

# Reproductive Coercion as a Determinant of Anxiety and Depression Among Married Women in Bangladesh: A Nationally Representative Survey-Weighted Multinomial Analysis of the 2022 DHS

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## Research Article

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# Abstract

## Purpose

Existing research often treats anxiety and depression as isolated outcomes. This study conducts the first nationally representative analysis of their comorbidity among ever-married women in Bangladesh, specifically investigating the “dual burden” of reproductive coercion and structural powerlessness.

## Methods

Data were analyzed from the 2022 BDHS (n = 20,029). Mental health outcomes were classified into a four-category joint variable (Neither, Anxiety-Only, Depression-Only, Comorbid) using validated GAD-7 and PHQ-9 scales. Survey-weighted multinomial logistic regression was employed to estimate Relative Risk Ratios (RRR).

## Results

Among ever-married women, 15% had symptoms of anxiety only, and 4.2% experienced comorbid anxiety and depression. Older women (45–49 years) (anxiety only: aRRR: 1.80, 95% CI: 1.39–2.31; comorbid: aRRR: 2.48, 95% CI: 1.58–3.90) and women facing pregnancy pressure (anxiety only: aRRR: 1.63, 95% CI: 1.28–2.07; comorbid: aRRR: 4.07, 95% CI: 2.83–5.85) were substantially more likely to experience psychological distress. Conversely, higher educational attainment was protective, significantly reducing the relative risk of comorbidity (aRRR 0.53, 95% CI 0.32–0.87). Significant regional disparities were observed, with elevated risks of comorbidity in Rangpur and Khulna, while history of terminated pregnancy and internalized acceptance of wife-beating were also identified as independent predictors.

## Conclusion

Anxiety and depression are common among married women in Bangladesh, with comorbid conditions driven by compounded reproductive, interpersonal, and structural stressors. Reproductive coercion and limited autonomy emerged as central determinants of severe psychological distress. Interventions addressing women’s mental health should move beyond individual-level screening to incorporate gender equity, reproductive autonomy, education, and region-specific strategies.

## Article Highlights

- One in five married women in Bangladesh experiences anxiety or depression, with 4.2% suffering from comorbid conditions.

- Reproductive coercion is a major driver of comorbid anxiety and depression, increasing the risk of experiencing both conditions by nearly fourfold.
- Education of both women and their partners provide substantial protection, reducing the risk of severe distress by nearly half.
- Pronounced regional inequalities exist, with women in the poverty-prone Rangpur and Khulna divisions facing the highest vulnerability.
- A joint-outcome framework reveals distinct risk profiles for comorbidity that are masked by traditional single-disorder analyses.

## Introduction

Anxiety operates as a distinct cognitive mode that fundamentally alters processing priorities. It is characterized by hypervigilance, a state in which individuals continuously scan their environment for threat-related stimuli, thereby heightening the encoding of potential dangers and skewing cognitive processing (1). These conditions represent a profound global health burden; anxiety alone is currently the most prevalent mental disorder worldwide, affecting approximately 359 million people (2). This psychological framework is particularly critical when examining the mental health of women in developing nations like Bangladesh, where patriarchal social structures entrench gender inequalities (3). In this context, the intersection of rigid gender norms, economic dependency, and the heavy burden of domestic responsibility creates a distinct environment of chronic stress. This “patriarchal pressure” acts as a unique environmental trigger, rendering married women disproportionately vulnerable to heightened anxiety states.

Depression functions as a debilitating cognitive state that fundamentally disrupts emotional regulation and executive control. It is characterized by a pervasive sense of despondency and anhedonia, where individuals experience a persistent loss of interest in daily activities and a distorted negative perception of the self and future (4). These impairments constitute a massive global health crisis; depression is currently a leading cause of disability worldwide, affecting approximately 280 million people (5). This clinical burden is profoundly amplified among women in developing nations like Bangladesh, where socio-cultural restrictions exacerbate psychological vulnerability (6). In this setting, the convergence of early marriage, financial dependence, and restricted mobility acts as a systemic stressor, stripping women of personal agency. This “structural powerlessness” functions as a critical environmental determinant, rendering married women disproportionately susceptible to severe depressive episodes (7).

The burden of mental disorders among women is a pressing challenge in low-resource settings, with prevalence rates notably higher than global averages. In developing nations, approximately 15.6% of pregnant women and 19.8% of new mothers experience mental disorders, compared to 10% and 13% worldwide (8). This crisis is acutely visible in Bangladesh, where one in five women of reproductive age exhibits symptoms of anxiety, and 5% present with clinical depression (9). Within this landscape, married women constitute a substantial demographic whose specific vulnerabilities remain critically overlooked

in public health discourse (10). This population endures a disproportionate psychological strain compared to their unmarried counterparts, a disparity driven by the convergence of socioeconomic pressure, unpaid domestic labor, and rigid societal expectations (11). Furthermore, the dual mandate of caregiving and work, compounded by limited employment opportunities, fosters a cycle of financial insecurity and chronic stress that deeply erodes their mental well-being.

Scholarly discourse consistently underscores a powerful nexus between socioeconomic disadvantage and psychological distress. Low income, limited educational attainment, and unemployment are universally identified as critical precipitants of anxiety and depression, particularly among married women (12). Yet, the determinants of well-being extend beyond material deprivation to the relational dynamics of marriage itself. While a supportive marital union can function as a protective buffer (13), relationships defined by conflict, rigid gender roles, and poor communication frequently exacerbate mental health struggles (14). This relational strain is evident in the disparities reported in empirical data: married women consistently endure higher stress burdens than their single counterparts (33% vs. 22%), a statistic that reflects the compounded weight of domestic responsibilities and unyielding social expectations (15, 16).

In the South Asian context, these vulnerabilities are inextricably bound to patriarchal norms and economic dependency. Research from rural Nepal demonstrates that low social status and financial reliance do not merely restrict women's autonomy; they actively increase exposure to intimate partner violence, creating a cycle of trauma that further degrades mental health outcomes (17). Within Bangladesh, recent estimates suggest the prevalence of anxiety symptoms among reproductive-aged women ranges from 4% to 19.5%, with risk factors heavily concentrated around age, regional disparities, and a lack of decision-making autonomy (6, 18–20). However, the current evidentiary landscape remains largely fragmented. The vast majority of existing research has been siloed into specific, isolated cohorts—such as garment and construction workers, university students, postpartum mothers, or residents of urban slums (21–32). Similarly, while localized studies on early married adolescents have established links between partner violence and anxiety, these findings lack national generalizability (33). This segmented approach frequently treats women as a homogeneous group or defines them solely by their occupation, thereby obscuring the distinct, intersectional challenges faced by the general population of married women. Consequently, there remains a critical scarcity of nationally representative research that specifically interrogates how the “dual burden”—manifested through the intersection of reproductive history, such as terminated pregnancy history and early childbearing, and structural economic dependence, characterized by low household wealth and restricted decision-making autonomy, impacts the comorbid mental health outcomes of married women across the entire country.

This study aims to bridge this evidentiary gap by conducting a comprehensive, nationally representative analysis of the determinants influencing anxiety, depression, and their comorbidity among ever-married women of reproductive age in Bangladesh. Unlike prior studies restricted to specific cohort or single-disorder models, this research utilizes a joint-outcome framework to provide a holistic examination of mental health. This approach contributes to the existing literature by shifting the analytical lens from

isolated risk factors to a nuanced perspective that distinguishes between women experiencing singular distress and those suffering from comorbid conditions. Investigating these distinct profiles is critical because mental well-being is shaped by the convergence of individual biological transitions, household power dynamics, and broader societal norms. Understanding these multifaceted interactions is essential for identifying not just the prevalence of symptoms, but the systemic roots of severe, concurrent psychological vulnerability. By dissecting these layers of influence, this research seeks to offer actionable insights for public health interventions that address the specific, compounded burdens of married women in Bangladesh.

## Theoretical Framework

This study adopts the “Social-Ecological Model” (SEM), as illustrated in Fig. 1, to examine the determinants of anxiety and depression among reproductive-aged women in Bangladesh (34). The SEM posits that mental health outcomes are not driven solely by individual traits but are shaped by nested levels of influence. At the individual level, the framework analyzes personal vulnerabilities, including age, education, and reproductive history (specifically terminated pregnancy and age at first birth). These interact with the interpersonal level, which captures household power dynamics through wealth status, spousal pressure to conceive, and women's empowerment (decision-making autonomy and attitudes toward violence).

The model expands to the community level, accounting for structural access and inequality through place of residence (urban versus rural) and administrative division. Finally, the societal level encompasses broader macrosystem influences, including religious norms and exposure to mass media, which dictate social expectations. By integrating these four levels, the framework hypothesizes that psychological distress is the cumulative result of interactions between a woman's personal history and her surrounding socioeconomic and cultural environment.

## Materials and Methods

### Study Design and Setting

The research utilized secondary data obtained from the 2022 Bangladesh Demographic and Health Survey (BDHS), which was a nationally representative cross-sectional survey. The 2022 BDHS was the ninth iteration of the survey, conducted under the authority of the National Institute of Population Research and Training (NIPORT), Medical Education and Family Welfare Division of the Ministry of Health and Family Welfare (MOHFW) in Bangladesh. The survey was implemented by Mitra and Associates, with technical assistance provided by ICF through The DHS Program and financial support provided by the United States Agency for International Development (USAID) and the Government of Bangladesh (9).

Figure 2 provides a flow chart detailing the process of selecting the 2022 BDHS participants and the final sample included in this study. The 2022 BDHS employed a two-stage stratified cluster sampling design.

The sampling frame was derived from the list of enumeration areas (EAs) generated by the Bangladesh Bureau of Statistics (BBS) for the 2011 Population and Housing Census of the People's Republic of Bangladesh. The primary sampling units (PSUs) were EAs, which typically encompassed an average of 120 households. In the first stage, a total of 675 PSUs were selected (237 from urban areas and 438 from rural areas) with probability proportional to the size of the EAs. In the second stage, a systematic sampling method was employed to select an average of 45 households from each of the selected PSUs, which yielded a total of approximately 30,375 selected households.

The mental health module, which utilized the Generalized Anxiety Disorder-7 (GAD-7) scale alongside the Water Glass Pictorial Scale, was administered specifically to married women between the ages of 15 and 49. Ethical protocols were strictly followed, with informed verbal consent secured from all respondents under approvals granted by the Bangladesh Medical Research Council (BMRC) and the ICF Institutional Review Board (IRB). To ensure the findings were nationally and regionally representative, standard DHS sampling weights were applied in all analyses to adjust for variations in selection probabilities and non-response rates. The demographic profile of this weighted sample closely aligned with the national benchmarks established in the 2022 BDHS Final Report.

## **Assessment of Mental Health Outcomes**

This study assessed two primary mental health outcomes, anxiety and depression, utilizing the Generalized Anxiety Disorder-7 (GAD-7) scale and the Patient Health Questionnaire-9 (PHQ-9), both of which were integrated into the Mental Health Module of the 2022 BDHS. To evaluate symptoms of anxiety, the study employed the GAD-7, a validated seven-item instrument designed to assess the core characteristics of generalized anxiety, specifically persistent and impairing worry (35). Beyond generalized anxiety, this tool captures attributes associated with panic disorder, social anxiety disorder, and posttraumatic stress disorder. The scale has demonstrated robust psychometric properties, including strong criterion, construct, factorial, and procedural validity. Empirical benchmarks indicate that a threshold score of 10 offers an 89% sensitivity and 82% specificity for detecting generalized anxiety disorder (36). Within the specific context of this survey, the GAD-7 items demonstrated high internal consistency, yielding a Cronbach's alpha of 0.833.

Depression symptoms were measured using the nine-item PHQ-9, which aligns with the diagnostic criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM). The PHQ-9 is widely recognized as a reliable and valid instrument for determining depression severity (37). Psychometric evaluations suggest that a cut-off score of 10 or higher provides a sensitivity and specificity of 88% for identifying major depressive disorder (38). Both the anxiety and depression scales focused on symptoms experienced during the two weeks preceding the survey interview. Symptom severity was quantified using a four-point Likert scale, where responses were coded as 0 for "not at all," 1 for "several days," 2 for "more than half the days," and 3 for "nearly every day". Composite scores for each disorder were derived by summing the individual item responses, with higher scores indicating greater symptom severity.

To enhance measurement accuracy and ensure inclusivity for respondents with varying literacy levels, the 2022 BDHS implemented the validated Water Glass Pictorial Scale as a visual aid. This tool utilized images of water glasses filled to different levels to represent the frequency of symptoms, thereby contextualizing the abstract Likert categories. Specifically, an empty glass corresponded to “never,” a glass one-fourth full represented “rarely,” a half-filled glass indicated “often,” and a glass three-fourths full signified “always”. While this approach facilitated the capture of self-reported perceptions, diagnostic clinical screening was not performed. Instead, a safety protocol was established wherein respondents scoring 10 or higher on the PHQ-9, or those reporting any frequency of suicidal ideation (responding “rarely,” “often,” or “always” to the relevant item), were provided with immediate referrals for mental health services.

## Operationalization of Comorbid Outcomes

To establish the clinical significance of the findings, specific diagnostic thresholds were applied to the continuous scores derived from the GAD-7 and PHQ-9 instruments. For the assessment of anxiety, the GAD-7 utilizes a cumulative scale ranging from 0 to 21. Consistent with the 2022 BDHS reporting standards and established psychometric literature, a total score of six or higher was utilized as the cut-off point to classify respondents as having symptoms of anxiety [9,36].

Similarly, the PHQ-9 provides a depression severity scale with a maximum possible score of 27. To distinguish between those with and without clinically relevant distress, a threshold score of 10 or higher was implemented to identify respondents exhibiting symptoms of depression [9,38]. These specific cut-off points were chosen for their high sensitivity and specificity in detecting generalized anxiety and major depressive disorders within a community-based sample, ensuring that the prevalence rates reported in this study are both clinically relevant and comparable to other national benchmarks.

To move beyond isolated prevalence rates and capture the “dual burden” of psychological distress, a composite multinomial outcome variable was constructed. This variable classifies respondents into four mutually exclusive categories based on the intersection of their anxiety and depression scores. This classification allows for the distinct analysis of women experiencing singular disorders versus those suffering from comorbidity, a state often associated with greater functional impairment. The operational definitions for these categories are detailed in Table 1.

Table 1  
Operational Definitions of Mental Health Outcome Categories

| Outcome Category | GAD-7 Score (Anxiety) | PHQ-9 Score (Depression) | Clinical Interpretation                                                                                               |
|------------------|-----------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Neither          | < 6                   | < 10                     | Respondents exhibited no significant symptoms of anxiety or depression.                                               |
| Anxiety Only     | ≥ 6                   | < 10                     | Respondents meet the threshold for anxiety symptoms but not for clinical depression.                                  |
| Depression Only  | < 6                   | ≥ 10                     | Respondents meet the threshold for clinical depression but not for anxiety symptoms.                                  |
| Comorbid (Both)  | ≥ 6                   | ≥ 10                     | Respondents meet the thresholds for both anxiety and depression simultaneously, indicating a dual burden of distress. |

## Independent Variables

To systematically analyze the determinants of anxiety and depression, predictor variables were categorized into four nested levels of influence based on the Social-Ecological Model (SEM): Intrapersonal, Interpersonal, Community, and Societal (Fig. 1).

## Intrapersonal Factors

The innermost level captures individual demographic and biological characteristics. Age was categorized into 5-year groups (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, and 45–49) to capture life-cycle stages. Educational attainment was classified into four levels: no education, primary, secondary, and higher. Crucial reproductive history markers were included as indicators of biological and psychological vulnerability: history of terminated pregnancy (yes/no), which has been identified as a significant predictor of anxiety. Additionally, early life transitions were measured using age at first birth and age at first sexual intercourse, both categorized to identify early-onset risks (< 18 years vs. ≥18 years).

## Interpersonal Factors

This level encompasses household socioeconomics and power dynamics. Household wealth status served as a proxy for economic resources, calculated via Principal Component Analysis (PCA) on household assets and divided into quintiles (poorest to richest). Spousal education was categorized similarly to the respondent's education.

To assess interpersonal power dynamics, we operationalized women's decision-making autonomy using an additive index based on four domains: control over personal healthcare, large household purchases, visits to family, and personal earnings. Participants were considered empowered in a domain if they

made decisions either alone or jointly with their partner. We summed these indicators to create a composite score, which was then dichotomized into low autonomy (participation in 0–1 domains) and high autonomy (participation in 2–4 domains). Attitudes toward violence (ATV) served as a proxy for patriarchal norms and were assessed using five indicators regarding the justification of wife-beating. We constructed a binary variable that classified respondents as supportive of violence if they justified wife-beating in at least one of the five presented scenarios, and non-supportive if they did not justify it in any situation. Furthermore, spousal pressure was included as a specific relational stressor, defined by whether the husband or family members pressured the respondent to become pregnant.

## **Community Factors**

The community level accounts for structural access and geographic context. Place of residence classified respondents as living in urban or rural areas. Regional disparities were captured using administrative divisions (Barishal, Chattogram, Dhaka, Khulna, Mymensingh, Rajshahi, Rangpur, and Sylhet), which reflects varying levels of infrastructure and economic development.

## **Societal Factors**

The outermost level represents influence on the broader stage. Religion was categorized as Muslim vs. Other (Hinduism, Buddhism, Christianity) to account for cultural and religious norms. Finally, media access was defined as a measure of information exposure and connectivity to the wider society. We created a composite binary indicator classifying respondents as having access if they reported using the internet or engaging with at least one form of mass media, such as reading newspapers, listening to the radio, or watching television.

Table 2  
Level wise characteristics of married women and distribution of the four-category mental health outcome.

|                              |                                                | <b>Weighted<br/>n (%)</b> |
|------------------------------|------------------------------------------------|---------------------------|
| <b>Level</b>                 | <b>Variables</b>                               | <b>N = 20,029</b>         |
| <b>Outcome Measure</b>       | <b>Mental health outcome (PHQ-9 and GAD-7)</b> |                           |
|                              | Neither depression nor anxiety                 | 15,973 (80%)              |
|                              | Anxiety only                                   | 3,070 (15%)               |
|                              | Depression only                                | 154 (0.8%)                |
|                              | Comorbid anxiety and depression                | 833 (4.2%)                |
| <b>Intrapersonal factors</b> | <b>Age group (5-year)</b>                      |                           |
|                              | 15–19                                          | 1,729 (8%)                |
|                              | 20–24                                          | 3,289 (16%)               |
|                              | 25–29                                          | 3,523 (18%)               |
|                              | 30–34                                          | 3,437 (17%)               |
|                              | 35–39                                          | 3,344 (17%)               |
|                              | 40–44                                          | 2,546 (13%)               |
|                              | 45–49                                          | 2,160 (11%)               |
|                              | <b>Educational attainment</b>                  |                           |
|                              | no education                                   | 2,752 (14%)               |
|                              | primary                                        | 5,214 (26%)               |
|                              | secondary                                      | 9,359 (47%)               |
|                              | higher                                         | 2,703 (13%)               |
|                              | <b>Age at first birth</b>                      |                           |
|                              | < 18 years                                     | 7,316 (37%)               |
|                              | ≥ 18 years                                     | 12,713 (63%)              |
|                              | <b>Age at first sex</b>                        |                           |
|                              | < 18 years                                     | 13,435 (67%)              |
|                              | ≥ 18 years                                     | 6,594 (33%)               |

|                              |                                                | <b>Weighted<br/>n (%)</b> |
|------------------------------|------------------------------------------------|---------------------------|
| <b>Level</b>                 | <b>Variables</b>                               | <b>N = 20,029</b>         |
| <b>Outcome Measure</b>       | <b>Mental health outcome (PHQ-9 and GAD-7)</b> |                           |
|                              | <b>Terminated pregnancy</b>                    |                           |
|                              | No                                             | 15,459 (77%)              |
|                              | Yes                                            | 4,569 (23%)               |
| <b>Interpersonal factors</b> | <b>Spousal pressure<br/>(Pregnancy)</b>        |                           |
|                              | No                                             | 18,453 (97%)              |
|                              | Yes                                            | 606 (3%)                  |
|                              | <b>Attitude towards violence</b>               |                           |
|                              | Does not justify wife-beating                  | 17,263 (86%)              |
|                              | Justifies wife-beating (any reason)            | 2,766 (14%)               |
|                              | <b>Women's decision-making autonomy</b>        |                           |
|                              | Low decision-making autonomy                   | 4,019 (20%)               |
|                              | High decision-making autonomy                  | 16,010 (80%)              |
|                              | <b>Partner's educational level</b>             |                           |
|                              | no education                                   | 4,121 (22%)               |
|                              | primary                                        | 5,386 (28%)               |
|                              | secondary                                      | 6,196 (33%)               |
|                              | higher                                         | 3,356 (18%)               |
| <b>Community factors</b>     | <b>Place of residence</b>                      |                           |
|                              | urban                                          | 5,700 (28%)               |
|                              | rural                                          | 14,328 (72%)              |
|                              | <b>Administrative division</b>                 |                           |
|                              | Barishal                                       | 1,199 (6%)                |
|                              | Chattogram                                     | 3,749 (19%)               |
|                              | Dhaka                                          | 5,080 (25%)               |

|                         |                                                | <b>Weighted<br/>n (%)</b> |
|-------------------------|------------------------------------------------|---------------------------|
| <b>Level</b>            | <b>Variables</b>                               | <b>N = 20,029</b>         |
| <b>Outcome Measure</b>  | <b>Mental health outcome (PHQ-9 and GAD-7)</b> |                           |
|                         | Khulna                                         | 2,389 (12%)               |
|                         | Mymensingh                                     | 1,527 (8%)                |
|                         | Rajshahi                                       | 2,625 (13%)               |
|                         | Rangpur                                        | 2,291 (11%)               |
|                         | Sylhet                                         | 1,169 (6%)                |
| <b>Societal factors</b> | <b>Household wealth index</b>                  |                           |
|                         | poorest                                        | 3,583 (18%)               |
|                         | poorer                                         | 4,028 (20%)               |
|                         | middle                                         | 4,135 (21%)               |
|                         | richer                                         | 4,189 (21%)               |
|                         | richest                                        | 4,094 (20%)               |
|                         | <b>Religion</b>                                |                           |
|                         | Others                                         | 1,921 (10%)               |
|                         | Islam                                          | 18,107 (90%)              |
|                         | <b>Exposure to mass media</b>                  |                           |
|                         | No media access                                | 17,624 (88%)              |
|                         | Has media access                               | 2,405 (12%)               |

## Statistical Analysis

Data cleaning, management, and statistical analyses were conducted using Stata (Version 17.0) and R (Version 4.5.1). To ensure the findings were nationally representative, all analyses incorporated the appropriate survey weights provided by the BDHS, which adjusted for the two-stage stratified cluster sampling design and non-response rates.

Initially, descriptive statistics, including weighted frequencies and percentages, were generated to characterize the study population. Since all explanatory variables and the outcome measure were categorical, the Chi-square test was performed to examine the bivariate association between each independent variable and the mental health outcome categories.

Prior to fitting the final models, diagnostic checks were conducted to ensure the validity of the statistical inferences. Multicollinearity among the covariates was assessed using the Variance Inflation Factor (VIF). All variables yielded VIF values below 4, indicating no significant collinearity issues.

To identify the determinants of singular and comorbid mental health conditions, a weighted Multinomial Logistic Regression model was employed. This method is appropriate for a nominal outcome variable with more than two categories ("Neither", "Anxiety Only", "Depression Only", and "Comorbid"). The "Neither" group served as the reference category. The measure of association is reported as Relative Risk Ratios (RRR) with 95% Confidence Intervals (CI), and a p-value of  $< 0.05$  was considered statistically significant.

Table 3

Survey-weighted bivariate associations between socio-ecological factors and four-category mental health status (depression/anxiety)

|                          |                           | Mental health outcome (PHQ-9 and GAD-7) |                                 |                               |                     |             |
|--------------------------|---------------------------|-----------------------------------------|---------------------------------|-------------------------------|---------------------|-------------|
|                          |                           | n (%)                                   |                                 |                               |                     |             |
| Level                    | Variables                 | Neither<br>N =<br>15,973                | Anxiety<br>only<br>N =<br>3,070 | Depression<br>only<br>N = 154 | Comorbid<br>N = 833 | P-<br>Value |
| Intrapersonal<br>factors | Age group<br>(5-year)     |                                         |                                 |                               |                     | < 0.001     |
|                          | 15–19                     | 1,487<br>(9.3%)                         | 179<br>(5.8%)                   | 19 (13%)                      | 44 (5.2%)           |             |
|                          | 20–24                     | 2,847<br>(18%)                          | 336<br>(11%)                    | 20 (13%)                      | 87 (10%)            |             |
|                          | 25–29                     | 2,895<br>(18%)                          | 465<br>(15%)                    | 30 (20%)                      | 133<br>(16%)        |             |
|                          | 30–34                     | 2,700<br>(17%)                          | 559<br>(18%)                    | 20 (13%)                      | 158<br>(19%)        |             |
|                          | 35–39                     | 2,538<br>(16%)                          | 624<br>(20%)                    | 21 (14%)                      | 161<br>(19%)        |             |
|                          | 40–44                     | 1,926<br>(12%)                          | 483<br>(16%)                    | 22 (14%)                      | 115<br>(14%)        |             |
|                          | 45–49                     | 1,579<br>(9.9%)                         | 423<br>(14%)                    | 21 (14%)                      | 136<br>(16%)        |             |
|                          | Educational<br>attainment |                                         |                                 |                               |                     | < 0.001     |
|                          | no education              | 1,995<br>(12%)                          | 568<br>(19%)                    | 27 (18%)                      | 161<br>(19%)        |             |
|                          | primary                   | 4,030<br>(25%)                          | 917<br>(30%)                    | 35 (23%)                      | 232<br>(28%)        |             |
|                          | secondary                 | 7,616<br>(48%)                          | 1,298<br>(42%)                  | 66 (43%)                      | 379<br>(46%)        |             |
|                          | higher                    | 2,331<br>(15%)                          | 286<br>(9.3%)                   | 26 (17%)                      | 61 (7.3%)           |             |
|                          | Age at first birth        |                                         |                                 |                               |                     | < 0.001     |
|                          | < 18 years                | 5,707<br>(36%)                          | 1,214<br>(40%)                  | 58 (38%)                      | 337<br>(40%)        |             |

|                                  |                                                 | Mental health outcome (PHQ-9 and GAD-7) |                                 |                               |                     |             |
|----------------------------------|-------------------------------------------------|-----------------------------------------|---------------------------------|-------------------------------|---------------------|-------------|
|                                  |                                                 | n (%)                                   |                                 |                               |                     |             |
| Level                            | Variables                                       | Neither<br>N =<br>15,973                | Anxiety<br>only<br>N =<br>3,070 | Depression<br>only<br>N = 154 | Comorbid<br>N = 833 | P-<br>Value |
|                                  | ≥ 18 years                                      | 10,265<br>(64%)                         | 1,855<br>(60%)                  | 96 (62%)                      | 496<br>(60%)        |             |
|                                  | <b>Age at first sex</b>                         |                                         |                                 |                               |                     | < 0.001     |
|                                  | < 18 years                                      | 10,563<br>(66%)                         | 2,187<br>(71%)                  | 103 (67%)                     | 582<br>(70%)        |             |
|                                  | ≥ 18 years                                      | 5,410<br>(34%)                          | 882<br>(29%)                    | 51 (33%)                      | 250<br>(30%)        |             |
|                                  | <b>Terminated<br/>pregnancy</b>                 |                                         |                                 |                               |                     | < 0.001     |
|                                  | No                                              | 12,522<br>(78%)                         | 2,218<br>(72%)                  | 112 (73%)                     | 608<br>(73%)        |             |
|                                  | Yes                                             | 3,451<br>(22%)                          | 852<br>(28%)                    | 42 (27%)                      | 225<br>(27%)        |             |
| <b>Interpersonal<br/>factors</b> | <b>Spousal<br/>Pressure</b>                     |                                         |                                 |                               |                     | < 0.001     |
|                                  | No                                              | 14,957<br>(97%)                         | 2,688<br>(96%)                  | 132 (94%)                     | 676<br>(90%)        |             |
|                                  | Yes                                             | 411<br>(2.7%)                           | 115<br>(4.1%)                   | 8 (6.0%)                      | 71 (9.6%)           |             |
|                                  | <b>Attitude Towards<br/>Violence</b>            |                                         |                                 |                               |                     | < 0.001     |
|                                  | Does not justify<br>wife-beating                | 13,892<br>(87%)                         | 2,541<br>(83%)                  | 124 (80%)                     | 705<br>(85%)        |             |
|                                  | Justifies wife-<br>beating                      | 2,080<br>(13%)                          | 528<br>(17%)                    | 30 (20%)                      | 127<br>(15%)        |             |
|                                  | <b>Women's<br/>decision-making<br/>autonomy</b> |                                         |                                 |                               |                     | < 0.001     |
|                                  | Low                                             | 3,307<br>(21%)                          | 531<br>(17%)                    | 37 (24%)                      | 143<br>(17%)        |             |
|                                  | High                                            | 12,665<br>(79%)                         | 2,539<br>(83%)                  | 116 (76%)                     | 690<br>(83%)        |             |

| Mental health outcome (PHQ-9 and GAD-7) |                                |                          |                                 |                               |                     |             |
|-----------------------------------------|--------------------------------|--------------------------|---------------------------------|-------------------------------|---------------------|-------------|
| n (%)                                   |                                |                          |                                 |                               |                     |             |
| Level                                   | Variables                      | Neither<br>N =<br>15,973 | Anxiety<br>only<br>N =<br>3,070 | Depression<br>only<br>N = 154 | Comorbid<br>N = 833 | P-<br>Value |
|                                         | <b>Spousal Education</b>       |                          |                                 |                               |                     |             |
|                                         | no education                   | 3,082<br>(20%)           | 781<br>(28%)                    | 32 (23%)                      | 227<br>(30%)        |             |
|                                         | primary                        | 4,303<br>(28%)           | 829<br>(30%)                    | 32 (23%)                      | 222<br>(30%)        |             |
|                                         | secondary                      | 5,086<br>(33%)           | 836<br>(30%)                    | 57 (40%)                      | 217<br>(29%)        |             |
|                                         | higher                         | 2,899<br>(19%)           | 357<br>(13%)                    | 20 (14%)                      | 80 (11%)            |             |
| <b>Community factors</b>                | <b>Place of residence</b>      |                          |                                 |                               |                     | 0.123       |
|                                         | urban                          | 4,637<br>(29%)           | 813<br>(26%)                    | 41 (27%)                      | 210<br>(25%)        |             |
|                                         | rural                          | 11,336<br>(71%)          | 2,257<br>(74%)                  | 113 (73%)                     | 623<br>(75%)        |             |
|                                         | <b>Administrative division</b> |                          |                                 |                               |                     | < 0.001     |
|                                         | Barishal                       | 958<br>(6.0%)            | 185<br>(6.0%)                   | 15 (10%)                      | 41 (4.9%)           |             |
|                                         | Chattogram                     | 2,924<br>(18%)           | 667<br>(22%)                    | 23 (15%)                      | 134<br>(16%)        |             |
|                                         | Dhaka                          | 4,199<br>(26%)           | 670<br>(22%)                    | 38 (25%)                      | 173<br>(21%)        |             |
|                                         | Khulna                         | 1,891<br>(12%)           | 342<br>(11%)                    | 18 (12%)                      | 138<br>(17%)        |             |
|                                         | Mymensingh                     | 1,253<br>(7.8%)          | 216<br>(7.0%)                   | 13 (8.8%)                     | 44 (5.3%)           |             |
|                                         | Rajshahi                       | 2,137<br>(13%)           | 390<br>(13%)                    | 21 (14%)                      | 77 (9.3%)           |             |
|                                         | Rangpur                        | 1,682<br>(11%)           | 435<br>(14%)                    | 22 (14%)                      | 153<br>(18%)        |             |

|                             |                                   | <b>Mental health outcome (PHQ-9 and GAD-7)</b> |                                           |                                        |                             |                     |
|-----------------------------|-----------------------------------|------------------------------------------------|-------------------------------------------|----------------------------------------|-----------------------------|---------------------|
|                             |                                   | <b>n (%)</b>                                   |                                           |                                        |                             |                     |
| <b>Level</b>                | <b>Variables</b>                  | <b>Neither<br/>N =<br/>15,973</b>              | <b>Anxiety<br/>only<br/>N =<br/>3,070</b> | <b>Depression<br/>only<br/>N = 154</b> | <b>Comorbid<br/>N = 833</b> | <b>P-<br/>Value</b> |
|                             | Sylhet                            | 929<br>(5.8%)                                  | 164<br>(5.4%)                             | 3 (2.0%)                               | 72 (8.7%)                   |                     |
| <b>Societal<br/>factors</b> | <b>Household<br/>wealth index</b> |                                                |                                           |                                        |                             | < 0.001             |
|                             | poorest                           | 2,755<br>(17%)                                 | 626<br>(20%)                              | 30 (19%)                               | 172<br>(21%)                |                     |
|                             | poorer                            | 3,125<br>(20%)                                 | 696<br>(23%)                              | 33 (21%)                               | 174<br>(21%)                |                     |
|                             | middle                            | 3,314<br>(21%)                                 | 599<br>(20%)                              | 32 (21%)                               | 192<br>(23%)                |                     |
|                             | richer                            | 3,369<br>(21%)                                 | 629<br>(20%)                              | 30 (20%)                               | 162<br>(19%)                |                     |
|                             | richest                           | 3,410<br>(21%)                                 | 521<br>(17%)                              | 29 (19%)                               | 133<br>(16%)                |                     |
|                             | <b>Religion</b>                   |                                                |                                           |                                        |                             | 0.002               |
|                             | Others                            | 1,611<br>(10%)                                 | 238<br>(7.7%)                             | 14 (9.1%)                              | 58 (7.0%)                   |                     |
|                             | Islam                             | 14,362<br>(90%)                                | 2,832<br>(92%)                            | 140 (91%)                              | 774<br>(93%)                |                     |
|                             | <b>Exposure to<br/>mass media</b> |                                                |                                           |                                        |                             | 0.190               |
|                             | No media access                   | 14,014<br>(88%)                                | 2,729<br>(89%)                            | 142 (92%)                              | 738<br>(89%)                |                     |
|                             | Has media<br>access               | 1,958<br>(12%)                                 | 340<br>(11%)                              | 12 (7.6%)                              | 94 (11%)                    |                     |

## Results

The analytical sample comprised a weighted total of 20,029 married women aged 15–49 years. As shown in Table 2, most women were classified as having neither depression nor anxiety (80.0%, n = 15,973). Among those with symptoms, anxiety only was the most prevalent category (15.0%, n = 3,070),

followed by comorbid anxiety and depression (4.2%,  $n = 833$ ). Depression only was least common (0.8%,  $n = 154$ ).

## Sample characteristics

Intrapersonal characteristics indicated representation across the reproductive life course. Women aged 25–29 years (18.0%), 30–34 years (17.0%), and 35–39 years (17.0%) comprised the largest age groups, while those aged 15–19 years represented 8.6% of the sample. Educational attainment was mixed: 46.8% had completed secondary education, 26.0% had primary education, 13.5% had higher education, and 13.7% reported no formal education. Early life transitions were common, with 67.2% reporting first sex before 18 years and 36.5% reporting first birth before 18 years. A history of terminated pregnancy was reported by 22.8% of women.

Interpersonal and household factors showed that 80.0% of women had high decision-making autonomy, while 13.8% justified wife-beating in at least one scenario. Pregnancy pressure from a husband or family member was reported by 3.2% of respondents. Regarding partner education, 32.8% of husbands had secondary education, 18.0% had higher education, and 21.8% had no formal education. At the community and societal levels, 71.5% of women resided in rural areas and 28.5% in urban areas. Participants were distributed across all eight administrative divisions, with the largest shares in Dhaka (25.1%) and Chattogram (19.4%). Most women identified as Muslim (90.4%). Media access was low (12.0%) based on the study composite indicator. Household wealth was approximately evenly distributed across quintiles.

## Bivariate associations

Bivariate analyses (Table 3) indicated that the distribution of the four-category mental health status differed significantly across most socio-ecological factors. Statistically significant differences were observed for intrapersonal indicators including age group, education, age at first birth, age at first sex, and terminated pregnancy (all  $p < 0.001$ ). Interpersonal factors were also strongly associated with mental health categories, including pregnancy pressure, attitudes justifying wife-beating, and women's decision-making autonomy (all  $p < 0.001$ ). At the community and societal levels, administrative division ( $p < 0.001$ ), household wealth index ( $p < 0.001$ ), and religion ( $p = 0.002$ ) were significantly associated with mental health categories. In contrast, place of residence (urban/rural) ( $p = 0.123$ ) and media access ( $p = 0.190$ ) were not significantly associated.

Table 4

Adjusted relative risk ratios (aARR) from survey-weighted multinomial regression of combined anxiety–depression categories (reference: neither depression nor anxiety)

| Predictor                 | Anxiety only vs Neither depression nor anxiety |         | Depression only vs Neither depression nor anxiety |         | Comorbid vs Neither depression nor anxiety |         |
|---------------------------|------------------------------------------------|---------|---------------------------------------------------|---------|--------------------------------------------|---------|
|                           | aARR (95% CI)                                  | p-value | aARR (95% CI)                                     | p-value | aARR (95% CI)                              | p-value |
| <b>Age at first birth</b> |                                                |         |                                                   |         |                                            |         |
| ≥ 18 years                | 1.03 (0.93–1.15)                               | 0.57905 | 0.98 (0.61–1.55)                                  | 0.91666 | 0.95 (0.78–1.16)                           | 0.60512 |
| <b>Age at first sex</b>   |                                                |         |                                                   |         |                                            |         |
| ≥ 18 years                | 0.94 (0.83–1.07)                               | 0.37956 | 1.14 (0.71–1.85)                                  | 0.58619 | 1.15 (0.90–1.46)                           | 0.25359 |
| <b>Age Group</b>          |                                                |         |                                                   |         |                                            |         |
| 20–24                     | 0.93 (0.74–1.18)                               | 0.57518 | 0.42 (0.21–0.85)                                  | 0.01637 | 1.03 (0.67–1.59)                           | 0.8845  |
| 25–29                     | 1.31 (1.05–1.65)                               | 0.0174  | 0.68 (0.32–1.44)                                  | 0.31537 | 1.54 (1.00–2.38)                           | 0.04934 |
| 30–34                     | 1.61 (1.29–2.02)                               | < 0.001 | 0.53 (0.26–1.09)                                  | 0.08593 | 1.86 (1.23–2.81)                           | 0.0035  |
| 35–39                     | 1.85 (1.47–2.32)                               | < 0.001 | 0.49 (0.23–1.08)                                  | 0.07884 | 1.95 (1.26–3.04)                           | 0.00294 |
| 40–44                     | 1.78 (1.40–2.28)                               | < 0.001 | 0.76 (0.32–1.80)                                  | 0.53607 | 1.74 (1.15–2.63)                           | 0.00927 |
| 45–49                     | 1.80 (1.39–2.31)                               | < 0.001 | 0.70 (0.30–1.61)                                  | 0.39758 | 2.48 (1.58–3.90)                           | < 0.001 |
| <b>Division</b>           |                                                |         |                                                   |         |                                            |         |
| Chattogram                | 1.21 (0.91–1.62)                               | 0.1819  | 0.47 (0.20–1.10)                                  | 0.08311 | 1.09 (0.63–1.90)                           | 0.74967 |
| Dhaka                     | 0.84 (0.65–1.09)                               | 0.18944 | 0.54 (0.24–1.20)                                  | 0.13024 | 0.98 (0.62–1.57)                           | 0.94587 |

| Predictor                           | Anxiety only vs Neither depression nor anxiety |         | Depression only vs Neither depression nor anxiety |         | Comorbid vs Neither depression nor anxiety |         |
|-------------------------------------|------------------------------------------------|---------|---------------------------------------------------|---------|--------------------------------------------|---------|
|                                     | aARR (95% CI)                                  | p-value | aARR (95% CI)                                     | p-value | aARR (95% CI)                              | p-value |
| Khulna                              | 0.93 (0.71–1.22)                               | 0.61008 | 0.57 (0.26–1.23)                                  | 0.15196 | 1.68 (1.09–2.58)                           | 0.01852 |
| Mymensingh                          | 0.86 (0.64–1.14)                               | 0.29545 | 0.66 (0.28–1.54)                                  | 0.33447 | 0.73 (0.47–1.15)                           | 0.18011 |
| Rajshahi                            | 0.89 (0.67–1.19)                               | 0.42176 | 0.58 (0.26–1.29)                                  | 0.18117 | 0.74 (0.46–1.18)                           | 0.20952 |
| Rangpur                             | 1.33 (1.02–1.73)                               | 0.03333 | 0.73 (0.31–1.71)                                  | 0.46576 | 2.12 (1.35–3.33)                           | 0.00112 |
| Sylhet                              | 0.88 (0.65–1.18)                               | 0.38518 | 0.17 (0.05–0.51)                                  | 0.00163 | 1.63 (0.98–2.72)                           | 0.06052 |
| <b>Education</b>                    |                                                |         |                                                   |         |                                            |         |
| Higher                              | 0.75 (0.58–0.96)                               | 0.02123 | 1.18 (0.47–2.96)                                  | 0.73134 | 0.53 (0.32–0.87)                           | 0.01134 |
| Primary                             | 0.90 (0.77–1.04)                               | 0.16423 | 0.62 (0.33–1.16)                                  | 0.13335 | 0.86 (0.67–1.11)                           | 0.23728 |
| Secondary                           | 0.83 (0.70–0.98)                               | 0.03172 | 0.58 (0.27–1.26)                                  | 0.17013 | 0.91 (0.69–1.19)                           | 0.47451 |
| <b>Decision-making autonomy</b>     |                                                |         |                                                   |         |                                            |         |
| High                                | 1.09 (0.96–1.23)                               | 0.17044 | 0.79 (0.50–1.24)                                  | 0.31041 | 1.16 (0.90–1.49)                           | 0.2548  |
| <b>ATV</b>                          |                                                |         |                                                   |         |                                            |         |
| Justifies wife-beating (any reason) | 1.29 (1.12–1.49)                               | < 0.001 | 1.55 (0.88–2.73)                                  | 0.12958 | 1.06 (0.84–1.35)                           | 0.61575 |
| <b>Exposure to Media</b>            |                                                |         |                                                   |         |                                            |         |

| Predictor                   | Anxiety only vs Neither depression nor anxiety |         | Depression only vs Neither depression nor anxiety |         | Comorbid vs Neither depression nor anxiety |         |
|-----------------------------|------------------------------------------------|---------|---------------------------------------------------|---------|--------------------------------------------|---------|
|                             | aARR (95% CI)                                  | p-value | aARR (95% CI)                                     | p-value | aARR (95% CI)                              | p-value |
| Has access                  | 1.03 (0.88–1.20)                               | 0.7368  | 0.65 (0.34–1.25)                                  | 0.19804 | 1.07 (0.80–1.41)                           | 0.65214 |
| <b>Partner education</b>    |                                                |         |                                                   |         |                                            |         |
| Higher                      | 0.75 (0.59–0.94)                               | 0.0124  | 0.57 (0.24–1.37)                                  | 0.20867 | 0.62 (0.43–0.91)                           | 0.01398 |
| Primary                     | 0.91 (0.79–1.04)                               | 0.15478 | 0.87 (0.51–1.51)                                  | 0.62957 | 0.81 (0.64–1.02)                           | 0.07034 |
| Secondary                   | 0.87 (0.75–1.02)                               | 0.07943 | 1.25 (0.67–2.34)                                  | 0.47861 | 0.75 (0.57–0.98)                           | 0.03731 |
| <b>Spousal pressure</b>     |                                                |         |                                                   |         |                                            |         |
| Yes                         | 1.63 (1.28–2.07)                               | < 0.001 | 2.20 (1.00–4.84)                                  | 0.04912 | 4.07 (2.83–5.85)                           | < 0.001 |
| <b>Religion</b>             |                                                |         |                                                   |         |                                            |         |
| Islam                       | 1.44 (1.17–1.77)                               | < 0.001 | 0.98 (0.53–1.83)                                  | 0.95525 | 1.75 (1.25–2.44)                           | 0.00117 |
| <b>Residence</b>            |                                                |         |                                                   |         |                                            |         |
| Rural                       | 1.00 (0.86–1.16)                               | 0.95515 | 1.05 (0.66–1.66)                                  | 0.83463 | 1.04 (0.76–1.41)                           | 0.80464 |
| <b>Terminated pregnancy</b> |                                                |         |                                                   |         |                                            |         |
| Yes                         | 1.28 (1.14–1.43)                               | < 0.001 | 1.50 (0.96–2.35)                                  | 0.07735 | 1.22 (1.00–1.49)                           | 0.04611 |
| <b>Wealth index</b>         |                                                |         |                                                   |         |                                            |         |
| Middle                      | 0.92 (0.78–1.09)                               | 0.32801 | 1.12 (0.60–2.08)                                  | 0.72153 | 1.18 (0.88–1.60)                           | 0.27103 |

| Predictor | Anxiety only vs Neither depression nor anxiety |         | Depression only vs Neither depression nor anxiety |         | Comorbid vs Neither depression nor anxiety |         |
|-----------|------------------------------------------------|---------|---------------------------------------------------|---------|--------------------------------------------|---------|
|           | aARR (95% CI)                                  | p-value | aARR (95% CI)                                     | p-value | aARR (95% CI)                              | p-value |
| Poorer    | 1.08 (0.93–1.27)                               | 0.32232 | 1.08 (0.58–2.00)                                  | 0.8127  | 1.08 (0.82–1.42)                           | 0.59466 |
| Richer    | 0.98 (0.82–1.17)                               | 0.84933 | 1.05 (0.55–2.00)                                  | 0.88538 | 1.01 (0.73–1.39)                           | 0.95344 |
| Richest   | 0.89 (0.73–1.10)                               | 0.28792 | 1.11 (0.56–2.23)                                  | 0.75978 | 0.92 (0.63–1.34)                           | 0.67339 |

## Multivariable Survey-Weighted Multinomial Regression

Table 4 presents the results of the fully adjusted survey-weighted multinomial logistic regression model. Using respondents with neither depression nor anxiety as the reference category, the analysis identifies distinct risk profiles for women experiencing singular versus comorbid mental health conditions.

### Anxiety Only (vs. Neither)

The likelihood of experiencing anxiety in isolation exhibited a distinct demographic and interpersonal pattern. Age emerged as a consistent predictor, with the relative risk rising monotonically across the lifespan, reflecting a cumulative burden of stress. Compared to adolescents (15–19 years), the risk of anxiety was significantly elevated among women in their thirties and peaked in the 35–39 age bracket (aRRR 1.85, 95% CI 1.47–2.32) and remained high through ages 45–49 (aRRR 1.80, 95% CI 1.39–2.31).

Indicators of interpersonal and reproductive stress were also robustly associated with anxiety. Women with a history of terminated pregnancy faced a 28% higher relative risk (aRRR 1.28, 95% CI 1.14–1.43), suggesting lasting psychological impacts from reproductive loss. Notably, markers of patriarchal pressure played a significant role; women facing spousal or family pressure to become pregnant (aRRR 1.63, 95% CI 1.28–2.07) and those justifying wife-beating (aRRR 1.29, 95% CI 1.12–1.49) were significantly more prone to anxiety, underscoring the link between low autonomy and hypervigilance.

Conversely, education functioned as a crucial protective buffer. A gradient effect was observed where higher educational attainment (aRRR 0.75, 95% CI 0.58–0.96) and having a highly educated partner (aRRR 0.75, 95% CI 0.59–0.94) significantly mitigated the risk of anxiety. At the societal level, identifying as Muslim was associated with a higher risk (aRRR 1.44, 95% CI 1.17–1.77), and regional disparities were evident, with women in the Rangpur division showing increased vulnerability (aRRR 1.33, 95% CI 1.02–1.73) relative to the reference division.

### Depression Only (vs. Neither)

The “depression-only” category was a relatively rare outcome (0.8% prevalence), resulting in wider confidence intervals and less precision in the estimates. However, pregnancy pressure again emerged as a potent stressor, more than doubling the relative risk of depression (aRRR 2.20, 95% CI 1.00–4.84). This suggests that reproductive coercion is a transdiagnostic risk factor, driving both anxiety and depressive symptoms. In contrast to anxiety, early adulthood appeared protective; women aged 20–24 years had a significantly lower risk compared to the youngest cohort (aRRR 0.42, 95% CI 0.21–0.85). Regionally, women residing in Sylhet exhibited a marked reduction in risk (aRRR 0.17, 95% CI 0.05–0.51) compared to the reference group.

## **Comorbid Anxiety and Depression (vs. Neither)**

The analysis of comorbidity revealed the most severe associations, highlighting the “dual burden” of compounding stressors. The profound impact of pregnancy pressure was most visible here, showing the strongest association in the entire model (aRRR 4.07, 95% CI 2.83–5.85). This indicates that reproductive coercion is not merely a stressor but a critical driver of severe, concurrent psychological distress.

Age-related vulnerability was also exacerbated in the comorbid group. The risk profile escalated sharply with age, reaching its peak among women aged 45–49 years (aRRR 2.48, 95% CI 1.58–3.90), suggesting that the intersection of aging and social responsibilities disproportionately contributes to comorbid conditions. A history of terminated pregnancy remained a significant risk factor (aRRR 1.22, 95% CI 1.00–1.49).

The protective role of socioeconomic status was strong against comorbidity. Higher education reduced the relative risk by nearly half (aRRR 0.53, 95% CI 0.32–0.87), and partner’s higher education conferred similar protection (aRRR 0.62, 95% CI 0.43–0.91), validating the hypothesis that resource access mitigates severe mental health outcomes. Societal and geographic factors further stratified risk; Muslim women faced a 75% higher relative risk of comorbidity (aRRR 1.75, 95% CI 1.25–2.44). Regional inequality was stark, with women in Rangpur (aRRR 2.12, 95% CI 1.35–3.33) and Khulna (aRRR 1.68, 95% CI 1.09–2.58) significantly more likely to suffer from simultaneous anxiety and depression compared to the reference division.

## **Discussions**

This study focused on the prevalence and determinants of singular and comorbid mental health outcomes among ever-married women of reproductive age (15–49) in Bangladesh. The findings reported that 15% of respondents had symptoms of anxiety alone, while 4.2% experienced comorbid anxiety and depression. Furthermore, the findings of our study suggested that age, education of the respondent and spouse, reproductive history, pregnancy pressure, and regional location were significant determinants of these mental health categories. Notably, the comorbidity of anxiety and depression was driven by distinct, high-intensity stressors that differed from those driving singular outcomes.

Our analysis revealed that the “dual burden” of psychological distress is most acutely visible in the strong association between reproductive coercion and comorbidity. We found that women facing pressure from husbands or families to become pregnant had a four-fold increase in the relative risk of experiencing simultaneous anxiety and depression (aRRR 4.07). This finding aligns with emerging literature on reproductive coercion, which suggests that the inability to control one's reproductive trajectory acts as a profound “transdiagnostic” stressor, stripping women of personal agency and increasing susceptibility to severe psychological impairment (39). While studies around the world have established links between intimate partner violence and mental health, our specific finding on pregnancy pressure highlights a nuanced form of “structural powerlessness” common in patriarchal settings like Bangladesh, where women’s value is frequently tied to their reproductive capacity (40). This pressure likely functions as a chronic environmental stressor, maintaining the body in a state of hypervigilance (anxiety) while simultaneously fostering the hopelessness characteristic of depression. We also found that identifying as Muslim was associated with a significantly higher relative risk of comorbidity (aRRR 1.75). This suggests that specific societal norms or cultural expectations regarding marital duties and family structures within these communities may impose unique pressures on married women that warrant deeper qualitative exploration (19, 40).

We found that women aged 45–49 had the highest relative risk of both anxiety and comorbidity, exhibiting a monotonic rise in vulnerability across the lifespan. Studies around the world also found higher levels of anxiety and depression in middle-aged women, often attributing this to the “sandwich generation” effect where women bear the dual responsibility of caring for aging parents and raising children (41–43). In the South Asian context, this period also coincides with the menopausal transition, which prior studies in Pakistan and Bangladesh have linked to increased psychological distress due to converging biological changes and shifting family roles (41, 44). This supports the hypothesis of “cumulative stress,” suggesting that the mental health burden on married women is not static but accumulates over decades of unpaid domestic labor and social obligation.

Though the educational level of respondents was significantly associated with all mental health categories, it served as a particularly robust protective barrier against comorbidity. Our study found that higher education reduced the risk of comorbid distress by nearly half. Research consistently shows that education serves as a powerful protective shield for women’s mental health (45, 46). By providing a greater sense of stability and a stronger voice in household decisions, education empowers women to navigate their daily lives with more confidence and control. Similarly, our findings highlight that a husband's education is just as important as the woman's own. Partners with higher educational attainment often hold more supportive and equal views on gender roles, which creates a more peaceful home environment (47, 48). This shared understanding helps reduce the domestic conflict and emotional strain that so often contributes to the “dual burden” of distress.

Regional disparities were severe, with women living in Rangpur and Khulna exhibiting significantly higher levels of comorbidity than the rest of the country. This can be explained by the economic geography of Bangladesh; Rangpur is historically one of the poorest divisions, where the synergy of poverty and

limited infrastructure exacerbates psychological vulnerability (49). Poverty has been proved to be one of the most consistent predictors of depression among women for its considerable impact on sources of social support and access to healthcare. Similarly, household wealth status was significantly associated with both anxiety and comorbidity, as lower economic status restricts the resources available to manage chronic stress (42, 48). Finally, women who justified wife-beating reported significantly higher levels of anxiety, reinforcing the theory that internalized patriarchal norms create a psychological environment of constant threat. Studies in Iran, Nigeria, and rural Bangladesh have similarly found that the normalization of violence is inextricably bound to chronic anxiety states, as it forces women to continuously scan their environment for potential social transgressions (50–54).

## Strength and Limitations

The primary strength of this study lies in its methodological innovation; to our knowledge, this is the first nationally representative analysis in Bangladesh to utilize a four-category joint-outcome framework to examine mental health. By moving beyond single-disorder analyses to a multinomial framework that classifies outcomes as neither, anxiety-only, depression-only, or comorbid, this study provides a clearer picture of the distinct mental health profiles among women. This approach offers deeper insight into how systemic inequities—such as reproductive coercion and economic dependence—serve as powerful drivers of severe, overlapping conditions rather than isolated symptoms.

Furthermore, the study is grounded in a robust Social-Ecological Model (SEM), which permits a holistic examination of determinants ranging from biological transitions to broad societal norms. Unlike previous research restricted to specific occupational cohorts or urban enclaves, this analysis utilizes the 2022 BDHS, ensuring national generalizability through a rigorous, stratified cluster sampling design. The internal validity of the findings is bolstered by the use of the validated Bangla versions of the GAD-7 and PHQ-9 instruments, which are widely recognized for their high sensitivity and specificity in screening for generalized anxiety and major depressive disorders. Finally, the application of a survey-weighted multinomial logistic regression model ensures that the estimates accurately reflect the complex stratification of the Bangladeshi population, correcting for sampling design and non-response bias.

Despite these strengths, several limitations must be acknowledged. First, the cross-sectional design of the BDHS precludes the establishment of causal relationships. While we identified strong associations between “patriarchal pressure” and comorbid outcomes, we cannot definitively determine the temporal sequence between stressors and the onset of symptoms. Second, we relied on proxy indicators—such as pregnancy pressure and decision-making autonomy—to infer the presence of “structural powerlessness”. While these variables are robust, they may not fully capture the multidimensional and often invisible nature of power dynamics within conservative households.

Third, the data relies on self-reported screening tools rather than diagnostic clinical interviews. While the Water Glass Pictorial Scale was employed to aid comprehension, cultural stigma surrounding mental health in Bangladesh may have led to the underreporting of symptoms. Fourth, the “depression-only”

category constituted a small proportion (0.8%) of the total sample, resulting in wider confidence intervals that require cautious interpretation. Finally, specific clinical nuances, such as the duration of symptoms or detailed history of intimate partner violence, were not available, limiting our ability to measure the full cumulative impact of trauma.

## Conclusions

Anxiety and depression are prevalent among married women in Bangladesh, yet the burden of comorbidity is driven by distinct, high-intensity stressors that differ from those driving singular outcomes. This study identifies reproductive coercion as a critical transdiagnostic driver of severe distress, amplifying the risk of simultaneous anxiety and depression by four times. These findings suggest that severe psychiatric comorbidity is not merely a medical issue but a symptom of structural powerlessness, where the intersection of economic dependence, rigid gender norms, and regional poverty creates a trap of chronic stress. While education serves as a robust protective buffer, the persistence of regional inequalities in Rangpur and Khulna highlights that individual resilience is often overwhelmed by systemic deprivation. Consequently, public health interventions must transcend symptom management to target the systemic roots of vulnerability. Policy efforts should prioritize family-centered educational initiatives, routine screening for reproductive pressure within maternal health programs, and region-specific resource allocation to mitigate the compounded psychological toll of limited autonomy.

## Declarations

### Ethics Statement

Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements, as this study involved secondary analysis of de-identified public domain data. The original survey protocol was approved by the National Research Ethics Committee (NREC) in Bangladesh and the ICF Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

### Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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# Author Contribution

KSAN and AH contributed to the literature search and study concept and design. AH, ASA, TI, and ARA contributed to data acquisition. KSAN and AH accessed the data and conducted the data analysis. KSAN, AH, ASA, TI, and ARA contributed to data interpretation. KSAN drafted the manuscript. All authors contributed to the critical revision of the manuscript.

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# Data Availability Statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed at the corresponding author/s. The dataset analyzed during the current study is available in the MEASURE DHS repository, <https://dhsprogram.com/data/available-datasets.cfm>.

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Figures

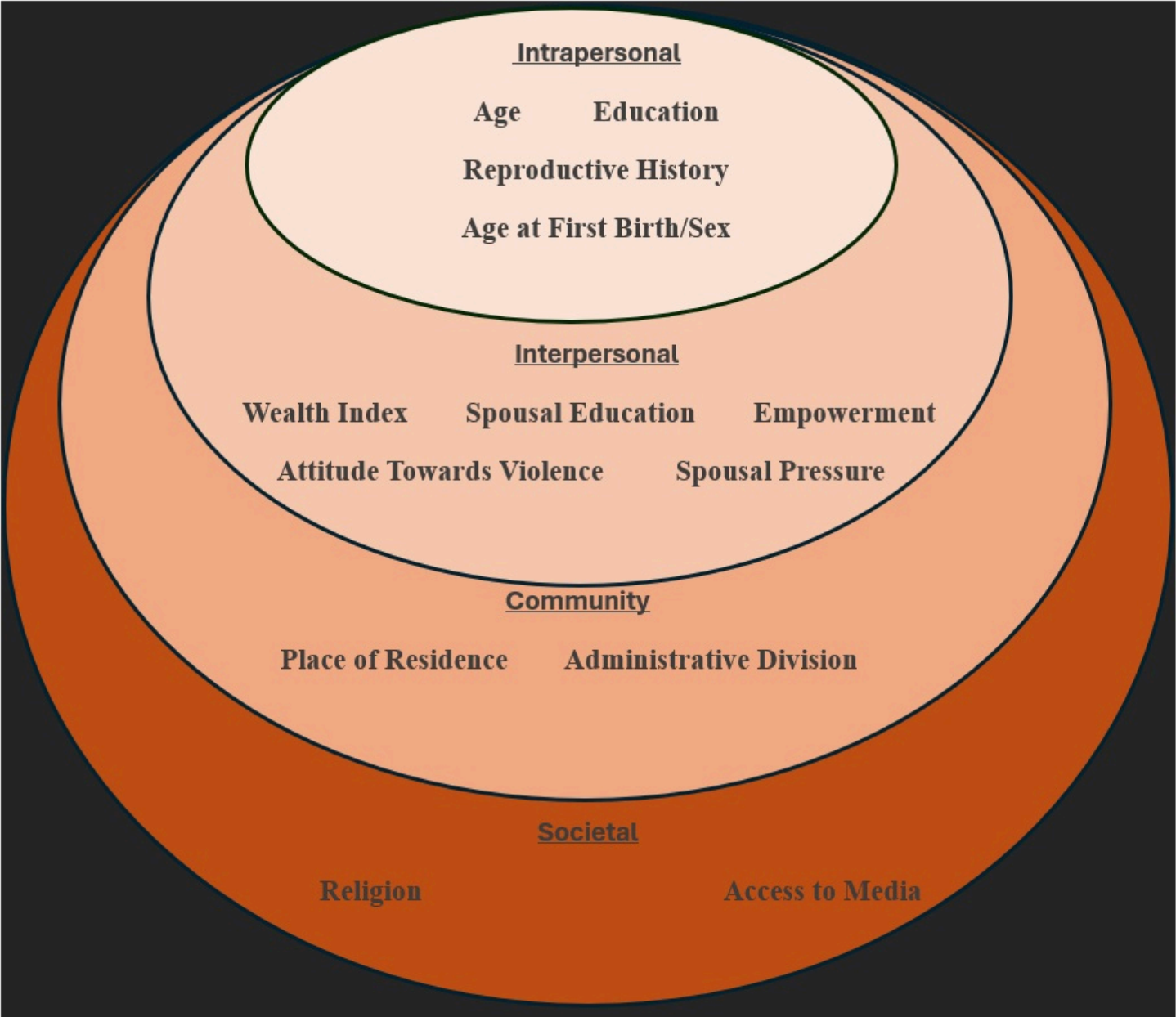


Figure 1

Theoretical Framework of the Study

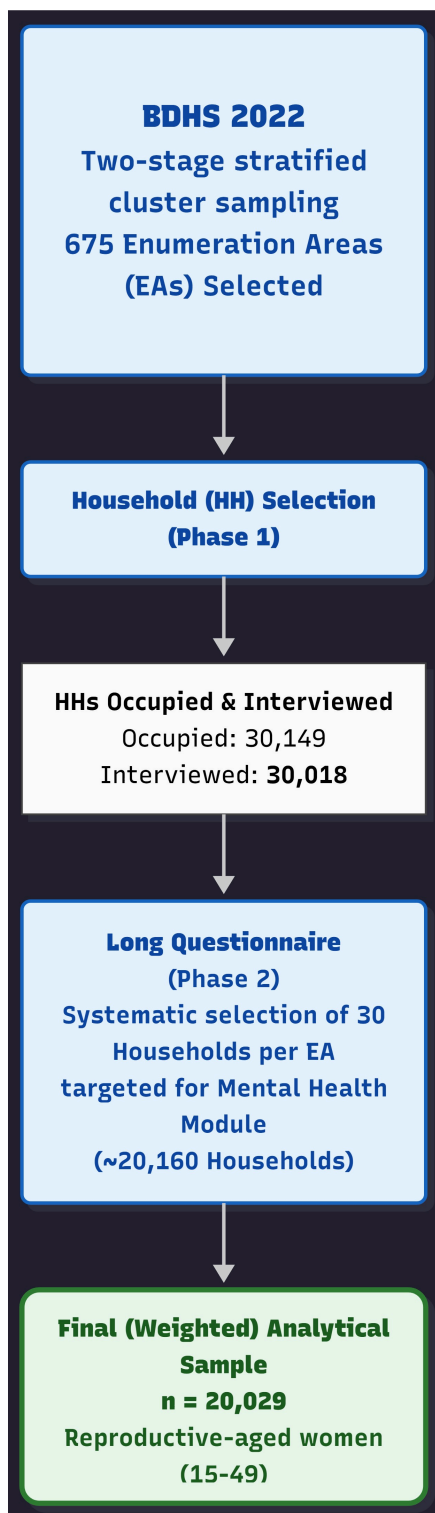


Figure 2

Schematic representation of the study population selection process