Social Science Spectrum ISSN 2454-2806
Vol. 12, No. 3, September 2026, pp. 105-129

Physical Intimate Partner Violence during Pregnancy in India: A Multilevel Analysis of Socioeconomic Disparities and Modifiable Risk Factors Using NFHS-5 Data

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Abstract

Physical intimate partner violence (IPV) during pregnancy remains an under-examined public health concern in India, where existing evidence documents wide sociodemographic and geographic variation but has not disentangled the independent contribution of individual, household, partner-related, empowerment, and community-level factors operating simultaneously. Guided by Heise's integrated ecological framework, this study examined the prevalence, trends, and multilevel determinants of physical IPV during pregnancy in India. Using data from the National Family Health Survey (NFHS-5, 2019-21) and NFHS-4 (2015-16), the analysis included 58,993 ever-married, ever-pregnant women aged 18-49 who completed the domestic violence module. A stepwise multilevel binary logistic regression, incorporating sampling weights and clustering by primary sampling unit, was fitted across four nested models to assess individual, household, empowerment, partner, and regional determinants. The national prevalence of physical IPV during pregnancy declined from 3.42% (NFHS-4) to 2.65% (NFHS-5) (95% CI: 2.41–2.92), though this masked pronounced geographic heterogeneity, with southern states such as Karnataka (5.24%) recording persistently high rates despite strong gender-development indicators. The null model showed substantial community-level clustering (ICC=47.89%), which individual and household factors barely reduced, while partner-related characteristics and regional factors together explained most of the between-cluster variance (PCV=87.14%). Partner controlling behaviour emerged as the strongest determinant, followed by partner alcohol use, childhood exposure to interparental violence, and women earning more than their partners, while women's participation in household decision-making was protective independent of employment status. These findings suggest that coercive control, rather than economic disadvantage alone, underlies much of the risk of violence during pregnancy in India, and that community-level mechanisms warrant further investigation.

Keywords: Intimate Partner Violence during Pregnancy; Risk Factors; Multilevel Analysis; NFHS-5; India.

I. Background

Intimate partner violence (IPV) against women refers to any behaviour of physical, sexual or psychological harm by a current or former male intimate partner within the context of marriage, cohabitation or any other formal or informal union. This includes physical aggression, sexual and reproductive coercion, controlling behaviour and multiple forms of emotional and psychological harm (WHO 2023). Reliable cross-national comparison of its prevalence became possible after the 2006 WHO multi-country study resolved the longstanding inconsistencies in research design and measurement of IPV, revealing lifetime global prevalence ranging between 15 to 71 percent across study sites with a majority reporting between 30 to 60 percent . Critically, IPV does not cease or pause during pregnancy. Roughly, 2 percent of pregnant women in high income settings, and 13.5 percent in sub-Saharan Africa experienced physical IPV during pregnancy by an intimate partner (Devries et al., 2010). The most recent large-scale evidence using DHS data from 601,534 women

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Acknowledgement: The authors would like to thank the anonymous reviewers of the journal for their helpful comments and suggestions for improving the paper.

across 57 low- and middle-income countries (LMICs), states that the global pooled prevalence now stands at 6.3 percent with national estimates ranging from 1.1 percent to 17.6 percent (Simon et al., 2025). This confirms that violence during pregnancy remains a major, unresolved public health challenge across varied socio-economic contexts.

Abuse during pregnancy has severe and enduring consequences for both maternal and neonatal health. The physical trauma leads to an increased risk of preterm birth, low birthweight, small-for-gestational-age births, premature rupture of membranes, and placental abruption (Agarwal et al., 2023; Alhusen et al., 2015; Bramhankar & Reshmi, 2021; Da Thi Tran et al., 2022; Garg et al., 2020). However, an indirect causal route could be because abused women are twice as likely to miss, delay or avoid antenatal care, foreclosing the early detection of any underlying complications occurring from the blunt force of physical abuse during pregnancy (Alhusen et al., 2015). The burden of psychiatric sequelae lasts long after pregnancy causing a multi-fold increase in the risk of antenatal and postnatal depression, anxiety, somatic distress and Post Traumatic Stress Disorder (PTSD) with frequent cases of comorbidity, especially in LMICs, (Halim et al., 2018) (Halim et al., 2018), including India (Varma et al., 2007). The psychological impact may also trigger suicidal tendencies (J. C. Campbell & Lewandowski, 1997; Ellsberg et al., 2008) develop into a dose-response relationship with postpartum depression (Miura & Fujiwara, 2017)or lead to a lower likelihood of adopting postpartum contraception (McDougal et al., 2020) reflecting a loss of reproductive autonomy. What we measure during pregnancy is, in most cases, the visible portion of a much longer abusive pattern. Physical abuse is often less frequent during pregnancy than in the twelve months immediately before or after delivery, while psychological aggression and sexual coercion increase among women already experiencing violence (Martin et al., 2001, 2004).

India presents this phenomena at an enormous scale of geospatial variability. The six broad administrative regions of India differ substantially in gender norms, female labour-force participation, caste structures, and institutional infrastructure, with physical violence during pregnancy ranging between the prevalence of 7 to 53 percent (Jungari et al., 2022) and a national average of 3.3 percent of the reproductive age women in India who either poorest, widowed or separated and poorest, widowed or separated women, residing in Southern states, or those with less-educated partners had experienced physical IPV during pregnancy (Krishnamoorthy & Ganesh, 2022). State-level prevalences according to NFHS-4, ranges between 0.5 percent to over 9 percent (Jungari, 2018). The Southern states of India, despite being the forerunner of gender development indices consistently report higher prevalence estimates. In contrast, the matrilinear northeastern states report comparatively lower prevalence rates at 2 percent (Haobijam & Singh, 2022).

Understanding what determines the risk of physical IPV during pregnancy in India requires thinking about violence as a phenomenon deeply embedded in household power structures and operating through several interconnected pathways (Martin et al., 1999). At the proximal level, a partner who drinks regularly could create a substantial threat. Though alcohol may not directly trigger partner abuse but it amplifies the severity significantly (Graham et al., 2011). This matters even for relatively empowered women because the male partner's drinking can override the protective effects of a woman's autonomy (Parekh et al., 2022)particularly during perinatal period which an increased risk of escalation (Bhatta et al., 2021).

Deeper than any single behaviour of the male partner is the architecture of normative attitudes and intra-household power dynamics deeply embedded in the Indian household which resists or sanctions violence. In households, where the male partner controls his wife's movements, finances and contact with close peers, or the woman believes that her husband is justified beating her : for going out without his permission or for burning dinner, violence is more likely to be expected as a cost of marriage (Mondal & Paul, 2021), a pattern corroborated across sub-Saharan African and South Asian DHS contexts (Gage & Hutchinson, 2006; Speizer & Pearson, 2011). However, if this woman participates in major household decisions (alone or jointly with husband), it indicates towards a greater bargaining power and therefore a lower likelihood that she may have experienced IPV (Antai, 2011; Tenkorang, 2019; Ibrahim et al., 2025). The acceptance and normalisation of violence

is also reproduced across generations as girls who grow up watching their fathers beat their mothers are more likely to be involved in abusive intimate relationships themselves (Kalra et al., 2025). Beyond these relational factors, individual demographic and socio-economic characteristics also determine the risk of abuse including low maternal education (Peedicayil et al., 2004; Khosla et al., 2005), Peedicayil et al., 2004; Khosla et al., 2005) household poverty (Carter-Cuadra, 2025), young maternal age, early marriage, unwanted pregnancy, and higher parity (Khosla et al 2005, Das, 2013; Jungari and Chinchore, 2022(Khosla et al., 2005; Das et al., 2013; Jungari & Chinchore, 2022).

The relationship between women's empowerment and IPV is where the conflict in literature begin and it becomes difficult to just ascertain a singular direction of association. The intuitive expectation that the more educated woman who is employed and financially independent is safer than her non-working counterpart does not hold consistently true. Indian women from backward castes and lower income group with lower levels of education are more likely to experience spousal violence. However, working women with higher education were not uniformly protected and often faced higher risk of exposure to IPV [Manna et al 2024]. In the Indian male-dominated society where patriarchal mindset is deeply entrenched in the idea of male-breadwinning, women's gains in education and their participation in the labour force can destabilise existing power hierarchies, challenge the husband's sense of entitlement, and provoke backlash (Pal, 2019; Bhalotra et al., 2021; Biswas & Thampi, 2021; Dhanaraj & Mahambare, 2022; Dulhunty, 2025; Chandra et al., 2025).

The individual, household, attitudinal, partner-related and regional contextual characteristics sit at the centre of Heise's integrated ecological framework which conceptualises the factors related to violence against women at different levels of socio-ecological. This provides the theoretical foundation for guides the conceptual and analytical framework of the present study (Heise, 1998). The framework focuses on factors which have been historically linked with the likelihood of violence against women and treats abuse as a phenomenon of interacting forces across four "embedded levels of causality": the individual's personal and developmental history, the microsystem of intimate relationships, the exo-system of community and institutional structures, and the macrosystem of cultural norms and values. When applied to IPV during pregnancy in India, this framework clarifies that single-level models may not be the most efficient in estimating the odds of a woman's exposure to violence, shaped simultaneously by who she is, who her partner is, how empowered she is, and where she lives. Evidence from DHS data across East Africa confirms that community-level factors including neighbourhood poverty, gender norms, and weak institutional sanctioning independently shape IPV risk among pregnant women over and above individual and household characteristics when analysed using multilevel models (Liyew et al., 2022; Mulatu et al., 2024).

Existing nationally representative evidence on the sociodemographic correlates of IPV during pregnancy are well established, and the most vulnerable subgroups have been identified. However, two women with the same socio-economic background may still differ significantly in the risk of violence exposure based on where she lives and what kind of partner she has and what normative attitudes she holds. The literature has not yet established is the degree to which community context operates on IPV risk independently of personal characteristics. India's regional heterogeneity in gender norms, caste hierarchies, female labour-force participation, and institutional infrastructure is well pronounced and treating regional context as a background variable or in a single level model with other variables, may underestimate the variation. Similarly, the woman empowerment-related variables including her decision-making autonomy, exposure to information, economic and digital independence have rarely been examined as a distinct domain alongside individual, household, and partner-level factors. This study addresses both these gap by providing the first nationally representative multilevel analysis of the determinants of physical IPV during pregnancy in the country, estimating the independent contribution of individual, partner-related, empowerment-related, and regional factors to a woman's risk.

II. Data source and study design

This study used secondary data from the fifth round of the National Family Health Survey (NFHS-5), conducted across all 28 states and 8 union territories of India between June 2019 and April 2021. NFHS-5 is a nationally representative, cross-sectional household survey, fifth round, implemented by the International Institute for Population Sciences (IIPS), Mumbai, under the aegis of the Ministry of Health and Family Welfare, Government of India, with technical support from ICF International. The survey follows a stratified two-stage probability sampling design representative of data at the national, state/union territory and district level. The primary sampling frame was based on Census 2011. In the first stage, primary sampling units (PSUs), which included villages in rural areas and census enumeration blocks in urban areas, were selected using probability proportional to size. In the second stage, households were selected from each PSU through systematic random sampling. Data collection used computer-assisted personal interviewing, with separate questionnaires for households, women aged 15–49, men aged 15–54, and children. The domestic violence (DV) questions within the Woman's Questionnaire were included only in the state module consisting of 15% households drawn from the district sample. These questions were administered to one randomly selected eligible woman per household, in the absence of other household members, to ensure privacy and minimise social desirability bias. Women who disclosed experiences of violence were provided information about local support organisations they could contact. Across all states and union territories, NFHS-5 collected data from 639,699 households and 724,115 women, of whom 72,320 completed the domestic violence module representing approximately 96 percent of eligible respondents, with the remaining 4 percent not interviewed due to privacy or safety concerns at the time of fieldwork (International Institute for Population Sciences [IIPS] & ICF, 2021).

Study population and sample

The target population for this study were women aged 18 to 49 years who have ever been married or in a union, ever been pregnant and have completed the Domestic Violence Module of NFHS-5.

Outcome variable

The primary outcome was physical intimate partner violence during pregnancy, derived from the question: "Has anyone ever hit, slapped, kicked, or done anything else to hurt you physically while you were pregnant?" The Domestic Violence Module of the NFHS-5 is administered exclusively to women who were ever married or cohabiting with their male partner, and the question on violence during pregnancy is followed by a perpetrator question identifying the husband or the co-living partner as the source of violence through the question "Who has done any of these things to physically hurt you while you were pregnant?". Women stated that the violence was perpetrated by their current or former husband, partner or boyfriend were coded as 1 (experienced physical IPV during pregnancy) and those reporting no such experience were coded as 0. This captures the lifetime experience of physical IPV during any pregnancy, consistent with nationally representative studies using NFHS data and comparable DHS-based analyses (McDougal et al., 2020; Krishnamoorthy & Ganesh, 2022; Kalra et al., 2025).

Independent variables

Independent variables were organised into four conceptual domains following Heise's integrated ecological framework and other national sub-national clinic and population based studies from different parts of India and several multi-country studies using DHS data. These variables were broadly categorised under individual, household, regional-level factors, women empowerment factors and partner related factors. These variables have been discussed in details in Supplementary Table 1.

Statistical analysis

The data used in this study is freely available for public use through the DHS Program upon request. After download, the data was recoded, and analysed using the STATA version 17.0 (StataCorp. 2021. Stata: Release 17*)*. Since the NFHS-5 uses a complex stratified cluster design with unequal selection probabilities, therefore we applied individual sampling weights for the domestic violence module (d005/1000000) throughout as probability weights (p-weight) to ensure all the estimates are representative of the target population. Missing data in large-scale national surveys like NFHS-5 are generally assumed to be missing completely at random (MCAR), where missingness is unrelated to observed or unobserved values. However we acknowledge that some variables, particularly sensitive items in the domestic violence module may reflect systematic underreporting, more accurately characterised as missing not at random (MNAR) (Kang, 2013). In the absence of auxiliary data to formally model the missing mechanism, pairwise deletion was applied as a pragmatic approach to address the missing values by removing on specific analysis-by-analysis method (Kalra et al., 2025), rather than dropping an entire row from the dataset, with the acknowledged limitation that any resulting bias is likely toward underestimation of prevalence and attenuation of effect sizes.

Prevalence of physical IPV during pregnancy and bivariate analysis with sociodemographic characteristics

The statistical analysis proceeded in two sequential stages. First, each independent variable was examined individually in relation to the outcome using bivariate analysis to assess whether an unadjusted association exists between the characteristic and the experience of physical IPV during pregnancy. A variable that appears weakly associated in isolation may become a meaningful predictor once other variables are accounted for simultaneously. And therefore, a p-value threshold of 0.05 or other variables of known theoretical relevance to IPV during pregnancy were retained as candidate variables fit for the multivariable models, consistent with the purposeful selection approach (Bursac et al., 2008; Zhang, 2016).

Multilevel stepwise binary logistic regression analysis

In large surveys like NFHS-5 which uses complex stratified cluster sampling, respondents are inherently grouped within communities, leading to correlation among observations. Women within the same PSU share similar socio-cultural environments and community norms, which makes their responses correlated rather than statistically independent. Ignoring this intra-cluster correlation underestimated and biased inference in single-level models. This hierarchical structure violates the independence assumption of standard single-level statistical models, resulting in biased parameter estimation and narrow confidence intervals. Therefore, in the second stage of the analysis, to draw appropriate inferences from hierarchical survey data, we used multilevel modelling technique (Bendel & Afifi, 1977; Mickey & Greenland, 1989). It corrects the estimated standard errors and allows for clustering of observations. Since the outcome variable (physical IPV during pregnancy) is dichotomous, multilevel binary logistic regression was the appropriate analytical framework. Women (level 1) were nested within primary sampling units as proxies for community-level context (level 2):

$$\log it(p_{ij}) = x_{ij}\,\beta + u_j, \quad (1)$$

where p_{ij} is the probability of experiencing physical IPV during pregnancy by the ith woman in the jth PSU, x_{ij} is the set of covariates, β is the unknown set of parameters and u_j records the random effect at the PSU level.

We fitted a series of four sequential random intercept multilevel models using the melogit command in Stata 17.0 to estimate the association between physical IPV during pregnancy and different covariates to assess the determinants of the phenomena. Model I was the empty null model with no covariates, used to establish baseline random-effects statistics and assess the magnitude of

community-level clustering. Model II introduced individual, household, and women empowerment-related covariates. Model III added partner-related factors to Model II variables. Model IV, the fully adjusted model, added regional-level variables to the preceding covariates. This stepwise structure allowed the independent contribution of each conceptual domain to be assessed sequentially before examining combined effects, with the change in variance measures across models identifying which domain most accounts for between-cluster heterogeneity in IPV risk and the change in variance measures across models identifies which domain most accounts for between-cluster heterogeneity in IPV risk [Merlo et al., 2016]. Fixed effects are reported as adjusted odds ratios (AOR) with 95% confidence intervals, with statistical significance set at p-value less than 0.05.

The multilevel framework partitions total variance in physical IPV during pregnancy into within-cluster (individual-level) and between-cluster (community-level) components, enabling estimation of both specific contextual effects (fixed-effects odds ratios) and general contextual effects (Merlo et al., 2006, 2016). To understand how much of the variation in physical IPV during pregnancy is attributable to the community (PSU) a woman lives in rather than her individual characteristics, random-effects statistics including are reported for each model. The Variance Component (VC) is the raw between-cluster variance on the log-odds scale. The Intraclass Correlation Coefficient (ICC) and Proportional Change in Variance (PCV) were calculated to assess the significance of variability in experiencing IPV during pregnancy across communities (Merlo et al., 2005). ICC converts the community-level variance component into the percentage of total variation attributable to between-community differences. The intraclass correlation coefficient (ICC) which converts this into the percentage of total IPV variation explained by community-level differences rather than individual differences was calculated as:

$$ICC = VC / (VC + 3.29) \times 100$$

The PCV measures the proportion of change in variance from the null-model variance explained by successive models, and is calculated as

$$PCV = [(VA - VB) / VA] \times 100,$$

where VA is the variance of the initial model and VB is the variance of the model with additional terms. Additionally, the model fitness was assessed using deviance (2*log likelihood ratio, for model comparison. Fixed effects are reported as adjusted odds ratios (AOR) with 95% confidence intervals (CI), with statistical significance set at $p < 0.05$.

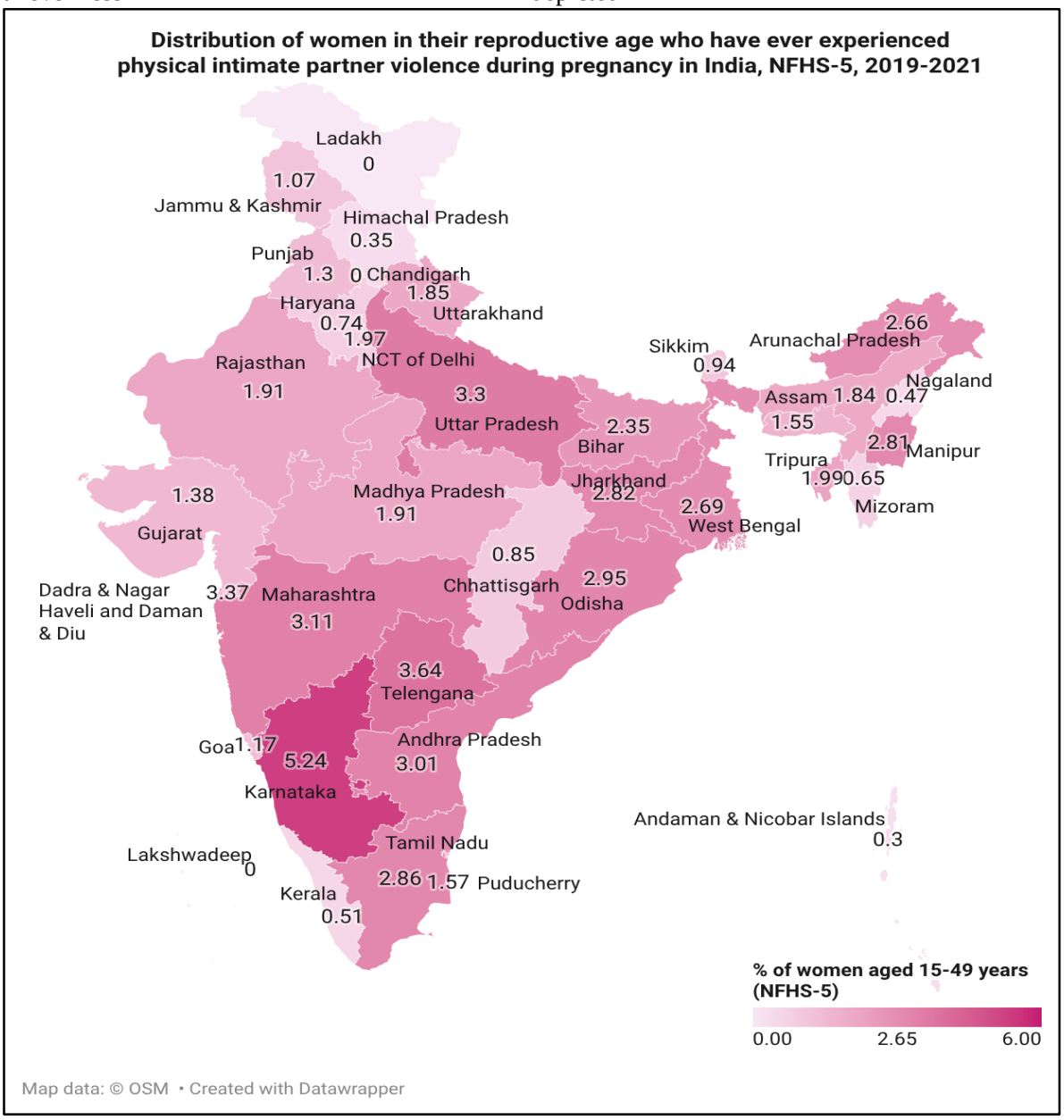
III. Results

Trends, prevalence and geographic distribution of physical IPV during pregnancy

Among the 58,993 ever-pregnant women aged 18–49 years who completed the NFHS-5 (2019-21) domestic violence module, 1565 women reported having ever experienced physical IPV during at least one pregnancy, with a national prevalence of 2.65% (95% CI: 2.41–2.92) Table 1 presents this prevalence across urban and rural settings in India in comparison with NFHS-4 (2015-16) percentage prevalence estimates for the 36 states and union territories (UT) of India. The national prevalence of physical IPV during pregnancy declined from 3.42% in NFHS-4 (2015-16) to 2.65% in NFHS-5 (2019-21), representing a relative decline of 23% over five years. However, this aggregate trend tends to mask substantial spatial heterogeneity across India's states and UTs, between urban and rural settings that require careful interpretation.

The geographical distribution of physical IPV during pregnancy prevalence in India using the NFHS-4 (2015-16) data, depicted in Figure 1, is characterized by a pronounced concentration in southern India. It is primarily driven by Tamil Nadu (5.89%), Telangana (5.17%), Karnataka (4.79%), and Andhra Pradesh (4.37%), alongside scattered high-burden pockets in central India (Chhattisgarh 4.62%) and the eastern belt (West Bengal 4.70%, Bihar 4.12%). In NFHS-5, the

national average had declined modestly, yet the geographic distribution continued to reveal striking unevenness depicted in



. Even after five years since NFHS-4 (2015-16), the southern high-prevalence cluster persisted with minimal amelioration. Karnataka's trajectory is particularly striking, with a marginal increase from 4.79% to 5.24%. This persistence in Karnataka despite its ranking as a frontrunner in development and gender equity indices suggests that structural factors within Kannada household patriarchy have proven resistant to five years of policy and programmatic intervention, indicating that macroeconomic development and gender development indicators do not uniformly translate into reduced intimate partner violence when patriarchal household norms and caste-based hierarchies remain deeply entrenched.

State-level trajectories reveal three distinct patterns of change between the two rounds of NFHS. The most dramatic reductions occurred in previously high-burden states. The state of Haryana in northwestern India declined in prevalence from 4.40% in NFHS-4 to 0.74% in NFHS-5, Bihar from 4.12% to 2.35%, and West Bengal in the east from 4.70% to 2.69%, suggesting that policy attention and mobilisation work by self-help groups in these states may have yielded measurable progress. Delhi, the country capital in the north, showed particularly striking decline from a near national average prevalence of 3.41% in NFHS-4 to 1.98% in NFHS-5.

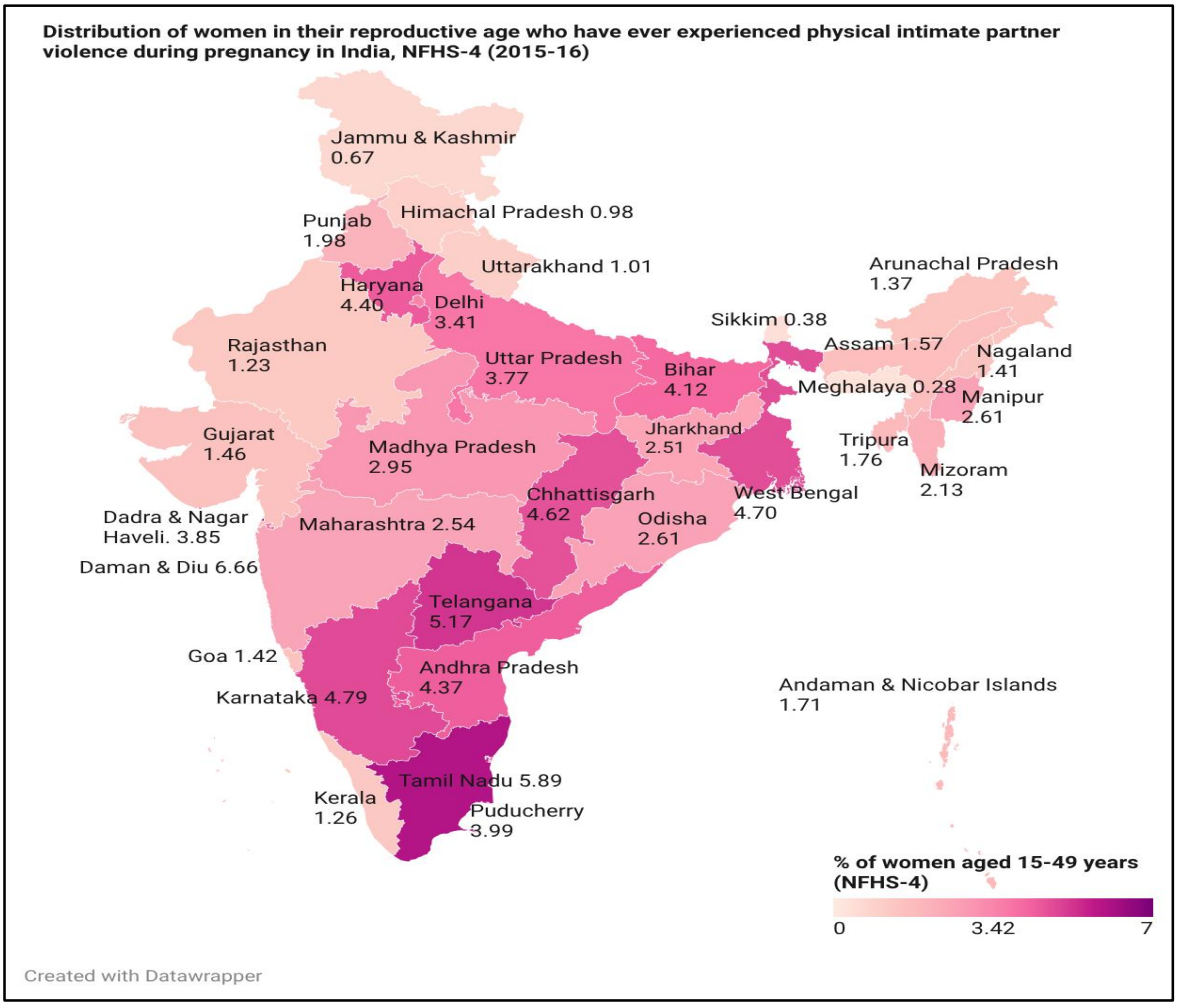


Figure 1: Distribution of women in their reproductive age who have ever experienced physical intimate partner violence during pregnancy in India, NFHS-4 (2015-16)

Conversely, several states in the north showed persistence or increase in the prevalence. Rajasthan reported rising in prevalence from 1.23% to 1.91%, Uttarakhand from 1.01 to 1.85% and Uttar Pradesh remained elevated at 3.30% in NFHS-5, nearly unchanged from 3.77% in NFHS-4between NFHS-4 and NFHS-5. However, the most striking prevalence is observed in Karnataka, a south Indian frontrunner state in most development and gender equity indices but consistently reporting the highest state-level prevalence at 5.24%, showing minimal change from 4.79% in NFHS-4. The southern states of Karnataka (4.79% in NFHS-4 to 5.24% in NFHS-5), Telangana (5.17% to 3.64%), Andhra Pradesh (4.37% to 3.01%), and Tamil Nadu (5.89% to 2.86% collectively form a high-prevalence cluster despite their stronger gender development indicators, suggesting that deeply embedded social norms in patriarchal households and caste-based social hierarchies may operate independently of macroeconomic development. In the northeastern region of the country, there was a significant increase in IPV reporting between the two survey rounds. Arunachal Pradesh showed the highest jump from 1.37% in NFHS-4 to 2.66% in NFHS-5. This was followed by modest increment in Assam (1.57% to 1.84%), Manipur (2.61% to 2.81%) and Tripura (1.76% to 1.99%). Given the overall decline in the national average, increase in specific regions suggests that protective factors operating nationally may not be uniformly distributed and that certain communities may face accelerating risks or barriers to violence reduction. This also proves the point why national average does not sufficiently paint the picture of inter-state heterogeneity given the vast variety in socio-economic and cultural settings that each state has in this country.

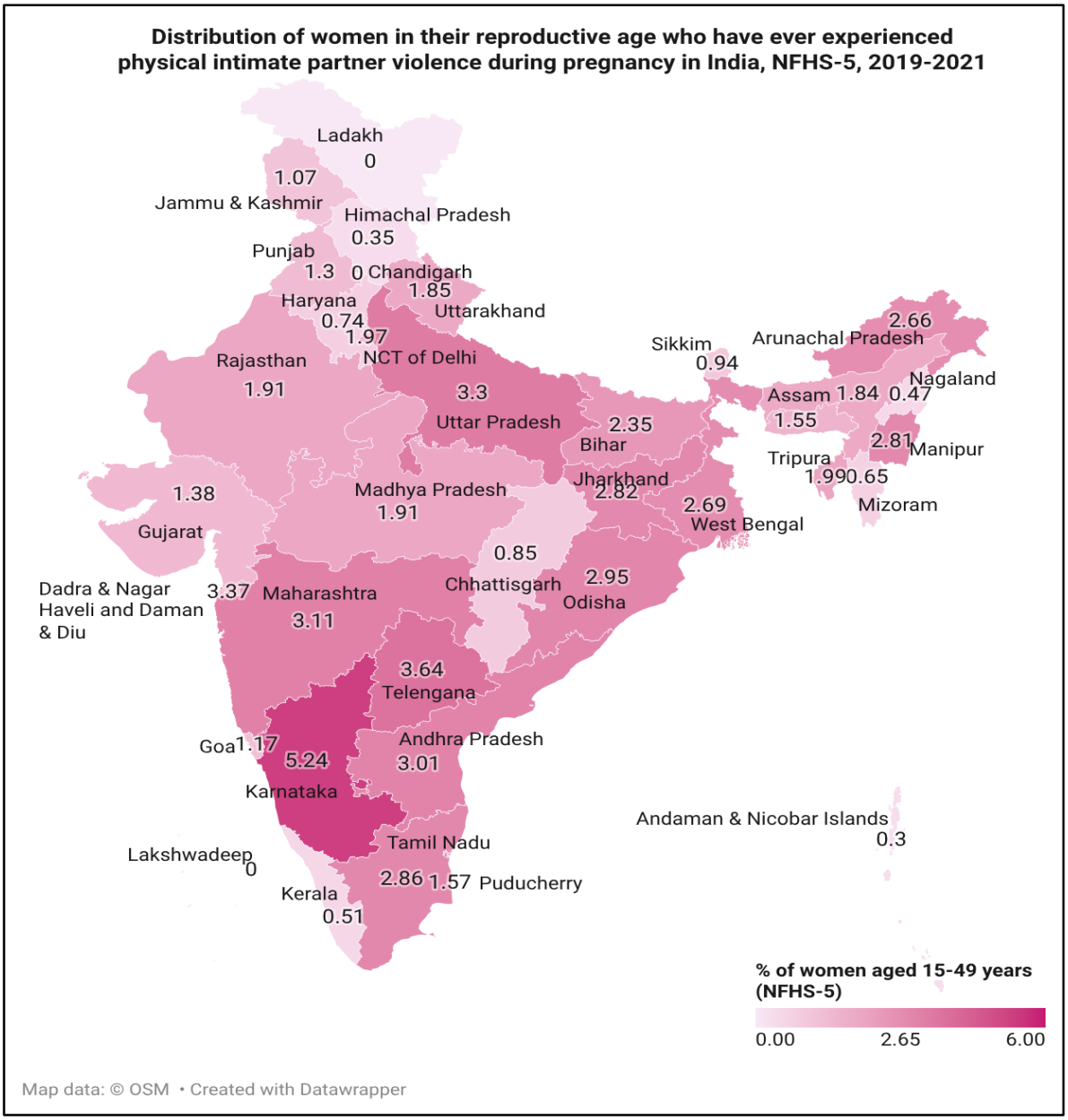


Figure 2: Distribution of women in their reproductive age who have ever experienced physical intimate partner violence during pregnancy in India, NFHS-5 (2019-21)

Table 1: State-wise prevalence (%) of women aged 15-49 years who have experienced physical intimate partner violence during pregnancy in India, NFHS-4 (2015-16) vs NFHS-5 (2019-21)

States	NFHS 4 (2015-16)			NFHS 5 (2019-21)		
	% Urban	% Rural	%Total	% Urban	%Rural	%Total
India			**3.42**			**2.65**
North						
Chandigarh	2.56	14.29	3.51	0	0	0
Delhi	3.45	0	3.41	2	0	1.97
Haryana	2.86	5.53	4.40	1.11	0.56	0.74
Himachal Pradesh	0.61	1.03	0.98	0	0.41	0.35
Jammu &Kashmir	0.51	0.74	0.67	0.15	1.48	1.07
Ladakh	-	-		0	0	0
Punjab	1.90	2.03	1.98	0.78	1.66	1.30
Rajasthan	1.10	1.28	1.23	1.89	1.92	1.91
Uttarakhand	0.60	1.23	1.01	1.96	1.80	1.85
Central						
Chhattisgarh	2.98	5.16	4.62	0.90	0.84	0.85
Madhya Pradesh	2.18	3.27	2.95	2.63	1.68	1.91
Uttar Pradesh	2.84	4.12	3.77	2.96	3.39	3.30

East						
Bihar	6.20	3.78	4.12	1.71	2.45	2.35
Jharkhand	1.39	2.89	2.51	2.13	3.03	2.82
Odisha	0.67	3.11	2.61	1.78	3.19	2.95
West Bengal	5.32	4.41	4.70	1.75	3.06	2.69
Northeast						
Arunachal Pradesh	2.18	1.13	1.37	1.06	2.94	2.66
Assam	1.84	1.51	1.57	1.96	1.82	1.84
Manipur	2.44	2.69	2.61	1.57	3.63	2.81
Meghalaya	0	0.35	0.28	2.47	1.32	1.54
Mizoram	2.77	1.21	2.13	0.89	0.38	0.65
Nagaland	0.37	2.06	1.41	0	0.68	0.47
Sikkim	0	0.63	0.38	0.39	1.14	0.94
Tripura	1.53	1.86	1.76	0	2.85	1.99
West						
Dadra & Nagar Haveli and Daman & Diu	2.01 9.56*	5.29 0*	3.85 6.66*	0.97	5.90	3.37
Goa	1.69	0.92	1.42	0.94	1.51	1.17
Gujarat	0.31	2.36	1.46	2.08	0.91	1.38
Maharashtra	2.17	2.89	2.54	2.54	3.57	3.11
South						
Andaman & Nicobar Islands	1.72	1.70	1.71	0	0.50	0.30
Andhra Pradesh	3.61	4.73	4.37	3.42	2.85	3.01
Karnataka	6.30	3.43	4.79	5.24	5.24	5.24
Kerala	0.70	1.77	1.26	0.53	0.50	0.51
Lakshadweep	0	0	0	0	0	0
Puducherry	2.57	7.53	3.99	1.31	2.38	1.57
Tamil Nadu	4.64	7.18	5.89	2.55	3.09	2.86
Telangana	4.10	5.97	5.17	2.03	4.55	3.64

* Prevalence estimates of percent women who reported having experienced physical IPV during pregnancy in NFHS-4 (2015-16) for the UT of Daman and Diu before its merge with Dadra and Nagar Haveli (UT) in January 2020, following which singular estimates were reported in NFHS-5 (2019-2021).

The urban-rural distinction reveals another layer of complexity. In NFHS-4, rural areas showed higher prevalence than urban areas in most states, however, this pattern was not uniform. In some states like Bihar, urban areas recorded higher prevalence (6.20%) than rural areas (3.78%), while in others like Tamil Nadu, the rural burden was substantially higher (7.18% rural vs 4.64% urban). In NFHS-5, this urban-rural gradient persisted but with notable reversals. Karnataka showed no urban-rural gradient (5.24% both settings), suggesting that controlling behaviours and gender-based violence may be embedded in Kannada household norms across both settings. In other states, rural areas continued to show elevated burdens, reflecting limited access to information, support services, and reporting mechanisms in rural settings. The persistence of this rural concentration despite national-level decline suggests that rural women may face particular vulnerability due to geographic isolation, limited institutional support, and the practical difficulties of seeking help in contexts where community social networks are tight and exit from violent relationships is economically and socially costly.

Whether this overall 23% decline represents genuine reduction in violence incidence or increased disclosure and reporting remains ambiguous. Women's increased awareness of their rights through media campaigns, greater access to helplines, and improved community awareness may have reduced stigma associated with disclosure, leading to higher prevalence estimates in surveys despite stable or declining underlying rates. Alternatively, the decline could reflect actual behavioural change in male partners or household dynamics, though the persistence of high prevalence in certain states and the continued rural-urban gradient suggest that factors driving violence remain potent and may require more intensive intervention than has occurred over the five-year interval.

Sociodemographic profile of study participants and prevalence of physical IPV experienced by women during pregnancy

Error! Reference source not found. presents the sociodemographic characteristics of the study population (N=58,993) as weighted frequencies and percentages. It also provides the weighted

prevalence of physical IPV during pregnancy with chi-square statistics to signify the strength of bivariate association of each characteristic with the outcome. The preliminary individual demographics showed weak associations. Age groups differed minimally across groups with prevalence moving gradually from 2.43% among 18–29 years old to 2.69% among 30–39 years and 2.83% among 40–49 year old women ($\chi^2 = 0.91$, $p = 0.40$). Religion and caste showed similar modest associations. Women from the Scheduled Caste (SC) reported a prevalence of 3.20% compared to 2.10% among those from other castes ($\chi^2 = 3.44$, $p = 0.02$), while religious groups showed no meaningful difference ($\chi^2 = 0.01$, $p = 0.99$) with an average prevalence around 2.65% (Hindus) and 2.67% among Muslim women respondents.

Educational attainment produced one of the strongest associations with IPV prevalence. This is evident from thrice as higher prevalence among women with no formal education (3.30%) compared to 1.09% among those with higher education, which indicates a consistent protective gradient across educational levels of a woman. This pattern held constant for partner's education as well as the prevalence declined from 3.39% when the male partners had no education to 1.32% for those who had with higher level of education. In terms of employment status, working women reported prevalence twice (4.14%) as much as opposed to 2.01% among non-working women in line with the male backlash theory which states that women's economic participation in patriarchal households often challenges traditional male authoritative image, thereby triggering retaliation. The changing breadwinner image when coupled with higher relative income by the woman in the relationship often results in higher incidence of physical abuse during pregnancy (6.04%) compared to women who are earning less or the same as their partners (2.47%). Women belonging to higher wealth quintile (1.50%) households displayed a clear protective gradient in IPV reporting as opposed to those from the poorest wealth quintile households (3.50%) indicating a significant association ($\chi^2 = 9.26$, $p < 0.001$). Notably, all wealth quintiles below the richest showed elevated prevalence, with the poorest and middle quintiles nearly equally burdened (3.50% and 3.11% respectively). Among the individual-level characteristics, exposure to paternal violence in childhood showed the single most powerful bivariate association ($\chi^2 = 262.19$, $p < 0.001$) in the study. Women who had witnessed their fathers beating their mothers reported almost six fold higher incidence of 6.92%, compared to 1.65% among those without this any such childhood exposure of violence.

Geographical variation in terms of region wise state clusters was distinctively clear. The South reported the highest regional occurrence among an average of 3.39% women primarily driven by Andhra Pradesh, Karnataka, Kerala and Tamil Nadu as discussed in Table 1 comparative to 1.42% in the North ($\chi^2 = 4.92$, $p < 0.001$). Other regions including Central (2.73%), East (2.55%), and West (2.54%) regions falling between these two extremes. The empowerment dimensions were among the strongest predictors of physical IPV during pregnancy. The number of household decisions a woman can take either alone or jointly follows a dose-response gradient. This is apparent in **Error! Not a valid bookmark self-reference.**, as

Table 2: Socio-demographic profile of study participants and weighted prevalence of physical intimate partner violence (IPV) during pregnancy across individual, household, empowerment, and partner characteristics, NFHS-5 (2019-21)

Background characteristics	N(%)	% with IPV	Chi-square (p-value)
Total	58993	1565 (2.65)	
Individual factors			
Age (in 5-year groups)			
18-29	17751(30.09)	2.43	0.91 (0.40)
30-39	22596 (38.30)	2.69	
40-49	18646 (31.61)	2.83	
Highest level of education			
No education	17247 (29.24)	3.30	12.76 (0.00)
Primary	8384 (14.21)	3.58	
Secondary	27171 (46.06)	2.31	
Higher	6191 (10.49)	1.09	
Religion			

Hindu	46650 (79.07)	2.65	0.01(0.99)
Muslim	9524 (16.15)	2.67	
Others	2817 (4.78)	2.71	
Caste			
Scheduled Caste	12338 (20.91)	3.20	3.44 (0.02)
Scheduled Tribe	5194 (8.81)	3.18	
Other backward castes	24822 (42.08)	2.64	
Others	16639 (28.20)	2.10	
Employment status			
Working	17815 (30.20)	4.14	59.72 (0.00)
Not working	41178 (69.80)	2.01	
Number of living children			
0-1	14103 (23.90)	2.29	2.24 (0.11)
2-3	35772 (60.64)	2.69	
4 or more	9118(15.46)	3.12	
Ever witnessed father beat her mother			
Yes	11209 (19.00)	6.92	262.19 (0.00)
No	47784 (81.00)	1.65	
Wealth index			
Poorest	11520 (19.52)	3.50	9.26 (0.00)
Poorer	12552 (21.28)	3.08	
Middle	12589 (21.34)	3.11	
Richer	12110 (20.53)	1.90	
Richest	10222 (17.33)	1.50	
Number of family members			
1-3	11151 (18.90)	2.79	0.39 (0.67)
4-6	35338 (59.90)	2.67	
7 and above	12504 (21.20)	2.48	
Sex of the household head			
Male	49386 (83.72)	2.53	6.14 (0.01)
Female	9607 (16.28)	3.30	
Empowerment related factors			
Justification of wife-beating			
No reason	29875 (50.64)	1.79	52.19 (0.00)
At least one reason	29118 (49.36)	3.53	
Decision making agency			
No HH decisions	9620 (16.31)	5.44	55.59 (0.00)
1-2 HH decisions	9935 (16.84)	3.32	
All 3 HH decisions	39438 (66.85)	1.80	
Mass media			
0	14751 (25)	2.78	0.29 (0.74)
1-2	37976 (64.37)	2.65	
3-4	6266 (10.62)	2.39	
Asset ownership			
Owns land/house jointly/alone	27351 (46.36)	2.74	0.38 (0.54)
Does not own any land/house	31642 (53.64)	2.58	
Bank account			
Yes	47424 (80.39)	2.70	0.56 (0.45)
No	11569 (19.61)	2.45	

Table 2: Contd…..

Background characteristics	N(%)	% with IPV	Chi-square (p-value)
Electronic Empowerment			
No source of electronic empowerment	25711 (43.58)	2.92	4.63 (0.11)
At least one source	27299 (46.28)	2.59	
Owns a mobile phone and uses it for financial transactions	5983 (10.14)	1.80	
Insurance			
Yes	18685(31.67)	2.81	0.78 (0.38)
No	40308 (68.33)	2.58	
Partner related factors			
Years of cohabitation			
< 5	7310 (12.39)	1.66	3.49 (0.02)
5-9	9768(16.56)	2.61	
10-19	20312 (34.43)	2.80	
20 and more	21600 (36.62)	2.87	
Partner's education			

No education	11504 (19.50)	3.39	8.67 (0.00)
Primary	9065 (15.37)	3.79	
Secondary	30129 (51.07)	2.39	
Higher	8014 (13.58)	1.32	
Don't know	281 (0.48)	2.43	
Partner's occupation			
Professional/technical/managerial/clerical	5959 (10.10)	1.59	8.88 (0.00)
Sales; Services/household & domestic; Agricultural; Skilled and unskilled manual; and other	53034 (89.90)	2.77	
Income difference			
More than him	3182 (20.00)	2.18	23.06 (0.00)
Less than him	8607 (54.09)	6.04	
About the same	3147 (19.78)	3.43	
Husband/Partner does not bring in money	802 (5.04)	3.08	
Marital control			
0	31924 (54.12)	0.67	267.29 (0.00)
1-2	16333 (27.69)	2.45	
3-4	7473 (12.66)	6.42	
5-6	3263 (5.53)	14.46	
Partner consumes alcohol			
Yes	14214 (24.13)	6.77	397.58 (0.00)
No	44699 (75.87)	1.35	
Regional related factors			
Place of residence			
Urban	18088 (30.66)	2.36	2.03 (0.15)
Rural	40905 (69.34)	2.78	
Region			
North	4371 (7.41)	1.42	4.92 (0.00)
Central	6363 (10.79)	2.73	
East	17630 (29.88)	2.55	
Northeast	3251 (5.51)	1.82	
West	12724 (21.57)	2.54	
South	14654 (24.84)	3.39	

Note: Income difference variable based on n=15,913 respondents with non-missing values. Missing data treated using pairwise deletion. % with IPV = weighted prevalence of physical IPV within each category.

5.44% women with no household decision-making autonomy reported having experienced physical abuse during pregnancy compared to 1.80% women among those participating in all three major decisions ($\chi^2 = 55.59$, $p < 0.001$). Justification of wife-beating was associated with nearly double the prevalence (3.53% versus 1.79%; $\chi^2 = 52.19$, $p < 0.001$). In contrast, media exposure through TV, radio, newspaper and movies showed negligible association across categories ($\chi^2 = 0.29$, $p = 0.74$), as did bank account ownership ($\chi^2 = 0.56$, $p = 0.45$) and asset ownership ($\chi^2 = 0.38$, $p = 0.54$).

Besides the selected empowerment related factors, partner-related factors dominated the bivariate association narrative. Exercising control through multiple behaviours by the male partner showed the steepest gradient in the entire analysis. Prevalence escalated from 0.67% when the male partner was display not show any controlling behaviours to 2.45% with those showing one to two behaviours, 6.42% with three to four behavioural traits, to a whooping 14.46% prevalence among women whose husbands displayed all five to six controlling behaviours as listed in the NFHS questionnaire ($\chi^2 = 267.29$, $p < 0.001$). About 6.77% women whose partners consumed alcohol reported physical violence during pregnancy compared to 1.35% among women whose partners did not ($\chi^2 = 397.58$, $p < 0.001$). Years of cohabitation showed modest positive association ($\chi^2 = 3.49$, $p = 0.02$), with women married 20 or more years reporting 2.87% prevalence compared to 1.66% for those married less than five years. Partner's occupational status mattered modestly: women with partners in professional/managerial roles reported 1.59% prevalence, while those with partners in other occupations reported 2.77% ($\chi^2 = 8.88$, $p < 0.001$).

Factors and determinants associated with physical intimate partner violence during pregnancy

Based on their significance level threshold of 0.05 in the chi-square test of bivariate association in

Geographical variation in terms of region wise state clusters was distinctively clear. The South reported the highest regional occurrence among an average of 3.39% women primarily driven by Andhra Pradesh, Karnataka, Kerala and Tamil Nadu as discussed in Table 1 comparative to 1.42% in the North ($\chi^2 = 4.92$, $p < 0.001$). Other regions including Central (2.73%), East (2.55%), and West (2.54%) regions falling between these two extremes. The empowerment dimensions were among the strongest predictors of physical IPV during pregnancy. The number of household decisions a woman can take either alone or jointly follows a dose-response gradient. This is apparent in **Error! Not a valid bookmark self-reference.**, as

Table 2, the variables of number of family members, having a bank account, insurance and electronic empowerment were filtered. To determine which of these factors independently predicted physical IPV risk, adjusting for confounding and mediation, a stepwise multilevel logistic regression approach was employed.

The remaining variables, including the ones with p-values of bivariate association below 0.05 but of theoretical relevance to IPV literature were retained for stepwise multilevel binary logistic regression modelling, the estimates of which are displayed in Table 3. The null model (Model I) in Table 3 established baseline clustering, with a community variance component of 3.02 (SE=0.14) significant at p-value > 0.001, indicating significant PSU level variation in reporting of physical IPV during pregnancy. This was backed by an Intraclass Correlation Coefficient (ICC) of 47.89%, indicating that community (PSU) context explained nearly half of total variation in IPV reporting.

Individual and household-level and women empowerment related factors were introduced in Model II, wherein age, religion, caste, number of children and sex of the head of the household did not show any significant association with the incidence of physical IPV during pregnancy in India. This could be due to confounding with empowerment factors. Women who pursued higher education (AOR=0.57, 95% CI: 0.35-0.95, p >0.05), belonged to the richer (AOR=0.55, 95% CI: 0.37-0.82, p>0.01) or richest (AOR=0.46, 95% CI: 0.29-0.75, p > 0.01) households were significantly associated with lower odds of experiencing abuse during pregnancy. On the other hand, being employed (AOR=1.74, 95% CI: 1.37–2.21 p > 0.001) or witnessing interparental violence (AOR=4.15, 95% CI: 3.28–5.26, p >0.001) were evidently leading to higher odds of violence during pregnancy. Asset ownership (AOR=0.95, 95% CI: 0.76–1.18, p > 0.05), and agency in 1-2 household decisions (AOR=0.65, 95% CI: 0.48–0.89, p > 0.01) and all three decisions (AOR=0.31, 95% CI: 0.24–0.41, p>0.001) were among the protective predictors while justification of wife-beating elevated the odds of incidence (AOR=1.49, 95% CI: 1.18–1.86).

Model III introduced partner-related factors, and this inclusion produced marked changes in effect estimates and the overall understanding of IPV risk factors. Women's employment status, their highest level of educational attainment and household wealth index, which were previously associated either as protective or risk factors with the odds in Model II, became attenuated and lost significance, once partner factors were accounted for. This was probably owing to the introduction of partner's occupation and couple's relative income variables in this model leading to the absorption of variance of the women. The likelihood that a woman with childhood abuse trauma exposure will experience physical abuse during pregnancy showed a slight weakening (AOR= 3.13 , 95% CI: 2.46–3.98, p > 0.001) but persisted being highly significant in Model IV. The autonomy of participating in all three major household decisions (AOR=0.43, 95% CI: 0.33–0.58, p > 0.001) and asset ownership (AOR=0.77, 95% CI: 0.62–0.95, p > 0.05) were still significantly associated with the risk of abuse operates independent of partner characteristics. Crucially, justification of wife-beating did not only show lower odds from AOR=1.49 in Model I to AOR=1.18 (95% CI: 0.93–1.50), but also lost its statistical significance in this model. Partner controlling behaviour itself emerged as the strongest risk factor demonstrating a one to two behaviours (AOR=3.39, 95% CI: 2.45–4.70, p > 0.001), three to four behaviours (AOR=10.31, 95% CI: 7.30–14.56, p > 0.001), and five to six behaviours (AOR=20.72, 95% CI: 13.56–31.70, p > 0.001). Women whose partners consumed

alcohol were at over three times higher the risk of experiencing an abusive pregnancy (AOR=3.70, 95% CI: 2.89–4.74, p > 0.001), indicating the independent risk of alcoholic male partners which not mediated through other variables.

The fully adjusted model incorporating individual, household, empowerment, partner, and now regional factors simultaneously, was ascertained as the best fit model. Woman's age showed minimal effect in full adjustment, with women aged 30–39 at (AOR=1.20, 95% CI: 0.80–1.81) and those aged 40–49 years (AOR=1.61, 95% CI: 0.96–2.69) and neither significantly elevated. Their highest level of educational attainment and wealth index reduced to statistical insignificance in the full model.

Working women showed an odds ratio of AOR=1.15, 95% CI: 0.84–1.58, no longer statistically significant, indicating that the crude excess risk among working women was driven by selection and confounding rather than employment itself causing increased violence risk. However, when examining relative income in a relationship, women earning more than their partners continued to show elevated risk, though slightly lower than Model III (AOR=2.50, 95% CI: 1.60–3.90, p >0.001), operationalizing a resource-threat mechanism where female economic advantage provokes backlash rather than conferring protection. Intergenerational transmission remained one of the most robust effects in the fully adjusted model. Women who had witnessed paternal violence in childhood were over three times the higher risk of experiencing physical abuse during pregnancy (AOR=3.08, 95% CI: 2.41–3.93, p > 0.001) compared to those without such exposure.

Table 3: Adjusted Odds Ratio from Stepwise Multilevel Logistic Regression for Physical Intimate Partner Violence during Pregnancy, NFHS 5 (2019-21)

Background characteristics	Null model (Model I)	AOR (95%CI)		
		Model II	Model III	Model IV
Intercept	0.007*** (0.006-0.008)			
Individual factors				
Age (in 5-year groups)				
18-29		Ref	Ref	Ref
30-39		1.04 (0.76-1.37)	1.21 (0.80-1.82)	1.20 (0.80-1.81)
40-49		1.07 (0.78-1.44)	1.63 (0.98-2.72)	1.61 (0.96-2.69)
Highest level of education				
No education		Ref	Ref	Ref
Primary		1.20 (0.87-1.66)	1.12 (0.82-1.53)	1.11 (0.81-1.53)
Secondary		0.80 (0.60-1.07)	0.84 (0.62-1.15)	0.84 (0.62-1.15)
Higher		0.57* (0.35-0.95)	0.86 (0.49-1.49)	0.84 (0.48-1.48)
Religion				
Hindu		Ref	Ref	Ref
Muslim		1.09 (0.73-1.65)	1.22 (0.83-1.80)	1.23 (0.83-1.83)
Others		1.17 (0.73-1.87)	1.33 (0.75-2.35)	1.36 (0.76-2.45)
Caste				
Scheduled Caste		Ref	Ref	Ref
Scheduled Tribe		0.97 (0.66-1.44)	0.96 (0.65-1.42)	0.96 (0.65-1.43)
Other backward castes		0.87 (0.64-1.18)	0.91 (0.66-1.25)	0.89 (0.65-1.23)
Others		0.95 (0.63-1.43)	1.12 (0.75-1.68)	1.14 (0.76-1.72)
Employment status				
Working		Ref	Ref	Ref
Not working		1.74*** (1.37-2.21)	1.17 (0.85-1.60)	1.15 (0.84-1.58)
Number of living children				
0-1		Ref	Ref	Ref
2-3		0.99 (0.72-1.36)	0.96 (0.68-1.35)	0.95 (0.68-1.34)
4 or more		1.03 (0.71-1.52)	1.06 (0.70-1.61)	1.07 (0.71-1.62)

Table 3: Contnd…..

Background characteristics	Null model (Model I)	AOR (95%CI)		
		Model II	Model III	Model IV
Ever witnessed father beat her mother				
No		Ref	Ref	Ref

Yes	4.15*** (3.28-5.26)	3.13*** (2.46-3.98)	3.08*** (2.41-3.93)
Wealth index			
Poorest	Ref	Ref	Ref
Poorer	0.92 (0.68-1.25)	1.07 (0.76-1.52)	1.03 (0.72-1.48)
Middle	0.79 (0.56-1.12)	1.03 (0.69-1.53)	0.97 (0.63-1.47)
Richer	0.55** (0.37-0.82)	0.77 (0.50-1.20)	0.71 (0.44-1.14)
Richest	0.46** (0.29-0.75)	0.73 (0.42-1.25)	0.66 (0.36-1.20)
Sex of the household head			
Male	Ref	Ref	Ref
Female	0.91 (0.70-1.18)	0.94 (0.71-1.25)	0.94 (0.71-1.25)
Justification of wife-beating			
No reason	Ref	Ref	Ref
At least one reason	1.49** (1.18-1.86)	1.18 (0.93-1.50)	1.16 (0.90-1.48)
Decision making agency			
No HH decisions	Ref	Ref	Ref
1-2 HH decisions	0.65** (0.48-0.89)	0.76 (0.55-1.05)	0.76 (0.55-1.06)
All 3 HH decisions	0.31*** (0.24-0.41)	0.43*** (0.33-0.58)	0.44*** (0.33-0.59)
Mass media			
0	Ref	Ref	Ref
1-2	1.06 (0.77-1.45)	0.99 (0.71-1.37)	0.98 (0.70-1.36)
3-4	1.12 (0.68-1.86)	0.92 (0.54-1.57)	0.91 (0.53-1.54)
Asset ownership			
Owns land/house jointly/alone	Ref	Ref	Ref
Does not own any land/house	0.95* (0.76-1.18)	0.77* (0.62-0.95)	0.77* (0.62-0.96)
Partner related factors			
Years of cohabitation			
< 5		Ref	Ref
5-9		1.31 (0.79-2.17)	1.31 (0.79-2.17)
10-19		1.06 (0.63-1.78)	1.06 (0.63-1.78)
20 and more		0.80 (0.43-1.51)	0.81 (0.43-1.52)
Partner's education			
No education		Ref	Ref
Primary		1.43* (1.00-2.04)	1.44* (1.01-2.05)
Secondary		1.19 (0.89-1.59)	1.19 (0.89-1.60)
Higher		0.85 (0.50-1.46)	0.84 (0.49-1.44)
Don't know		0.84 (0.16-4.53)	0.84 (0.16-4.54)
Partner's occupation			
Professional/technical/managerial/clerical		Ref	Ref
Sales; Services/household & domestic; Agricultural; Skilled and unskilled manual; and other		0.91 (0.54-1.55)	0.90 (0.53-1.53)
Income difference			
More than him		Ref	Ref
Less than him		2.55*** (1.64-3.96)	2.50*** (1.60-3.90)
About the same		1.21 (0.85-1.73)	1.19 (0.83-1.71)
Husband/Partner does not bring in money		0.83 (0.25-2.75)	0.82 (0.25-2.67)
Marital control			
0		Ref	Ref
1-2		3.39*** (2.45-4.70)	3.40*** (2.45-4.72)
3-4		10.31*** (7.30-14.56)	10.36*** (7.28-14.75)
5-6		20.72*** (13.55-31.68)	20.72*** (13.46-31.90)
Partner consumes alcohol			
Yes		Ref	Ref
No		3.70*** (2.89-4.74)	3.70*** (2.89-4.75)
Regional related factors			
Place of residence			
Rural			Ref
Urban			1.09 (0.83-1.44)

Table 3: Contnd…..

Background characteristics	Null model (Model I)	AOR (95%CI)		
		Model II	Model III	Model IV
Region				
North				Ref

Central				1.26 (0.88-1.80)
East				0.90 (0.62-1.32)
Northeast				0.96 (0.61-1.52)
West				1.25 (0.84-1.85)
South				1.24 (0.85-1.80)
Random Effects				
Community variance (SE)	3.02*(0.14)	2.91*(0.17)	3.00*(0.20)	2.98* (0.20)
ICC (%)	47.89	46.96	47.71	47.55
PCV (%)	Ref	28.57	85.71	87.14
Model Fitness				
Deviance (-2LLR)	12596.4	11500.12	9913.68	9905.02

Note: *** p < 0.01, ** p < 0.05, * p < 0.1. COR: AOR: Adjusted Odds Ratio of experiencing physical IPV during pregnancy for women in a given category compared with the reference group, controlling for all other individual- and regional or contextual level factors in the model.

Household decision-making autonomy and ownership of land or house (either independently or with partner) preserved its strong protective effect in the final model (all 3 decisions: AOR=0.44, 95% CI: 0.33–0.59, p > 0.001) (AOR=0.77, 95% CI: 0.62–0.96, p > 0.05), remaining one of the few consistently protective empowerment dimensions and suggesting that voice in household governance reduces vulnerability to physical violence independent of other factors. Justification of wife-beating was still statistically insignificant in Model IV (AOR=1.16, 95% CI: 0.90–1.48), demonstrating that women's stated acceptance of violence is confounded with or mediated through partner characteristics rather than independently predictive. This attenuation—from AOR=1.49 in Model II to non-significance in Model IV—reveals the strong collinearity between normative acceptance of wife-beating and actual experience of partner controlling behaviour, suggesting that women's attitudes are shaped by the controlling relationships they inhabit rather than independent drivers of violence.

Partner's controlling behaviour and their alcohol consumption were still among the strongest determinants of experiencing an abusive pregnancy with odds escalating sharply between number of controlling behaviours. The likelihood estimates virtually remained unchanged since Model III and were reported at AOR=3.40, 95% CI: 2.45–4.72, p > 0.001 for one to two controlling behaviours, AOR=10.36, 95% CI: 7.28–14.75, p > 0.001 for three to four behaviours, to AOR=20.73, 95% CI: 13.47–31.91, p > 0.001 for women whose partners exhibited five to six controlling behaviours. The odds of being abused by an alcoholic partner remained exactly the same at AOR=3.70, 95% CI: 2.89–4.75, p > 0.001. The persistence of these effect sizes and the lack of attenuation across model specifications indicates that controlling behaviour operates as a direct mechanism through which coercive household authority is established and physical violence becomes enacted, rather than being mediated through other measured variables. Partner's education showed modest effect in full adjustment, with primary education relative to higher education at AOR=1.44 (95% CI: 1.01–2.05), suggesting that partner education's protective effect operates partly through pathways not fully captured in this analysis.

The regional variables added in the final model were found to have insignificant association with the risk of abuse during pregnancy. The urban residence had a higher but insignificant association with the odds of violence during pregnancy when compared to women from the rural areas. The central (AOR=1.26 , 95% CI: 0.88–1.80) , western (AOR=1.25 , 95% CI: 0.84-1.85) and southern (AOR=1.24 , 95% CI: 0.85–1.80) were among the regions with the higher odds of IPV reporting, however the estimates were not significant to establish an association. This attenuation indicates that regional differences in IPV prevalence operate largely through differences in population composition (education, employment, empowerment levels, partner education, partner alcohol use) rather than through unmeasured regional cultural or institutional factors. However, the non-significant but elevated point estimate for the South suggests some residual regional effect beyond what measured variables capture, potentially reflecting unmeasured community-level factors such as enforcement of laws protecting women, community institutional capacity, or locally specific gender ideologies.

Multilevel random effects and fitness of model

The null model revealed substantial community-level clustering at an ICC of 47.89%, with a community level variance (VC) of 3.02 (SE=0.14, p<0.001). This means that nearly half of the total variation in physical IPV during pregnancy was attributable to differences between primary sampling units rather than differences between individual women within PSUs. The community level variance if translated, would mean that if we randomly selected two women from different PSUs, the variance between communities would be 3.02 on the logit scale, translating to a 47.89% probability that their differing IPV status could be attributed to community differences rather than individual differences.

It directly violates the independence assumption of standard logistic regression and fully justifies the multilevel approach. The high magnitude of community-level variance in the null model, before any individual-level covariates are included, establishes that place of residence is not a peripheral factor but rather nearly as important as individual characteristics in shaping IPV risk. After adding the individual, household and empowerment characteristics, the ICC in Model II was estimated at 46.96% (VC=2.91, SE=0.17, p<0.001), a decline of only 0.93 percent points from the null model, indicating that individual factors alone explained minimal between-cluster variation. This modest reduction in VC from 3.02 to 2.91 suggests that women's age, education, caste, employment status, wealth, and empowerment dimensions, while important predictors of individual IPV risk may not substantially account for why some communities have higher IPV prevalence than others. The persistence of substantial clustering at nearly 47% even after accounting for comprehensive individual and household characteristics points to community-level factors that operate beyond individual circumstances.

The introduction of partner-related characteristics in Model III produced marked changes in the deviance but counterintuitively increased community-level clustering. The ICC increased slightly to 47.71% (VC=3.00, SE=0.20, p<0.001), rising 0.75 percent points from Model II. This slight increase in ICC, despite the strong individual-level effects of partner controlling behaviour and alcohol consumption, reveals a critical insight: partner characteristics, while powerfully predicting individual women's risk, cluster geographically in patterns that are not fully explained by individual differences. In other words, communities differ not only in how women are distributed across individual risk factors but also in how partner characteristics are distributed. The variance component increased from 2.91 to 3.00, suggesting that accounting for partner factors exposed additional community-level heterogeneity in the distribution of men's controlling behaviours and alcohol use across geographic areas. Despite the dramatic improvement in individual-level model fit when partner factors were added (deviance reduction from 11,554.12 to 9,914.06), the community-level variation remained stubbornly persistent and actually increased slightly.

The model fitness was assessed using deviance statistics which measures how well a model fits the observed data and smaller the value, the better the model fits the data. It is calculated as

$$\text{Deviance} = -2 * \text{Log Likelihood (or -2LL)}$$

This is because log likelihood is always negative (since it is the natural log of probabilities of an event occurring, which falls between 0 and 1, making the log negative in value). Multiplying it by -2, we flip the sign, we get a positive number which is easier to interpret. When we compare the null model (essentially a smaller nested model) with a larger nested model with additional covariates (Model II, III and IV), the difference in the deviance follows a chi-square distribution. Unlike AIC/BIC which adjusts for model complexity (previously chosen as fit statistics but later scraped due to inconsistency owing to model complexity), deviance in a nested model comparison isolates the domain specific contribution (individual, partner and regional factors) to overall fit.

The null model with no predictors reports a deviance of 12596.40, which keeps dropping, as we keep adding variables in each successive model, to 11554.12 in Model II, a drop by 1042.28

points meaning that women's age, education, employment, wealth index and other characteristics at individual (including empowerment) and household level can make better predictions about who experiences IPV during pregnancy. The deviance plummets to a further 9914.06 in Model III (by 1640 points, a drop larger than the previous one) with 5 additional variables following a χ^2 distribution with df=5, indicating that partner factors significantly improved model fit ($p<0.001$) and are more dominant predictors of the risk of IPV exposure than individual and household characteristics. However, on addition on regional variables (place of residence and regions), the deviance further falls to 9905.48. The minimal reduction (8.58 points) with 6 additional variables ($\chi^2 = 8.58$, df=6, $p>0.05$) suggests regional factors add minimal information beyond individual and partner characteristics. The notable regional variation in prevalences documented in Table 1 operates almost entirely through differences in population composition (education, partner's alcohol consumption, controlling behaviours) rather than through regional cultural factors.

The proportional change in variance (PCV) demonstrates which domain most effectively reduced between-cluster heterogeneity. Model II, adding individual and household factors, showed PCV=28.57%, indicating that these factors explained less than one-third of null-model variance. Model III, adding partner factors, showed substantial improvement with PCV=85.71%, indicating that partner-related characteristics and behaviours account for substantially more between-cluster variation than individual factors alone. The fully adjusted Model IV achieved PCV=87.14%, indicating that all measured variables combined explained 87.14% of between-cluster variance, leaving 12.86% of community-level variation unexplained. This means that despite including comprehensive individual, household, empowerment, partner, and regional factors, more than one-eighth of the variation in IPV risk across communities remains driven by unmeasured community-level mechanisms.

IV. Discussion

This study was a comprehensive examination of the prevalence of physical IPV during pregnancy using NFHS-4 (2015-16) and NFHS-5 (2019-21) for the states and UTs of India, stratified by urban-rural context. Following which, we used stepwise multilevel binary logistic regression, to identify the which factors among individual, household, partner and empowerment characteristics were the strongest determinants of the odds of experiencing physical abuse during pregnancy. It was found that women who have had childhood exposure to interparental violence, earn more than their male partner, or involved with an alcoholic partner, who only has had preliminary level of schooling, and/or occasionally exhibits multiple constraining behaviour on her daily activities and movement were among the most likely to report having experienced physical IPV during pregnancy. The national prevalence of 2.65% for physical IPV during pregnancy appears substantially lower than documented in comparable lower-and-middle-income countries. Studies from Nigeria (Ezekwe-Anya, n.d.; Oche et al., 2020), Jordan (Abujilban et al., 2022), and Ethiopia(Abota et al., 2021; Liyew et al., 2022) report ranges from 3% to 30% (J. Campbell et al., 2004; Garcia-Moreno et al., 2005; Devries et al., 2010; Simon et al., 2025) suggesting two things: either, India's documented prevalence is actually lower than socioeconomically comparable nations or that systematic underreporting operates intensely. The NFHS employs WHO ethical guidelines for sensitive data collection on violence across physical, sexual, and emotional domains (Golder et al., 2016). However, the survey's structural features create significant barriers to disclosure. For example, NFHS directly enquires: "Has anyone ever hit, slapped, kicked, or done anything else to hurt you physically while you were pregnant?" This kind of direct questioning in shared Indian household spaces, depends critically on interview context and respondent comfort, often interrupted by compromised privacy. Extended family structures common in India compromise true interview privacy, as conversations conducted in shared living spaces risk being overheard or interrupted by household members whose presence fundamentally shapes what women feel safe disclosing.

Empirical research comparing different modes (in-person/telephonic) and techniques of interview has reported a substantial variation in IPV disclosure rates with profound implications for prevalence estimates. The Pregnancy Risk Assessment Monitoring System (PRAMS) study of

39,348 women across 14 U.S. states found physical abuse prevalence of 5.3% when assessed via postal questionnaires administered 3-6 months postpartum, substantially higher than household survey estimates (Goodwin et al., 2000). Crucially, unintended pregnancies showed markedly elevated abuse prevalence of 12.6-15.3% compared to intended pregnancies at 5.3%, demonstrating that pregnancy context intersects with violence exposure in ways standard household surveys may capture incompletely (Gazmararian et al., 1996; Goodwin et al., 2000). Directed comparisons between self-administered questionnaires and face-to-face interviews for IPV consistently document substantially higher disclosure rates with self-completion formats, particularly for sensitive physical violence questions (Canterino et al., 1999).

Beyond interview methodology, women in India face culturally specific barriers to IPV disclosure rooted in gender norms and shame that operate at multiple levels. The Oxfam Report on Measurement of Domestic Violence in NFHS surveys found that 54% women and 51% men agreed that wife-beating is justifiable "under some circumstances," most commonly when wives disrespect in-laws (cited by both women and men), followed by neglect of household or children (Golder et al., n.d.). This normalization of male authority and entitlement to discipline wives creates profound shame around IPV disclosure (Kennedy & Prock, 2018). Disclosing abuse to a stranger often risks confirming the very behaviours that men cite to justify violence, creating a psychological bind where admission becomes self-incriminatory. Women may silence themselves not from fear of interviewer judgment, but from internalized shame and acceptance of normative behaviour rooted in the Indian patriarchal society. India-specific evidence of substantial measurement-related underreporting emerges from over two decades of small-scale regional studies. Hospital and community based findings reported a prevalence of physical IPV during pregnancy ranging from 8.3 % in eastern India (Odisha, West Bengal and Jharkhand) (Babu & Kar, 2012), 15% in urban Mumbai (Das et al., 2013) to 44% in rural Maharashtra (Jain et al., 2004) and 3.7% in a public health facility (Nath et al., 2021) to 30.7% according to a cohort based study in tertiary care centre (Ramalingappa et al., 2017) in Bangalore, Karnataka. These prevalence estimates exceed NFHS findings, strongly suggesting systematic underreporting in large scale health and household surveys. The gap between clinic-based and population-based estimates likely reflects both population composition differences (clinic attendees may represent women with violence-related health complications, potentially oversampling) and critically, interview setting effects. Private clinical settings may create substantially greater psychological safety for disclosure than household surveys where partner proximity cannot be guaranteed and the interview itself could trigger suspicion.

The five-year decline in the NFHS national average from 3.42% (NFHS-4) to 2.65% (NFHS-5) may indicate two different things: (a) a decline in the perpetration of violence policy attention and self-help group mobilization or, (b) a decline in reporting tendencies of women who are being interviewed in NFHS-5. Haryana's dramatic 80% reduction from 4.40% to 0.74% and Bihar's 45% decline from 4.12% to 2.35% indicate that intensive state-level gender-based violence prevention initiatives through programmes like "Do Kadam Barabari Ki Ore" (Two Steps Towards Equality) aimed at changing deeply entrenched gender power hierarchies in Bihar (The Prevention Collaborative, 2019), police training on domestic violence response, establishment of protection officer networks and expansion of community mobilization through self-help groups (Mittal et al., 2023) can achieve measurable violence reduction even in resource-constrained settings. Interventions like Bihar's 2016 alcohol prohibition policy, implemented with the explicit goal of reducing domestic violence, road accidents, women safety and household economic hardship from male drinking, represented a policy-level intervention reducing the perpetration of domestic violence against women by 76.47% (Prakash et al., 2023). However, the decline may also reflect increased normalization of gender equality rhetoric without corresponding household power shifts, causing women to experience heightened shame disclosing violence that contradicts the public narrative of female empowerment. The stark inter-regional paradox that the southern states despite their near universal female literacy rate and high workforce participation continue to show high or stagnant IPV prevalence rates challenges that simplistic linkage of economic and gender development indices to violence reduction. Rigid normative behaviour in Indian societies where “a substantial proportion

of the population condones abuse, women's risk of experiencing, accepting, or rationalizing IPV may be higher (Garcia-Moreno et al., 2005; González & Rodríguez-Planas, 2021; Heise, 1998)."

Among the determinants of the risk of physical IPV during pregnancy, partner controlling behaviour emerged as a dominant and most persistent risk factor across all models, with the odds over 20 times higher among women whose male partners exhibit all controlling behaviours as listed in the NFHS-5 survey. This composite variable is measured across freedom of movement, finances, social contact, and decision-making and persisted in its likelihood to determine the risk of violence during pregnancy across all adjusted models, even after accounting for individual women's characteristics, empowerment dimensions, partner attributes, and regional factors. This indicates that partner control functions as the primary mechanism through which coercive household authority translates into physical violence during pregnancy. The complete absorption of wife-beating justification by partner controlling behaviour variable in the adjusted model III provides critical insight into how these apparently distinct risk factors actually operate as interconnected components of a single system of coercive control in the real world. In the bivariate analysis, women's justification of wife-beating was significantly associated with IPV, yet this association disappeared entirely once partner controlling behaviour was introduced. An NFHS-4 based investigation found that both wife-beating justification and controlling behaviour independently increased IPV risk, and identified these as overlapping manifestations of coercive household authority (Mondal & Paul, 2021). The mechanism underlying this reduction in statistical significance is signifies that the variable of women's attitudes towards wife-beating justification is a component tool within the broader controlling behaviour system. Women whose partners exercise controlling behaviour across multiple domains in his female partner's daily life, often tend to use normative justifications of wife-beating as manifestation of decades of conditioned acceptance passed down by generations, often intensified if she has been exposed to interparental violence as a child. She has grown up thinking that if her mother has faced it silently, it is only the correct thing to do as a woman whose male partners has the right to discipline her when she transgresses against household norms, disrespect in-laws, or fail in other domestic duties. Women experiencing this systematic control internalize these justifications as cognitive accommodations to minimize threat within relationships where their autonomy is already severely constrained in terms irrespective of economic independence. This is because if being employed in a job would have been a protective factor, then the wives who are earning more than their husbands would not have reported twice as much violence than their non-working housewife counterparts.

Partner alcohol consumption and women's household decision making agency are part of the same system of household power dynamics. Women whose partners consumed alcohol faced almost a four times higher odds indicating alcohol's association with IPV operates independently of individual, empowerment, and household factors. Alcohol may not always be directly associated with immediate perpetration, however, it affects cognitive functioning and behavioural inhibition and affects the risk of abuse through intensity and frequency of consumption (Parekh et al., 2022) affecting women's health during and beyond pregnancy (Wagman et al., 2018). Men with alcohol dependence may use their drinking as justification for exercising control, may use control to extract money for alcohol, or may leverage alcohol intoxication as a circumstance in which violence becomes socially acceptable. Integrated Cognitive Behavioural Couple's Therapy and Group Interventions focused on harmful drinking patterns and IPV simultaneously in South India demonstrate that when IPV and alcohol use is addressed in a simultaneous, coordinated and not sequential intervention, alcohol-dependent men have reported significantly lower IPV perpetration and their wives show markedly improved mental health outcomes (Periyasamy et al., 2025; Satyanarayana et al., 2016). This synergistic effectiveness confirm that alcohol and controlling tendencies are interconnected components of male dominance system where each reinforces the other.

A prospective longitudinal analysis found that a woman brought up in an abusive household is significantly associated with IPV experience later in her adult life, even after adjusting for other psychosocial factors (Shakoor et al., 2022). The influence of a mother's gender attitudes has more

lasting impact on a girl child than the father (Dhar et al., 2019). Girls growing up observing fathers control mothers internalize the structure of intimate relationships as inherently hierarchical, learn to interpret male dominance as natural, and develop anxiety, hypervigilance, difficulty with emotional regulation and a bypassed shame towards admitting abuse as a wrong act (Mehfooz et al., 2023). These persist into her adulthood and shape partner selection toward men displaying familiar controlling or aggressive profiles, creating a demographic of women who unconsciously select controlling partners because such dynamics feel "normal," then experience the same violence they witnessed, and subsequently may internalize the same justifications their mothers internalized (Do et al., 2021). Therefore, controlling behaviour, wife-beating justification, and intergenerational normalization are not three separate pathways, rather temporal manifestations of a single system: girls raised in controlling relationships become women who accept controlling relationships because they learned to interpret control as love; these women raise children who inherit both the psychological vulnerability and the normalized expectations that perpetuate the cycle.

Conclusion

Then what works in favour of these women at the risk of abuse? Decision making agency and ownership of assets. Women participating in all three major household decisions showed dramatically reduced odds of violence compared to those with no autonomous decision-making, and this protective effect persisted unchanged across all models. This protection is not directly explained by economic empowerment, since women's employment did not show any protective effect. A woman who participates in household economic decisions, involved in regular social contact with family and peers, and capable of taking healthcare decisions is less likely to be controlled by her male partner entirely. She possesses a leverage to refuse, negotiate and credibly exit the relationship, if it turns abusive. The critical finding is that women earning more than their partners reported elevated odds, suggested that economic independence without sufficient household decision-making agency may trigger male backlash violence as men sense their authority and breadwinner image being threatened. Decision-making autonomy, however shows protective effects, independent of employment status. Similarly, a woman may not be employed but if she owns land or house either independently or jointly with her partner, it acts as a protection against violence.

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