







# BMJ Open Physical violence during pregnancy in sub-Saharan Africa: why it matters and who are most susceptible?

Bright Opoku Ahinkorah ,<sup>1</sup> Richard Gyan Aboagye ,<sup>2</sup> Abdul-Aziz Seidu ,<sup>3,4,5</sup> James Boadu Frimpong ,<sup>6</sup> John Elvis Hagan Jr ,<sup>6,7</sup> Eugene Budu,<sup>3</sup> Sanni Yaya ,<sup>8,9</sup>

**To cite:** Ahinkorah BO, Aboagye RG, Seidu A-A, *et al.* Physical violence during pregnancy in sub-Saharan Africa: why it matters and who are most susceptible? *BMJ Open* 2023;**13**:e059236. doi:10.1136/bmjopen-2021-059236

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-059236>).

Received 11 November 2021  
Accepted 20 March 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

## Correspondence to

Dr Abdul-Aziz Seidu;  
[abdul-aziz.seidu@stu.ucc.edu.gh](mailto:abdul-aziz.seidu@stu.ucc.edu.gh)

## ABSTRACT

**Objective** The study assessed the prevalence of physical violence against pregnant women and its associated factors in sub-Saharan Africa (SSA).

**Design** We analysed cross-sectional data of 108971 women in sexual unions from the most recent Demographic and Health Surveys of 26 countries in SSA. The predictors of physical violence were examined using a multilevel binary logistic regression. All the results were presented as adjusted odds ratios (aORs) with their corresponding 95% confidence intervals (CIs).

**Setting** Twenty-six countries in SSA.

**Participants** 108971 women who had ever been pregnant.

**Outcome measure** Physical violence during pregnancy.

**Results** Physical violence was identified in 6.0% of pregnant women in SSA. The highest prevalence (14.0%) was reported in South Africa, while Burkina Faso recorded the lowest (2.1%). Women who had primary (aOR=1.26, 95% CI=1.15, 1.38) and secondary education (aOR=1.15, 95% CI=1.01, 1.32); those who were cohabiting (aOR=1.21, 95% CI=1.11, 1.32); those who were working (aOR=1.17, 95% CI=1.08, 1.28); and those whose partners had primary (aOR=1.15, 95% CI=1.04, 1.28) and secondary education (aOR=1.14, 95% CI=1.01, 1.28) were more likely to experience physical violence during pregnancy compared with those who had no formal education; those who were married; those who were not working, and those whose partners had no formal education, respectively. Moreover, women whose partners consumed alcohol (aOR=2.37, 95% CI=2.20, 2.56); those who had parity of four or more (aOR=2.06, 95% CI=1.57, 2.72); and those who perceived intimate partner violence (IPV) as a culturally accepted norm (aOR=1.55, 95% CI=1.44, 1.67) had higher odds of experiencing physical violence during pregnancy compared to those whose partners did not consume alcohol, those with parity zero, and those who did not perceive IPV as culturally accepted, respectively. On the contrary, women who were aged 35-39, those who were of the richest wealth index, and those in rural areas had reduced odds of experiencing physical violence during pregnancy.

**Conclusion** Based on the findings, community leaders are encouraged to liaise with law enforcement agencies to strictly enforce laws on gender-based violence by prosecuting perpetrators of IPV against pregnant women as a deterrent. Also, intensifying education on what

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The study's main strength was the use of recent nationally representative datasets of 26 countries.
- ⇒ The sample size used for the study also makes it possible to generalise the findings to pregnant women in the selected countries.
- ⇒ In ensuring the validity and reliability of the findings, rigorous statistical tools were used.
- ⇒ The cross-sectional nature of the study makes it impossible to draw causal inferences.
- ⇒ The sensitive nature of the questions related to physical violence might have caused respondents to under-report their experiences.
- ⇒ The sensitive nature of the questions related to physical violence might have caused respondents to under-report their experiences.

constitutes IPV and the potential consequences on the health of pregnant women, their children, and their families will be laudable. Improving the socioeconomic status of women may also help to eliminate IPV perpetration against women at their pregnancy stage.

## BACKGROUND

Intimate partner violence (IPV) remains a major concern of public health interest globally.<sup>1-3</sup> IPV is defined as any act that causes physical, sexual, emotional, or psychological harm to a partner or an ex-partner.<sup>4,5</sup> Over the years, IPV has been identified as gender-based violence that has been observed across differences in race, nationality, class, religion, or beliefs.<sup>6,7</sup> In 2021, the World Health Organization (WHO) projected that one in every three (30%) women in the world had experienced physical and/or sexual IPV or non-partner sexual violence at some point in their lives.<sup>8</sup>

Generally, IPV against women has negative effects on their physical and mental health. For instance, a study conducted among



first-time Australian mothers indicated that women who were physically abused reported worse mental and physical health relative to those who did not experience any IPV. Specifically, women who experienced IPV were more likely to experience anxiety, depressive symptoms, back pain, poor functional health status, incontinence, and post-traumatic stress disorder.<sup>9</sup>

Although the negative impact of IPV on women in general is great, IPV against pregnant women has serious health consequences including pregnancy-related complications, preterm delivery, miscarriage, and physical injuries.<sup>7 10–13</sup> IPV has also been found as a factor that significantly contributes to the rate of maternal mortality.<sup>14 15</sup> Additionally, pregnant women who lose their unborn babies as an outcome of experiencing IPV may be mentally affected.<sup>16–18</sup>

Despite the disturbing effects of IPV perpetration on the general health of women and at the stage of pregnancy where it is also profound, IPV among pregnant women continues to be high in sub-Saharan Africa (SSA).<sup>19–21</sup> For example, a study by Alebel *et al*<sup>21</sup> revealed that IPV among pregnant women was 26.1% in Ethiopia. Some women in SSA have previously experienced and continue to experience IPV as a culturally accepted norm in their society,<sup>22–24</sup> which should not be the case. Some studies have revealed that the mother's educational status, place of residence, intimate partner's educational status, intimate partner's alcohol use, cultural acceptance of IPV in intimate relationships, being in a polygamous union, and employment status are factors associated with experience of IPV among pregnant and non-pregnant women.<sup>21 23–26</sup> For example, a country-based study in Ethiopia revealed that pregnant women who were not educated were more likely to experience IPV.<sup>21</sup> Therefore, gaining a better understanding of the personal, social, and cultural factors associated with the experience of IPV during pregnancy can guide prevention and intervention efforts in SSA.

However, there is a gap in literature on the pooled prevalence and factors associated with IPV among pregnant women using most recent nationally representative data in SSA. This has made it difficult in designing and implementing public health interventions that help to reduce violence against pregnant women in SSA, considering the sociocultural variations among sub-Saharan African countries. Therefore, this study examined the prevalence and factors associated with physical violence during pregnancy in 26 countries in SSA using nationally representative data from the recent Demographic and Health Surveys (DHSs). Findings from the study could help direct policies towards the reduction of violence against pregnant women in SSA, an objective which is in conformity with the United Nations' Sustainable Development Goal 5 of realising gender equality and empowering women and female children by 2030.<sup>27</sup>

## METHODS

### Data source and study design

We analysed data from the DHS of 26 countries in SSA. The countries were chosen based on the availability of the domestic violence module data and survey years ranging from 2010 to 2020. The data from the women's file were combined. DHS is a global survey done in over 85 low-and middle-income countries.<sup>28</sup> The United States (US) Agency for International Development (USAID) funds DHS. Additional funding for the survey comes from the US Centers for Disease Control and Prevention, United Nations Population Fund, United Nations Children's Fund (UNICEF), Irish Embassy (Irish Aid), United Nations Development Programme, WHO, United Nations Women (UN Women), and the Global Alliance for Vaccine and Immunization. The DHS Programme, a USAID-funded initiative that offers support and technical help in the execution of DHSs in several countries, is where Inner City Fund provides technical assistance.<sup>28</sup> The DHS is conducted periodically, usually 5 years in the participating countries. However, resources and technical constraints tend to prolong the conduct of the survey. The data were collected from the respondents using structured questionnaires. Trained research assistants conducted the interview in the local dialect of the respective country. The respondents for the DHS were recruited using a two-stage cluster sampling procedure. The first step was to choose sample locations (clusters) made up of enumeration areas (EAs). A systematic sampling of households was performed in the second step. In each of the selected EAs, a household listing was conducted, and households to be included in the survey were chosen at random from the list. A prior study revealed a precise sampling technique and data collection procedure.<sup>29</sup> A total of 108 971 women who had ever been pregnant constituted the sample size (see [table 1](#)). The datasets can be accessed online at: <https://dhsprogram.com/data/available-datasets.cfm>.

### Outcome variable

The study's outcome variable was physical violence during pregnancy. Women were asked if they had ever suffered physical violence during pregnancy (ie, during any of their pregnancies anyone had ever hit, slapped, kicked or done anything else to hurt them physically?) and, if yes, who had perpetrated the violence.<sup>30</sup> We focused on partners/husbands as perpetrators in this study. As a result, women who said their partners/husbands ever hit, slapped, kicked or did anything else to hurt them physically during pregnancy were considered to have experienced physical violence during pregnancy, while those who said no did not experience physical violence during pregnancy.

### Explanatory variables

This study included a total of 15 explanatory variables. These variables were chosen based on their association with IPV and their availability in the DHS dataset.<sup>31–35</sup>

**Table 1** Description of study sample

Survey country	Survey year	Weighted sample size	Weighted percentage
1. Angola	2015–2016	7441	6.8
2. Benin	2017–2018	3918	3.6
3. Burkina Faso	2010	9461	8.7
4. Burundi	2016–2017	5970	5.5
5. Cameroon	2018	3781	3.5
6. Chad	2014–2015	6093	5.6
7. Comoros	2012	1739	1.6
8. Cote d'Ivoire	2011–2012	4060	3.7
9. Democratic Republic of the Congo	2013–2014	4552	4.2
10. Ethiopia	2016	4007	3.7
11. Gabon	2012	2668	2.4
12. Gambia	2019–2020	1475	1.3
13. Kenya	2014	3512	3.2
14. Liberia	2019–2020	1620	1.5
15. Malawi	2015–2016	4406	4.0
16. Mali	2018	3126	2.9
17. Namibia	2013	824	0.8
18. Nigeria	2018	8206	7.5
19. Rwanda	2014–2015	1506	1.4
20. Sierra Leone	2019	3462	3.2
21. South Africa	2016	110	0.1
22. Tanzania	2015–2016	6173	5.7
23. Togo	2013–2014	4569	4.2
24. Uganda	2016	5874	5.4
25. Zambia	2018	5583	5.1
26. Zimbabwe	2015	4835	4.4
All countries		108971	100.0

### Individual-level factors

The individual-level variables were maternal age, partners' age, educational level of respondents and their partners, marital status, current working status, frequency of listening to radio, frequency of watching television, frequency of reading newspaper/magazine, partners' alcohol consumption, and justification of IPV. We maintained the existing coding for the age of the respondent, educational level of the respondent and their partners, current working status and partners' alcohol consumption as found in the DHS dataset. In the DHS, the alcohol consumption variable was derived from the question 'Does (did) your (last) (husband/partner) drink alcohol?'. The response options were 0=no and 1=yes. The marital status of the respondents was recoded as 'married' and 'cohabiting'. Parity was recoded into '0', '1', '2', '3' and '4 or more'. Partner's age was recoded as '15–24', '25–34', '35–44' and '45 and above'. For the frequency of

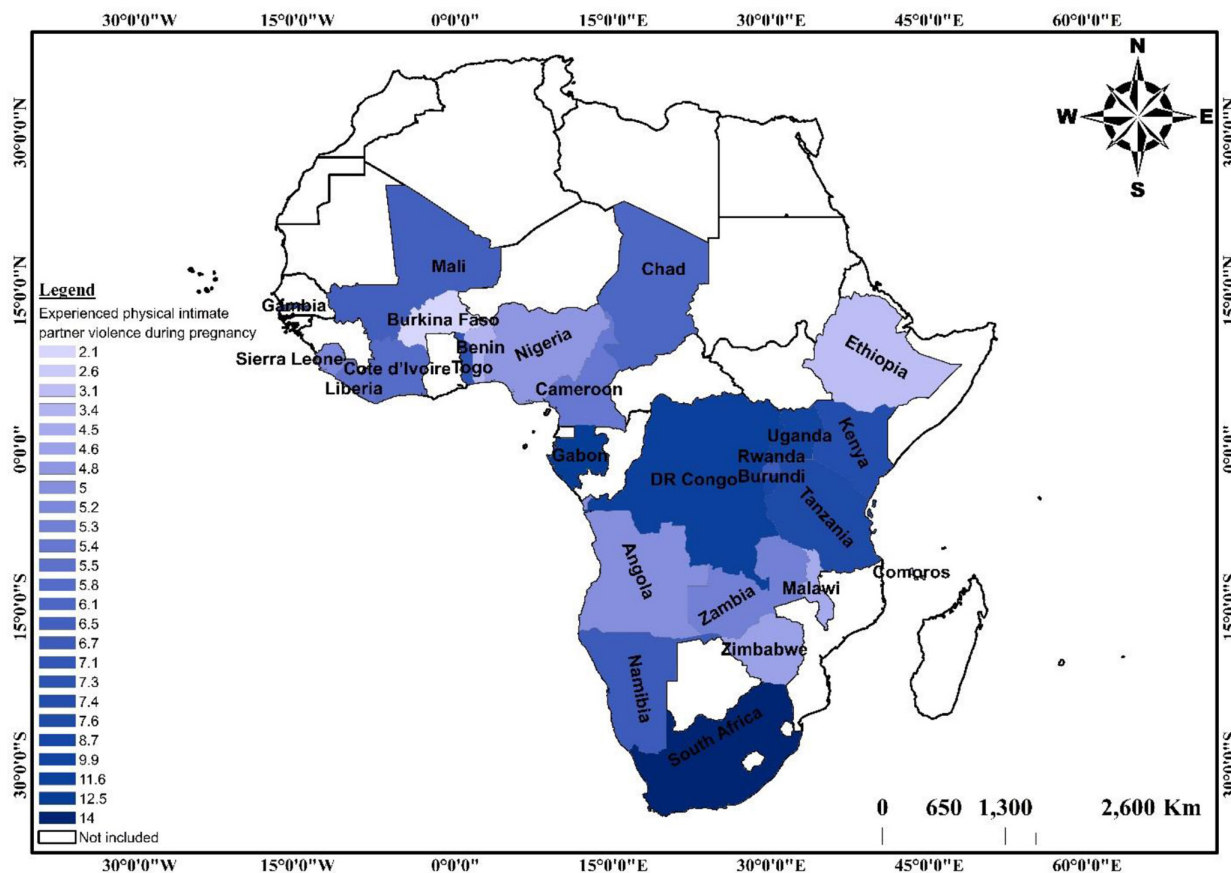
listening to radio, frequency of watching television and frequency of reading newspaper/magazine, respondents who answered 'not all' and 'less than once a week' were maintained and used in the analysis, whereas those who selected 'at least once a week' and 'almost every day' were classified as 'at least once a week'. For justification of IPV, each respondent was asked if they justified wife beating by a partner if a woman burns food, argues with the partner, goes out without telling the partner, neglects the children and refuses to have sexual contact with the partner. The response options for all five items were 'no', 'yes' and 'don't know'. The response options 'no' or 'don't know' were recoded as 'no', but the option 'yes' was maintained. The derived response option 'no' in all the five items was classified as 'not justify IPV', while the option 'yes' in any of the five items was considered as 'justifying IPV'.

### Contextual-level factors

Wealth index, place of residence, and geographical subregions were the contextual-level variables. We maintained the original coding of wealth index and place of residence as was done in the DHS datasets. Wealth index was used as a proxy measure of socioeconomic status. It was assessed using component rankings derived from principal component analysis on the ownership of family goods, such as access to drinking water, kind of toilet, type of cooking fuel, and possession of a television and refrigerator. On the wealth index, households are divided into five categories based on individual rankings: poorest, poorer, middle, richer and richest. The study's 26 countries were divided into geographical subregions based on their location within the African continent and used as a covariate in the analysis. The subregions are classified as 'Central', 'Eastern', 'Western' and 'Southern' Africa.

### Statistical analyses

Stata software V.16.0 (Stata Corporation, College Station, Texas, USA) was used to analyse the data. First, a spatial map was used to show the prevalence of physical violence during pregnancy. The relationship between the explanatory variables and physical violence during pregnancy was examined using a Pearson  $\chi^2$  test of independence. We used the best selection method by employing the Stata command "gvselect" to select the best set of variables for the regression model. Also, we controlled for the geographical sub-region variable in the regression analysis. Later, we used a four-model multilevel binary logistic regression to examine the relationship between the explanatory variables and physical violence during pregnancy. The clustering of the primary sample units were shown to be responsible for the variance in IPV in model 0. Individual-level characteristics were incorporated into model I. The contextual-level variables were included in model II. Finally, model III was fitted to include all explanatory variables. In fitting the four models, we used the Stata command 'melogit'. The analysis also included Akaike's Information Criterion tests to compare the models and to check for the fitness of the models. The



**Figure 1** Prevalence of physical violence during pregnancy in sub-Saharan Africa

results of the multilevel binary logistic regression were given as adjusted odds ratios (aORs) with a 95% confidence interval (CI). To improve the generalisability of our findings, we weighted all the analyses to compensate for oversampling and undersampling, including the complicated survey design. In writing this work, we followed the Strengthening Reporting of Observational Studies in Epidemiology reporting criteria (online supplemental table 1).<sup>36</sup>

#### Patient and public involvement

Patients and the public were not involved in the design and conduct of this research.

## RESULTS

### Prevalence of physical violence during pregnancy among women in sub-Saharan Africa

Figure 1 presents the prevalence of physical violence among women during pregnancy in SSA. The prevalence of physical violence during pregnancy in SSA was 6.0%. The highest prevalence was reported in South Africa (14.0%), whereas the lowest prevalence was recorded in Burkina Faso (2.1%).

### Distribution of physical violence during pregnancy across the sociodemographic characteristics of women in sub-Saharan Africa

Table 2 presents the associations between the explanatory variables and physical violence during pregnancy in SSA. The study found that maternal age, maternal educational level, marital status, current working status, exposure to newspaper/magazine, exposure to radio, exposure to television, partner's age, partner's educational level, partner's alcohol consumption, IPV justification, parity, wealth index, and place of residence were significantly associated with physical violence among pregnant women in SSA. However, the results from the best set of variables considered for the regression analysis were maternal age, maternal educational level, marital status, current working status, partner's age, partner's educational level, partner's alcohol consumption, IPV justification, parity, wealth index, and place of residence.

### Predictors of physical violence during pregnancy in sub-Saharan Africa

Women who had primary (aOR=1.26, 95% CI=1.15, 1.38) and secondary education (aOR=1.15, 95% CI=1.01, 1.32); those who were cohabiting (aOR=1.21, 95% CI=1.11, 1.32); those who were working (aOR=1.17, 95% CI=1.08, 1.28); and those whose partners had primary (aOR=1.15, 95% CI=1.04, 1.28) and secondary education (aOR=1.14, 95% CI=1.01, 1.28) were more likely to experience

**Table 2** Distribution of physical violence during pregnancy across the sociodemographic characteristics of women in sub-Saharan Africa

Variable	Weighted N	Weighted %	Experienced physical violence during pregnancy	P- value*
			Yes (%)	
Maternal age (years)				0.015
15–19	5850	5.4	6.7	
20–24	18542	17.0	6.4	
25–29	23536	21.6	6.2	
30–34	21119	19.4	6.3	
35–39	17684	16.2	5.4	
40–44	12770	11.7	5.6	
45–49	9470	8.7	5.5	
Maternal educational level				<0.001
No education	42506	39.0	5.1	
Primary	36642	33.6	7.6	
Secondary	25460	23.4	5.8	
Higher	4363	4.0	2.7	
Marital status				<0.001
Married	85750	78.7	5.5	
Cohabiting	23221	21.3	8.0	
Current working status				<0.001
No	33757	31.0	5.2	
Yes	75214	69.0	6.4	
Frequency of listening to radio				<0.001
Not at all	48122	44.2	6.4	
Less than once a week	20226	18.5	5.8	
At least once a week	40623	37.3	5.7	
Frequency of watching television				0.004
Not at all	67327	61.8	6.3	
Less than once a week	12601	11.6	5.8	
At least once a week	29043	26.6	5.5	
Frequency of reading newspaper or magazine				0.035
Not at all	90838	83.4	6.0	
Less than once a week	10147	9.3	6.5	
At least once a week	7986	7.3	6.1	
Partner's age (years)				<0.001
15–24	5904	5.4	6.9	
25–34	33393	30.6	6.5	
35–44	36015	33.1	6.2	
45+	33659	30.9	5.2	
Partner's educational level				<0.001
No education	34341	31.5	4.9	
Primary	33165	30.4	7.4	
Secondary	32782	30.1	6.5	
Higher	8683	8.0	3.5	
Partner's alcohol consumption				<0.001

Continued



Table 2 Continued

Variable	Weighted N	Weighted %	Experienced physical violence during pregnancy	P- value*
No	70 824	65.0	4.0	
Yes	38 147	35.0	9.8	
IPV justification				<0.001
Not justified	57 941	53.2	4.7	
Justified	51 030	46.8	7.5	
Parity				<0.001
Zero birth	3089	2.8	5.0	
One	16 011	14.7	4.6	
Two	18 430	16.9	5.7	
Three	17 113	15.7	5.9	
Four or more	54 328	49.9	6.6	
Wealth index				<0.001
Poorest	21 224	19.5	6.7	
Poorer	22 304	20.5	7.2	
Middle	22 023	20.2	6.1	
Richer	21 952	20.1	5.9	
Richest	21 468	19.7	4.2	
Place of residence				0.014
Urban	37 235	34.2	5.6	
Rural	71 736	65.8	6.2	

\*P values are from X<sup>2</sup> test.

physical violence during pregnancy compared with those who had no education; those who were married; those who were not working, and those whose partners had no formal education, respectively. Moreover, women whose partners consumed alcohol (aOR=2.37, 95% CI=2.20, 2.56); those who had parity of four or more (aOR=2.06, 95% CI=1.57, 2.72); and those who perceived IPV as a culturally accepted norm (aOR=1.55, 95% CI=1.44, 1.67) had higher odds of experiencing physical violence during pregnancy than those whose partners did not consume alcohol; who had no parity and did not perceive IPV as a culturally accepted norm. On the contrary, women who were in 35–39 maternal age range (aOR=0.46, 95% CI=0.36, 0.58), those who were of the richest wealth index (aOR=0.72, 95% CI=0.61, 0.86), and those in rural areas (aOR=0.85, 95% CI=0.76, 0.95) had reduced odds of experiencing physical violence during pregnancy (table 3, model III).

## DISCUSSION

Using nationally representative data from current DHSs, the study examined the prevalence of physical violence during pregnancy and its associated factors in 26 countries in SSA. Physical violence was identified in 6.0% of pregnant women in SSA. There were differences in prevalence across the countries studied. South Africa had the

highest prevalence (14.0%), while Burkina Faso had the lowest (2.1%). The findings compare and contrast with the findings of previous studies.<sup>37 38</sup> The discrepancies in prevalence between the studies<sup>37 38</sup> and the current study could be attributable to sample size, as the current study used a larger sample size. IPV has been found to be high among women in general in South Africa.<sup>37</sup> The low prevalence physical violence during pregnancy among women in Burkina Faso could be attributed to the societal perception of IPV as a normal practice. It could also be that Burkinabe women might have under-reported their experiences as a result of the sensitive nature of the questions and fear of being stigmatised by the interviewers to whom they are familiar with.

Physical violence during pregnancy was higher among women with at least primary level of education compared with those with no formal education. A finding that contradicts the observation of a previous study.<sup>26</sup> This finding also contradicts the role of education in the elimination and justification of IPV.<sup>39</sup> A possibility for this finding could be that educated women exert increased autonomy and tend to reject some sociocultural expectations (such as being submissive to their partners). Similarly, we found that pregnant women whose partners had at least primary education were more likely to experience physical violence compared with those whose partners were

**Table 3** Mixed-effects analysis of predictors of physical violence during pregnancy in sub-Saharan Africa

Variables	Model 0	Model I Adjusted OR (95% CI)	Model II Adjusted OR (95% CI)	Model III Adjusted OR (95% CI)
Fixed-effect results				
Maternal age (years)				
15–19		Reference category		Reference category
20–24		0.76** (0.62, 0.92)		0.77** (0.63, 0.93)
25–29		0.59*** (0.48, 0.74)		0.61*** (0.49, 0.75)
30–34		0.53*** (0.43, 0.66)		0.55*** (0.44, 0.68)
35–39		0.45*** (0.35, 0.56)		0.46*** (0.36, 0.58)
40–44		0.46*** (0.36, 0.59)		0.47*** (0.37, 0.61)
45–49		0.46*** (0.35, 0.60)		0.47*** (0.36, 0.62)
Maternal educational level				
No education		Reference category		Reference category
Primary		1.28*** (1.17, 1.40)		1.26*** (1.15, 1.38)
Secondary		1.15* (1.01, 1.30)		1.15* (1.01, 1.32)
Higher		0.85 (0.61, 1.19)		0.89 (0.63, 1.27)
Marital status				
Married		Reference category		Reference category
Cohabiting		1.26*** (1.15, 1.37)		1.21*** (1.11, 1.32)
Current working status				
No		Reference category		Reference category
Yes		1.15*** (1.06, 1.25)		1.17*** (1.08, 1.28)
Partner's educational level				
No education		Reference category		Reference category
Primary		1.17** (1.06, 1.29)		1.15** (1.04, 1.28)
Secondary		1.14* (1.02, 1.29)		1.14* (1.01, 1.28)
Higher		0.83 (0.68, 1.01)		0.87 (0.71, 1.06)
Partner's age (years)				
15–24		Reference category		Reference category
25–34		0.97 (0.81, 1.17)		0.99 (0.82, 1.19)
35–44		0.96 (0.79, 1.17)		0.99 (0.81, 1.20)
45+		0.85 (0.68, 1.06)		0.88 (0.71, 1.10)
Partner's alcohol consumption				
No		Reference category		Reference category
Yes		2.41*** (2.24, 2.60)		2.37*** (2.20, 2.56)
Parity				
Zero		Reference category		Reference category
One		0.99 (0.76, 1.30)		0.98 (0.75, 1.28)
Two		1.38* (1.05, 1.81)		1.34* (1.02, 1.77)
Three		1.59** (1.21, 2.10)		1.54** (1.17, 2.04)
Four or more		2.17*** (1.65, 2.86)		2.06*** (1.57, 2.72)
IPV justification				
Not justified		Reference category		Reference category
Justified		1.57*** (1.46, 1.69)		1.55*** (1.44, 1.67)

Continued

Table 3 Continued

Variables	Model 0	Model I Adjusted OR (95% CI)	Model II Adjusted OR (95% CI)	Model III Adjusted OR (95% CI)
Wealth index				
Poorest			Reference category	Reference category
Poorer			1.06 (0.96, 1.17)	1.04 (0.98, 1.20)
Middle			0.88* (0.80, 0.97)	0.93 (0.84, 1.03)
Richer			0.80*** (0.71, 0.91)	0.91 (0.81, 1.03)
Richest			0.54*** (0.45, 0.63)	0.72*** (0.61, 0.86)
Place of residence				
Urban			Reference category	Reference category
Rural			0.86** (0.77, 0.97)	0.85** (0.76, 0.95)
Subregions				
Southern			Reference category	Reference category
Eastern			0.89 (0.67, 1.17)	0.87 (0.65, 1.15)
Central			0.99 (0.75, 1.30)	0.87 (0.65, 1.17)
Western			0.61*** (0.46, 0.81)	0.79 (0.58, 1.06)
Random effects				
Primary sampling unit variance (95% CI)	0.12 (0.10, 0.15)	0.12 (0.09, 0.15)	0.12 (0.10, 0.16)	0.12 (0.09, 0.15)
Intraclass correlation coefficient	0.04	0.03	0.04	0.03
Wald $\chi^2$	Reference	1210.14***	185.01***	1231.92***
Model fitness				
Log-likelihood	-22525.11	-21456.62	-22314.81	-21422.33
Akaike's Information Criterion	45 054.21	42 963.23	44 649.62	42 910.42
Sample size	108 971	108 971	108 971	108 971
Number of clusters	1594	1594	1594	1594
Exponentiated coefficients; 95% CIs in brackets. *P<0.05, **p<0.01, ***p<0.001. IPV, intimate partner violence.				

not educated. Similar findings were found in a previous study.<sup>40</sup> However, the study contradicts the finding of a previous study.<sup>41</sup> A plausible explanation for this finding could be the economic power exerted by educated men, which may predispose them to physically abuse their partners as a form of showing patriarchal power.<sup>41</sup> Therefore, continuous education on the effects of IPV should be provided to both educated men and women to serve as a protective mechanism for IPV.

Akin to the observations of previous studies,<sup>35 40</sup> the odds of experiencing physical violence during pregnancy was higher among cohabiting pregnant women than married women. Women who are cohabiting depend on their male intimate partners for their needs, making them less empowered and more prone to physical and sexual violence.<sup>40</sup> It could also be that there is greater

opportunity for the perpetration of physical violence when living together.

Physical violence during pregnancy was higher among women whose partners consumed alcohol than those whose partners did not consume alcohol. This discovery aligns with earlier research.<sup>35 42 43</sup> This finding could be that the consumption of alcohol might have caused male spouses to neglect their family which may facilitate tensions in their marital or intimate relationships that may subsequently lead to physical, emotional or sexual violence against their spouses.<sup>35 42</sup> Also, alcohol consumption may lead to reduced inhibitions, reduced functioning, and increased depressive symptoms which could increase the possibility of committing violence against pregnant women.<sup>43</sup> Some men also deliberately take alcohol to boost their desire to physically, emotionally, or sexually assault their spouses.<sup>42 43</sup>



Similar to previous studies,<sup>41 42</sup> pregnant women who had parity of four or more were more likely to experience physical violence than those with no births. This finding could be as a result of the additional burden that is placed on the couple amid high socioeconomic hardship and an increase in family size especially in sub-Saharan African countries where limited financial resources are endemic.<sup>41</sup> When this happens, male spouses may be frustrated and assault their female spouses with the slight provocation whether physically, emotionally, or sexually.

Other results showed that pregnant women who justified IPV had higher tendency of experiencing physical violence than those who did not. From a sociocultural perspective, there is an accepted norm where some women believe that when they disrespect their male spouses or in-laws or do not provide their spouses with good food, they are inclined to accept being violence perpetrated against them.<sup>44</sup>

Pregnant women who are in the 35–39 maternal age range were less likely to experience IPV compared with those aged 15–19 years, a finding that corroborates previous studies.<sup>35 45</sup> Generally, older women are more likely to be autonomous than younger women, decreasing their probability of being physically or emotionally assaulted by their male spouses.<sup>35 45</sup> Also, younger women may be more vulnerable and powerless compared with older women, making younger women more likely to be sexually abused.<sup>46</sup>

Corroborating previous studies,<sup>40 47 48</sup> the present study found that pregnant women who are of the richest wealth index were less likely to experience physical violence compared with those of the poorest wealth index. The negative relationship between wealth status of women and IPV experience suggests that women who are rich are more empowered to fight for their rights and that of other females compared with poor women.<sup>40 47</sup>

The odds of experiencing physical violence during pregnancy were lower among women who lived in rural areas. This finding was confirmed by a previous study.<sup>38</sup> Our finding could be attributed to the relatively higher standard of living in urban areas which may trigger male spouses to be violent as a result of the additional economic burden.<sup>38 49</sup> Another possible reason could be associated with the lower awareness of the phenomenon and their socioeconomic standing of rural dwellers, making them relatively receptive to abusive behaviours.<sup>38</sup>

### Strengths and limitations

The study's main strength was the use of nationally representative datasets of 26 countries. The sample size used for the study also makes it possible to generalise the findings to pregnant women in the selected countries. In ensuring the validity and reliability of the findings, rigorous statistical tools were used. Moreover, experienced field assistants were engaged to solicit respondents' opinions using carefully structured

questionnaires, which reflects a higher response rate. However, the study had some limitations. The cross-sectional nature of the study design limits causal inferences. Also, the sensitive nature of the questions might have caused respondents to either under- or over-report their opinions. Since respondents self-reported, the findings might have been influenced by recall or social desirability biases.

### CONCLUSION

A 6.0% prevalence of physical violence during pregnancy was obtained in this study. The study also found country-specific variations in the prevalence of IPV during pregnancy. Predictors of IPV during pregnancy in the selected countries in SSA have also been highlighted. Hence, IPV preventive programmes could focus on those factors. Based on the findings, community leaders are encouraged to liaise with law enforcement agencies to strictly enforce the laws on gender-based violence by prosecuting perpetrators of IPV against pregnant women as a deterrent. Also, intensifying education on what constitutes IPV and the potential consequences on the health of pregnant women, their children and their families would be laudable. Improving the socioeconomic status of women may also help to eliminate IPV perpetration against women during pregnancy.

### Author affiliations

<sup>1</sup>School of Public Health, Faculty of Health, University of Technology Sydney, Sydney, New South Wales, Australia

<sup>2</sup>Department of Family and Community Health, Fred N. Binka School of Public Health, University of Health and Allied Sciences, Hohoe, Ghana

<sup>3</sup>Department of Population and Health, University of Cape Coast, Cape Coast, Ghana

<sup>4</sup>College of Public Health, Medical and Veterinary Sciences, James Cook University, Townsville, Queensland, Australia

<sup>5</sup>Centre for Gender and Advocacy, Takoradi Technical University, Takoradi, Ghana

<sup>6</sup>Department of Health, Physical Education, and Recreation, University of Cape Coast, Cape Coast, Ghana

<sup>7</sup>Neurocognition and Action-Biomechanics-Research Group, Faculty of Psychology and Sport Sciences, Bielefeld University, Bielefeld, Germany

<sup>8</sup>School of International Development and Global Studies, University of Ottawa, Ottawa, Ontario, Canada

<sup>9</sup>The George Institute for Global Health, Imperial College London, London, UK

**Acknowledgements** The authors thank the MEASURE DHS Project for their support and for free access to the original data. The authors are also grateful to Eric Duku of the Department of Geography and Regional Planning, University of Cape Coast, Ghana for helping to produce the spatial map.

**Contributors** BOA, RGA and A-AS contributed to the study design and conceptualisation. BOA, RGA, A-AS and EB performed the analysis. BOA, RGA, A-AS, JBF, JEHJ, EB and SY drafted the manuscript. A-AS had final responsibility to submit for publication. All authors read and amended drafts of the paper and approved the final version. A-AS is the guarantor for the content of the study.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Map disclaimer** The inclusion of any map (including the depiction of any boundaries therein), or of any geographic or locational reference, does not imply the expression of any opinion whatsoever on the part of BMJ concerning the legal status of any country, territory, jurisdiction or area or of its authorities. Any such expression remains solely that of the relevant source and is not endorsed by BMJ. Maps are provided without any warranty of any kind, either express or implied.

**Competing interests** None declared

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not required.

**Ethics approval** There was no need for further ethical approval for this study because we used publicly available secondary data. More information regarding the DHS data usage and ethical guidelines can be found at <http://goo.gl/ny8T6X>. All methods were performed in accordance with the relevant guidelines and regulations.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** All data relevant to the study are included in the article or uploaded as supplemental information. The dataset is freely available via <https://dhsprogram.com/data/available-datasets.cfm>

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iDs

Bright Opoku Ahinkorah <http://orcid.org/0000-0001-7415-895X>

Richard Gyan Aboagyee <http://orcid.org/0000-0002-3498-2909>

Abdul-Aziz Seidu <http://orcid.org/0000-0001-9734-9054>

James Boadu Frimpong <http://orcid.org/0000-0002-9416-1176>

John Elvis Hagan Jr <http://orcid.org/0000-0003-3530-6133>

Sanni Yaya <http://orcid.org/0000-0002-4876-6043>

#### REFERENCES

- Mannell J, Guta A. The ethics of researching intimate partner violence in global health: A case study from global health research. *Glob Public Health* 2018;13:1035–49.
- Hatcher AM, Woollett N, Pallitto CC, *et al*. Bidirectional links between HIV and intimate partner violence in pregnancy: implications for prevention of mother-to-child transmission. *J Int AIDS Soc* 2014;17:19233.
- Martz DM, Jameson JP, Page AD. Psychological health and academic success in rural Appalachian adolescents exposed to physical and sexual interpersonal violence. *Am J Orthopsychiatry* 2016;86:594–601.
- Balogun MO, John-Akinola YO. A qualitative study of intimate partner violence among women in Nigeria. *J Interpers Violence* 2015;30:2410–27.
- Ogum Alangea D, Addo-Lartey AA, Sikweyiya Y, *et al*. Prevalence and risk factors of intimate partner violence among women in four districts of the central region of Ghana: baseline findings from a cluster randomised controlled trial. *PLoS ONE* 2018;13:e0200874. [10.1371/journal.pone.0200874](https://doi.org/10.1371/journal.pone.0200874) Available: <https://doi.org/10.1371/journal.pone.0200874>
- Ilika AL, Okonkwo PI, Adogu P. Intimate partner violence among women of childbearing age in a primary health care centre in Nigeria. *Afr J Reprod Health* 2002;6:53–8.
- Murshid NS, Lemke M, Hussain A, *et al*. Combatting gender-based violence: perspectives from social work, education, interdisciplinary studies, and medical anthropology. In: *Transforming Global Health*. Cham: Springer, 2020: 83–96.
- Violence against women. 2021. Available: <https://www.who.int/news-room/fact-sheets/detail/violence-against-women> [Accessed 24 Jul 2021].
- Brown SJ, Conway LJ, FitzPatrick KM, *et al*. Physical and mental health of women exposed to intimate partner violence in the 10 years after having their first child: an Australian prospective cohort study of first-time mothers. *BMJ Open* 2020;10:e040891.
- Ahinkorah BO. Intimate partner violence against adolescent girls and young women and its association with Miscarriages, stillbirths and induced abortions in sub-Saharan Africa: evidence from demographic and health surveys. *SSM Popul Health* 2021;13:100730:100730..
- Samad N, Das P, Ahinkorah BO, *et al*. Intimate partner violence and pregnancy termination in Armenia: evidence from nationally-representative survey data. *Eur J Investig Health Psychol Educ* 2021;11:294–302.
- Sigalla GN, Mushi D, Meyrowitsch DW, *et al*. Intimate partner violence during pregnancy and its association with Preterm birth and low birth weight in Tanzania: A prospective cohort study. *PLoS One* 2017;12:e0172540.
- Wright EN, Hanlon A, Lozano A, *et al*. The impact of intimate partner violence, depressive symptoms, alcohol dependence, and perceived stress on 30-year cardiovascular disease risk among young adult women: A multiple mediation analysis. *Prev Med* 2019;121:47–54.
- Campbell J, Matoff-Stepp S, Velez ML, *et al*. Pregnancy-associated deaths from Homicide, suicide, and drug overdose: review of research and the intersection with intimate partner violence. *J Womens Health (Larchmt)* 2021;30:236–44.
- Alhusein JL, Ray E, Sharps P, *et al*. Intimate partner violence during pregnancy: maternal and neonatal outcomes. *J Womens Health (Larchmt)* 2015;24:100–6.
- Spencer C, Mallory AB, Cafferky BM, *et al*. Mental health factors and intimate partner violence perpetration and Victimization: A meta-analysis. *Psychology of Violence* 2019;9:1–17.
- Lagdon S, Armour C, Stringer M. Adult experience of mental health outcomes as a result of intimate partner violence Victimization: a systematic review. *Eur J Psychotraumatol* 2014;5:24794.
- Stewart DE, Vigod S, Riazantseva E. New developments in intimate partner violence and management of its mental health sequelae. *Curr Psychiatry Rep* 2016;18:4.
- Tenkorang EY, Asamoah-Boaheng M, Owusu AY. Intimate partner violence (IPV) against HIV-positive women in sub-Saharan Africa: a mixed-method systematic review and meta-analysis. *Trauma, Violence, & Abuse* 2021;22:1104–28.
- Muluñeh MD, Stulz V, Francis L, *et al*. Gender-based violence against women in sub-Saharan Africa: a systematic review and meta-analysis of cross-sectional studies. *Int J Environ Res Public Health* 2020;17:903.
- Alebel A, Kibret GD, Wagnew F, *et al*. Intimate partner violence and associated factors among pregnant women in Ethiopia: a systematic review and meta-analysis. *Reprod Health* 2018;15:196.
- Sano Y, Konkor I, Antabe R, *et al*. Physical intimate partner violence justification and female genital mutilation in Kenya: evidence from the demographic and health survey. *Journal of Aggression, Maltreatment & Trauma* 2021;30:781–91.
- Wado YD, Mutua MK, Mohiddin A, *et al*. Intimate partner violence against adolescents and young women in sub-Saharan Africa: who is most vulnerable? *Reprod Health* 2021;18(Suppl 1):119.
- Ahinkorah BO. Polygyny and intimate partner violence in sub-Saharan Africa: evidence from 16 cross-sectional demographic and health surveys. *SSM Popul Health* 2021;13:100729.
- Izugarra CO, Obiyari MO, Degfie TT, *et al*. Correlates of intimate partner violence among urban women in sub-Saharan Africa. *PLoS One* 2020;15:e0230508.
- Delavar M, Abdollahi F, Abhari F, *et al*. Physical violence against pregnant women by an intimate partner, and adverse pregnancy outcomes in Mazandaran province, Iran. *J Fam Community Med* 2015;22:13.
- UN. Transforming our world: the 2030 agenda for sustainable development. Available: <https://sustainabledevelopment.un.org/post2015/transformingourworld>; 2015
- Corsi DJ, Neuman M, Finlay JE, *et al*. Demographic and health surveys: A profile. *Int J Epidemiol* 2012;41:1602–13.
- Aliaga A, Ruilin R. Cluster optimal sample size for demographic and health surveys. In 7th International Conference on Teaching Statistics–ICOTS; July 2006:2–7
- Pool MS, Otupiri E, Owusu-Dabo E, *et al*. Physical violence during pregnancy and pregnancy outcomes in Ghana. *BMC Pregnancy Childbirth* 2014;14.
- Islam MJ, Mazerolle P, Broidy L, *et al*. Exploring the prevalence and correlates associated with intimate partner violence during pregnancy in Bangladesh. *J Interpers Violence* 2021;36:663–90.
- Jabbi A, Ndow B, Senghore T, *et al*. Prevalence and factors associated with intimate partner violence against women in the Gambia: A population-based analysis. *Women Health* 2020;60:912–28.

- 33 Yaya S, Hudani A, Buh A, *et al.* Prevalence and predictors of intimate partner violence among married women in Egypt. *J Interpers Violence* 2021;36:10686–704.
- 34 Solanke BL. Does exposure to Interparental violence increase women's risk of intimate partner violence? evidence from Nigeria demographic and health survey. *BMC Int Health Hum Rights* 2018;18:1.
- 35 Abramsky T, Watts CH, Garcia-Moreno C, *et al.* What factors are associated with recent intimate partner violence? findings from the WHO multi-country study on women's health and domestic violence. *BMC Public Health* 2011;11.
- 36 von Elm E, Altman DG, Egger M, *et al.* The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies. *Epidemiology* 2007;18:800–4.
- 37 Groves AK, Moodley D, McNaughton-Reyes L, *et al.* Prevalence, rates and correlates of intimate partner violence among South African women during pregnancy and the postpartum period. *Matern Child Health J* 2015;19:487–95.
- 38 Yaya S, Ghose B. Alcohol drinking by husbands/partners is associated with higher intimate partner violence against women in Angola. *Safety* 2019;5:5.
- 39 Dickson KS, Ameyaw EK, Darteh EKM. Understanding the endorsement of wife beating in Ghana: evidence of the 2014 Ghana demographic and health survey. *BMC Womens Health* 2020;20:25.
- 40 Ahinkorah BO, Dickson KS, Seidu AA. Women decision-making capacity and intimate partner violence among women in sub-Saharan Africa. *Arch Public Health* 2018;76:1–10.
- 41 Ezeanochie MC, Olagbuji BN, Ande AB, *et al.* Prevalence and correlates of intimate partner violence against HIV-Seropositive pregnant women in a Nigerian population. *Acta Obstet Gynecol Scand* 2011;90:535–9. 10.1111/j.1600-0412.2011.01083.x Available: <https://doi.org/10.1111/j.1600-0412.2011.01083.x>
- 42 Makayoto LA, Omolo J, Kamweya AM, *et al.* Prevalence and associated factors of intimate partner violence among pregnant women attending Kisumu district hospital, Kenya. *Matern Child Health J* 2013;17:441–7.
- 43 Owusu Adjah ES, Agbemaflle I. Determinants of domestic violence against women in Ghana. *BMC Public Health* 2016;16:1–9.
- 44 Das S, Bapat U, Shah More N, *et al.* Intimate partner violence against women during and after pregnancy: a cross-sectional study in Mumbai slums. *BMC Public Health* 2013;13.
- 45 Stöckl H, Penhale B. Intimate partner violence and its association with physical and mental health symptoms among older women in Germany. *J Interpers Violence* 2015;30:3089–111.
- 46 Felson RB, Cundiff PR. Sexual assault as a crime against young people. *Arch Sex Behav* 2014;43:273–84.
- 47 Chernet AG, Cherie KT. Prevalence of intimate partner violence against women and associated factors in Ethiopia. *BMC Womens Health* 2020;20:22.
- 48 Kwagala B, Wandera SO, Ndugga P, *et al.* Empowerment, partner's Behaviours and intimate partner physical violence among married women in Uganda. *BMC Public Health* 2013;13.
- 49 Paul S. Women's labour force participation and domestic violence: evidence from India. *J. South Asian Dev* 2016;11:224–50.