women

The result from a multinomial logit model to check for imbalance among the covariates was presented in Table 12. The result from the multinomial logit model to compare each covariate with the educational level using no education as the reference category and reporting the Relative Risk Ratio (RRR) indicates that tertiary education was significantly associated with Age group 20 to 24 (RRR: 3.73, 95% CI 3.07, 4.53) and Age group 45 to 49 (RRR: 2.68 95%CI 2.13, 3.36), rural residents (RRR:0.08 , 95% CI 0.08, 0.09), the richest women (RRR: 14.06, 95% CI 8.20, 24.53), single women (RRR: 9.23, 95%CI 8.05, 10.59), Yoruba ethnic group (RRR: 8.47, 95%CI 4.98, 15.70), women who have more than four children (RRR: 0.08 95%CI 0.07, 0.09), and women who don't use media (RRR 0.23: 95% CI 0.19, 0.28).Since the confidence interval does not include one ($p < 0.05$), it showed that there is selection bias in each of the following covariates, age, residence, wealth index, marital status, ethnicity, parity, alcohol intake, media use.

Table12: Imbalance among women's educational level

Covariates Age Base(15 - 20)	Treatment variable Level of Education	RRR	95% CI Lower	 Upper
20-24	None			
	Pry	0.98	0.87	1.11
	Sec	0.55	0.49	0.62
	Tertiary	3.73	3.07	4.53
25-29	None			
	Pry	0.99	0.88	1.11
	Sec	0.37	0.33	0.42
	Tertiary	3.53	2.92	4.28
30-34	None			
	Pry	1.06	0.94	1.20
	Sec	0.32	0.29	0.36
	Tertiary	3.77	3.11	4.57
35-39	None			
	Pry	1.37	1.21	1.56
	Sec	0.29	0.25	0.32
	Tertiary	3.23	2.64	3.95
40-44	None			
	Pry	1.53	1.34	1.74
	Sec	0.25	0.22	0.28
	Tertiary	2.71	2.19	3.35
45-49	None			
	Pry	1.61	1.39	1.86
	Sec	0.24	0.20	0.27
	Tertiary	2.68	2.13	3.36
Residence (Urban)		1.00		
Rural	None			
	Pry	0.79	0.72	0.87
	Sec	0.21	0.19	0.23
	Tertiary	0.08	0.08	0.09
Marital status (married)		1.00		
Single	None			
	Pry	1.65	1.44	1.88
	Sec	13.92	12.30	15.74
	Tertiary	9.23	8.05	10.59
Widow/divorced	None			
	Pry	2.44	1.97	3.03
	Sec	3.77	3.03	4.68
	Tertiary	3.53	2.74	4.55
Wealth index (poorest)				
Second	No			
	pry		1.26	1.16

	Sec		3.72	3.28
	Tertiary		2.51	1.52
Middle	No			
	Pry		1.91	1.73
	Sec		14.77	13.00
	Tertiary		24.88	16.11
Fourth	No			
	Pry		3.34	2.92
	Sec		59.77	51.22
	Tertiary		211.82	137.55
Richest	No			
	Pry		5.19	4.12
	Sec		2.64	1.66
	Tertiary		2.88	1.59
Ethnicity base(Hausa)				
Igbo	None			
	Pry	36.71	22.99	58.63
	Sec	2.79	1.61	4.60
	Tertiary	3.74	2.01	6.62
Yoruba	None			
	Pry	67.53	36.17	126.07
	Sec	4.02	2.36	7.64
	Tertiary	8.47	4.98	15.70
Other ethnic groups	None			
	Pry	8.61	7.70	9.62
	Sec	25.27	22.53	28.34
	Tertiary	27.47	23.75	31.78
Parity Base (None)				
1-2	None			
	Pry	0.88	0.79	1.00
	Sec	0.28	0.25	0.31
	Tertiary	0.39	0.35	0.45
3-4	None			
	Pry	0.98	0.87	1.10
	Secondary	0.21	0.19	0.24
	Tertiary	0.30	0.26	0.34
5-7	None			
	Pry	0.85	0.76	0.95
	Secondary	0.08	0.07	0.09
	Tertiary	0.08	0.07	0.09
Alcohol use base (Yes)				
No	None			
	Pry	0.01	0.00	0.02
	Secondary	0.00	0.00	0.01

	Tertiary	0.00	0.00	0.01
Cigarette base (yes)				
No	None			
	Pry	0.32	0.12	0.80
	Secondary	0.29	0.12	0.73
	Tertiary	0.15	0.06	0.38
Media use (Yes)				
No	None			
	Pry	2.00	1.81	2.21
	Secondary	10.11	9.20	11.11
	Tertiary	27.37	24.32	30.80

4.9 Weighted propensity scores and Overlap

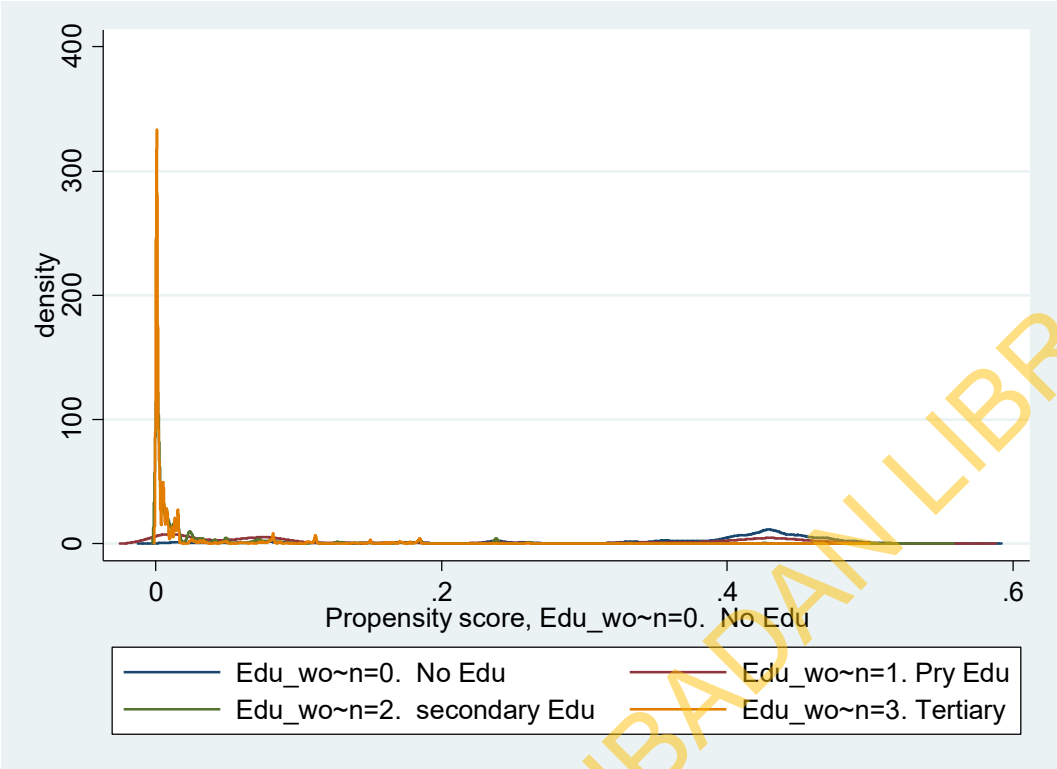
Haven checked and confirmed the presence of selection bias in the data, the propensity score and the propensity score weight were generated using "quietly teffect" command in "Stata MP 14" so as to correct for selection bias, the result of the propensity score and propensity score weight were presented in table 13. The result showed that the PS weighting balanced the covariates (that is, selection bias was corrected) as the standardized difference for the weighted scores were all close to zero, and the variance ratio of the weighted scores were all close to one. Also, the similarity in the trends for each level of education presented in figure 2 showed that there is a good overlap in the estimated propensity scores for educational level among men.

Table 13: Weighted propensity scores for women

Variables	Primary				Secondary				Tertiary			
	SD Raw	SD Weighted	VR Raw	VR Weighted	SD Raw	SD Weighted	VR Raw	VR Weighted	SD Raw	SD Weighted	VR Raw	VR Weighted
Age												
20-24	-0.07	0.04	0.87	1.08	0.09	0.03	1.17	1.05	0.09	-0.06	1.17	0.89
25-29	-0.08	0.05	0.88	1.09	-0.07	0.07	0.88	1.14	0.07	-0.06	1.11	0.88
30-34	-0.04	0.11	0.93	1.25	-0.13	0.05	0.77	1.12	0.10	0.05	1.17	1.12
35-39	0.07	-0.02	1.15	0.95	-0.15	-0.01	0.69	0.99	0.02	-0.10	1.05	0.80
40-44	0.11	-0.09	1.26	0.82	-0.17	-0.13	0.60	0.73	-0.04	0.04	0.91	1.07
45 – 49	0.11	0.04	1.35	1.14	-0.16	0.06	0.56	1.22	-0.04	0.29	0.89	2.13
Residence												
Rural	-0.08	-0.18	1.17	1.14	-0.69	-0.13	2.06	1.11	-1.24	-0.22	1.90	1.17
Marital status												
Single	0.12	0.12	1.50	1.13	1.02	0.03	4.80	1.04	0.81	0.06	4.47	1.06
Divorced/widowed	0.13	0.06	2.61	1.68	0.05	0.10	1.50	2.13	0.06	0.10	1.73	2.23
Wealth index												
Second	-0.11	-0.08	0.92	0.89	-0.59	-0.07	0.41	0.89	-0.94	-0.19	0.06	0.71
Fourth	0.27	0.16	2.06	1.31	0.68	0.18	3.56	1.35	0.43	0.21	2.74	1.40
Richest	0.11	0.04	1.35	1.14	-0.16	0.06	0.56	1.22	-0.04	0.29	0.89	2.13
Parity												
1-2	-0.01	0.00	0.98	0.99	0.03	0.03	1.05	1.04	0.13	-0.07	1.18	0.90
2-3	0.05	0.00	1.06	1.00	-0.10	0.01	0.86	1.02	-0.02	-0.07	0.97	0.90
>4	-0.05	-0.09	0.99	0.91	-0.73	-0.06	0.47	0.95	-0.78	0.09	0.42	1.07
Smoke												
No	-0.05	0.00	3.17	0.92	-0.05	-0.02	3.32	1.45	-0.10	-0.02	6.74	1.51
Media												
No	0.15	0.13	1.60	1.30	0.46	0.09	2.99	1.21	0.42	0.10	2.83	1.24

SD = Standard difference, VR= Variance Ratio

Figure 2: Overlap plot for the propensity score of women level of education



4.10 Treatment effect for attitude towards domestic violence among women

After correcting for the selection bias, results from the logistic regression that combined regression adjustment and inverse-probability weighting was presented for women in table 14. In comparative with uneducated women, those who have tertiary education (OR = 0.94, 95% CI: 0.80, 2.22) were less likely to justify DV. Those who had only primary education (OR = 1.03, 95%CI: 0.88, 2.41), secondary education (OR= 1.04, 95%CI: 0.88, 2.42) were more likely to justify domestic violence. Also, the PO mean showed that women who had no education (OR=1.39, 95%CI: 1.19, 1.61) were more likely to justify DV compared to their educated counterparts.

Table 14: Treatment effect for attitude towards domestic violence among women

logistic regression that combined regression adjustment and inverse-probability weighting				
Variables	**OR**	**P value**	**95% CI**	
			Lower	**Upper**
Education				
None				
Primary	1.03	0.688	0.88	2.41
Secondary	1.04	0.662	0.88	2.42
Tertiary	0.94	0.477	0.80	2.22
PO Mean				
Educated				
Not Educated	1.39	<0.0001	1.19	1.61

CHAPTER FIVE

5.0 Discussion, Conclusion and Recommendation

5.1 Discussion

Effect of education on attitude towards domestic violence among men

Effect of education on ATDV was assessed among men in Nigeria using a nationally representative data (MICS). ATDV was the outcome variable. Selection bias was detected in the data and PSM addressed the selection bias in the data. The PSM has proved to be effective in some studies (Yang *et al.*, 2016; Yaya *et al.*, 2019; Yusuf *et al.*, 2014).

This study showed that lower proportion of men justified domestic violence compared to women, although this rate was higher than that of Ukraine and Ghana, but almost in line with the percentage reported in Moldova and Namibia (Sardinha and Catalan, 2018). The above mentioned studies and this study have similar definitions of ATDV. However, the disparity in the descriptive findings could be a result of the differences in the characteristics of the countries such as cultural beliefs and level of campaign against domestic violence in the different countries. Arisi and Oromareghake enlightened us with the findings from their study; they reported that some cultures in Nigeria considered women as inferior beings, only useful in the kitchen, for pleasure and temptation (Arisi and Oromareghake, 2011). Also, it was known as common practice among them that women must kneel to beg their husband when they are being beaten by their husband (Arisi and Oromareghake, 2011). Act of beating women is regarded to as a legitimate requital for a wife's defiance rather than seen it as 'violence'(Krause *et al.*, 2016). Our findings revealed that a higher proportion of those who have no education lived in the rural area, stays in the north-west region and belongs to the Hausa ethnic group. Also higher proportion of uneducated men used tobacco which was analogous to previous findings where there was a preponderance of uneducated men in the rural settings, northwest region and Hausa

men, this findings is not out of the way, a scholar from Nigeria also reported a similar findings (Antai and Antai, 2008).

The association between educational level and ATDV in this study was similar to the findings from previous studies (Okenwa-Emegwa *et al.*, 2016). The result from the imbalance test to check for the observable difference between the treatment and the control group (selection bias) showed that age, marital status, parity, alcohol use, tobacco use, media use, residential type, region, ethnicity and wealth index were not balanced which indicates the presence of selection bias among the Educational groups which is the treatment variable. Our result showed that those who had primary education, secondary education and tertiary education are less likely to justify domestic violence which was contrary to the previous finding where men who had primary and secondary education justified domestic violence (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).

Effect of education on attitude to domestic violence among women

Effect of education on ATDV was assessed among women in Nigeria. The rate at which women justified domestic violence was higher than that found in Ukraine and Ghana but lower than that of Zimbabwe (Sardinha and Catalan, 2018). The disparity in the descriptive findings of this study and the above mentioned studies could be a result of the differences in the belief of women in the countries; Haj-Yahia from Palestine reported that victims of DV were restricted to justify domestic violence to avoid marital separation as it could affect the children and their sustenance (Haj-Yahia, 2005). This study revealed that education influenced ATDV which was similar to

the findings from Nigeria that showed similar result (Okenwa-Emegwa *et al.*, 2016). The result from the imbalance test to check for the observable difference between the treatment and the control group showed that age, marital status, parity, alcohol use, tobacco use, media use, residential type, region, ethnicity and wealth index were not balanced which indicates the presence of selection bias among the levels of education. The result showed that women who had primary education and secondary education were more likely to justify DV while women who have attained tertiary education were less likely to justify DV which was similar to previous findings (Okenwa-Emegwa *et al.*, 2016). Although, was not statistical significant for this study. This study and that of (Okenwa-Emegwa *et al.*, 2016) used a nationally representative data and definition of ATDV was similar, but the disparity could be as a result of the differences in the statistical significance could be traced to the methods of analysis i.e the PSM that was used for this study has addressed the selection bias in the data hereby providing a better estimate (Cepeda *et al.*, 2003).

Limitation of study

PSM is only capable of adjusting for selection bias, other types of bias such as measurement bias may not be addressed by PSM. However, this limitation does not erode the strength of this study as it added to knowledge about statistical methodology and alternative to improve findings from non- experimental studies.

5.2 Conclusion

Education played a crucial role in ATDV among men and women in Nigeria. The use of PSM effectively controlled for selection bias in the estimation of effect of education on ATDV.

Embracing the use of PSM will enable researchers make causal inference from non-experimental or cross-sectional studies in situations where randomized control trials are not feasible.

5.3 Recommendation

Since PSM has proved useful and has provided a better estimate for making a reliable inference from cross-sectional studies, this methodology is recommended especially when an experimental study is not achievable. Also, education remains a major driver of human's behavioral pattern as its influence on ATDV was unveiled in this study. Efforts to improve access to education should be prioritized.

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