

# Mental Health and Well-Being in the Workplace: A Cross-Sectional Analysis of Socioeconomic and Demographic Determinants by Using PDHS 2017-18

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## Abstract

*In low-and middle-income countries, public health dimensions, particularly mental health and well-being in the workplace, remain critical yet under-explored, while social injustice and limited social protection inflame vulnerabilities. This cross-sectional study examines the links between occupational, demographic, and socioeconomic factors and well-being among 5,485 adult employees in Pakistan, using PDHS data from 2017 to 18. Descriptive analysis reveals a portfolio of pronounced disadvantages: around 80% of employees have no formal education, 75% of respondents live in rural areas, and only 12.3% are covered by social security health insurance. The average household size is 9 members, revealing substantial family responsibilities, while 84% of households are male-headed. Model findings show that factors such as urban residence, access to health insurance, and higher education attainment are strongly associated with improved well-being scores. Lower socioeconomic status and large household sizes emerge as significant factors. These outcomes call for integrated policies that address educational equity, expand social protection schemes, and incorporate mental health support within occupational health frameworks. By improving psychologically safe and supportive workplaces, Pakistan can advance Sustainable Development Goals 3 (good health and well-being) and 8 (decent work and economic growth), fostering individual capacities and national productivity. This effort provides the first nationally representative evidence on workplace mental health in Pakistan, offering a foundation for evidence-informed interventions in similar resource-constrained settings.*

**Keywords:** Mental Health; Workplace Well-Being; Socioeconomic Factors; Health Security Insurance; Education Equity; Demographic and Health Survey

## Introduction

Mental health and psychological well-being are now considered part of overall health, productivity, and human development. According to the WHO, mental health is a condition of well-being in which each person achieves their potential, copes with the normal stresses of life, works effectively, and serves their community (Saraceno & Caldas, 2022; Kelloway et al., 2025; De Oliveira et al., 2023). This definition highlights the inherent connection between economic and psychological involvement, suggesting that emotional well-being and workplace productivity are not independent of one another. Mental health disorders are a major contributor to the burden of disease globally: depression alone affects 5% of adults in the global

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population, and anxiety disorders affect 4% of the global population (Cuijpers et al., 2023; Chauhan, 2025). The cost of mental illnesses, such as lost productivity in the world, is estimated to be more than US 6 trillion by the year 2030 by the World Economic Forum, which makes it not only a matter of concern for the general population but also an economic necessity (Bloom et al., 2012; McGorry, 2013; Razzouk, 2017; Frank, 2022).

In the working environment, mental health has a significant impact on motivation, creativity, and performance; whereas persistent stress, job insecurity, or harassment can cause depression, anxiety, and productivity loss (Goetzel et al., 2018). The contemporary workplace, characterised by rapid technological advancement, competition, and changing job designs, imposes unprecedented psychological strain on employees. It revealed that those who are affected by chronic work stress, excessive workload, job insecurity, or other forms of harassment are more depressed, anxious, and burned out (Harnois et al., 2000; Ullah et al., 2023; LaMontagne et al., 2014; Cleary et al., 2020).

The workplace can reduce as well as increase psychological distress. It provides support and identity to some, and causes management for others. Therefore, workplace mental health is not just an ethical but also a rational human capital investment (Weehuizen, 2008; Khan et al., 2023). It is a growing area of study that mental health at work is not only an ethical duty but also an investment in human capital and national productivity (Simola, 2023). The problem of mental health is disproportionate in low- and middle-income countries (LMICs), with over 80% of individuals with mental disorders receiving insufficient care (Saraceno & Caldas, 2022; Cronin et al., 2017). According to the Global Burden of Disease Study, Mental health is a silent epidemic because of a shortage of trained professionals, a funding shortage, and stigma (Choudhary, 2024). Also, LMICs have mental health policies, occupational counselling schemes, or workplace support services, which make working populations more vulnerable (Javed et al., 2021; Shahid et al., 2025; Vigo et al., 2022).

Mental health is a serious issue in Pakistan, which is associated with socioeconomic instability, urbanisation, and demographic stressors. The Pakistan Institute of Living and Learning (PILL) estimate that almost a quarter of the adult population has some mental disorder; most of them have depression and anxiety. Recent research shows that moderate to high levels of psychological distress are reported by 34% of working-age adults, and this is usually because of financial instability, workplace discrimination, or work-family imbalance (Dayani et al., 2024). Pakistan has a labour force of about 70 million, with a high rate of informal employment, low social protection, and persistent income inequality. These material states make people susceptible to mental stress, particularly low-income and female employees. To further complicate matters, Pakistan has not invested much in the mental health infrastructure. The national health budget allocates less than 0.5 per cent to mental health, and fewer than 500 psychiatrists are available to treat over 240 million individuals (Rahman et al., 2024; Andlib & Zafar, 2023; Kishwar et al., 2023). The current mental health services are concentrated in major urban areas, and rural areas are underserved. This gap is one reason for underdiagnosed and untreated psychological morbidity. Misconceptions and cultural stigma that mental illness is mostly blamed on fate, weakness, and spiritual reasons further discourage help-seeking behaviour.

These wider issues are reflected in the workplaces in Pakistan. Workers are prone to working long hours, poor job security, poor professional health, and poor mental health awareness. Also, gender inequality is a source of such issues: women are twice as overworked, and with home affairs, there is a wage difference, and harassment in the workplace. The study had shown that in Pakistan, female workers report experiencing much more stress and depressive symptoms than male workers (Haq et al., 2008; Rehman & Butt, 2024; Kumar et al., 2013; Obaid et al., 2023).

The changing economic environment, such as globalisation, digitalisation, and the growth of service sectors, has brought about a new psychosocial environment in the workplace. The more educated younger workers are frequently underemployed or unable to work, or older workers are facing skills gaps or being forced to exit the digital economy (Akbar et al., 2025; Akhtar & Moore, 2016; Palumbo & Cavallone, 2024). The emphasis on productivity and competition has also contributed to more work pressure and, consequently, emotional fatigue and burnout. The workplace is a key social determinant of health and a key to sustainable economic growth and social inclusion, as seen through a public health lens (Frank et al., 2023; Cerf, 2023). By addressing mental health as a measure of occupational health, countries like Pakistan can align with the United Nations Sustainable Development Goals (SDGs), including SDG 3 (Good Health and Well-being) and SDG 8 (Decent Work and Economic Growth).

The DHS is largely determined on demographic and reproductive health indicators. Nevertheless, it contains extensive information on education, income, employment, and household characteristics that can be used to indirectly examine the socioeconomic and demographic conditions that influence mental health and well-being. The researchers can provide insight into the impact of structural inequalities on the Pakistani workforce, in terms of income, education level, gender, and urban-rural residence, using a representative dataset from across the country (Gul et al., 2020). The paper examines the relationship between social and economic factors and mental health at work. This association plays an essential role in understanding the groups at risk and in shaping policy frameworks to internalize mental health promotion across the labor, education, and social welfare systems. Through this study, evidence-based recommendations are made to improve occupational safety, workplace equity, and mental health programs for the population, making the workforce more inclusive and resilient in Pakistan.

**Figure 1: Studies 2020- 10 October 2025**

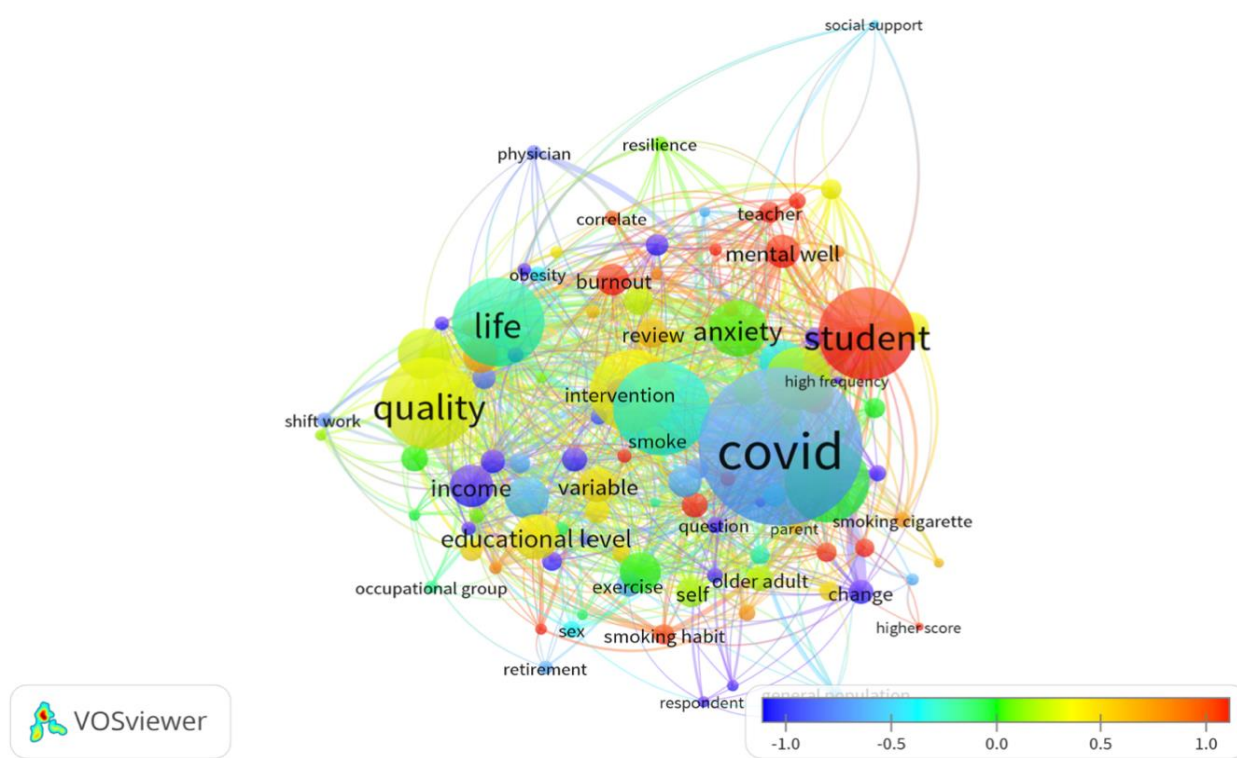


Figure 1 VOSviewer map shows that mental health issues, particularly associated with lifestyle disruption, psychological distress, anxiety, workplace instability, and social uncertainty, appeared in the post-COVID-19 period. The studies highlight dominant themes, including socioeconomic factors, health behaviors, and occupational stress, along with protective elements like social support and resilience. Thus, COVID-19 is a transition period from short-term mental distress to longer-term workplace and structural influence.

**Figure 2: studies from 2000- 10 October 2025**

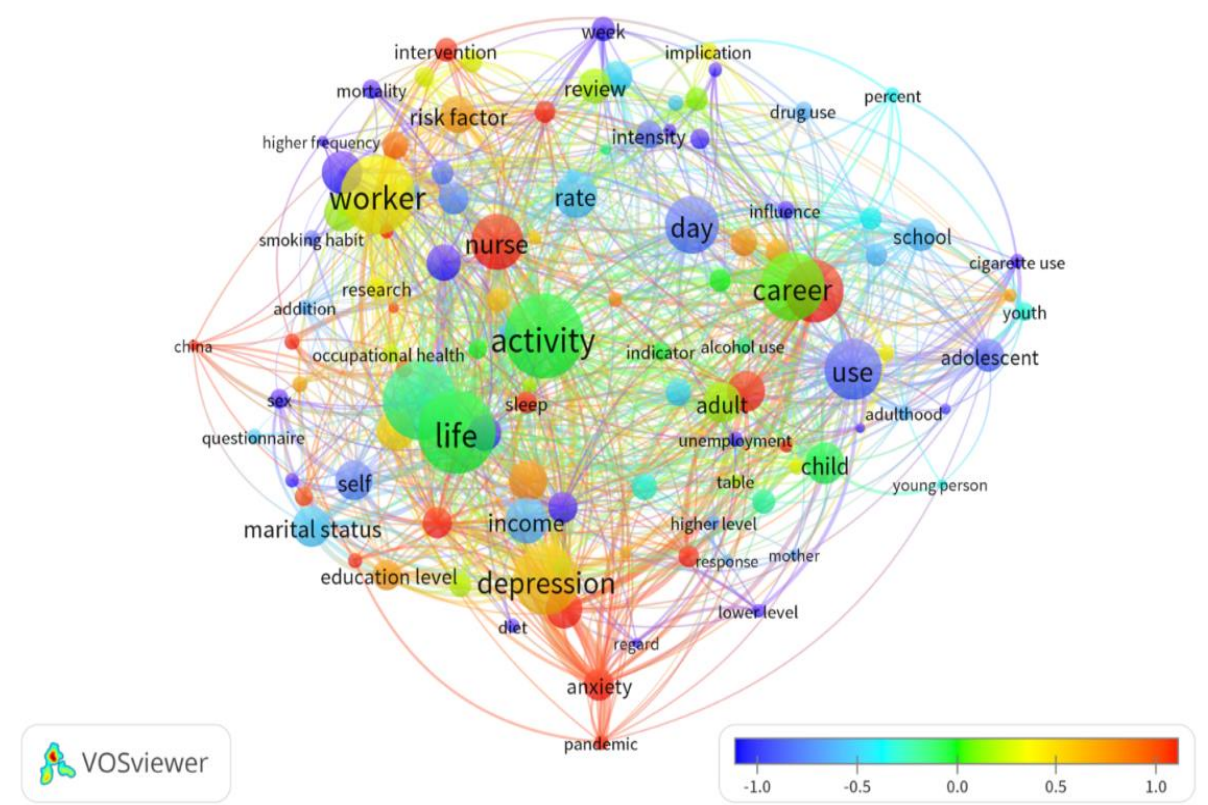


Figure 2 presents mental health studies from 2000 to October 2025, showing a systematic and interdisciplinary field focused on well-being, psychological factors, quality of life, and depression, particularly among adolescents and students. The major areas included self-perception, marital status, and social relationships. Therefore, symptoms such as depression, burnout, insomnia, and anxiety combine with occupational stress in demanding roles such as nursing and shift work. The maps also cover youth-associated risks like pregnancy, substance use, and academic stress. Besides, it shows how daily patterns such as work routines and sleeping are linked to mental health outcomes. The emerging topics, such as self-care, sleeplessness, and burnout, have become highly prominent. Therefore, Figure 3 shows that behavioral health and mental health studies from 1950 to October 2025 have grown into a significant connection to lifestyle factors and quality of life with mental health. Studies reveal that socioeconomic circumstances have a prolonged effect on anxiety and depression, alongside occupational hazards and developmental challenges for children and adolescents. Thus, stress- and workplace-related concerns reinforce the importance of socioeconomic, demographic, and behavioral links in the current study.



among this group of the population. Another key area of intervention in the model is job control, which shows that the adverse outcomes of high demands can be mitigated by enhancing worker autonomy through participatory management, skill development opportunities, and flexible job design. Therefore, this theoretical method stresses the significance of interventions on multiple levels. Policies that help to curb excessive work demands and give employees more control over their jobs are essential in preventing mental health risks associated with the workplace. The steps are especially relevant in those cases when structural inequalities and lack of resources are causing work-related stress, like in Pakistan.

### Data Sources

The descriptive statistics in Table 1 (Appendix) present the major demographic and socioeconomic traits of the participants and reveal several significant trends in age, household structure, marriage, education, employment, and social protection. The age-demographic distribution of the respondents is mainly young adults with a majority of them being between 30-34 (30.63) and 35-39 (26.25) giving an average response of 4.807 on the coded scale; the near-normal distribution (skewness -0.019, kurtosis 2.46) shows a balanced representation of age. Household size is 8.88 (SD = 4.36) with more than 85% residing in 5-10 member households. However, the skewness is positive (1.439), and the kurtosis is high (5.663), indicating larger household sizes, which are prevalent in developing areas. There is a significant shortage in educational attainment (mean 0.551, SD 1.256), with 79.43% having no education and just 3.5% having the highest level, as evidenced by a high positive skewness (2.348). Households are mainly male-headed (83.81%), urban-resident (71.94%), and married (99.12%) with a low coverage of Sehat Sahulat social health insurance (12.25%) and high positive skewness (2.303) and leptokurtosis (6.302) showing that they do not have access to many social safety in The perceived quality of life remains relatively high (mean 74.38, SD 43.65), even with negative skewness (-1.117) meaning that the participants have more positive perceptions of their living conditions, but the opinions are quite diverse. Employer-provided health insurance covers 42.86 percent of the sample, with a fairly balanced distribution. Smoking is rare (only 0.44 percent are occasional smokers), and current employment is minimal (only 3.94 percent), with extreme skewness (7.219) and kurtosis (54.075) suggesting multiple household heads have no economic activity. Professionally, more than half (56.88%) are in professional, technical, or managerial positions, followed by skilled manual (26.96%), with a mean score of 3.246, suggesting that some of them are in formal occupations. In general, the sample is relatively small, consisting primarily of young, married, urban people living in large, male-headed families with low levels of education and lacking social health protection. Despite such socioeconomic disadvantages, subjective well-being is rather positive, indicating the need for targeted policy actions in education, employment, and access to health insurance. The correlation explained in table 2 in appendix 1.

## Results

### Table 3: Logistic Regression

| Percentage Score                            | Coef.                            | SE    | t-value | P-value  | OR    | 95% Confidence Interval |
|---------------------------------------------|----------------------------------|-------|---------|----------|-------|-------------------------|
| Residence                                   |                                  |       |         |          |       |                         |
| Urban                                       | 0.068                            | 0.009 | 7.50    | 0.000*** | 1.070 | (1.052, 1.089)          |
|                                             | Base Outcomes (Rural)            |       |         |          |       |                         |
| Age                                         |                                  |       |         |          |       |                         |
| 25-29                                       | -0.224                           | 0.206 | -1.09   | 0.276    | 0.799 | (0.534, 1.197)          |
| 30-34                                       | 0.186                            | 0.026 | 7.26    | 0.000*** | 1.204 | (1.145, 1.267)          |
| 35-39                                       | 0.957                            | 0.197 | 4.87    | 0.000*** | 2.604 | (1.770, 3.831)          |
| 40-44                                       | 0.833                            | 0.104 | 7.98    | 0.000*** | 2.300 | (1.876, 2.820)          |
| 45-49                                       | 1.108                            | 0.213 | 5.20    | 0.000*** | 3.028 | (1.995, 4.597)          |
|                                             | Base Outcomes (20-24)            |       |         |          |       |                         |
| No of Household members                     |                                  |       |         |          |       |                         |
| 10                                          | 0.656                            | 0.29  | 2.26    | 0.024**  | 1.927 | (1.092, 3.402)          |
| 15                                          | 0.257                            | 0.032 | 8.13    | 0.000*** | 1.293 | (1.214, 1.377)          |
| 20                                          | 1.355                            | 0.285 | 4.75    | 0.000*** | 3.877 | (2.218, 6.777)          |
| 25                                          | 0.273                            | 0.163 | 1.68    | 0.093*   | 1.314 | (0.955, 1.808)          |
|                                             | Base Outcomes (5, member)        |       |         |          |       |                         |
| Educational attainment                      |                                  |       |         |          |       |                         |
| No Education                                | 0.152                            | 0.017 | 8.68    | 0.000*** | 1.164 | (1.126, 1.204)          |
| Incomplete Primary                          | 0.268                            | 0.035 | 7.63    | 0.000*** | 1.307 | (1.221, 1.400)          |
| Incomplete secondary                        | 0.107                            | 0.043 | 2.48    | 0.013**  | 1.113 | (1.023, 1.211)          |
| Complete secondary                          | 0.113                            | 0.087 | 1.30    | 0.194    | 1.120 | (0.944, 1.328)          |
| Higher                                      | 0.222                            | 0.096 | 2.30    | 0.021**  | 1.249 | (1.034, 1.507)          |
|                                             | Base Outcomes (Complete Primary) |       |         |          |       |                         |
| Sex of Household Head                       |                                  |       |         |          |       |                         |
| Female                                      | 1.398                            | 0.119 | 11.79   | 0.000*** | 4.047 | (3.205, 5.110)          |
|                                             | Base Outcomes (Male)             |       |         |          |       |                         |
| Current marital status                      |                                  |       |         |          |       |                         |
| Windowed                                    | 0.736                            | 0.089 | 8.32    | 0.000*** | 2.088 | (1.753, 2.485)          |
|                                             | Base Outcomes (Married)          |       |         |          |       |                         |
| Respondent currently working                |                                  |       |         |          |       |                         |
| Yes                                         | 1.058                            | 0.108 | 9.78    | 0.000*** | 2.881 | (2.331, 3.560)          |
|                                             | Base Outcomes (No)               |       |         |          |       |                         |
| Respondent's occupation (group)             |                                  |       |         |          |       |                         |
| Professional/Technical/Managerial           | 0.761                            | 0.104 | 7.29    | 0.000*** | 2.140 | (1.746, 2.624)          |
| Skilled Manual                              | 0.294                            | 0.085 | 3.47    | 0.001*** | 1.342 | (1.136, 1.585)          |
| Unskilled Manual                            | 0.141                            | 0.043 | 3.27    | 0.001*** | 1.151 | (1.058, 1.253)          |
|                                             | Base Outcomes (Not Working)      |       |         |          |       |                         |
|                                             | Base Outcomes (No)               |       |         |          |       |                         |
| Health Insurance type: Provided by employer |                                  |       |         |          |       |                         |
| Yes                                         | 0.258                            | 0.152 | 1.70    | 0.089*   | 1.294 | (0.961, 1.744)          |
|                                             | Base Outcomes (No)               |       |         |          |       |                         |
| Frequency smokes cigarettes                 |                                  |       |         |          |       |                         |

|                                           |          |       |                      |          |       |                |
|-------------------------------------------|----------|-------|----------------------|----------|-------|----------------|
| Some days                                 | 0.526    | .083  | 6.31                 | 0.000*** | 1.692 | (1.438, 1.991) |
| Base Outcomes (Does not smoke)            |          |       |                      |          |       |                |
| Constant                                  | 0.259    | 0.195 | 1.33                 | .185     | 1.296 | (0.884, 1.899) |
| <b>Other Statistics</b>                   |          |       |                      |          |       |                |
| Mean dependent var                        | 74.385   |       | SD dependent var     |          |       | 43.655         |
| Pseudo r-squared                          | 0.291    |       | Number of obs        |          |       | 5485           |
| Chi-square                                | 943.959  |       | Prob > chi2          |          |       | 0.000          |
| Akaike crit. (AIC)                        | 5333.912 |       | Bayesian crit. (BIC) |          |       | 5452.888       |
| *** $p < .01$ , ** $p < .05$ , * $p < .1$ |          |       |                      |          |       |                |

### Model Outcomes

$$WB_i = \alpha_i + \left( \sum_{i \in Dem} \delta_{ki} X_i \right) + \left( \sum_{i \in eco} \gamma_{mi} Z_i \right)$$

$$WB_i = \alpha_i + \left( \sum_{i \in Dem + i \in eco} \delta_{ki} X_i + \gamma_{mi} Z_i \right)$$

$$WB_i = \alpha_i + \delta_{k1} Res_1 + \delta_{k2} age_2 + \delta_{k3} NHM_3 + \delta_{k4} EDUA_4 + \delta_{k5} SHH_5 + \delta_{k6} CMS_6 + \delta_{k7} RCW_7 + \delta_{k8} RO_8 + \gamma_{m1} HITSS_1 + \gamma_{m2} HITPE_2 + \gamma_{m3} FSC_3 + \varepsilon$$

The results of the logistic regression analysis that examined the factors that affected the quality of life of the respondents, in terms of percentage scores, will be presented in Table 3. The pseudo- $R^2$  of 0.291 indicates that the variation in the dependent variable explained by the predictor variables in the model is about 29.1%. Moreover, the statistical significance of the model as a whole ( $\chi^2 = 943.959$ ,  $p = 0.001$ ) suggests that the variables included in the model have a joint contribution to the explanation of the changes in the probability of attaining a high quality of life. Residence is one of the essential qualities of life determinants. To be more exact, urban dwellers are more likely to report higher quality of life ratings by 7 percent, as compared to their rural peers (0.068,  $p < 0.01$ , OR = 1.070, 95% CI [1.052, 1.089]). This finding indicates that living in the city is associated with better access to amenities, services, and job opportunities, hence leading to an improved overall well-being. The quality of life is non-linearly related to the age of respondents. The odds of reporting a higher quality of life are much higher in the age groups of 30–34, 3539, 4044, and 4549 than in the youngest group (2044 years). These odds ratios are: 30-34 years: OR = 1.204 ( $p < 0.01$ ); 35-39 years: OR = 2.604 ( $p < 0.01$ ); 40-44 years: OR = 2.300 ( $p < 0.01$ ); and 45-49 years: OR = 3.028 ( $p < 0.01$ ). These results suggest a positive correlation between age and quality of life that could be explained by the improvement of economic security and the experience of life. The results indicate that there was a positive relationship between age and quality of life that might be attributed to enhanced economic stability and the amassing of experience in life. The age group between 25 and 29 has a non-significant negative coefficient (224 = -0.214,  $p = 0.276$ ), showing an instability in early adulthood. The number of household members also shows a statistically significant impact on the quality of life. Larger households are also more likely to report a better quality of life than households with five members: 10 members: OR = 1.927 ( $p < 0.05$ ). In families that have fifteen individuals, the odds ratio (OR) was 1.293 ( $p < 0.01$ ). The OR in the families with twenty members was 3.877 ( $p < 0.01$ ). An OR of 1.314 was found in a twenty-five-member household ( $p < 0.10$ ). This trend implies that extended families enjoy resource pooling, shared work, and social support. Nevertheless, with a very big family, its incremental well-being might eventually decline. In terms of education, quality of life has a strong and

consistent positive relationship. Better well-being was reported more by people who had higher levels of education compared to those who had only completed primary education. Namely, odds ratios were as follows: no education (OR = 1.164,  $p < 0.01$ ) and incomplete primary education (OR = 1.307,  $p < 0.01$ ).

Secondary education, especially incomplete education, was found to have an odds ratio (OR) of 1.113 ( $p < 0.05$ ), and higher education (more than secondary education) had an odds ratio (OR) of 1.249 ( $p < 0.05$ ). Thus, education has a significant impact on quality of life by expanding employment opportunities, increasing income, and raising awareness of health and social services. The household head's sex was also an important factor (0.398,  $p < 0.01$ , OR = 4.047, 95% CI 3.205, 5.110). Female-headed households were four times more likely to report a better quality of life compared to male-headed households. This observation may indicate that female-headed families are more efficient in utilizing resources or that external support programs targeting women are influencing this outcome. Well-being was strongly predicted by current marital status. The widowed respondents are much more likely to report a better quality of life compared to the married respondents (0.736 (0.01) = 2.088). This outcome indicates that survivor benefits have been received or that greater social support is provided by extended family and community structures. Employment status significantly and positively influences quality of life. Currently working respondents are nearly three times as likely to report a higher quality of life as non-working respondents (0.01, 2.881, 95% CI [2.331, 3.560]). This finding underscores the economic engagement in enhancing livelihoods and mental health. Occupational status also supports the occupation effect. Respondents in professional/technical/managerial jobs are more likely to report a better quality of life (OR = 2.140,  $p < 0.01$ ) as opposed to those who are not working. Similarly, skilled manual labourers (OR = 1.342,  $p < 0.01$ ) and unskilled manual labourers (OR = 1.151,  $p < 0.01$ ) have statistically significant positive correlations. These findings highlight the importance of occupation and employment status on well-being. Thus, regardless of whether health insurance is publicly or privately provided, it is positively associated with quality of life. Social security (Sehat Sahulat) has an odds ratio (OR) of 1.487 ( $p < 0.01$ ), whereas employer-provided insurance has an odds ratio (OR) of 1.294 ( $p < 0.10$ ). This would mean that the availability of health protection from any source is a factor in an improved perception of security and overall quality of life among individuals, despite the insignificant contribution of employer-based coverage. More so, the frequency of smoking is a major consideration. Occasional respondent smokers have 1.69 times higher odds of reporting better quality of life (OR=1.692, 95% CI=1.438-1.991,  $p=0.01$ ). This contradictory finding could indicate that smoking, in this case, is a mechanism for some socioeconomic groups to relax or deal with stress, but not an indicator of health issues.

### Model Fit and Summary

The logistic regression model reveals the ability to explain the data well based on Pseudo R<sup>2</sup>, which is 0.291, and is statistically significant on the whole ( $p < 0.001$ ). In addition, the values of AIC (5333.912) and BIC (5452.888) show that the model is well specified. To sum up, the findings reveal that urban residence, age, household, educational level, female-headed households, employment, occupation category, and the existence of health insurance cover are the most affecting factors to a high quality of life. These results represent the importance of socioeconomic integration, involvement in the labour force, and social protection program access in enhancing the well-being of individuals and households.

**Table 4: Ramsey RESET Test for Omitted Variables**

| <b>H0: Model has no omitted variables</b> |       |
|-------------------------------------------|-------|
| Test                                      | Value |
| F (3, 5470)                               | 1.90  |
| Prob > F                                  | 0.127 |

\*Omitted: Powers of fitted values of well-being

Table 4 shows the findings of the Ramsey Regression Equation Specification Error Test (RESET) that was used to test the probability of omitted variable bias in the logistic regression model. The null hypothesis (H0) holds that the model is specified correctly, so it has no other variables that are omitted. The F-statistic is 1.90 with a p-value of 0.127, exceeding the significance of 0.05. The null hypothesis is therefore not rejected. The omitted variable bias cannot be statistically justified, and this is an indication that the specification of the model is appropriate. Therefore, the explanatory variables included appear to be adequate to explain the variation found in the dependent variable. This finding confirms the validity of the regression results, which were brought forward earlier, thus suggesting that the model is well-designed and that the coefficients acquired can be interpreted and treated with confidence.

**Table 5: VIF's Results**

| <b>Model-1</b> |       |
|----------------|-------|
| VIF            | 1/VIF |
| 3.430          | 0.292 |
| 3.080          | 0.325 |
| 2.020          | 0.494 |
| 1.750          | 0.571 |
| 1.530          | 0.656 |
| 1.180          | 0.848 |
| 1.090          | 0.919 |
| 1.080          | 0.923 |
| 1.070          | 0.935 |
| 1.060          | 0.948 |
| 1.050          | 0.950 |
| 1.670*         |       |

\*Indicates Mean VIF

The values of the Variance Inflation Factor (VIF) are given in Table 5 and are used to determine how much the independent variables used in the model are multi-collinear. Multicollinearity arises when there is a strong relationship between two or more predictors. The findings indicate that multicollinearity is not a significant problem. Since all the values of the Variance Inflation Factor (VIF) are far below the critical values, it means that the data does not show the existence of multicollinearity in the model. Thus, it occurs that the independent variables in the logistic regression model are not highly correlated with one another. This implies that the approximated coefficients are most likely to be reliable and statistically stable.

**Table 6: Outcomes of Link test for Percentage Well-being**

| Dependent Variable: Percentage Score |                |                 |                |                |                             |
|--------------------------------------|----------------|-----------------|----------------|----------------|-----------------------------|
| Hat & Hat^2                          | Log likelihood | -2424.6988      | LR chi2(2)     | 1284.49        |                             |
|                                      | Pseudo R2      | 0.2094          | Prob > chi2    | 0.0000         |                             |
|                                      | <b>Coef.</b>   | <b>St. Err.</b> | <b>t-value</b> | <b>P-value</b> | <b>[95% Conf. Interval]</b> |
| Hat                                  | 1.130          | 0.053           | 21.320         | 0.000          | 1.026-1.234                 |
| _Hat-sq                              | -0.096         | 0.091           | -1.607         | 0.283          | -0.274-0.082                |
| Cons                                 | 0.004          | 0.046           | 0.090          | 0.928          | -0.087-0.095                |

Table 6 shows the results of the link test, a diagnostic instrument used to determine whether the logistic regression model was valid or not. The predicted value (hat) and its squared counterpart (hat 2) are used as independent variables in this test. With the correctly specified model, the hat term would be significant relative to the hat 2 terms, which are expected to be small. The results suggest that the hat coefficient is 1.130 ( $p < 0.001$ ), which is significant and indicates that the model can explain. Conversely, the coefficient of hat 2 (-0.096,  $p = 0.283$ ) is not significant, which helps demonstrate that the model is specified appropriately. The hat 2 value is not significant, implying that the model is not mis-specified in terms of form. The results of the link test show that the logistic regression model for percentage well-being is specified and does not omit any significant nonlinear terms.

**Table 7: Ramsey RESET test [Fitted^2 & fitted^3]**

| Fitted^2 and fitted^3            | Ramsey RESET test                                           |
|----------------------------------|-------------------------------------------------------------|
| [Percentage score] fitted_sq = 0 | <b>H<sub>0</sub></b> : The model is correctly specified     |
| [Percentage score] fitted_cu = 0 | <b>H<sub>1</sub></b> : The model is not correctly specified |
| $\chi^2(2)$                      | 1.23                                                        |
| Prob > $\chi^2$                  | 0.28                                                        |

The findings of the Ramsey Regression Equation Specification Error Test (RESET) of the fitted squared and cubic terms are shown in Table 7. The null hypothesis (H<sub>0</sub>) indicates that the model is correctly specified, and the alternative hypothesis (H<sub>1</sub>) indicates that the model may be mis-specified. The 2 (2) statistic of the test was 1.23 with a p-value of 0.28. The null hypothesis is not rejected as the p-value is larger than 0.05. This finding implies that the model contains no specification error and that its functional form is suitable. In combination with the results of the link test, this confirms that the logistic regression model is correctly specified and statistically valid.

**Table 8: IROC Curve for Percentage Score**

|                        |        |
|------------------------|--------|
| Number of observations | 5389   |
| Area under ROC curve   | 0.8107 |

Table 8 shows the results of the Receiver Operating Characteristic (ROC) curve, which measures the capacity of the model to discriminate the dependent variable, which is the percent. The ROC results verify a high predictive power and strong classification accuracy. The area under the ROC curve (AUC) measures the overall effectiveness of the model; values close to 1 reveal strong discrimination, whereas values near 0.5 show weak discrimination. The AUC value for the model with 5,389 observations is 0.8107, suggesting good predictive accuracy. Therefore, the model shows only around 81 successes in properly separating people with

different levels of well-being. Going by these results, the ROC outcomes support the strong predictive properties of the logistic regression model and reliable classification results.

**Figure 4: ROC curve**

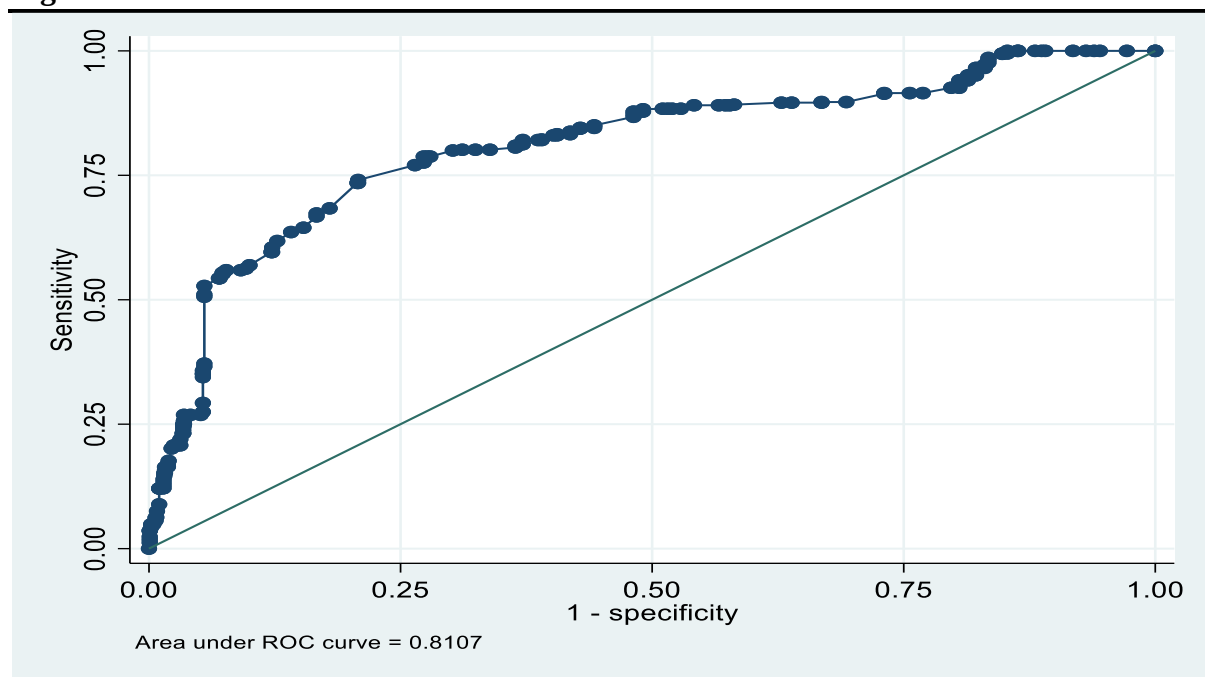


Figure 4 shows the Receiver Operating Characteristic (ROC) curve, which was used to assess the logistic regression model's discriminatory ability in predicting the probability of high well-being as a percentage score. In this curve, sensitivity (true positive rate) is on the vertical axis and 1 - specificity (false positive rate) on the horizontal axis, evaluating the model's effectiveness at distinguishing between people with high and low levels of well-being. The area under the curve (AUC) was calculated to be 0.8107, representing a strong discriminating ability of the model. In most models, an AUC greater than 0.8 is said to reflect good to excellent predictive accuracy (Hosmer, Lemeshow, and Sturdivant, 2013). The model's classification accuracy for well-being status is about 81%. The rapidly increasing slope of the curve to the right-hand side of the upper-left part of the graph compels one to acknowledge that the model in question has high sensitivity and moderate specificity. It means that the model is effective in finding patients with high scores of well-being, and the number of false positives is reduced. As a result, the logistic regression model is supported by the ROC analysis, and its ability to distinguish between outcome categories and its predictive performance are verified.

## Conclusion

The cross-sectional analysis of the Pakistan Demographic and Health Survey 2017-18 highlights the complex interactions among socioeconomic, demographic, workplace factors, and mental health and well-being among adult employees aged 25-49 years. What it reveals is a landscape of significant vulnerability, where almost three-quarters of the employees are uneducated; nearly three-quarters of the respondents are in rural regions and, of the total, only 12 are covered by social security health insurance such as Sehat Sahulat. The sample sheds some light on structural disparities that undermine psychological resilience in the workplace. In contrast, urban living, insurance, and educational attainment have a strong protective effect. In other households, large families and a lack of occupational prospects become a source of chronic stress. The patterns mentioned above highlight the importance of heterogeneous

interventions that extend beyond individual-level coping to address systemic determinants. Improving access to quality education, specifically for women, and fostering social protection mechanisms, such as scaling the Sehat sehulat program and creating employer-mandated mental health support, could provide high-impact pathways to improve well-being at the workplace. Policymakers must ensure the inclusion of mental health services within the paradigms of occupational health and primary care, in line with SDG 3 (good health and well-being) and SDG 8 (decent work and economic growth). Our cross-sectional study does not support causal inference and relies on self-reported measures; however, it is nationally representative of the population and adjusts for confounding factors, providing a good baseline for mental health in Pakistani workplaces. Follow-up longitudinal studies that include work-related stressors and objective biomarkers help sufficiently understand the dynamics over time and guide specific interventions. In conclusion, workplace mental health is not only a step towards better population health but also a forceful factor in collective economic performance, leading to sustainability and productivity. Thus, an investment in the psychological well-being of the workforce in Pakistan will be a leading step towards productivity, equity, and group development. We can clearly see that it is time to support our country.

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## Appendix 1

**Table 1: Descriptive Statistics**

| Vari.                                       | Category             | Freq | %     | $\bar{x}$ | S     | Min | Max | Skewness | Kurtosis |
|---------------------------------------------|----------------------|------|-------|-----------|-------|-----|-----|----------|----------|
| Age                                         |                      |      |       | 4.807     | 1.28  | 2   | 7   | -.019    | 2.46     |
|                                             | 20-24                | 216  | 3.94  |           |       |     |     |          |          |
|                                             | 25-29                | 504  | 9.19  |           |       |     |     |          |          |
|                                             | 30-34                | 1680 | 30.63 |           |       |     |     |          |          |
|                                             | 35-39                | 1440 | 26.25 |           |       |     |     |          |          |
|                                             | 40-44                | 1008 | 18.38 |           |       |     |     |          |          |
|                                             | 45-49                | 637  | 11.61 |           |       |     |     |          |          |
| No of Household members                     |                      |      |       | 8.884     | 4.358 | 5   | 25  | 1.439    | 5.663    |
|                                             | 5                    | 2352 | 42.88 |           |       |     |     |          |          |
|                                             | 10                   | 2365 | 43.12 |           |       |     |     |          |          |
|                                             | 15                   | 528  | 9.63  |           |       |     |     |          |          |
|                                             | 20                   | 120  | 2.19  |           |       |     |     |          |          |
|                                             | 25                   | 120  | 2.19  |           |       |     |     |          |          |
| Educational attainment                      |                      |      |       | .551      | 1.256 | 0   | 5   | 2.348    | 7.508    |
|                                             | No education         | 4357 | 79.43 |           |       |     |     |          |          |
|                                             | Incomplete primary   | 288  | 5.25  |           |       |     |     |          |          |
|                                             | Complete primary     | 288  | 5.25  |           |       |     |     |          |          |
|                                             | Incomplete secondary | 240  | 4.38  |           |       |     |     |          |          |
|                                             | Complete secondary   | 120  | 2.19  |           |       |     |     |          |          |
|                                             | Higher               | 192  | 3.50  |           |       |     |     |          |          |
| Sex of Household Head                       |                      |      |       | 1.162     | .368  | 0   | 1   | 1.836    | 4.37     |
|                                             | Male                 | 4597 | 83.81 |           |       |     |     |          |          |
|                                             | Female               | 888  | 16.19 |           |       |     |     |          |          |
| Residence                                   |                      |      |       | .281      | .449  | 0   | 1   | .977     | 1.954    |
|                                             | Urban                | 3946 | 71.94 |           |       |     |     |          |          |
|                                             | Rural                | 1539 | 28.06 |           |       |     |     |          |          |
| Current marital status                      |                      |      |       | 1.018     | .186  | 0   | 1   | 10.549   | 112.28   |
|                                             | Married              | 5437 | 99.12 |           |       |     |     |          |          |
|                                             | Widowed              | 48   | 0.88  |           |       |     |     |          |          |
| Percentage Score                            |                      |      |       | 74.38     | 43.65 | 0   | 100 | -1.117   | 2.248    |
|                                             | worst possible       | 1405 | 25.62 |           |       |     |     |          |          |
|                                             | best possible        | 4080 | 74.38 |           |       |     |     |          |          |
|                                             | quality of life      |      |       |           |       |     |     |          |          |
| Health Insurance type: Provided by employer |                      |      |       | .429      | .495  | 0   | 1   | .288     | 1.083    |

|                                   |       |       |       |       |   |   |        |         |  |
|-----------------------------------|-------|-------|-------|-------|---|---|--------|---------|--|
| No                                | 3134  | 57.14 |       |       |   |   |        |         |  |
| Yes                               | 2351  | 42.86 |       |       |   |   |        |         |  |
| Frequency smokes cigarettes       |       |       | .009  | .132  | 0 | 1 | 15.018 | 226.546 |  |
| does not smoke                    | 5461  | 99.56 |       |       |   |   |        |         |  |
| some days                         | 24    | 0.44  |       |       |   |   |        |         |  |
| Respondent currently working      |       |       | .171  | 1.123 | 0 | 1 | 7.219  | 54.075  |  |
| No                                | 5269  | 96.06 |       |       |   |   |        |         |  |
| Yes                               | 216   | 3.94  |       |       |   |   |        |         |  |
| Respondent's occupations (Groups) |       |       | 3.246 | 3.460 | 1 | 4 | 0.724  | 1.5846  |  |
| Not working                       | 569   | 10.37 |       |       |   |   |        |         |  |
| Professional/technical/managerial | 3,120 | 56.88 |       |       |   |   |        |         |  |
| Skilled Manual                    | 1,479 | 26.96 |       |       |   |   |        |         |  |
| Unskilled Manual                  | 317   | 5.78  |       |       |   |   |        |         |  |

**Table 2: Pairwise correlations**

| Variables                                       | (1)               | (2)               | (3)               | (4)               | (5)               | (6)               | (7)               | (8)               | (9)              | (10)  |
|-------------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------|
| (1) Residence                                   | 1.000             |                   |                   |                   |                   |                   |                   |                   |                  |       |
| (2) Age                                         | -0.016<br>(0.238) | 1.000             |                   |                   |                   |                   |                   |                   |                  |       |
| (3) No of Household members                     | -0.005<br>(0.716) | -0.105<br>(0.000) | 1.000             |                   |                   |                   |                   |                   |                  |       |
| (4) Educational attainment                      | 0.246<br>(0.000)  | -0.157<br>(0.000) | -0.127<br>(0.000) | 1.000             |                   |                   |                   |                   |                  |       |
| (5) Sex of Household Head                       | -0.064<br>(0.000) | -0.073<br>(0.000) | -0.133<br>(0.000) | 0.025<br>(0.068)  | 1.000             |                   |                   |                   |                  |       |
| (6) current marital status                      | 0.046<br>(0.001)  | 0.014<br>(0.296)  | -0.030<br>(0.027) | -0.041<br>(0.002) | 0.086<br>(0.000)  | 1.000             |                   |                   |                  |       |
| (7) Respondent currently working                | 0.324<br>(0.000)  | -0.022<br>(0.098) | -0.077<br>(0.000) | 0.359<br>(0.000)  | 0.033<br>(0.014)  | 0.223<br>(0.000)  | 1.000             |                   |                  |       |
| (8) respondent's occupation (group)             | 0.243<br>(0.000)  | -0.014<br>(0.310) | -0.086<br>(0.000) | 0.011<br>(0.422)  | 0.039<br>(0.004)  | 0.362<br>(0.000)  | 0.750<br>(0.000)  | 1.000             |                  |       |
| (9) Health Insurance type: Provided by employer | 0.600<br>(0.000)  | -0.032<br>(0.019) | 0.002<br>(0.885)  | 0.061<br>(0.000)  | -0.031<br>(0.023) | 0.021<br>(0.112)  | -0.047<br>(0.001) | -0.014<br>(0.306) | 1.000            |       |
| (10) Frequency smokes cigarettes                | 0.106<br>(0.000)  | -0.042<br>(0.002) | -0.059<br>(0.000) | -0.029<br>(0.031) | 0.151<br>(0.000)  | -0.006<br>(0.645) | -0.013<br>(0.320) | -0.010<br>(0.456) | 0.077<br>(0.000) | 1.000 |