

Intimate partner violence during pregnancy and preterm birth among mothers who gave birth in public hospitals, Amhara Region, Ethiopia: A case-control study

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Abstract

Background: Preterm birth (PTB) is an important and under-reported public health problem in developing nations such as Ethiopia. Limited research has been conducted to date to address the effect of intimate partner violence (IPV) during pregnancy on PTB. This study was conducted to assess the association between IPV during pregnancy and PTB.

Methods: A case control study was conducted on 138 cases and 276 controls in four randomly selected public hospitals from February to April 2018. Mothers who gave birth before 37 completed weeks of gestation were included as cases, and mothers who gave birth at 37 and above completed weeks of gestation were deemed as controls. A simple random sampling technique was employed to select the two consecutive controls. Bivariate and multivariate logistic regression analyses were done.

Results: In this study, the prevalence of any IPV during pregnancy was 44.8% among cases and 25% among controls. Any IPV during pregnancy was significantly associated with PTB [AOR = 2.85; 95% CI: 1.42-6.22]. In addition, women who were exposed to emotional violence during the recent pregnancy were three times more likely to have a PTB compared to those who were not violated [AOR = 3.05; 95% CI: 1.35-6.91]. Similarly, women who experienced physical IPV during pregnancy were 2.6 times [AOR = 2.56; 95% CI: 1.27-6.78] more at risk of PTB compared to those who had no physical IPV.

Conclusion: This study found that IPV during pregnancy is significantly associated with PTB. Hence, IPV screening needs to be integrated into routine antenatal care (ANC) services. [*Ethiop. J. Health Dev.* 2020; 34(1):44-53]

Key words: Intimate partner violence, pregnancy, preterm birth, Ethiopia

Background

Worldwide, prematurity remains the leading cause of neonatal and under-five mortality. Annually, more than 1.1 million deaths occur due to prematurity and more than 60% of these deaths occur in Africa and South Asia (1-4). The World Health Organization (WHO) defines preterm birth as “a birth of new born, which has happened before 37 weeks of gestational age” (5, 6). The prevalence of PTB varies across the globe, with more than 15 million babies being born before 37 weeks of gestation each year. Of these, more than 80% happen between 32 to 37 weeks of gestation and 85% are found to be concentrated in Africa and South Asia (1, 7, 8). In Ethiopia, the prevalence of PTB ranges from 4.4% to 25.6% (9-14); more specifically, its prevalence ranges from 4.4% to 14.3% in Amhara Region (9, 11).

In Ethiopia, prematurity is the leading cause of neonatal mortality and the fourth leading cause of under-five mortality. Consequently, Ethiopia ranks as one of the top 15 PTB high-burden countries in the world (2, 15, 16).

Intimate partner violence (IPV) is a public health problem, defined by the WHO as “a physical, sexual, or psychological coercive act by a current or former partner or spouse to a woman” (17). The global prevalence of any IPV among all ever-partnered women is 30%. Of these, more than 37% of violence happens in African, Eastern Mediterranean and South-East Asia regions (18, 19). In Ethiopia, the prevalence

of IPV among ever-married women ranges from 9.4% to 78%, with the highest IPV reported in Amhara Region, which is estimated to be anywhere from 35% to 78% (20, 21).

In the past few decades, several policies, strategies and programs at global, regional and national levels have attempted to prevent and improve the care given for PTBs (22-25). These include antenatal corticosteroid injections, antibiotics, kangaroo mother care, admission to immediate intensive care units, and long-term complex health services for PTB. Moreover, the global community has made a commitment through the Sustainable Development Goals (SDGs) and ‘Every Woman Every Child’ initiatives (26-28). However, PTB is still a public health problem of developing nations such as Ethiopia.

Studies conducted across the globe have identified different factors associated with PTB. These factors include: low socio-economic status, infections, hypertension during pregnancy, substance use during pregnancy, cervical incompetence, diabetes mellitus, and any violence during pregnancy (29-33). However, studies conducted across the globe differ on the association between IPV and PTB. Some studies reveal significant association between IPV and PTB (29, 30, 32, 33) while others find no significant association between the two variables (34-37). In Ethiopia, there is scant information about the issue. Therefore, this study aimed to investigate the effects of IPV during pregnancy on PTB in Amhara Region.

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Methods

Study setting and study participants: An unmatched case control study design was employed to assess the association between IPV during pregnancy and PTB. The study was conducted from 01 February to 02 April 2018 at four randomly selected referral and district hospitals (namely, Debre Birhan, Dessie, and Bahir Dar Felege Hiwot and Woldia hospitals) located in Amhara Regional State, Ethiopia.

The cases and controls were determined based on gestational age, measured based on either last menstrual period, ultrasound or Ballard maturity examination.

Mothers who gave live singleton births between 28 and 37 weeks of gestation in the selected hospitals were included as cases; those mothers who delivered live singleton births at 37 and above weeks of gestation were considered as controls. However, mothers with induced termination of pregnancy for indicated medical reasons, and those mothers who were seriously ill during the study period, were excluded from the study.

The sample size was calculated using Epi Info version 7.2.0.1 software by using a double population proportions formula and employing the following assumptions: proportion of exposure to any IPV during pregnancy and given term babies (controls) as 34.6%, odds ratio = 1.91 (32), 80% power, 95% confidence interval ($Z_{\alpha/2}=1.96$), ratio = 1:2, with a 10% non-response rate. Finally, the calculated sample size was 138 cases and 276 controls.

The cases were proportionally allocated to the randomly selected hospitals based on the average preterm case flows they had in the previous year. Eight trained midwifery data collectors and four supervisors were assigned to the study hospitals. The cases were recruited consecutively until the required sample size was met. Subsequently, two consecutive controls were randomly selected for each eligible case among those women who gave birth on the same day as the selected cases. The same data collector interviewed both the cases and the controls in a separate room near the labor ward to ensure privacy. The participants were interviewed within four to six hours of giving birth.

Data collection and procedures: The IPV questionnaire was adopted and modified from the Ethiopian Demographic and Health Survey (21) and the WHO 2005 Multi-Country study to assess women's health and violence against women (18). The questionnaire consisted of sociodemographic characteristics, medical problems, substance use and experiences of IPV during the index pregnancy.

The questionnaire included 13 IPV-related questions to assess the experience of the three constructs of IPV (six physical, four emotional and three sexual) to determine the exposure to IPV over the nine months of each mother's most recent pregnancy. Finally, participants were classified as: never, physical abuse only, emotional abuse only, sexual abuse only, any abuse (physical or sexual or emotional abuse), and all forms of IPV (physical, sexual and emotional abuse).

The data were collected by face-to-face interviews using a standard, structured and pretested questionnaire. The questionnaire was translated into the local language (Amharic) and then translated back to English language to maintain consistency. The pretest was done on a 5% sample (seven cases and 14 controls) of women who had given birth at non-selected hospitals in the same region. A three-day training program was provided for data collectors and their supervisors.

The trained midwives and/or nurses who were working in labor wards conducted the interviews and other vital measurements.

Study variables: *Preterm birth:* "a birth of new born that occurred between 28 and 37 weeks of gestational age" (5, 6).

Emotional IPV: mothers who experienced any of the following abusive acts: being insulted by their husband/boyfriend in the form of abusive language that made them feel bad; being insulted in front of others; being scared or intimidated on purpose; being threatened directly, or through a threat to someone the respondent cares about by their husband/boyfriend during the index pregnancy (18).

Physical IPV: mothers who experienced any of the following: being slapped or having had something thrown at them that could hurt them; being pushed or shoved; being hit with a fist or something else that could hurt; being kicked, dragged, choked or burnt on purpose; being threatened with or actually having, a gun, a knife, or another weapon used on them by a current husband/boyfriend during the index pregnancy (18).

Sexual IPV: mothers who experienced any of the following: being physically forced to have sexual intercourse when they did not consent to; having had sexual intercourse because they were afraid of what their partner might do; being forced to do something sexual that they found humiliating or degrading to them by a husband/boyfriend during the index pregnancy (18).

Any IPV: women who experienced at least one of the three constructs of IPV (i.e. physical, sexual or emotional violence) during pregnancy were classified as having "ever" experienced any IPV during the index pregnancy.

Data processing and analysis: After checking for its completeness, the data was entered and cleaned using EpiData version 3.1 software and exported into SPSS version 20.0 for analysis. Before carrying out the analysis, the nature of the variables was assessed using frequency tables. Moreover, normality assumption was checked for continuous independent variables.

Bivariate logistic regression analysis was done to evaluate the association between PTB and any IPV during pregnancy. Each construct of IPV (physical

violence, psychological violence and sexual violence) and other pregnancy-related factors was assessed separately. Variables with a p-value of <0.25 in the bivariate logistic regression were entered into the multivariate logistic regression analysis model. The data was checked using the Hosmer–Lemeshow goodness of fit test. Furthermore, correlation between selected independent variables, such as domains of IPV (physical, sexual and emotional IPV), substance use during pregnancy and IPV, was checked for the existence of perfect correlation.

Multivariate logistic regression analysis was performed using the stepwise method to control any interaction between the three domains and to specifically see the effect of each type of violence on PTB after controlling for potential confounders. The multivariable logistic regression analysis model was conducted for two separate models. The first model was done for any IPV during pregnancy and PTB adjusted for selected confounders. The second model was done by removing any IPV during pregnancy from the model and entering the three domains of IPV (i.e. physical IPV, sexual IPV and emotional IPV) together to see the existence of any statistically significant association between any of the three constructs of IPV and PTB, adjusted for covariates. Finally, the level of statistical significance was declared at a p-value of <0.05.

Ethical issues and consent to participate

Ethical approval was obtained from the Institutional Research and Ethics Review Board of the School of Public Health, Addis Ababa University under project number SPH/038/2017.

All participants, including 15-year-old females, were asked for informed verbal consent before participating in the study. They were provided with adequate

information on the purpose, objectives, procedures, potential risks and benefits of the study; they were also assured of strict confidentiality with regard to any information obtained from them. There was no denial of health services for refusing to participate in the study. There was immediate linkage to the psychiatric clinic for those in need of counseling following interviews. Each participant was assured that they had the right to refuse to answer questions, ask for clarification about questions, and to discontinue the interview at any time. The confidentiality and privacy of the data was maintained, since no personal identifiers were used.

Results

In this study, a total of 134 cases and 268 controls were included with a response rate of 97.1%. The mean age in both cases and controls was 27.12, with a standard deviation of 5.25. More than half (60.4%) of cases reside in rural areas, with 31.7% of the controls living in rural areas. A comparison for the highest completed level of education revealed that a higher proportion of cases (44.8%) had not attended any formal education compared to controls (17.9%).

A higher proportion cases (33.8%) had short birth intervals compared to controls (17.8%). However, only 9% of cases and 2.2% of controls mentioned they had no ANC in the current pregnancy. More than a quarter (27.6%) of cases had a history of exposure to previous adverse birth outcomes (e.g. PTB, low birth weight, stillbirth and abortion) compared to controls (13.8%). Mothers who had PTBs had used more substances (e.g. alcohol, cigarettes, hashish, khat, Intravenous drugs) during pregnancy compared to their counterparts (65.7% of cases and 56.3% of controls) who had not used substances (see Table 1).

Table 1: Sociodemographic characteristics, obstetric conditions and substance use of mothers who gave birth in government hospitals of Amhara Region, Ethiopia, 2018

Predictor variables	Cases	Controls
	N (%)	N (%)
Age (in completed years)		
15-24	38 (28.4)	81 (30.2)
25-34	78 (58.2)	162 (60.4)
≥35	18 (13.4)	25 (9.3)
Residence		
Urban	53 (39.6)	183 (68.3)
Rural	81 (60.4)	85 (31.7)
Education level of mother		
Illiterate	60 (44.8)	48 (17.9)
Primary	35 (26.1)	106 (39.6)
Secondary	21 (15.7)	66 (24.6)
Tertiary	18 (13.4)	48 (17.9)
Main occupation of mother		
Housewife	72 (53.7)	135 (50.4)
Government employee	24 (17.9)	45 (16.8)
Merchant	14 (10.4)	27 (10.1)
Others ⁺	24 (17.9)	61 (22.8)
Nutritional status of mother (MUAC)		
SAM	7 (5.2)	3 (1.1)
Moderate	12 (9.0)	34 (12.7)
Normal (≥ 23 cm)	115 (85.8)	231 (86.2)
Birth interval for this pregnancy (n=206)		
< 2 years	26 (33.8)	23 (17.8)
≥ 2 years	51 (66.2)	106 (82.2)
ANC follow-up		
Yes	122 (91.0)	262 (97.8)
No	12 (9.0)	6 (2.2)
Previous adverse birth outcomes		
Yes	37 (27.6)	37 (13.8)
No	97 (72.4)	231 (86.2)
Medical problems during this pregnancy (HIV, HTN, DM, PROM, UTI)		
Yes	52 (38.8)	21 (7.8)
No	82 (61.2)	247 (92.2)
Substance use during pregnancy (alcohol, khat, cigarettes, hashish, IV drug use)		
Yes	88 (65.7)	151 (56.3)
No	46 (34.3)	117 (43.7)

Key: Others⁺ = (student, daily laborer, self-employed, NGO employee), MUAC- Mid Upper Arm Circumference, SAM- Severe Acute Malnutrition, HTN- Hypertension; DM = Diabetes Mellitus; PROM = Premature Rupture of Membrane; UTI = Urinary Tract Infection

Intimate partner violence during pregnancy:

The experience of any IPV during pregnancy was higher among the cases compared to those of the controls (44.8% and 25.0%, respectively). In addition,

a higher proportion of cases had experienced all forms of IPV compared to the controls (12.7% and 4.1%, respectively) (see Table 2).

Table 2: Experience of intimate partner violence during pregnancy among mothers who gave birth in government hospitals, Amhara Region, Ethiopia, 2018

Predictor variables		Cases	Controls
		N (%)	N (%)
Emotional IPV	Yes	44 (32.8)	36 (13.4)
	No	90 (67.2)	232 (86.6)
Physical IPV	Yes	23 (17.2)	20 (7.5)
	No	111 (82.8)	248 (92.5)
Sexual IPV	Yes	33 (24.6)	41 (15.3)
	No	101 (75.4)	227 (84.7)
Any IPV during pregnancy	Yes	60 (44.8)	66 (25.0)
	No	74 (55.2)	201 (75.0)
All forms of IPV	Yes	17 (12.7)	11 (4.1)
	No	117 (87.3)	257 (95.9)

The association between IPV during pregnancy and preterm birth: Adjustment was made for maternal residence, education level, maternal age, ANC visits for the current birth, previous history of adverse birth outcomes, current maternal and husband substance use (e.g. alcohol, cigarettes, hashish, khat, intravenous drugs) during pregnancy.

After adjusting for the selected covariates, women who had experienced any IPV during pregnancy had three times higher odds of PTB compared to those who did not experience any IPV during pregnancy [AOR = 2.85; 95% CI: 1.42-6.22]. The likelihood of PTB among women who were exposed to emotional IPV was three times higher compared to those who had not experienced any emotional IPV [AOR = 3.05; 95% CI:

1.35-6.91]. Similarly, women who experienced physical IPV during pregnancy were 2.5 times more likely to have a PTB compared to those had not experienced physical IPV [AOR = 2.56; 95% CI: 1.27-6.78]. Furthermore, living in rural areas [AOR = 2.86; 95% CI: 1.27-6.42], having no education [AOR = 3.82; 95% CI: 1.20-13.46], having a history of previous adverse birth outcomes (e.g. stillbirth, PTB, low birth weight and abortion) prior to the current birth [AOR = 2.59; 95% CI: 1.27-5.32], having medical problems during this index pregnancy [AOR = 9.98; 95% CI: 3.94-25.29] were the independent predictors of PTB. However, the association between sexual IPV and PTB was refuted, after adjusting for the covariates [AOR = 0.39; 95% CI: 0.09-1.67] (see Table 3).

Table 3. The association between any IPV during pregnancy and preterm births among mothers who gave birth at four public hospitals, Amhara Region, Ethiopia, 2018

Predictor variables		Birth outcomes		COR (95% CI)	AOR (95% CI)
		Preterm N (%)	Term N (%)		
Any IPV during pregnancy* (Model 1)	Yes	60 (44.8)	66 (25.0)	2.47 (1.59, 3.85) ^a	2.85 (1.42-6.22) ^b
	No	74 (55.2)	201 (75.0)	1.00	1.00
Residence	Urban	53 (39.6)	183 (68.3)	1.00	1.00
	Rural	81 (60.4)	85 (31.7)	3.29 (2.14, 5.06) ^a	2.86 (1.27, 6.42) ^b
Age in years	15-24	38 (28.4)	81 (30.2)	0.65 (0.32, 1.34)	
	25-34	78 (58.2)	162 (60.4)	0.67 (0.34, 1.30)	
	35 and above	18 (13.4)	25 (9.3)	1.00	
Completed educational level	Illiterate	60 (44.8)	48 (17.9)	3.33 (1.72, 6.46) ^a	3.82 (1.20, 13.46) ^b
	Primary school	35 (26.1)	106 (39.6)	0.88 (0.45, 1.71)	1.55 (0.44, 5.56)
	Secondary school	21 (15.7)	66 (24.6)	0.85 (0.41, 1.76)	1.52 (0.41, 5.74)
	Tertiary school	18 (13.4)	48 (17.9)	1.00	1.00
Birth interval	< 2 years	26 (33.8)	23 (17.8)	2.35 (1.22, 4.51)	
	≥ 2 years	51 (66.2)	106 (82.2)	1.00	
ANC follow-up	Yes	122 (91.0)	262 (97.8)	1.00	
	No	12 (9.0)	6 (2.2)	4.29 (1.57, 11.71)	
Previous adverse birth outcome (abortion, PTB, LBW, still birth)	Yes	37 (27.6)	37 (13.8)	2.38 (1.43, 3.98) ^a	2.59 (1.27, 5.32) ^b
	No	97 (72.4)	231 (86.2)	1.00	1.00
Substance use during pregnancy	Yes	88 (65.7)	151 (56.3)	1.48 (0.96, 2.28)	
	No	46 (34.3)	117(43.7)	1.00	
Medical problems during pregnancy (DM, UTI, PROM...)	Yes	52 (38.8)	21 (7.8)	7.46 (4.24, 13.12) ^a	9.98 (3.94, 25.29) ^b
	No	82 (61.2)	247 (92.2)	1.00	1.00
Emotional IPV** (Model 2)	Yes	44 (32.8)	36 (13.4)	3.15 (1.91, 5.21) ^a	3.05 (1.35, 6.91) ^b
	No	90 (67.2)	232 (86.6)	1.00	1.00
Physical IPV*** (Model 3)	Yes	23 (17.2)	20 (7.5)	2.56 (1.35, 4.87) ^a	2.51 (1.27, 6.78) ^b
	No	111 (82.8)	248 (92.5)	1.00	1.00

Key: AOR = adjusted odds ratio; COR = crude odds ratio; CI = confidence interval; a = $p < 0.05$ in the bivariate model, b = $p < 0.05$, in the final model (backward elimination method); DM = diabetes mellitus; UTI = urinary tract infection; PROM = premature rupture of membrane; PTB = preterm birth; LBW = low birth weight

***Model 1:** the association between any IPV during pregnancy and preterm birth adjusted for maternal sociodemographic characteristics, substance use, obstetric factors, medical problems during pregnancy in the absence of the three constructs IPV.

****Model 2:** the association between emotional IPV during pregnancy and preterm birth adjusted for maternal sociodemographic, substance use, obstetric factors, medical problems during pregnancy in the absence of physical IPV and any IPV.

*****Model 3:** the association between physical IPV during pregnancy and PTB in the absence of any IPV and emotional IPV but adjusted for other covariates.

Discussion

In this study, the prevalence of any IPV during pregnancy was 20% higher among cases compared to the controls. This finding is similar to the findings of a study conducted in Peru (32), a review and meta-analysis of 50 studies (19), a study conducted in Columbia (31), and a study carried out in Vietnam (38). The current study reveals a statistically significant association between IPV during pregnancy and PTB.

Other studies suggest that exposure to violence during pregnancy has an effect on premature delivery in the form of physical trauma and/or early secretion of placental corticotrophin-releasing hormone (CRH) due to stress, which leads to the premature onset of labor (39-42). However, under stress-free situations, placental CRH is secreted in the late half of pregnancy, which determines the timing of parturition and delivery (42). Similarly, in this study, the odds of PTB among women who had experienced IPV during pregnancy was three times higher compared to those who never experienced any IPV during pregnancy. This finding is similar to the finding of a review and meta-analysis of 50 studies, which revealed that IPV was significantly associated with PTB (19). Similarly, a study conducted among Columbian women to assess the effect of IPV on PTB (31) and a study done in Virginia (43) also support this finding of the current study.

Emotional violence during pregnancy has been found to have a direct effect on the hypothalamus-pituitary and adrenal (HPA) axis, which elevates levels of CRH and Adrenocorticotrophic hormone (ACTH) (44-47), which increases the premature production of cortisol and estrogen and has a direct impact on the premature activation of labor. This study reveals that women who experienced emotional IPV during pregnancy were at three times higher risk of PTB compared to those women did not experience any emotional IPV. The result is consistent with a study conducted in Peru (32), a review and meta-analysis of 50 studies (19), and a study conducted in Columbia (31). In contrast, this finding does not concur with studies conducted in Tanzania (33) and in Iran (34). This discrepancy might be due to the different measurement scales used in the studies. In the current study, we used the WHO multi-country study assessment tool, while the studies conducted in Tanzania and Iran used their national survey violence assessment tools. In addition, sociocultural variations across the study settings could also explain the variation.

It has been suggested that exposure to physical violence during pregnancy has an effect on premature birth in the form of physical trauma upon the abdomen, uterus and post-trauma-induced stress that leads to premature onset of labor (39-41). Similarly, in this study, women who had experienced physical IPV during pregnancy had a 2.5 times greater likelihood of

PTB compared to those who had not experienced any form of physical IPV. The finding is similar to studies conducted in Tanzania (30), in Peru (32), and in Vietnam (38). Conversely, a survey conducted among Canadian women (37) and a study conducted in Brazil (48) concluded that there is no association between physical IPV and PTB. This variation could be explained by differences in the study designs and measurement tools, and by the small sample size used in the present study compared to the other two studies.

However, in this study, there is no statistically significant association between the experience of sexual IPV during pregnancy and PTB. This finding is similar to a study conducted in Tanzania (30). Conversely, the result is not consistent with an epidemiologic review conducted on six studies (49) and a cohort study conducted in Washington D.C. (50), which revealed that in terms of having a PTB, there was no difference between women who had a history of sexual violence and those who had no such history. This inconsistency might be because the issue is highly sensitive, which might lead to compromised self-responses in developing nations such as Ethiopia, compared to women in developed nations.

Limitations of the study

First, this study may have been prone to information bias, despite our best efforts to minimize bias by using standard tools, extensively training the data collectors, and using the same interviewer to conduct interviews with both cases and controls. Second, this study presents the content of very personal and sensitive behavior, in particular sexual violence and substance use. Such topics may be difficult for mothers to discuss in face-to face interviews. Accordingly, this may have had an impact on the findings.

Conclusions

In conclusion, the prevalence of any IPV during pregnancy was nearly double among cases compared to controls. This study revealed a significant association between any IPV during pregnancy and PTB. Similarly, emotional IPV and physical IPV during pregnancy were the independent predictors of PTB.

Preventive and control programs and strategies to protect women from violence during pregnancy and non-pregnancy periods should be developed at all governmental levels. For instance, during ANC, the integration of a screening tool to identify victims of violence and associated guidelines and pathways of care could better serve these mothers and help reduce PTB. Finally, longitudinal and qualitative studies are recommended to explore more evidence.

List of abbreviations

ACTH	Adrenocorticotrophic Hormone
ANC	Antenatal Care

AOR	Adjusted Odds Ratio
CRH	Corticotrophin Releasing Hormone
CI	Confidence Interval
COR	Crude Odds Ratio
CSA	Central Statistical Agency
FMoH	Federal Ministry of Health
IPV	Intimate partner violence
LBW	Low Birth Weight
PROM	Premature Rupture of Membrane
PTB	Preterm birth
SDGs	Sustainable Development Goals
WHO	World Health Organization

Availability of data and materials

All materials and data related to this article are included in the article. Besides, the data and materials are available on request from the main author.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

All authors conceived and designed the study. AW, GB and ND supervised the data collection. AW, ND, SM and AW performed the data analysis, interpretation of data and drafted the manuscript. AW, GB, ND and AW were actively involved in data interpretation and critically reviewed the manuscript. All authors read and approved the final manuscript.

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