





Mistreatment of women during childbirth and postpartum depression: secondary analysis of WHO community survey across four countries

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ABSTRACT

Background Postpartum depression (PPD) is a leading cause of disability globally with estimated prevalence of approximately 20% in low-income and middle-income countries. This study aims to determine the prevalence and factors associated with PPD following mistreatment during facility-based childbirth.

Method This secondary analysis used data from the community survey of postpartum women in Ghana, Guinea, Myanmar and Nigeria for the WHO study, 'How women are treated during facility-based childbirth'. PPD was defined using the Patient Health Questionnaire (PHQ-9) tool. Inferential analyses were done using the generalised ordered partial proportional odds model.

Results Of the 2672 women, 39.0% (n=1041) developed PPD. 42.2% and 5.2% of mistreated women developed minimal/mild PPD and moderate/severe PPD, respectively. 43.0% and 50.6% of women who experienced verbal abuse and stigma/discrimination, respectively developed minimal/mild PPD. 46.3% of women who experienced physical abuse developed minimal/mild PPD while 7.6% of women who experienced stigma/discrimination developed moderate/severe PPD. In the adjusted model, women who were physically abused, verbally abused and stigma/discrimination compared with those who were not were more likely to experience any form of PPD ((OR: 1.57 (95% CI 1.19 to 2.06)), (OR: 1.42 (95% CI 1.18 to 1.69)) and (OR: 1.69 (95% CI 1.03 to 2.78))), respectively. Being single and having higher education were associated with reduced odds of experiencing PPD.

Conclusion PPD was significantly prevalent among women who experienced mistreatment during childbirth. Women who were single, and had higher education had lower odds of PPD. Countries should implement women-centred policies and programmes to reduce mistreatment of women and improve women's postnatal experiences.

BACKGROUND

Mistreatment of women during facility-based childbirth represents an important cause of infringement on women's right and dignity.^{1,2}

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Mistreatment of women during facility-based childbirth is a global phenomenon but more common in low-income and middle-income countries.
- ⇒ Most studies on mistreatment of women during childbirth have reported measures related to physical abuse, verbal abuse, neglect, and stigma and discrimination.
- ⇒ There is limited evidence using empirical data to explore relationship between mistreatment during facility-based childbirth and postpartum depression (PPD).

WHAT THIS STUDY ADDS

- ⇒ This study has shown that PPD is common among postpartum women.
- ⇒ Women who experience mistreatment during facility-based childbirth have higher odds of experiencing PPD compared with those who did not experience mistreatment.
- ⇒ Women who were single or have higher education had lower odds of developing PPD.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ The findings from this study suggests that context-specific policies and programmes need to be implemented in the various countries to reduce mistreatment of women and improve women's postnatal experiences.
- ⇒ Pregnant women and postnatal mothers should be supported, educated and empowered to know their health rights to minimise mistreatment during childbirth.
- ⇒ We recommend implementation of awareness campaigns and early screening, detection and treatment of mothers with PPD.

This global public health problem manifests in a variety of forms. These include verbal abuse, physical abuse, stigma and discrimination, poor communication between women and healthcare providers, constraints due to the conditions in the healthcare system,

non-consented care, non-confidential care, non-dignified care, abandoning care due to failure to pay, detention at facilities, forced to use unnecessary medication and lack of informed consent for examinations, treatment and invasive procedures.³⁻⁶

Respectful maternity care is a universal human right for every expectant woman in every setting including postnatal care.^{7,8} Nonetheless, many women experience mistreatment during childbirth in health facilities globally including low/middle-income countries (LMICs).^{5,6,9} A study led by the WHO, reported 42% of 2016 observed women during childbirth and 35% of 2672 women surveyed reported experiencing physical or verbal abuse, stigma or discrimination during childbirth.⁶

Furthermore, mistreatment during childbirth may have both direct and indirect impacts on the health and well-being of the woman and her baby.⁸ Pregnancy and the postpartum period are vulnerable times for maternal mental health; but in low-income nations, many people view symptoms of depression as spiritual or personal issues rather than a medical condition, which requires clinical attention and could be treated.¹⁰ Depression is a common mental health problem during the postpartum period and is associated with numerous medical and psychosocial problems in both the mother and child.¹¹

Depression is a leading cause of disability in women globally with estimated prevalence of approximately 20% in LMICs.¹² Postpartum depression (PPD) is a vital public health issue.¹³ Findings from a systematic qualitative review exploring what women want from postnatal care found that some women experience periods of low mood, depression and loneliness during the postnatal period.¹⁴

Causes of PPD are multifactorial. Negative birth experiences including feeling of abandonment during childbirth, are linked to the occurrence of mental health disorders, including PPD and post-traumatic stress disorder.¹⁵ Studies exploring PPD in Brazil and Russia also reported that mistreatment of women (or disrespect and abuse or negative birth experiences) increase the odds of PPD.^{15,16} Birth experiences such as lack of social support, obstetric difficulties and traumatic childbirth also play a major role in the development of PPD.¹⁶ Smorti and colleagues in 2019, identified high level of PPD among women who experienced induced labour.¹⁷ Weobong *et al* also identified peripartum/postpartum complications, newborn ill-health, stillbirth or neonatal death as determinants of postnatal depression in rural Ghana.¹⁸

In recent years, there have been important advances in documenting the burden of mistreatment of women during maternity care. While there has been an increase in the volume of research reporting prevalence and determinants of mistreatment of women in LMICs, few studies have assessed the consequences of poor care during childbirth on the mental health of women and their newborns in the postnatal period.¹⁵ This study aims to determine the prevalence and factors associated with

PPD following mistreatment during childbirth in some selected public health facilities across four countries.

METHODS

Data collection and recruitment procedure

This secondary analysis is based on the WHO multi-country study: 'How women are treated during facility-based childbirth study'.⁶ The details of the data collection methods and tools have been published elsewhere.^{6,19} In brief, consenting women who were at least 15 years old and had childbirth in 12 public health facilities in Ghana, Guinea, Myanmar and Nigeria were recruited. Women were observed during labour and birth. After discharge, the women were followed up and interviewed between 4 and 8 weeks during community surveys at locations agreeable to them outside the health facility. Each study participant had unique identity number that was used for both the labour observation at the facility and the community survey. The data were collected using digital, tablet-based tools (BLU Studio XL2, Android, BLU Products, Miami, Florida, USA) and uploaded to a central monitoring unit (Openclinica server) at WHO in Geneva.

Study design and participants

The study participants for this analysis were the women who took part in the WHO community survey across the four countries.

Twelve maternity units, in general hospitals (three in each country) were involved in the study. All the hospitals were purposively selected. They were included in the study because they were not included in the formative phase of the study, were at least secondary-level facility, conducted at least 200 deliveries per month, had a well-defined catchment area and were willing to allow non-clinicians to observe women in labour. Data collection started first in Nigeria from 19 September 2016 to 26 February 2017, followed by Ghana from 1 August 2017 to 18 January 2018, in Guinea from 1 July to 30 October 2017 and finally in Myanmar from 26 June to 5 September 2017.

The community-based surveys were conducted with the women within 4–8 weeks post partum. Women were eligible for the community survey if they were admitted for childbirth, were at least 15 years old, were willing and able to participate, lived in the catchment area and provided consent. Women were excluded if they were not admitted for childbirth, had first-degree relative in the hospital, were a staff of the hospital, were distressed or were unable to provide consent. Also excluded were women who lived outside the catchment area or could not provide sufficient contact information. We did not seek consent from providers. We have included an author reflexivity statement detailing how we have leverage on our international collaboration to enhance equitable partnership as online supplemental appendix 1.

Postpartum instrument

The dependent variable for this study is PPD: this was defined based on the Patient Health Questionnaire

(PHQ-9) grade line that was adapted and used.²⁰ PHQ-9 tool is effective for detecting and monitoring the severity of depression.²¹ PHQ-9 is a nine-item questionnaire designed to screen for depression in primary care and other medical settings.²⁰ This depression module scores each of the nine Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) criteria as '0' (not at all), '1' (several days), '2' (more than half the days) and '3' (nearly every day), as answers to these nine items. The individual scores are added to arrive at the total final score which is used to establish depressive disorder diagnoses as well as grade depressive symptom severity. The scale has the interpretation of the scores as '1–4' (minimal depression), '5–9' (mild depression), '10–14' (moderate depression), '15–19' (moderately severe depression) and '20–27' (severe depression).²⁰ In this analysis, the responses are re-classified into three levels: no depression, mild/minimal (mild and minimal) and moderate/severe (moderate, moderately severe and severe).

Exposure

There are three primary exposure variables of interest highlighted in previous research and which are based on respondents report of having experienced the following mistreatment items: physical abuse, verbal abuse and stigma and/or discrimination which were reported across all four study countries. Responses were classified as having been mistreated and categorised as dichotomous (yes or no) and analysed as separate exposure variables against the outcome variable.

Physical abuse included pinching, kicking, slapping, punching, gagging, tying, holding down and fundal pressure. Verbal abuse consisted of shouting, scolding, mocking, negative comments about baby's physical appearance, negative comments on woman's sexual activity, threatened that mother and baby would have poor outcome and staff hissing at the woman. Stigma and/or discrimination included negative comments regarding woman's race, religion, age, marital status, educational level and low economic status.

Statistical analysis

Descriptive and inferential analyses were carried out using complete cases. Initial analyses were done to identify the proportion of women who experienced mistreatment as was reported by the respondents during the follow-up survey. Proportions were obtained for all the categorical variables of interest. For the inferential statistics, we employed the generalised ordered partial proportional odds model due to the ordered number of categories (three) of the predicted variable.

This model is used to quantify the ORs of the predictor on the outcome of interest controlling for identified confounding variables (marital status, maternal age, education, number of pregnancies, number of births, country, mode of delivery and consent for CS in the dataset. The model is specified as follows:

$$P(Y_i > j) = g(X\beta_j) = \frac{\exp(\alpha_j + X_i\beta_j)}{1 + \{\exp(\alpha_j + X_i\beta_j)\}}, \quad j = 1, 2, \dots, M-1 \quad (1)$$

where M represents the number of categories of the ordinal variable, in this case three, that is, minimal, moderate and severe. It can be deduced from equation (1) that the probability that Y will take on each value say, $1, \dots, M$ are equal to

$$P(Y_i = 1) = 1 - g(X_i\beta_1) \quad (2)$$

$$P(Y_i = j) = g(X_i\beta_{j-1}) - g(X_i\beta_j), \quad j = 2, \dots, M-1 \quad (3)$$

$$P(Y_i = M) = g(X_i\beta_{M-1}) \quad (4)$$

Based on these expressions, if $M=2$, the generalised ordered partial proportional odds model is equivalent to the standard logistic regression model.

Equation (1) is similar to a parallel-lines model except that in the parallel-lines (proportional odds) model all β 's are constrained to be the same for all values of j thereby being equivalent to

$$P(Y_i > j) = g(X\beta) = \frac{\exp(\alpha_j + X_i\beta)}{1 + \{\exp(\alpha_j + X_i\beta)\}}, \quad j = 1, 2, \dots, M-1 \quad (5)$$

The key problem with the parallel-lines model which is mostly used is because of its restrictive assumption on the β 's which are likely to be violated due to differences across the values of j 's. These restrictive assumptions are easily overcome with the use of the proposed generalised ordered partial proportional odds model.²²

Variables included in the adjusted model were those that showed significance at $p < 0.2$ (the bivariate level). This model is used to find the statistical association between PPD (no depression, mild/minimal, moderately/severe) and the exposures (physical abuse, verbal abuse, and stigma and/or discrimination) while controlling for confounders. Predictive probabilities were obtained for the three predictors to determine their significance and predictive abilities of the outcome variable of interest (PPD). All analyses were carried out with Stata V.17.

Assessment of the parallel regression assumption

A postestimation approach was adopted using the *oparallel* package in Stata to determine whether the parallel regression assumption of an ordered logit model was violated or not. The test specified were the score, Wolfe-Gould and Brant. In all, the global test statistic for each with their corresponding p values were obtained. All were statistically significant indicating a clear violation of the parallel regression assumptions. Therefore, the generalised ordered partial proportional odds model was specified and used for the analyses.

Patient and public involvement

The design of this study involving four LMICs was the result of a technical consultation meeting that was held at the headquarters of the WHO in November 2013. Among the participants were representatives from other United Nations agencies, academia, research institutions, non-governmental organisations and advocacy groups.

Patients were not directly involved in the design of the study.

RESULTS

Sociodemographic characteristics of study participants

There was a total of 2672 women included in this analysis. Majority (73.9%) of the respondents were predominantly within the age of 20–34 years. Most (91.3%) of the women were either married or cohabiting and most (81.9%) had vaginal birth.

The overall proportion of the study participants who developed PPD was 39.0% (n=1041). About 35.5% (n=949) developed minimal/mild PPD while 3.4% (92) developed moderate/severe PPD. Single mothers suffered PPD most with 111 cases of depression out of 233 (47.6%). Of the 2672 mothers, 51.2% were either illiterates or had primary education with about 36.9% having developed PPD. Mothers who had attained tertiary education status recorded the highest percentage of PPD cases (44.4%). Majority of the mothers who suffered PPD were mothers that had more than three births (40.1%). PPD was higher among mothers who had vaginal birth (39.4%). By comparison majority (48.5%) of mothers that were sampled (n=561) in Nigeria suffered PPD, followed by Guinea (41.8%, n=645). Mothers from Myanmar recorded the least (26.3%) proportion of PPD (table 1).

There were 287 (10.7%) physically abused, 821 (30.7%) verbally abused and 79 (2.9%) experienced stigma or discrimination. Approximately, 35.4% of the total study participants experienced some form of mistreatment during facility-based childbirth. Majority (50.6%) of the mothers who suffered mistreatment developed minimal/mild PPD. Mothers who suffered severe PPD most were those who experienced stigma (7.6%). Of the total women who experience physical abuse (n=149), 51.9% developed PPD, out of this proportion 46.3% developed minimal/mild PPD. Regarding verbal abuse, 5.1% of women who experience it developed moderate/severe PPD. In all 47.4% of women who experienced any form of mistreatment during childbirth developed PPD (n=448) (table 1).

Proportional odds for no against mild/minimal and moderate/severe PPD

All the primary exposures (physical abuse, verbal abuse and stigma) as well as the confounding variables were statistically significant in predicting no depression against mild minimal, moderate and severe PPD at an alpha level of 5% except maternal age, number of births, number of pregnancies and mode of delivery. There was a 52% (OR=1.52, CI 1.18 to 1.96), 57% (OR=1.57, CI 1.32 to 1.87) and 80% (OR=1.80, CI 1.12 to 2.89) statistically significant increase in PPD among respondents who were physically and verbally abused and stigmatised for the second adjusted model with only the three primary exposures of interest. This was slightly increased

to 57% (OR=1.57, CI 1.19 to 2.06), and reduced to 42% (OR=1.42, CI 1.18 to 1.69) and 69% (OR=1.69, CI 1.03 to 2.78) to have any form of PPD against no depression in the overall model. While mothers with tertiary educational status are 32% less likely of being PPD, single mothers have 36% (OR=0.64, CI 0.47 to 0.87) reduced chance PPD. Participants from Myanmar had a 91% increased (OR=1.91, CI 1.49 to 2.45) odds of having PPD compared with Ghana (table 2).

Proportional odds for both no and mild/minimal against moderate/severe PPD

All the primary exposures in the unadjusted model were statistically significant in predicting the combination of no depression and mild/minimal versus moderately/severe PPD at an alpha level of 5% except maternal age, number of births, pregnancies and mode of delivery. For the primary exposure variables, there were 42% (OR=1.42, CI 1.10 to 1.83) and 46% (OR=1.46, CI 1.23 to 1.74) statistically significant increase in the odds of PPD among participants who were physically and verbally abused. This was marginally reduced to 32% (OR=1.32 CI 1.00 to 1.74) and 36% (OR=1.36, CI 1.13 to 1.64) respectively for physical and verbal abuse in the overall adjusted model. There was a 62% (OR=1.62, CI 1.20 to 2.19) statistically significant increase odds of being moderately/severely depressed among participants from Myanmar and a 32% (OR=0.68, CI 0.52 to 0.89) statistically significant decreased chance of moderate/severe PPD among participants from Nigeria when compared with participants from Ghana. Participants who had their babies by spontaneous vaginal delivery were 42% (OR=1.42, CI 1.10 to 1.83) more likely of having moderate/severe PPD (table 3).

Predictive probabilities of the three primary exposure variables

Women who are not physically and verbally abused and stigmatised have a very high predictive probability (62.5%), (64.0%) and (61.9%), respectively of not having PPD. We observed a moderately high predictive probability among participants who answered yes to being physically abused (54.0%), verbally abused (56.1%) and stigmatised (50.4%) but being classified under no PPD. Being physically (42.2%) and verbally (40.2%) abused and stigmatised (45.7%) have a high predictive probability of mild/minimal PPD. We observed a similar statistically significant predictive probabilities among participants who were moderately/severely depressed with regards to being physically abused (3.8%), verbally abused (3.7%) and stigmatised (3.8%) (figures 1–3).

DISCUSSION

We report findings on PPD from a community-based survey among 2672 postpartum women who had facility-based childbirth across four countries. In our findings, 47.4% of the women who experienced mistreatment (physical abuse, verbal abuse, and stigma and discrimination)

Table 1 Sociodemographic, and obstetric characteristics and mistreatment during childbirth among postpartum women who had facility-based childbirth

Variables	Total participants N=2672	PPD (Yes) n=1041 (39.0)	No PPD n=1631 (61.0)	Postpartum depression		χ^2 (p value)
				Minimal/mild n=949 (35.5)	Moderate/severe n=92 (3.4)	
Maternal age						0.258
≤19	287 (10.7)	112 (39.0)	175 (61.0)	95 (33.1)	17 (5.9)	
20–34	1977 (73.9)	769 (38.9)	1208 (61.2)	703 (35.5)	66 (3.3)	
≥35	408 (15.3)	160 (39.2)	248 (60.8)	151 (37.5)	9 (2.2)	
Marital status						0.016
Single	233 (8.7)	111 (47.6)	122 (52.4)	100 (42.9)	11 (4.7)	
Married/cohabitating	2439 (91.3)	930 (39.1)	1509 (61.9)	849 (34.8)	81 (3.3)	
Education						0.002
No/primary education	1368 (51.2)	506 (36.9)	862 (63.0)	449 (32.8)	57 (4.2)	
Secondary/vocational	775 (29.0)	300 (38.7)	475 (61.3)	284 (36.7)	16 (2.1)	
Tertiary education	529 (19.8)	235 (44.4)	294 (55.6)	216 (40.8)	19 (3.6)	
Number of pregnancies						0.839
1	921 (34.5)	348 (37.8)	573 (62.2)	317 (34.4)	31 (3.4)	
2	649 (24.3)	261 (40.2)	388 (59.8)	244 (37.6)	17 (2.6)	
3	443 (16.6)	172 (38.8)	271 (61.2)	155 (34.9)	17 (3.8)	
≥4	653 (24.4)	258 (39.5)	395 (60.5)	231 (35.4)	27 (4.1)	
None/unknown	6 (0.2)	2 (33.3)	4 (66.7)	2 (33.3)	0 (0.0)	
Number of births						0.825
1	1560 (58.4)	610 (39.1)	950 (60.9)	561 (35.9)	49 (3.1)	
2	511 (19.1)	202 (39.5)	309 (60.5)	184 (36.0)	18 (3.5)	
3	278 (10.4)	99 (35.6)	179 (64.4)	89 (32.0)	10 (3.6)	
≥4	317 (11.9)	127 (40.1)	190 (59.9)	112 (35.3)	15 (4.7)	
Unknown	6 (0.2)	3 (50.0)	3 (50.0)	3 (50.0)	0 (0.0)	
Caesarean section						0.055
Consented	418 (15.6)	149 (35.7)	269 (64.4)	139 (33.3)	10 (2.4)	
Not consented	64 (2.4)	21 (32.8)	43 (67.2)	16 (25.0)	5 (7.8)	
Refuse/don't	2190 (81.9)	871 (39.8)	1319 (60.2)	794 (36.3)	77 (3.5)	
Mode of delivery						0.850
Vaginal	2187 (81.9)	862 (39.4)	1325 (60.6)	785 (35.9)	77 (3.5)	
Caesarean section	483 (18.1)	178 (36.9)	305 (63.2)	163 (33.8)	15 (16.3)	
Unknown	2 (0.1)	1 (50.0)	1 (50.0)	1 (50.0)	0 (0.0)	
Country						0.000
GHA	836 (31.3)	334 (39.9)	502 (60.1)	314 (37.6)	20 (2.4)	
GUI	644 (24.1)	269 (41.8)	375 (58.2)	214 (33.2)	55 (8.5)	
MMR	631 (23.6)	166 (26.3)	465 (73.7)	159 (25.2)	7 (1.1)	
NGA	561 (21.0)	272 (48.5)	289 (51.5)	262 (46.7)	10 (1.8)	
Mistreatment (abuse)						
Physical abuse						
No	2385 (89.3)		1493 (62.6)	816(34.2)	76 (3.2)	
Yes	287 (10.7)	149 (51.9)	138 (48.1)	133 (46.3)	16 (5.6)	0.000
Verbal abuse						
No	1851 (69.3)		1205 (65.1)	596 (32.2)	50 (2.7)	

Continued

Table 1 Continued

Variables	Total participants N=2672	PPD (Yes)		Postpartum depression		χ^2 (p value)
		n=1041 (39.0)	No PPD n=1631 (61.0)	Minimal/mild n=949 (35.5)	Moderate/severe n=92 (3.4)	
Yes	821 (30.7)	395 (48.1)	426 (51.9)	353 (43.0)	42 (5.1)	0.000
Stigma and discrimination						
No	2593 (97.0)		1598 (61.6)	909 (35.1)	86 (3.3)	
Yes	79 (2.9)	46 (58.2)	33 (41.8)	40 (50.6)	6 (7.6)	0.001
Overall						
No	1727 (64.6)		1134 (65.7)	550 (31.9)	43 (2.5)	0.000
Yes	945 (35.4)	448 (47.4)	497 (52.6)	399 (42.2)	49 (5.2)	

Total depression score 0 grouped as no depression, total depression score 1–9 grouped as minimal/mild, total depression score 10–27 grouped as moderate/severe.
GHA, Ghana; GUI, Guinea; MMR, Myanmar; NGA, Nigeria; PPD, postpartum depression.

developed PPD. In a recent study conducted in Nigeria, Adeyemo and colleagues reported a high PPD prevalence of nearly 36%.²³ This could be because women experience significant hormonal changes and fluctuations during and after pregnancy leading to mood changes and instability.²⁴ All the primary exposure (physical, verbal, and stigma and discrimination) mistreatment variables included in this analysis as provided in the tables and the predictive (margins plot) analysis, showed significant influence on increasing the odds and probabilities of PPD. This increase is more among postpartum mothers who experience mistreatment during childbirth. This suggests that mistreatment during childbirth increases the risk of PPD occurrence.

There was a positive association between postpartum women who reported that they were physically or verbally abused and the development of moderate/severe PPD relative to those with no PPD and/or those with mild or minimal PPD. Women who were verbally abused during childbirth were almost two times more likely to develop severe symptoms of PPD as was also reported in a survey of the Pelotas birth cohort in 2019.¹⁵ Similarly, physical abuse of women during childbirth positively influences their chance of developing moderate/severe PPD relative to not developing PPD at all or developing mild/minimal PPD (adjusted OR: 1.57; 95% CI 1.19 to 2.06). This aligns with the findings that abused women are significantly more depressed than the non-abused.²⁵ As postulated elsewhere 'disrespect and abuse towards women during childbirth may contribute to the development of postpartum depression'.²⁶ These results affirm their findings that there is a positive association between mistreatment (or institutional violence in obstetric care) and PPD. This may also be a result of women reporting inadequate support due to early discharge and not receiving timely support during childbirth.¹⁴

In terms of women's characteristics, our findings show differences in women's vulnerabilities of self-reporting PPD. Maternal age was not a statistically

significant predictor of PPD, contrary to the results of Smorti and colleagues.¹⁷ The findings of this survey contradicts a study conducted in Nigeria where they found PPD to be common among single than married women.²⁷ They attributed their findings to the conjecture that being single and pregnant is associated with economic hardships and stigmatisation, particularly in traditional African settings.¹⁸ Women who gave birth by spontaneous vaginal birth reported increased odds of PPD. This is contrary to a similar study that intimated that vaginal birth among respondents was observed as natural and normal and so had a less increased risk for PPD.²⁸

Assessing the confounders to developing severe PPD, it was realised that attaining tertiary education significantly decrease the odds of developing moderate/severe PPD compared with no PPD and/or having mild or minimal PPD. It is possible that these women by virtue of their higher educational level are gainfully employed and may command some level of respect among healthcare workers. It is stipulated that working mothers however are especially vulnerable to workplace stressors because of sleep deprivation and inability to engage in health promotion activities because of competing demands from home and work.²⁹

Women in Myanmar had an increased probability of developing any score of PPD, while women who delivered in Nigeria had a decreased probability of developing PPD when compared with their Ghanaian counterparts. This affirms the fact that the prevalence of PPD may be different between populations and its manifestations may vary across cultures.³⁰ These differences imply that a woman's susceptibility to PPD is based on several factors including social, economic, psychological and biological factors.^{31 32} A postnatal experience where women adjust to their new realities of motherhood and parenting in their own cultural context is essential to achieve positive motherhood.¹⁴

Table 2 Determinants of postpartum depression among women who experience mistreatment during childbirth in health facilities

	Unadjusted OR (95% CI)	Adjusted OR (95% CI) – PE	Adjusted OR (95% CI)
No depression vs depression (mild, minimal, moderate and severe)			
Physical abuse			
Yes	1.81 (1.41 to 2.31)***	1.52 (1.18 to 1.96)**	1.57 (1.19 to 2.06)**
No	Ref	Ref	Ref
Verbal abuse			
Yes	1.72 (1.46 to 2.04)***	1.57 (1.32 to 1.87)***	1.42 (1.18 to 1.69)***
No	Ref	Ref	Ref
Stigma and discrimination			
Yes	2.24 (1.42 to 3.53)**	1.80 (1.12 to 2.89)*	1.69 (1.03 to 2.78)*
No	Ref	Ref	Ref
Maternal age (years)			
≤19	1.01 (0.74 to 1.37)	–	1.29 (0.85 to 1.97)
20–24	1.00 (0.77 to 1.30)	–	1.13 (0.81 to 1.56)
25–29	1.06 (0.83 to 1.35)	–	1.26 (0.95 to 1.67)
30–34	0.97 (0.76 to 1.25)	–	1.15 (0.88 to 1.51)
35+	Ref	–	Ref
Marital status			
Single	0.68 (0.52 to 0.89)**	–	0.64 (0.47 to 0.87)**
Married/cohabitating	Ref	–	Ref
Education			
No/primary education	Ref	–	Ref
Secondary education (Ref)	0.93 (0.78 to 1.11)	–	1.02 (0.83 to 1.25)
Tertiary education	0.73 (0.59 to 0.90)**	–	0.68 (0.53 to 0.88)**
Country			
GHA	Ref	–	Ref
GUI	0.93 (0.75 to 1.14)	–	0.83 (0.65 to 1.06)
MMR	1.86 (1.45 to 2.33)***	–	1.91 (1.49 to 2.45)***
NGA	0.71 (0.7 to 0.88)**	–	0.84 (0.66 to 1.08)
Number of pregnancies			
1	Ref	–	Ref
2	0.90 (0.73 to 1.12)	–	0.95 (0.73 to 1.24)
3	0.96 (0.76 to 1.21)	–	0.85 (0.62 to 1.17)
≥4	0.93 (0.76 to 1.14)	–	0.96 (0.69 to 1.34)
Mode of delivery			
Vaginal	0.89 (0.73 to 1.10)	–	1.22 (0.98 to 1.53)
Caesarean	Ref	–	Ref
Number of births			
1	Ref	–	Ref
2	0.98 (0.80 to 1.21)	–	0.99 (0.76 to 1.3)
3	1.16 (0.89 to 1.51)	–	1.26 (0.90 to 1.77)
≥4	0.96 (0.75 to 1.23)	–	0.95 (0.66 to 1.35)

*P value<0.05; **p value<0.01; ***p value<0.001.

GHA, Ghana; GUI, Guinea; MMR, Myanmar; NGA, Nigeria; PE, primary exposure; ref, reference.

Table 3 Determinants of moderate/severe postpartum depression among women who experience mistreatment during childbirth in health facilities

	Unadjusted OR (95% CI)	Adjusted OR (95% CI)—PE	Adjusted OR (95% CI)
No depression and mild/minimal versus moderate/severe depression			
Physical abuse			
Yes	1.66 (1.30 to 2.13)***	1.42 (1.10 to 1.83)**	1.32 (1.00 to 1.74)*
No	Ref	Ref	Ref
Verbal			
Yes	1.59 (1.34 to 1.88)***	1.46 (1.23 to 1.74)***	1.36 (1.13 to 1.64)**
No	Ref	Ref	Ref
Stigma and discrimination			
Yes	1.90 (1.21 to 2.98)**	1.55 (0.98 to 2.46)	1.52 (0.94 to 2.47)
No	Ref	Ref	Ref
Maternal age (years)			
≤19	1.19 (0.86 to 1.63)	–	1.54 (0.96 to 2.45)
20–24	1.09 (0.84 to 1.42)	–	1.11 (0.77 to 1.59)
25–29	1.09 (0.85 to 1.39)	–	1.02 (0.73 to 1.42)
30–34	1.02 (0.79 to 1.31)	–	1.05 (0.78 to 1.42)
35+	Ref	–	Ref
Marital status			
Single	0.71 (0.54 to 0.93)*	–	0.79 (0.57 to 1.09)
Married/cohabitating	Ref	–	Ref
Education			
No/primary education	Ref	–	Ref
Secondary education	0.84 (0.70 to 1.02)	–	0.86 (0.69 to 1.08)
Tertiary education	0.71 (0.58 to 0.87)**	–	1.05 (0.79 to 1.39)
Country			
GHA	Ref	–	Ref
GUI	1.21 (0.97 to 1.49)	–	1.16 (0.89 to 1.51)
MMR	1.79 (1.42 to 2.24)***	–	1.62 (1.20 to 2.19)**
NGA	0.69 (0.55 to 0.85)**	–	0.68 (0.52 to 0.89)**
Number of pregnancies			
1	Ref	–	Ref
2	0.87 (0.71 to 1.07)	–	0.89 (0.68 to 1.18)
3	0.98 (0.77 to 1.24)	–	1.16 (0.81 to 1.63)
≥4	0.96 (0.78 to 1.18)	–	1.25 (0.87 to 1.79)
Mode of delivery			
Vaginal	0.91 (0.74 to 1.12)	–	1.42 (1.11 to 1.83)**
Caesarean	Ref	–	Ref
Number of births			
1	Ref	–	Ref
2	0.99 (0.81 to 1.23)	–	1.02 (0.78 to 1.34)
3	1.19 (0.91 to 1.57)	–	1.08 (0.76 to 1.55)
≥4	1.03 (0.79 to 1.32)	–	1.06 (0.72 to 1.55)

*P value<0.05; **p value<0.01; ***p-value<0.001.

GHA, Ghana; GUI, Guinea; MMR, Myanmar; NGA, Nigeria; PE, primary exposure; ref, reference.

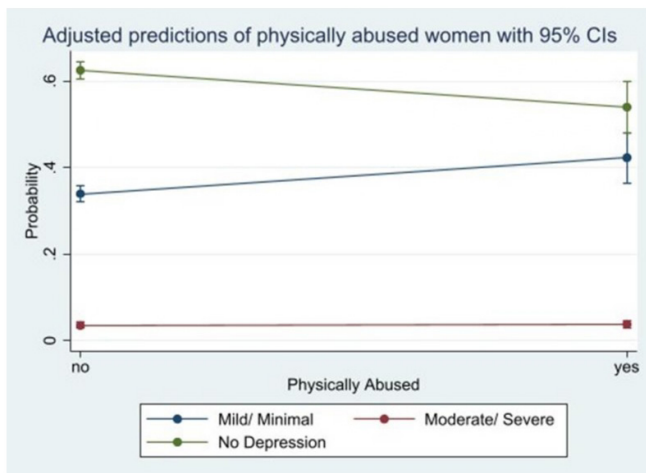


Figure 1 Predictive probability of physical abuse and postpartum depression.

Strengths and limitations

The strengths of this study include it being a multi-country study, large sample size and the use of a standardised tool across multiple countries. The paper highlights important findings related to PPD with relevant clinical and research implications. Although the PHQ-9 tool has been validated in Ghana³³ and Nigeria,³⁴ it has not been validated in Guinea and Myanmar. As a result, the estimates of PPD from Guinea and Myanmar may have to be interpreted with caution.

Implications for future research and practice

While the focus of quantitative measurement studies on mistreatment of women has primarily been conducted during the intrapartum period, qualitative evidence across maternity care has emphasised that women's experiences of care across pregnancy, childbirth and the postnatal period should be a continuum, and not as three distinct and unrelated states.³⁵ Future studies should build on studying the effects of mistreatment during the

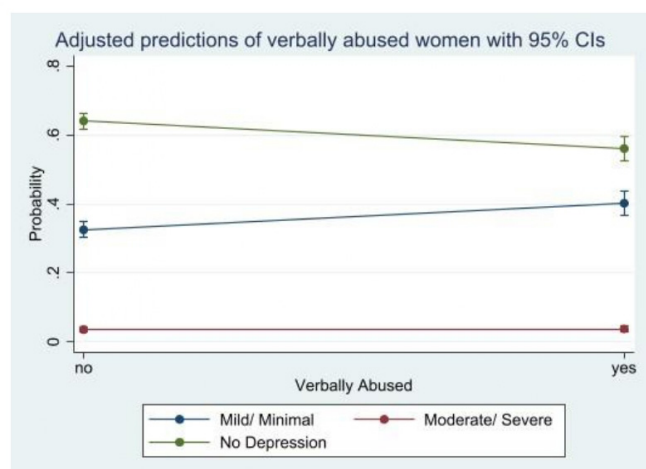


Figure 2 Predictive probability of verbal abuse and postpartum depression.

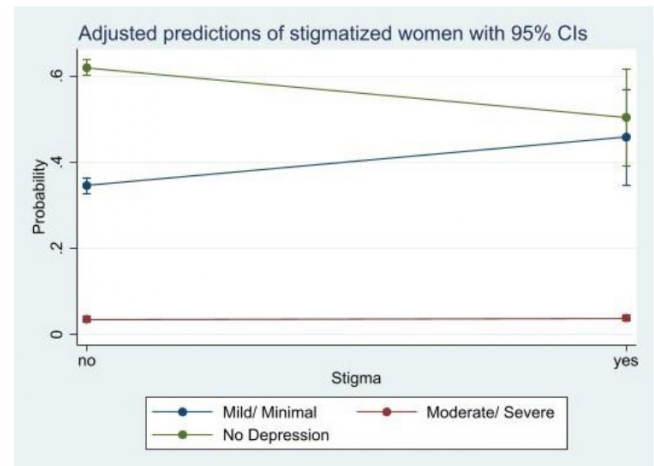


Figure 3 Predictive probability of stigmatisation and postpartum depression.

postnatal period and the health of both mothers and their newborn.

Strategies need to be put in place to educate healthcare providers of the consequences of mistreatment during childbirth. Literature suggests that many forms of disrespect and abuse during childbirth are normalised so they are not considered a problem.¹⁵ Future research on strategies for prevention of mistreatment during childbirth and control and service support should be implemented to reduce the likelihood of PPD, facilitate the early identification of cases so that they receive adequate treatment and support.

Psychosocial and/or psychological interventions during the antenatal and postnatal period are recommended to prevent PPD and anxiety.⁷ Specialised training and support for healthcare providers is an opportunity to improve women's experiences of care in the postnatal period and improve future health-seeking behaviour, especially for first-time mothers. Women want to feel 'cared for' during the postnatal period as they navigate the transition to motherhood and recovery from childbirth. Postnatal contacts provide an opportunity for healthcare providers to facilitate respectful, individualised, person-centred care at every contact including but not limited to screening for PPD, monitor the baby's growth and overall health status, treat childbirth-related complications, counsel women about their family planning options and refer the mother and baby for specialised care if necessary.¹⁴

CONCLUSION

Our study has shown that, beyond the abuse of their human rights, women who are mistreated during facility-based childbirth risk experiencing PPD. Women who were single, and those who have higher education had lower odds of PPD. This calls for women to be treated with respect and dignity during facility-based childbirth.

The findings of this study can be used as evidence in the study countries to inform policies and programmes that

will ensure that all women have positive pregnancy and childbirth experiences, and improved postnatal experiences supported by empowered healthcare providers within well-functioning health systems. It is essential to reformulate the training of health professionals to promote a more humanised view among facility-based childbirth. Awareness campaigns, screening for early detection and treatment among postpartum mothers is also very necessary to reduce any further impact on mother and child.

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Contributors CG, EM, KA-B conceptualised the analysis with contributions from HM and OT. KA-B, EM, CG, AKA, OT, TMM, MDB and TAI conducted training, data collection and management. CG, PAA and HM conducted the data analysis. CG, EM and PAA prepared the first draft of this article. All authors were involved in data interpretation and review of the final manuscript. EM is the guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by WHO Ethical Review Committee, WHO Review Panel on Research Projects and in-country ethics committees. The country-specific ethical review committees that reviewed and approved this project were Le Comité National d'Ethique pour la Recherche en Santé (Guinea); Federal Capital Territory Health Research Ethics Committee

(Nigeria); Research Ethical Review Committee, Oyo State (Nigeria); State Health Research Ethics Committee of Ondo State (Nigeria); Ethics Review Committee of the Ghana Health Service (Ghana); Ethical and Protocol Review Committee of the College of Health Sciences, University of Ghana (Ghana); and Ethics Review Committee, Department of Medical Research (Myanmar). Participants gave informed consent to participate in the study before taking part and institutional permission for recruitment and observation was obtained from each site.

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Appendix 1 – Reflexivity Statement

1. How does this study address local research and policy priorities?

This research study, which was in two phases was designed as a research collaboration to develop and validate study tools for measuring mistreatment of women during facility-based childbirth. Mistreatment of women during childbirth is a global maternal health problem with grave consequences for both women and their newborns. This is a problem in the study countries. With accurate description and measurement of mistreatment, effective interventions could be put in place to prevent and manage it. This will also enhance monitoring the progress of interventions. Again, with standardized tools, appropriate comparisons can be made within and between countries. This study started with Ghana, Nigeria and Myanmar and was later joined by the team from Guinea (CERREGUI). For this analysis and manuscript, the Ghanaian team (CG, EM, KA-B) came up with the concept note with inputs from our WHO partners (HM and OT) based on the local need for research into maternal mental health which has not been given much attention and its association with mistreatment during childbirth.

2. How were local researchers involved in study design?

The overall study was designed with inputs from the whole study group. At the early stages of the project, a meeting was held at the WHO headquarters, Geneva in 2014. The country research teams (KA-B, EM–Ghana, TMM–Myanmar, MDB–Guinea and Prof Bukola Fawole-Nigeria) were involved in the deliberations to choose appropriate study designs based on their local context together with the WHO research team (HM, OT). Prof Bukola Fawole later passed on to glory before the completion of the study and was duly acknowledged by dedicating the primary paper of the second phase of the study to his memory. CG, KA-B and EM were the Ghanaian study site coordinators and conceptualized this analysis with inputs from HM and OT. The Ghanaian team led the analysis and writing of this manuscript on behalf of the whole research team. PAA joined the research team for this analysis and drafting of the initial manuscript based on her research needs as a PhD student at the University of Ghana, School of Public Health.

3. How has funding been used to support the local research team?

At the start of the study, a research capacity building plan was developed by the local research teams and their WHO counterparts, with support from the HRP Alliance for Research Capacity Strengthening. During the project, the WHO research team led by OT

facilitated a two weeks workshop on data analysis with the research teams from Ghana, Guinea and Nigeria (1-Accra, Ghana 2015, with over 20 members) including KA-B, EM, MDB and others not named on this particular paper, 2- Yangon, Myanmar 2015, involving 14 members of the Myanmar research team and other researchers from the Department of Medical Research) and three week-long workshops on scientific writing (1-Conakry, Guinea 2016, 2-Yangon, Myanmar 2016, 3-Melbourne, Australia 2019). Funding was also used to facilitate dissemination workshops in Guinea, where the team led by MDB shared the results and implications from the study with the Ministry of Health, professional associations, WHO-Guinea and other key stakeholders:<https://www.who.int/news/item/15-05-2020-research-leads-to-actions-improving-childbirth-in-guinea>. The study also contributed partly to KA-B and TMM's PhD dissertations. TMM's PhD at Khon Kaen University Thailand was sponsored with a scholarship from the HRP Alliance for Research Capacity Strengthening). KA-B's PhD at Utrecht University, The Netherlands, was funded by the Julius Global Health Support Program (Scholarship), University Medical Center Utrecht in the Netherlands.

4. How are research staff who conducted data collection acknowledged?

This paper is one of 18 papers (7 qualitative from the formative phase, 1 protocol, 1 methodological development, and 9 quantitative from the measurement phase) from our research collaboration. Among these 18 papers, research staff who collected data from all 4 study countries have contributed as co-authors on at least 1 paper. Each country's research team has led at least 4 papers with their teams. In all the papers, research assistants who collected data have been duly acknowledged.

5. Do all members of the research partnership have access to study data?

All members of this research partnership have full access to the data. This is evidenced by the number of published journal articles that have come out from this study with lead authors from all the partner countries including this paper.

6. How was data used to develop analytical skills within the partnership?

The research team has worked together in the data analysis throughout the whole study and the current paper. The data analysis workshops and the scientific writing workshops that took place as part of the research partnership helped to strengthen the analytic and writing skills for the research team. For this paper, the Ghanaian team (CG, PAA, KA-B and EM) led the analysis with support from HM and OT.

7. How have research partners collaborated in interpreting study data?

Throughout the research, all partners have been involved in interpreting the study data during data analysis. In particular, for multi-country papers emanating from our research partnership, discussions are held to understand the issues and develop the implications for each country's research, policy and practice.

8. How were research partners supported to develop writing skills?

The research team writing this paper is made up of all levels (senior, mid, junior) academics and clinicians. KA-B, PAA, AA and HM are currently working on their PhDs, and they are supported by OT and CG. The authors were supported by the WHO research team (HM OT) to develop and refine their writing skills through regular reviewing of the manuscript and providing constructive feedback. The scientific writing workshops also contributed towards developing the writing skills of the researchers.

9. How will research products be shared to address local needs?

All papers arising from this research partnership have been published in open access journals. After the publication too, plans were developed for the dissemination of our findings within WHO and our individual institutions. Significantly, the standardized tools for measuring mistreatment during facility-based childbirth are also freely available to be used by other researchers.

10. How is the leadership, contribution and ownership of this work by LMIC researchers recognised within the authorship?

To ensure fairness in the leadership, contribution, and ownership of the work, a clear data use and authorship guidance were drawn and discussed with research teams from the study countries and WHO. Among the Ghanaian authors who led this work CG, PAA and KA-B are the first, second and third authors respectively. EM is the last and also the corresponding author. In addition, 9 out of the 11 authors are researchers from the study countries (Ghana, Guinea, Myanmar, Nigeria).

11. How have early career researchers across the partnership been included within the authorship team?

The study teams include early career researchers and clinician researchers (CG, PAA, KAB, HM, OA, TAI, TMM, EM) within the authorship team. They contributed to the data collection, analysis plan, analysis, and writing. It is worth mentioning that, only 1 out of the 8 early career researchers is based in a high-income country. The remaining are based in low-income countries (Ghana, Guinea, Myanmar, Nigeria).

12. How has gender balance been addressed within the authorship?

Gender balance has always been considered within the authorship. Four of the authors are females (PAA, HM, TAI, OT) and seven are males (CG, KA-B, AA, MDB, OA, TMM, EM).

13. How has the project contributed to training of LMIC researchers?

The overall study has also contributed to KA-B and TMM's PhD dissertations. TMM's PhD was made possible through a scholarship from the HRP Alliance for Research Capacity Strengthening). PAA, a PhD student, used the analysis and the initial drafting of the manuscript to improve on her research skills. The data analysis and writing workshops which were carried out as part of this research project also contributed to addressing the research training needs of the study countries.

14. How has the project contributed to improvements in local infrastructure?

This project has not directly contributed to improvements in local infrastructure. However, tablets that were procured for the study countries, have been used for other studies after this collaborative research.

15. What safeguarding procedures were used to protect local study participants and researchers?

The current study was adapted based on local context to safeguard the safety of our research team and study participants. For instance, in Myanmar labour observations were not made because it was considered inappropriate or unsafe to observe labour in the wards of public hospitals. We used all female data collectors due to the sensitive nature of the study. Again, the research team had a study site obstetrician and a senior midwife who were at hand to handle any issues arising. For instance, if a research assistant observes that a woman in labour (including those who are not study participants) is being abuse excessively, she will inform the obstetrician or senior midwife for immediate redress. Finally, there was regular debriefing and reflexive discussions between data collectors, country study teams and our partners from WHO which helped to address any teething issues during data

collection. This process of reflection during data collection is very important to any research involving sensitive topics or violence to ensure the safety of both study participants and research teams.