

*Research Paper***Exploring Dietary Diversity, Psychological Stress, and Domestic Violence in Pregnant Women: A Socio-Demographic Analysis from Rawalpindi, Pakistan**

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**Abstract:** Pregnancy is one of the most vulnerable and significant stages a woman experiences in her lifetime. Yet, the simultaneous interplay of dietary diversity, stress, and violence in the Pakistani context remains poorly understood. Therefore, the current cross-sectional Rawalpindi-based survey study focused on differences in adequacy of dietary diversity, levels of stress, and prevalence of domestic violence concerning socio-economic status during pregnancy. The sample was selected through purposive sampling, and 381 participants attending different hospitals in Rawalpindi were interviewed using a structured questionnaire. The questionnaire consisted of socio-demographic characteristics, lifestyle attributes, obstetric history, the Diet Quality Questionnaire (DQQ), the Perceived Stress Scale (PSS), the Abuse Assessment Screen (AAS), and an economic abuse assessment. Associations were assessed using multiple regression, and relationships between key variables were examined with Pearson correlation. The results showed that 28.9% of women had inadequate minimum dietary diversity for women (MDD-W), 100% of the individual consumed grains, a moderate percentage of individuals used pulses, dairy products, and other vegetables, and low consumption of nutrient-dense food groups. The 71.9% had moderate, and 19.7% had high-stress levels, but 22% of individuals screened positive for AAS, whereas Economic abuse prevailed in 32% of the participants. Socio-economic status significantly ( $p \leq 0.0002$ ) affected MDD-W, AAS, and economic abuse. The Pearson correlation among MDD-W, PSS, AAS, and economic abuse was negligible. The study highlighted that lower socio-economic status is the most vulnerable factor to provoking stress, domestic violence, and inadequacy of MDD-W. The results help us to analyze the domains where interference is needed based on the intensity of vulnerability.

**Keyword:** Dietary diversity, Perceived stress scale, Economic abuse, Domestic violence, Abuse Assessment screen

**Article History**

Received: 29 July 2025; Revised: 17 September 2025; Accepted: 29 October 2025 Online: 30 November 2025; Published: 30 December 2025; DOI <https://doi.org/10.69501/ennf4258>

**1. Introduction**

The vulnerability regarding pregnancy is a state of lack of health, linked with the presence of at least one of the four

determinants; deficiency, need, risk exposure, and barriers (Colciago et al., 2020), and yet, the influence of the stress and inflammation on mental and behavioral

adaptation of mother during pregnancy is not clear (Bradshaw et al., 2024). Due to the diversity of the environment, every woman gets affected differently, giving rise to varying degrees of vulnerability (Fig. 1). micronutrient deficiencies, stressful situations, and ongoing or history of domestic abuse are the fundamental factors for increasing vulnerability (Biaggi et al., 2016; Robertson et al., 2004; Torheim & Arimond, 2013). Their association with the sociocultural and demographic aspects of Pakistan since a huge gap exists between the impact these factors have on maternal and neonatal outcomes and their general recognition in society (Mongan et al., 2019). As of 2020, almost 800 women died from preventable causes related to pregnancy and childbirth every day (WHO, 2023a). The significant contribution, 95% of all maternal deaths were reported by low and lower-middle-income countries. Pakistan observed an MMR of 186 deaths in 2019: The total excludes Azad Jammu, Kashmir, and Gilgit Baltistan (NIPS, 2019; Shaeen et al., 2022). Of the total low birth-weight babies born in 2020 (19.8 million), 24.9% were reported in South Asia (WHO, 2023b). These births result in either death within the first month or chronic diseases later in life accompanied by stunted growth and lower Intelligence Quotient (IQ) level (Gu et al., 2017).

Much research has proven the association between cultural and societal traditions and maternal complications in the underdeveloped and developing world (Kaur et al., 2018; Tariq et al., 2024). The low social standing of certain groups acts as a *barrier* to access healthcare empowering the harmful means to aid childbearing (Evans, 2013). Pakistan, by far, represents a strongly patriarchal society. Male dominance and power over women in terms of economic, social as well as health autonomy perpetuate gender-based violence

and gendered expectations and burdens (Jamal, 2017). A study conducted in the year 2021 in Dera Ghazi Khan, South Punjab, Pakistan highlights the socio-cultural aspects of maternal mortality from the perspectives of gynecologists and Lady Health Workers (LHW). *“I become horrified to see the pale ghostly faces of women who come to us with maternal complications. The cultural thing here is giving food to the men within the house first, and then the children. Women’s dietary needs are not their priority”* (Omer et al., 2021).

During pregnancy, achieving adequate nutrients in the diet comes with special emphasis on diversity in the foods consumed (Arsenault et al., 2014). Dietary diversity comprises several distinct food groups ingested over a specified period; the reference period can vary but is typically the day before or the preceding week (Gina Kennedy, 2011; Younis et al., 2025). Inadequate dietary diversity indicates micronutrient inadequacy (A Herforth & A Rzepa, 2016). The micronutrient status during pregnancy determines the fetus, nutritional status, birth weight, and possibility of birth defects (Engidaye et al., 2019; Zerfu et al., 2018; Syed et al., 2022). Since micronutrient deficiency is asymptomatic (hidden hunger) until it manifests as a pregnancy complication, the mother becomes inevitably vulnerable.

Pregnancy-induced stress is ‘the imbalance that a pregnant woman feels when she cannot cope with demands, which is expressed both behaviorally and physiologically (Bradshaw et al., 2024; Ruiz & Fullerton, 1999; Ali et al., 2025). The assessment of maternal stress helps in identifying women needing extra psychological adjustment to reduce the probability of postpartum depression (Inekwe & Lee, 2022). While evidence consistently shows that maternal prenatal

**Table 1.** General characteristics.

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**Total N (381)**

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| Characteristic                               | n   | (%)  |
|----------------------------------------------|-----|------|
| <b>Age</b>                                   | -   | -    |
| 18-24                                        | 64  | 16.8 |
| 25-35                                        | 254 | 66.7 |
| 36 and above                                 | 63  | 16.5 |
| <b>Gravida</b>                               | -   | -    |
| 1-2                                          | 109 | 28.6 |
| 3-4                                          | 165 | 43.3 |
| 5 and above                                  | 107 | 28.1 |
| <b>Gestational Complication</b>              | -   | -    |
| Yes                                          | 123 | 32.3 |
| No                                           | 258 | 67.7 |
| <b>History of deliveries</b>                 | -   | -    |
| Cesarean                                     | 154 | 40.4 |
| Normal                                       | 179 | 47   |
| Never given birth                            | 48  | 12.6 |
| <b>History of preterm births</b>             | -   | -    |
| Yes                                          | 51  | 13.4 |
| No                                           | 330 | 86.6 |
| <b>History of miscarriage</b>                | -   | -    |
| Yes                                          | 131 | 34.4 |
| No                                           | 250 | 65.6 |
| <b>Area of residence</b>                     | -   | -    |
| Rural                                        | 246 | 64.6 |
| Urban                                        | 135 | 35.4 |
| <b>Duration of sleep per day</b>             | -   | -    |
| Less than 8 hours                            | 161 | 42.3 |
| 8-12 hours                                   | 203 | 53.3 |
| More than 12 hours                           | 17  | 4.5  |
| <b>Family system</b>                         | -   | -    |
| Nuclear                                      | 121 | 31.8 |
| Joint                                        | 260 | 68.2 |
| <b>Education level</b>                       | -   | -    |
| Graduate                                     | 104 | 27.3 |
| Higher Secondary school/<br>Secondary school | 132 | 34.6 |
| Middle school/under                          | 145 | 38.1 |
| <b>Socioeconomic status</b>                  | -   | -    |
| Upper                                        | 22  | 5.8  |
| Upper middle                                 | 82  | 21.5 |
| Lower middle                                 | 139 | 36.5 |
| Upper lower                                  | 136 | 35.7 |
| Lower                                        | 2   | 0.5  |

stress is associated with an increased risk of adverse child outcomes including delays in neonatal and early-childhood cognitive development the strength and direction of these associations vary across studies, and

causal mechanisms remain complex and not fully established (Lautarescu et al., 2020; Zia-ur-Rehman et al., 2025). In Pakistan, lack of autonomy in family decisions are

widespread issues that contribute to prenatal stress (Ali et al., 2011).

**Table 2.** Frequency distribution for Minimum Dietary Diversity (MDD-W).

| Variable   | N (381) |      |
|------------|---------|------|
|            | n       | (%)  |
| MDD-W      | -       | -    |
| Inadequate | 110     | 28.9 |
| Adequate   | 271     | 71.1 |

According to the Economic and Social Costs of Violence against Women and Girls (VAWG) Pakistan Summary Report 2019, women having experienced Intimate Partner Violence (IPV) were more likely to have a miscarriage (6.7%), have stillbirth or abortion (5.3%). The United Nations Declaration on the Elimination of Violence against Women (1993) describes it as ‘an act of gender-specific violence as a consequence of which the woman suffers from any form of physical, sexual or emotional harm inclusive of threats, persuasion, and force or any unreasonable deprivation of freedom whether public or private’. The presence of spousal violence was higher among illiterate and poorer women than among richer and literate women aged 15-49 years (Hussain et al., 2017a). With Pakistan’s depreciating economy and ever-growing population, it becomes vital to categorize those affected to prevent unfortunate outcomes of pregnancy. The current study helps identify the most vulnerable groups, formulate targeted interventions, and shape public health policy. Additionally, the study highlights the interrelated challenges of suboptimal dietary intake, psychological stress, and intimate partner violence faced by pregnant women in the Rawalpindi region of Pakistan.

## 2. Materials and Methods

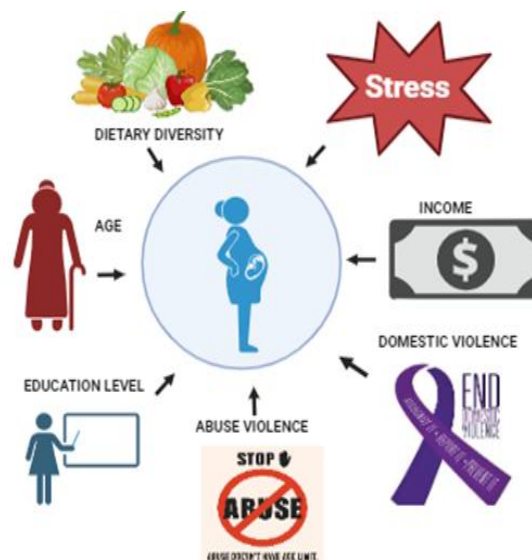
### 2.1 Study design and settings

A cross-sectional study was conducted in different Hospitals (Fauji Foundation Hospital, (FFH), Pak Emirates Military Hospital (PEMH), and Kausar Nursing Clinic) in Rawalpindi, Pakistan. Data were

collected from pregnant women in outpatient (OPD) and indoor patient (Fig. 2).

### 2.2 Sampling Technique

To target women with varied cultural and socio-economic backgrounds, purposive sampling technique was used to select locations for data collection. The sample consisted of 381 pregnant women (Aged 18-45 years) excluding severe complication (e.g., pre-eclampsia, active psychiatric hospitalization).



**Fig. 1** Factors affecting outcomes of pregnancy.

### 2.3 Ethical Approval

The review committee of the Institute of Diet and Nutritional Sciences (IDNS) department gave ethical approval under Ref. no. UOL/ISB/AHBS/DN/FYP/24

### 2.4 Analytical Methods / Data Collection Procedure

Data were collected via face-to-face interviews using a structured questionnaire. The instrument comprised four sections: (I) socio-demographic, lifestyle, and obstetric history; (II) the Diet Quality Questionnaire (DQQ); (III) the Perceived Stress Scale (PSS); and (IV) the Abuse Assessment Screen (AAS). The PSS and AAS were translated into Urdu and pre-tested for cultural appropriateness and comprehension in a pilot study (n=20).

**Table 3.** Bivariate analysis of socio-demographic factors and MDD-W.

| (Predictors)                                 | N (381) | MDD-W (Dependent) |            |              |
|----------------------------------------------|---------|-------------------|------------|--------------|
| Characteristic                               | n       | < 5 n (%)         | ≥ 5 n (%)  | p            |
| <b>Age</b>                                   | -       | -                 | -          | 0.390        |
| 18-24                                        | 64      | 19 (29.7)         | 45 (70.3)  | -            |
| 25-35                                        | 254     | 72 (28.3)         | 182 (71.7) | -            |
| 36 and above                                 | 63      | 19 (30.2)         | 44 (69.8)  | -            |
| <b>No. of children</b>                       | -       | -                 | -          | 0.091        |
| None                                         | 63      | 20 (31.7)         | 43 (68.3)  | -            |
| 1-2                                          | 196     | 60 (30.6)         | 136 (69.4) | -            |
| 3 or more                                    | 122     | 30 (24.6)         | 92 (75.4)  | -            |
| <b>Area of residence</b>                     | -       | -                 | -          | 0.987        |
| Rural                                        | 246     | 72 (29.3)         | 174 (70.7) | -            |
| Urban                                        | 135     | 38 (28.1)         | 97 (71.9)  | -            |
| <b>Family system</b>                         | -       | -                 | -          | 0.404        |
| Nuclear                                      | 121     | 35 (28.9)         | 86 (71.1)  | -            |
| Joint                                        | 260     | 75 (28.8)         | 185 (71.2) | -            |
| <b>Education level</b>                       | -       | -                 | -          | 0.355        |
| Graduate                                     | 104     | 27 (26)           | 77 (74)    | -            |
| Higher Secondary school/<br>Secondary school | 132     | 37 (28)           | 95 (72)    | -            |
| Middle school/under                          | 145     | 46 (31.7)         | 99 (68.3)  | -            |
| <b>Socio-economic status</b>                 | -       | -                 | -          | <b>0.000</b> |
| Upper                                        | 22      | 1 (4.5)           | 21 (95.5)  | -            |
| Upper middle                                 | 82      | 23 (28)           | 59 (72)    | -            |
| Lower middle                                 | 139     | 30 (21.6)         | 109 (78.4) | -            |
| Upper lower                                  | 136     | 55 (40.4)         | 81 (59.6)  | -            |
| Lower                                        | 2       | 1 (50)            | 1 (50)     | -            |

**Table 4.** Frequency distribution for Perceived Stress.

|                         | N (381) |      |
|-------------------------|---------|------|
| Variable                | n       | (%)  |
| <b>Perceived Stress</b> | -       | -    |
| Low                     | 32      | 8.4  |
| Moderate                | 274     | 71.9 |
| High                    | 75      | 19.7 |

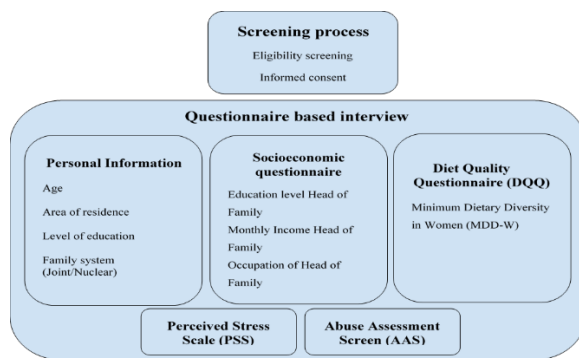
**Table 5.** Bivariate analysis socio-demographic factors and Perceived Stress.

| Predictors               | N (381) | Perceived stress (Dependent) |           |           |       |
|--------------------------|---------|------------------------------|-----------|-----------|-------|
| Characteristic           | n       | Low                          | Moderate  | High      | p     |
| <b>Age (in years)</b>    | -       | -                            | -         | -         | 0.402 |
| 18-24                    | 64      | 6 (9.4)                      | 37 (57.8) | 21 (32.8) | -     |
| 25-35                    | 254     | 21 (8.3)                     | 193 (76)  | 40 (15.7) | -     |
| 36 and above             | 63      | 5 (7.9)                      | 44 (69.8) | 14 (22.2) | -     |
| <b>No. of children</b>   | -       | -                            | -         | -         | 0.877 |
| None                     | 63      | 9 (14.3)                     | 38 (60.3) | 16 (25.4) | -     |
| 1-2                      | 196     | 15 (7.7)                     | 143 (73)  | 38 (19.4) | -     |
| 3 or more                | 122     | 8 (6.6)                      | 93 (76.2) | 21 (17.2) | -     |
| <b>Area of residence</b> | -       | -                            | -         | -         | 0.570 |

|                                              |     |           |            |           |       |
|----------------------------------------------|-----|-----------|------------|-----------|-------|
| Rural                                        | 246 | 24 (9.8)  | 174 (70.7) | 48 (19.5) | -     |
| Urban                                        | 135 | 8 (5.9)   | 100 (74.1) | 27 (20)   | -     |
| <b>Family system</b>                         | -   | -         | -          | -         | 0.152 |
| Nuclear                                      | 121 | 10 (8.3)  | 82 (67.8)  | 29 (24)   | -     |
| Joint                                        | 260 | 22 (8.5)  | 192 (73.8) | 46 (17.7) | -     |
| <b>Education level</b>                       | -   | -         | -          | -         | 0.764 |
| Graduate                                     | 104 | 11 (10.6) | 76 (73.1)  | 17 (16.3) | -     |
| Higher Secondary school/<br>Secondary school | 132 | 8 (6.1)   | 97 (73.5)  | 27 (20.5) | -     |
| Middle school/under                          | 145 | 13 (9)    | 101 (69.7) | 31 (21.4) | -     |
| <b>Socioeconomic status</b>                  | -   | -         | -          | -         | 0.111 |
| Upper                                        | 22  | 6 (27.3)  | 14 (63.6)  | 2 (9.1)   | -     |
| Upper middle                                 | 82  | 4 (4.9)   | 61 (74.4)  | 17 (20.7) | -     |
| Lower middle                                 | 139 | 11 (7.9)  | 104 (74.8) | 24 (17.3) | -     |
| Upper lower                                  | 136 | 11 (8.1)  | 94 (69.1)  | 31 (22.8) | -     |
| Lower                                        | 2   | 0 (0)     | 1 (50)     | 1 (50)    | -     |

## 2.5 Data/Statistical Analysis

The data collected was analyzed using Statistical Package for Social Sciences (SPSS) version IBM 26.0. Chi-square tests were used to examine associations between socio-demographic factors and MDD-W, while multiple regression was employed to identify the significant predictors of the primary outcome variables, such as perceived stress scores and dietary quality, while controlling for potential confounders. The results and interpretation have been discussed accordingly.



**Fig. 2.** The research process and related measuring instruments.

## 3. Results and Discussion

### 3.1 Personal Information

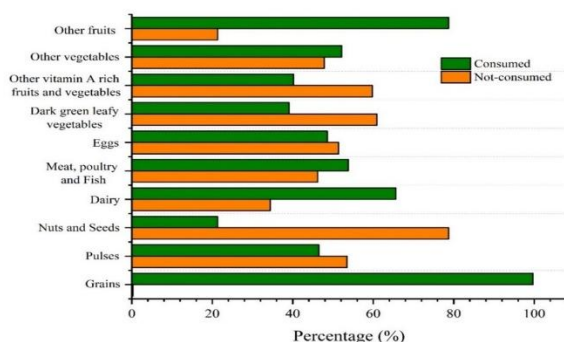
The age group between 25 and 35 was the maximum participants (66.7%). The women who had 3-4 times pregnancies were

43.3% (165). The observations (Table. 1) reflected that 32.3% had gestational complications, and 47% of births were normal, but 13.4% of the women who had experienced preterm births and miscarriages were 13.4% and 34.4% respectively. The maximum number of women (64.6%) came from rural areas, their sleep time was 8-12 hours per day, and 68.2% lived in a joint family system. The middle school and lower levels of education were reported at a maximum of 38.1%. In total, 36.5% belonged to the lower middle and 35.7% belonged upper lower socio-economic class.

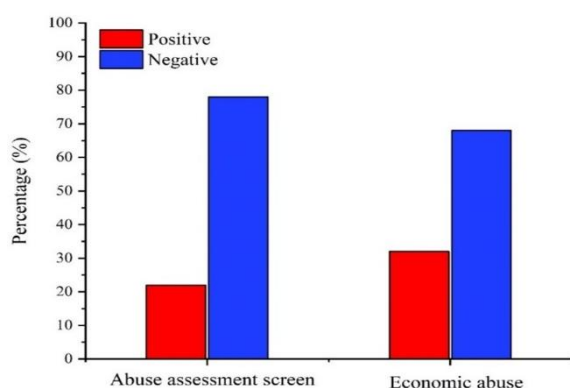
### 3.2 Univariate frequency distribution for Minimum Dietary Diversity (MDD-W)

Our findings (Table. 2) showed that 28.9% (110) had inadequate while 271 (71.1%) had adequate minimum dietary diversity. Our findings are consistent with Indian statistics based on rural women from Pune; 73% (Gokhale & Rao, 2022) but considerably better than Southwestern Bangladesh; 37% only (Shamim et al., 2016). The minimum number of food groups consumed was 3 whereas the maximum number of food groups was 9. This difference may be primarily driven by cultural food preferences, as our population had less access to health facilities, and availability of resources.





**Fig 3.** Frequency distribution bar chart for consumption of food groups.

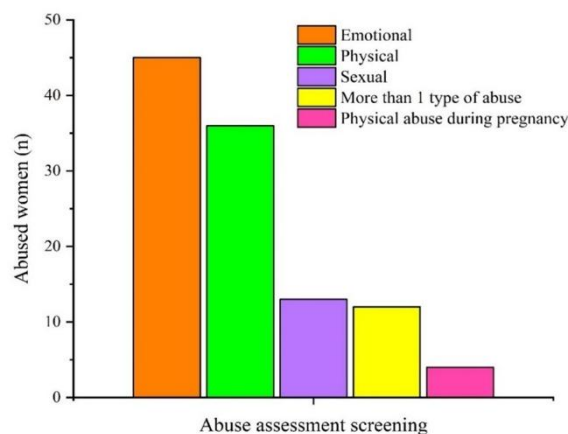


**Fig 4.** Frequency distribution column chart for AAS and Economic abuse.

### 3.3 Univariate frequency distribution of consumption of food groups

In Fig. 3, the results have been depicted that 100% of the participants consumed grains, indicating that grains are a staple food group consumed by almost everyone. A moderate percentage of individuals consumed pulses, dairy products, and other vegetables. However, there is still a portion of the population that lacks sufficient access or preference for these groups, while most individuals consume grains. There are a relatively low consumption of nutrient-dense food groups such as eggs, dark green leafy vegetables, and nuts and seeds. This suggests that a significant portion of the population may not meet the MDD, which could impact their nutritional status. High grain consumption was consistent with patterns in other developing nations, including India (Gokhale & Rao, 2022), Bangladesh (Nguyen et al., 2017), and Tanzania (Ochieng et al., 2017). Consumption of dark green leafy vegetables

was lower than the 47% reported in India (Gokhale & Rao, 2022). This could be because of the Indians are predominantly vegetarians, is further supported by data from India, which reported a dairy consumption rate of only 24.5%.



**Fig 5.** Frequency distribution column chart for different types of abuse.

### 3.4 MDD about socio-demographic factors

In bivariate frequency distribution between predictor variables; general characteristics and dependent variable; MDD, showed that with an increasing number of children, the MDD-W adequacy increases (Table. 3). As far as socio-economic status is concerned, the lower the socio-economic class, the lower the MDD-W adequacy ( $p \leq 0.0002$ ). The Indian data also reveals an increase in dietary diversity with monthly income (Rammohan et al., 2021). Bivariate analysis ( $p < 0.05$ ) revealed that several predictor variables were significantly associated with adequacy in MDD-W. As the education levels decrease, the inadequacy increases, this is comparable to research conducted in Ethiopia by Gudeta et al., 2022).

### 3.5 Univariate frequency distribution of perceived stress

The high-stress levels reported in Pakistan in the research studying predictors of antenatal stress in the year 2016-17 were 42.2% (Waqas et al., 2020), considerably higher than the present study findings (Table. 4). The current study results showed that 32 (8.4%) had low, 274 (71.9%) had

moderate, and 75 (19.7%) had high-stress levels.

### 3.6 Perceived stress about sociodemographic factors

The bivariate frequency distribution between general characteristics and the dependent variable; Perceived stress, showed that high stress was observed in the 18-24 years age group. The reasons behind such findings could be justified by the fact that younger women are more prone to financial and social support (Waqas et al., 2020). The inexperience and unfamiliarity with pregnancy, low education levels, and hormonal imbalance are all potential causes of higher stress. The stress was more dominant in rural women, joint family systems, low education levels, and upper-lower socio-economic status in the current study (Table. 5).

### 3.7 Prevalence of domestic and economic abuse

The abuse assessment screen revealed that 22% were positive and 78% were negative. The economic abuse on the other hand showed a higher positivity rate than AAS, with 32% cases and 68% negative for the abuse. The current study (Fig. 4) depicted domestic violence to be quite higher than in China 15.62% (Zheng et al., 2020).

### 3.8 Univariate frequency distribution of different types of abuse

In the responses in the AAS, the prevalence of different types of abuse was observed. It was noticed that 45 women experienced emotional abuse, 36 experienced physical, 13 sexual, and 13 women experienced more than 1 type of abuse, while, 5 women were physically abused during pregnancy. Our findings (Fig. 5) are similar to China which marks mental violence as most prevalent; 90, followed by physical 8, and 7 experienced sexual violence, whilst 25 reported experiencing two forms of violence out of 813 women in the study as reported by (Zheng et al., 2020). The Indian study

reported cases of violence during pregnancy; 2% comparable to the present study while 1.3% in the total (Singh & Haobijam, 2023).

### 3.9 Bivariate frequency distribution between AAS and economic abuse

The cross-tabulation (Fig. 6) analysis revealed that the number of women was positive for both AAS and economic abuse. The comparison between economic abuse positive and negative showed that women positive for economic abuse were more likely to be positive for AAS as well. The reasons behind such an outcome might be that women's economic dependence gives additional power to spouses and in-laws to force and control women according to their preferences, progressing to violence and brutality (Fekadu et al., 2018).

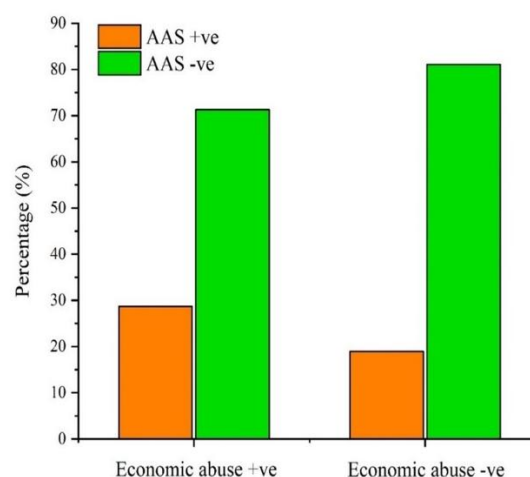


Fig 6. Bivariate frequency distribution column chart for AAS and economic abuse.

### 3.10 AAS about sociodemographic factors

In the bivariate frequency distribution (Table. 6) between predictor variables; general characteristics and socio-economic status along with the dependent variable; AAS, we derive the following; the age group 25-35 years experienced the most abuse. By increasing the number of children, the positivity for abuse decreases ( $p \leq 0.031$ ). Rural residents experienced more abuse than

Table 6. Bivariate analysis socio-demographic factors and AAS.



| Predictors                                   | N (381) | Abuse Assessment Screen<br>(Dependent) |            |       |
|----------------------------------------------|---------|----------------------------------------|------------|-------|
| Characteristic                               | n       | +ve n (%)                              | -ve n (%)  | p     |
| <b>Age (in years)</b>                        | -       | -                                      | -          | 0.518 |
| 18-24                                        | 64      | 22 (34.4)                              | 42 (65.6)  | -     |
| 25-35                                        | 254     | 49 (19.3)                              | 205 (80.7) | -     |
| 36 and above                                 | 63      | 13 (20.6)                              | 50 (79.4)  | -     |
| <b>No. of children</b>                       | -       | -                                      | -          | 0.031 |
| None                                         | 63      | 23 (36.5)                              | 40 (63.5)  | -     |
| 1-2                                          | 196     | 39 (19.9)                              | 157 (80.1) | -     |
| 3 or more                                    | 122     | 22 (18)                                | 100 (82)   | -     |
| <b>Area of residence</b>                     | -       | -                                      | -          | 0.459 |
| Rural                                        | 246     | 53 (21.5)                              | 193 (78.5) | -     |
| Urban                                        | 135     | 31 (23)                                | 104 (77)   | -     |
| <b>Family system</b>                         | -       | -                                      | -          | 0.388 |
| Nuclear                                      | 121     | 22 (18.2)                              | 99 (81.8)  | -     |
| Joint                                        | 260     | 62 (23.8)                              | 198 (76.2) | -     |
| <b>Education level</b>                       | -       | -                                      | -          | 0.841 |
| Graduate                                     | 104     | 17 (16.3)                              | 87 (83.7)  | -     |
| Higher Secondary school/<br>Secondary school | 132     | 34 (25.8)                              | 98 (74.2)  | -     |
| Middle school/under                          | 145     | 33 (22.8)                              | 112 (77.2) | -     |
| <b>Socioeconomic status</b>                  | -       | -                                      | -          | 0.038 |
| Upper                                        | 22      | 1(4.5)                                 | 21(95.5)   | -     |
| Upper middle                                 | 82      | 17 (20.7)                              | 65 (79.3)  | -     |
| Lower middle                                 | 139     | 28 (20.1)                              | 111 (79.9) | -     |
| Upper lower                                  | 136     | 37 (27.2)                              | 99 (72.8)  | -     |
| Lower                                        | 2       | 1 (50)                                 | 1 (50)     | -     |

urban residents, similar to the findings in Northeast India (Singh & Haobijam, 2023). The joint families had significantly higher levels of abuse than nuclear due to sharing homes and multiple exposures with many family members. The women with lower education levels had the highest levels of abuse. The abuse increased greatly with lower socio-economic status ( $p \leq 0.038$ ). The findings of the Pakistan Demographic and Health Survey 2012-2013, which examined variables linked to spousal violence, match these findings (Hussain et al., 2017b).

### 3.11 Economic abuse with socio-demographic factors

In the bivariate frequency distribution between predictor variables (Table. 7); general characteristics and socio-economic

status along with the independent and dependent variables; economic abuse, showed that with the increasing age, women with more than 3 children, rural areas, lower education level, and joint families suffered more economic abuse. The lower socio-economic status showed a significant ( $p \leq 0.001$ ) relationship with economic abuse. The several risk factors for Intimate partner violence (IPV) during pregnancy, including low socio-economic status due to poverty, unemployment, and a lack of schooling. Women from underprivileged families in Pakistan, where socio-economic inequalities are widespread, may be more inclined to encounter IPV during pregnancy (Cao et al., 2023). The economics and politics are also significant variables in Pakistan's IPV epidemic (Ilyas, 2023).

### 3.12 Correlation between MDD, PS, AAS, and economic abuse

Pearson correlation showed generally weak linear associations ( $r < 0.3$ ) among all selected variables (Table. 8). The PS was the only variable exhibiting weak negative correlations with all other. Notably, the Abuse Assessment Screen (AAS) and dietary diversity (MDD) showed only a weak positive correlation with economic abuse. The inclusive pattern of negligible correlations recommends that stress, abuse, and poor dietary diversity may not be direct causative of one another. Instead, this pattern is consistent with the interpretation that they represent co-occurring but independent adverse outcomes, potentially restricting from common underlying

structural determinants such as low socioeconomic status.

### 4. Conclusion

This study explored the correlations between dietary diversity, stress, and domestic violence with socio-demographic characteristics among pregnant women in Rawalpindi, Pakistan. The findings identified that the "upper-lower" socio-economic status is the most vulnerable group (females aged 18-24) to inadequate dietary diversity, elevated stress levels, and domestic violence. The highest number of females with inadequate dietary diversity,

**Table 7.** Bivariate analysis socio-demographic factors and Economic abuse.

| Predictors                                   | N (381) | Economic Abuse<br>(Dependent) |            |       |
|----------------------------------------------|---------|-------------------------------|------------|-------|
| Characteristic                               | n       | +ve n (%)                     | -ve n (%)  | p     |
| <b>Age</b>                                   | -       | -                             | -          | 0.874 |
| 18-24                                        | 64      | 19 (29.7)                     | (45) 70.3  | -     |
| 25-35                                        | 254     | 82 (32.3)                     | 172 (67.7) | -     |
| 36 and above                                 | 63      | 21 (33.3)                     | 42 (66.7)  | -     |
| <b>No. of children</b>                       | -       | -                             | -          | 0.601 |
| None                                         | 63      | 19 (30.2)                     | 44 (69.8)  | -     |
| 1-2                                          | 196     | 59 (30.1)                     | 137 (69.9) | -     |
| 3 or more                                    | 122     | 44 (36.1)                     | 78 (63.9)  | -     |
| <b>Area of residence</b>                     | -       | -                             | -          | 0.834 |
| Rural                                        | 246     | 82 (33.3)                     | 164 (66.7) | -     |
| Urban                                        | 135     | 40 (29.6)                     | 95 (70.4)  | -     |
| <b>Family system</b>                         | -       | -                             | -          | 0.194 |
| Nuclear                                      | 121     | 29 (24)                       | 92 (76)    | -     |
| Joint                                        | 260     | 93 (35.8)                     | 167 (64.2) | -     |
| <b>Education level</b>                       | -       | -                             | -          | 0.805 |
| Graduate                                     | 104     | 26 (25)                       | 78 (75)    | -     |
| Higher Secondary school/<br>Secondary school | 132     | 40 (30.3)                     | 92 (69.7)  | -     |
| Middle school/under                          | 145     | 56 (38.6)                     | 89 (61.4)  | -     |
| <b>Socioeconomic status</b>                  | -       | -                             | -          | 0.001 |
| Upper                                        | 22      | 0                             | 22 (100)   | -     |
| Upper middle                                 | 82      | 23 (28)                       | 59 (72)    | -     |
| Lower middle                                 | 139     | 38 (27.3)                     | 101 (72.7) | -     |
| Upper lower                                  | 136     | 60 (44.1)                     | 76 (55.9)  | -     |
| Lower                                        | 2       | 1 (50)                        | 1 (50)     | -     |

**Table 8.** Pearson correlation between Minimum Dietary Diversity, Perceived Stress, Abuse Assessment Screen, and Economic Abuse

| Variable                  | Perceived stress | Abuse Assessment Screen | Economic abuse | Minimum dietary diversity |
|---------------------------|------------------|-------------------------|----------------|---------------------------|
| Perceived stress          | 1                | -0.288                  | -0.100         | -0.286                    |
| Abuse Assessment Screen   | -                | 1                       | 0.110          | 0.276                     |
| Economic abuse            | -                | -                       | 1              | 0.196                     |
| Minimum dietary diversity | -                | -                       | -              | 1                         |

alongside the highest prevalence of elevated stress levels and domestic violence incidents compared to other socio-economic classes. The improving dietary diversity and addressing maternal health concerns, in which initiatives to alleviate domestic violence, are essential for protecting the health and welfare of pregnant women and their unborn children. A comprehensive approach that combines nutritional support, mental health care, and domestic safety measures is imperative for mitigating the negative outcomes associated with these socio-demographic factors. The longitudinal research is required to clarify the temporal relationships between dietary diversity, stress, domestic violence, and pregnancy outcomes.

#### Disclosure statement

The authors report there are no competing interests to declare

#### Acknowledgement

The research was undertaken voluntarily and was not supported by any external funding. However, we acknowledge the authors Mirha Imran, Muqdas Razzaq, Soha Ahmed and Rimsha Khalid have equally contributed in this paper.

#### Data Availability Statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author(s).

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