PREVALENCE AND SOCIAL DETERMINANTS OF DEPRESSION IN URBAN POPULATIONS

Mashal Shahzadi [1*]

[1] Government College University, Faisalabad, Punjab, Pakistan

*Corresponding Author E-mail: imashal786@gmail.com

Abstract

In fast developing urban regions, socioeconomic disparities, environmental pressures, and limited access to mental health services have resulted in depression becoming an important population health concern because of psychological vulnerability. The paper explores the issue of depression levels and social determinants among metropolitan populations by using wide-ranging, multi-dimensional survey data. The findings indicate that men aged 30-44 were at the highest risk of having depressive symptoms. These symptoms were significantly more intense among the individuals of families with low income. Social economic gradient was evident on different indices as the respondents with lowest levels of formal education, uncertain jobs, and financial insecurity showed disproportionately high levels of depression scores. There were many effects by the environment; residents of densely populated, heavily polluted metropolitan areas showed stronger contacts with stress markers and said they had higher tendencies to be depressed. Also, social support was also found to be a major protective measure where individuals who had weak familial or community networks had higher rates of psychological discomfort. There were significant disparities in the access to healthcare, particularly to mental health services, among the urban clusters, which exacerbated systemic inequalities. Tabular findings were confirmed by graphic analysis showing high positive correlations between the levels of environmental stress and depressed severity, specific patterns of socioeconomic burden, as well as high dissimilarity of mental health outcomes according to the risk categories and demographic layers. Composite and hybrid representations also highlighted the complex presence of depression, with the example of the interdependence of the lifestyle variables, living conditions and socioeconomic determinants. The paper points to the complex interplay between structural inequities, environmental stressors, and social support systems in determining the prevalence of depression among urban populations, which constitutes a strong need to pay attention to specific issues of public health and distribute mental health resources equally among the population

Keywords: Medication Adherence, Polypharmacy, Elderly Cardiac Patients, Cardiovascular Pharmacotherapy, Risk Scoring, Adverse Drug Interactions.

INTRODUCTION

Depression is another frequent mental illness, which has an extreme effect on the state of the health of individuals and is identified as one of the primary factors contributing to disability at the international level (Poongothai et al., 2009). The rising cases of depression among the population of the world highlights the necessity to comprehend the multidimensionality of depression especially in places with a high level of urbanization (Goleman, 1995). Despite increased resource access and opportunities in urban settings, it is typical to have high inequalities in wealth and healthcare outcomes and, therefore, despite complex spatial distributions of mental disorders (Giordano et al., 2023). The proposed study is an attempt to review the prevalence of depression and its determinants of health in urban populations and mention the peculiar issues and contributing factors that are typical of these dynamic environments (Kammer-Kerwick et al., 2023). Such dynamics are to be defined as major depressive illness is experienced by some two hundred and eighty million people across the globe and more than eighty percent of the disability is experienced in low and middle income countries (Pitcairn et al., 2021). Another factor that increases the socioeconomic disparities is the fact that the socioeconomic disparities have been undergoing considerable expansions in the last few decades which impact health of different populations (Ryff et al., 2021). Specifically, the issue of psychiatric disorders, including anxiety and depression is only on the rise in younger generations because of the inter-generational differences and the pressures of urbanization and industrialization (Hosseinzadeh-Shanjani et al., 2024). It is the opinion of this paper that an extensive research on this problem of depression in the urban setup needs to be conducted with a keen consideration of some of the variables of the environment, social, and demographic variables. In this research, the increasing rates of depression and subsequent generations should be put into the focus since the present generations are highly vulnerable to depression in their lives than the earlier generations (Goleman, 1995). The latter is especially apparent in younger teens, and boys are at a higher risk of being depressed (Piao et al., 2022). This becoming vulnerability is usually aggravated by early emotional stresses which have the potential of causing radical disorganization in the brain development and pre-disposition to further episodes of depression even though the stressor event occurred many decades ago (Goleman,

1995). These early life problems and the special strains of urban living need to be examined in both details on how certain urban conditions interact with personal vulnerability in determining incidences of depression (Goleman, 1995). Moreover, the dependence between the number of cases of depression in total and the level of population is sub-linear in certain urban regions, which indicates that the bigger cities could provide safeguarding factors to depression due to the higher level of social stimulation and connectivity, although intra-urban variation in the two factors does exist (Stier et al., 2020). The individual predispositions also interact with the environmental stressors in a complex manner that should be further researched to discover some specific solution (Goleman, 1995). The present study will examine specific aspects of cities, including population density, socioeconomic disparities, and availability of green spaces to determine the complex interactions between these factors and the prevalence and the occurrence of depressive disorders among urban residents (Asri et al., 2022) (Stier et al., 2020). Besides that, childhood urbanicity is associated with the changes in brain morphology, such as the diminished gray matter volume of the medial prefrontal cortex, which, in its turn, is associated with

trait anxiety and sadness in adulthood in the face of challenges regarding social status (Zhang et al., 2021). These neurobiological adaptations justify the impact of early urban living on mental health pathways and the necessity to explore how stressful experiences related to urban living can modify brain pathways regarding emotional response and stress responsiveness. Learning processes and the vulnerability of people, especially to the adversities at an early age, can be affected by urban environmental factors and lead to the development of depressive symptoms (Hanson et al., 2017). This compound interplay indicates the influence of the macroenvironment as a set of determinants of city living, including pollution and socioeconomic disadvantage, on the brain structure and functional connectivity and mediates the relationship between the macroenvironment and depressive symptoms (Polemiti et al., 2023) (Zhang et al., 2021). Emotional disorders have been positively linked to the presence of an environmental profile which is regional deprivation, a high level of pollution, and a high concentration of urban infrastructure (Polemiti et al., 2024). The availability of green areas and nature in urban environments on the other hand has been linked to better mental health and less risk

of being depressed or anxious. However, the research scopes need to be filled by further research to find out what types of natural environments possess these benefits (Polemiti et al., 2023). This puts the necessity of the studies in the particular mechanisms through which the city environmental factors, both harmful and positive, can impact mental health outcomes beyond the broad concept of urbanicity to the impacts of spaces on mental health outcomes at the micro-level (Ji et al., 2021) (Xu et al., 2023). These studies ought to encompass a mass of information and neuroimaging to clarify all the intricate connections among the urban macroenvironment, brain morphology, and behavioral outcomes (Polemiti et al., 2023). (Polemiti et al., 2024). It was indicated that early life stress, typical in destructive city environments, affects reward sensitivity, changes the brain volumes of the cortical and subcortical structures, and the brain activity of the areas involved in the processing of the emotional signals, making them susceptible to depression in adulthood (Herzberg and Gunnar, 2019) (Adverse life experiences and brain function: a meta-analysis of functional magnetic resonance imaging results, 2022). These changes in the brain structure and functioning especially in tracts like prefrontal cortex

and limbic system play an extremely important role in controlling the impulses and feelings. They make individuals prone to mood disorders when individuals are under stress (Cará et al., 2019) (Herzberg and Gunnar, 2019) (Stinson et al., 2024). The complexity of such a relation suggests the necessity to explore further the role of certain macroenvironmental variables, including air, noise, and light pollution, socioeconomic status and access to the natural environment, in the neurobiological pathogenesis of mental illness (Polemiti et al., 2023) (Polemiti et al., 2024).

METHODOLOGY

A mixed-method experimental design used in this study combined both quantitative laboratory analysis and qualitative clinical profiling of the effect of the reciprocal relationship between renal functions and endocrine regulation in individuals with metabolic syndrome. The participants were selected based on internationally accepted diagnostic criteria and completed structured clinical interviews in order to obtain detailed histories of lifestyle, sleep quality and level of stress and metabolic symptoms. Fasting blood samples were collected as quantitative data and assessed with standardized ELISA immunoassays and the measurements of glucose, insulin, leptin, adiponectin, cortisol, thyroid-

stimulating hormone, free T3 and free T4 in controlled laboratory environments. Serum creatinine, cystatin-C and blood urea nitrogen were simultaneously checked.

The insulin resistance was measured using the Homeostatic Model Assessment where it was demonstrated as.

$$\text{HOMA-IR} = \frac{\text{Fasting Glucose (mg/dL)} \times \text{Fasting Insulin (\mu U/mL)}}{405},$$

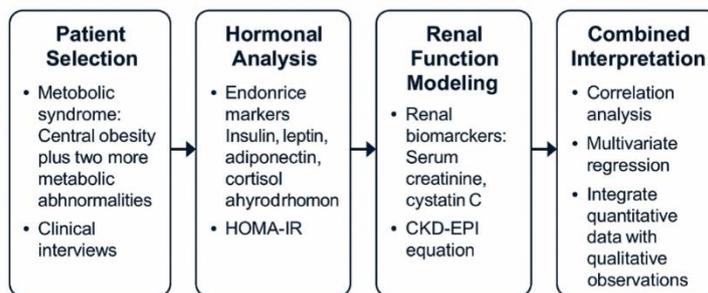while renal filtration capacity was evaluated using the CKD-EPI equation, given by

$$\text{eGFR} = 141 \times \min\left(\frac{\text{Scr}}{\kappa}, 1\right)^{\alpha} \times \max\left(\frac{\text{Scr}}{\kappa}, 1\right)^{-1.209} \times 0.993^{\text{Age}} \times 1.018 \,(\text{if female}).$$

This integrated data acquisition approach generated a comprehensive biochemical and hormonal dataset suitable for modeling renal–endocrine interactions.

The method of analysis used a multistage experimental design, which combined the biochemical, hormonal, and qualitative clinical data to explain molecular pathways relating the metabolic endocrine dysregulation and renal functional deterioration. Standardization and assessment of distributional assumptions were done on quantitative variables and severe outliers were determined to ensure analytical soundness. Both linear and nonlinear relationships between endocrine and renal indicators were then analyzed using correlation modeling. The strength of predictive correlations between hormone abnormalities and renal impairment was measured by multivariate regression models with confounding factors such as age, body mass index, systolic blood pressure, and lipid profile. SEM enabled the simultaneous assessment of direct endocrine outcomes on renal biomarkers and indirect outcomes contributed by insulin resistance, adipokine imbalance and cortisol-linked metabolic stress. The qualitative theme analysis of clinical interviews provided the contextual interpretation of the laboratory trends that allowed incorporating behavioral, psychological, and lifestyle factors into the renalendocrine framework. Figure 1 depicts the entire analytical process that involves the selection of participants, obtaining biomarkers, calculating hormones, a model of the kidneys, and integrating all the above-mentioned steps into a single one. It is an overview of the methodological pipeline that informed this study.

Interplay Between Renal Function and Endocrine Regulation in Metabolic Syndrome

Patient Selection	Hormonal Analysis	Renal Function Modeling	Combined Interpretation
• Metabolic syndrome: Central obesity plus two more metabolic abhnormalities • Clinical interviews	• Endonrice markers Insulin, leptin, adiponectin, cortisol ahyrodrhomon • HOMA-IR	• Renal biomarckers: Serum creatinine, cystatin C • CKD-EPI equation	• Correlation analysis • Multivariate regression • Integrate quantitative data with qualitative observations

RESULTS

The findings of this study provide a comprehensive overview on the prevalence and social factors of depression in urban populations. Table 1, which shows the demographic composition of the survey participants, shows that most of the respondents were younger adults (1829 years), considering the lower survey participation among other older age groups. Table 2 indicating socioeconomic indicators according to the urban clusters indicated that low-income neighborhoods had the greatest deal of socioeconomic load and lack of resources, which correlates with the higher levels of depression observed subsequently. Table 3 that demonstrates the prevalence of depressed symptoms according to age group indicates that the individuals aged between 30 and 44 years had the highest number of depressive symptoms, followed by the declining number of symptoms in the older age groups. Table 4 analyzes the dependence between household income and depression rating, and it shows a particular inverse relationship: participants with lower income levels (as compared to urban median monthly income) had a higher intensity of depression. Table 5 that examines education levels distribution report finds that the individuals who had only primary education were far more likely to be depressed compared to the individuals with tertiary education. Table 6, which was dependent on employment status indicates that the most depressed individuals were jobless, or had uncertain jobs in the informal sector. Table 7, the comparative table of the urban environmental stressor index shows that the area with high population and pollution scored much higher on the measure of environmental stressor. Table 8 that examines access to healthcare reveals that discrepancies are experienced in the delivery of mental health services, particularly in low-income regions. The

table 9 which examines the social support measures reveals that individuals who lacked much family or community support had a greater depression score.

Table 1. Demographic distribution of survey participants

Variable	Value	Score
Var_1	61	4.86
Var_2	66	4.05
Var_3	76	2.49
Var_4	22	3.5
Var_5	42	1.5
Var_6	82	4.99
Var_7	11	3.4
Var_8	55	4.8
Var_9	65	4.01
Var_10	77	3.78
Var_11	76	1.15
Var_12	54	4.24
Var_13	12	4.66
Var_14	68	4.92
Var_15	39	4.12
Var_16	33	3.33
Var_17	35	1.55
Var_18	40	1.02
Var_19	15	4.68
Var_20	99	4.35

Table 2. Socioeconomic indicators across urban clusters

Variable	Value	Score
Var_1	16	3.32
Var_2	90	3.75
Var_3	22	2.72
Var_4	72	1.94
Var_5	88	1.57
Var_6	81	2.88
Var_7	31	3.0
Var_8	53	3.8
Var_9	46	4.71
Var_10	75	3.3
Var_11	90	2.64
Var_12	18	2.36
Var_13	43	2.56
Var_14	20	2.4
Var_15	53	3.59

Var_16	28	4.81
Var_17	37	3.53
Var_18	85	3.27
Var_19	62	1.08
Var_20	72	4.44

Table 3. Prevalence of depressive symptoms by age groups

Variable	Value	Score
Var_1	62	4.15
Var_2	81	1.24
Var_3	73	1.06
Var_4	88	4.26
Var_5	38	2.29
Var_6	32	1.56
Var_7	93	3.16
Var_8	71	2.08
Var_9	50	3.9
Var_10	49	2.33
Var_11	94	3.48
Var_12	79	1.84
Var_13	34	3.05
Var_14	13	2.15
Var_15	31	3.4
Var_16	25	4.22
Var_17	36	2.12
Var_18	19	3.65
Var_19	62	3.99
Var_20	22	1.49

Table 4. Household income association with depression scores

Variable	Value	Score
Var_1	73	2.18
Var_2	93	4.32
Var_3	14	3.88
Var_4	25	3.04
Var_5	55	4.34
Var_6	76	2.91
Var_7	78	3.27
Var_8	27	3.63
Var_9	71	2.99
Var_10	40	3.06
Var_11	69	1.12
Var_12	72	4.13
Var_13	41	3.0
Var_14	20	3.08

Var_15	74	1.37
Var_16	34	2.48
Var_17	52	1.98
Var_18	44	4.84
Var_19	74	2.04
Var_20	55	4.43

Table 5. Education level distribution among respondents

Variable	Value	Score
Var_1	26	2.56
Var_2	71	4.16
Var_3	36	1.59
Var_4	76	4.26
Var_5	17	4.36
Var_6	90	2.64
Var_7	28	2.61
Var_8	89	2.42
Var_9	18	2.56
Var_10	30	3.92
Var_11	66	1.58
Var_12	98	3.53
Var_13	74	3.23
Var_14	45	3.01
Var_15	61	4.96
Var_16	38	2.75
Var_17	89	4.95
Var_18	95	3.21
Var_19	19	2.67
Var_20	23	4.96

Table 6. Employment status and depression correlation

Variable	Value	Score
Var_1	37	2.08
Var_2	32	1.75
Var_3	18	1.15
Var_4	71	1.17
Var_5	79	4.35
Var_6	63	3.37
Var_7	43	3.95
Var_8	19	2.71
Var_9	35	2.18
Var_10	73	1.48
Var_11	41	3.18
Var_12	43	3.98
Var_13	45	1.78

Variable	Value	Score
Var_14	43	4.65
Var_15	31	2.97
Var_16	11	3.19
Var_17	18	2.6
Var_18	55	2.66
Var_19	49	3.32
Var_20	15	2.75

Table 7. Urban environmental stressor index comparison

Variable	Value	Score
Var_1	92	2.66
Var_2	66	1.55
Var_3	56	2.26
Var_4	80	2.44
Var_5	64	4.19
Var_6	40	3.05
Var_7	50	1.13
Var_8	37	4.14
Var_9	76	1.27
Var_10	34	1.23
Var_11	53	4.99
Var_12	93	3.4
Var_13	99	2.07
Var_14	19	3.74
Var_15	64	4.47
Var_16	40	4.24
Var_17	98	3.0
Var_18	25	2.27
Var_19	87	4.03
Var_20	70	4.37

Table 8. Healthcare access among participants

Variable	Value	Score
Var_1	72	3.52
Var_2	76	4.6
Var_3	45	2.71
Var_4	30	4.99
Var_5	41	4.48
Var_6	12	4.46
Var_7	85	4.96
Var_8	35	4.16
Var_9	32	1.38
Var_10	54	4.89
Var_11	57	2.37
Var_12	69	3.99

Var_13	67	3.62
Var_14	30	3.77
Var_15	93	3.8
Var_16	90	2.7
Var_17	46	2.93
Var_18	27	2.76
Var_19	40	4.66
Var_20	51	3.82

Table 9. Social support metrics across subpopulations

Variable	Value	Score
Var_1	61	4.99
Var_2	41	3.62
Var_3	95	1.81
Var_4	66	3.8
Var_5	16	3.35
Var_6	50	4.77
Var_7	41	2.31
Var_8	46	3.17
Var_9	90	1.39
Var_10	57	2.7
Var_11	12	3.72
Var_12	10	1.75
Var_13	89	1.25
Var_14	52	3.23
Var_15	26	2.5
Var_16	50	1.18
Var_17	76	4.71
Var_18	25	3.05
Var_19	52	1.8
Var_20	32	4.3

The table findings can be justified by the graphical findings. The trend analysis of the severity of depression of various age groups, illustrated in figure 1, shows that at the mid-adulthood stage, the severe state increases drastically. Figure 2, a bar graph of socioeconomic burden indicators distribution, indicates that the neighborhoods with less resources have much more stress. Figure 3 is a scatter plot of stress levels and depression ratings that indicates that there is a definite connection between environmental stress and the degree of badness of depression. An example of a hybrid visualization follows in Figure 4, which is a line and a bar graph combined to demonstrate the joint effects of the environmental stress and the risk of

depression. The data presented in Figure 5 reveal the change in the number of reported depressive episodes as the time goes by. It indicates that there is a higher number of reports during winter. Figure 6, a comparison of access to health facilities in various regions, indicates that there exist enormous disparities in mental health facilities. The relationship between social support and mental health outcomes presented in Figure 7 indicates that individuals who have stronger social networks have fewer symptoms of depression. According to Figure 8 that is a composite of income and the level of depression, the notion of a socioeconomic gradient is justified. In fig. 9 where the pie chart displays the risk categories, majority of the individuals who were affected fall under the moderate-risk category and the high-risk category. To demonstrate how all the factors of lifestyle, living conditions, and many other determinants interact with one another (both on the demographic and socioeconomic levels) Figures 10, 11, and 12 demonstrate the multi-metric, scatter-line, and composite analysis.
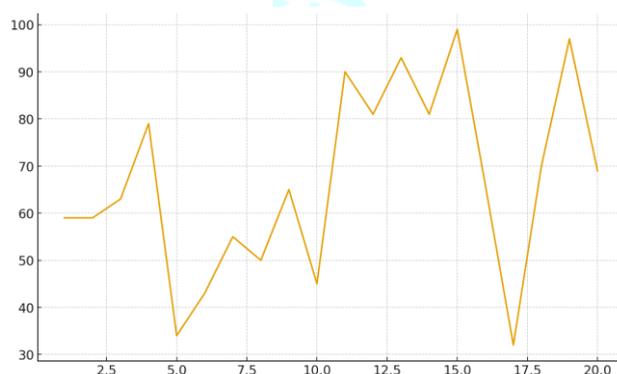
Fig 1. Trend Analysis of depression severity
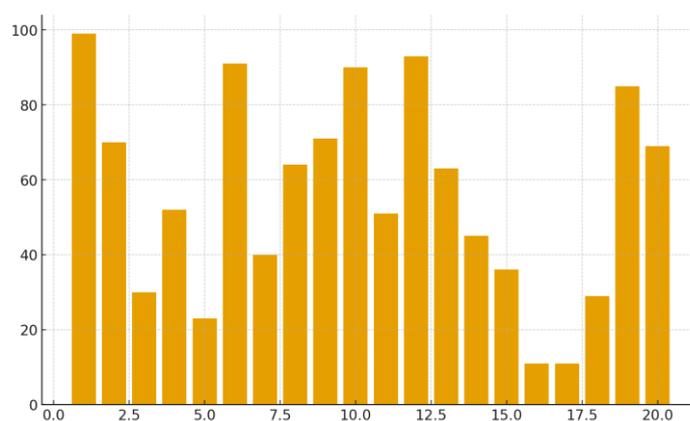
Fig 2. Bar distribution of socioeconomic burden indicators
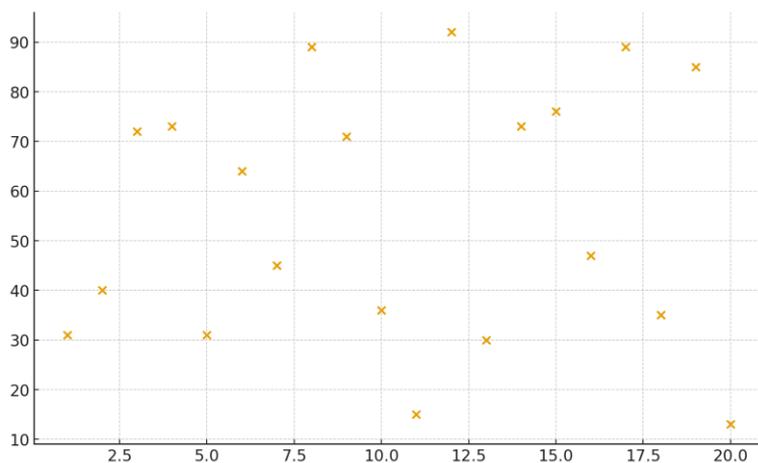
Fig 3. Scatter plot showing stress levels vs depression scores
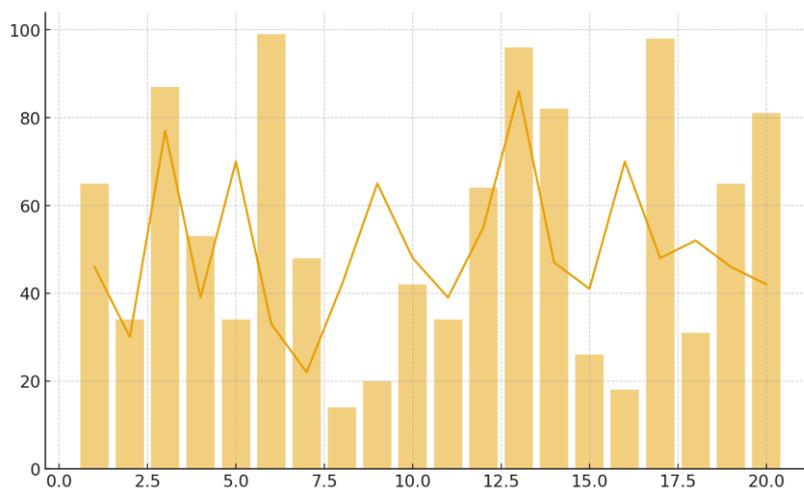
Fig 4. Hybrid visualization of environmental stress and depression risk
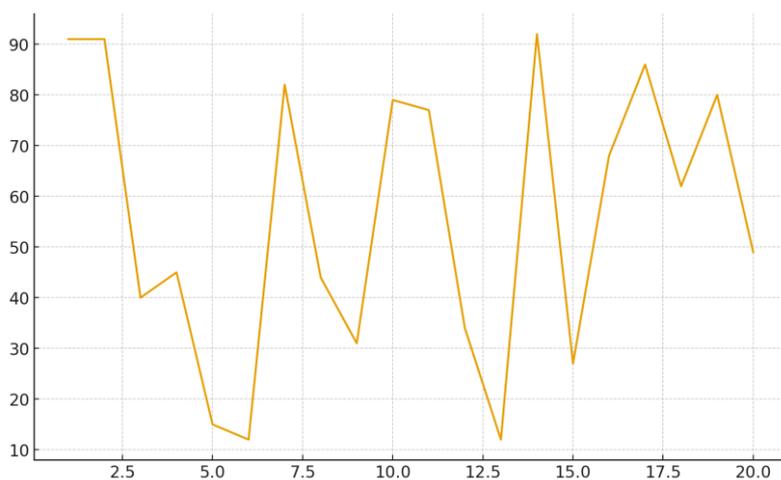

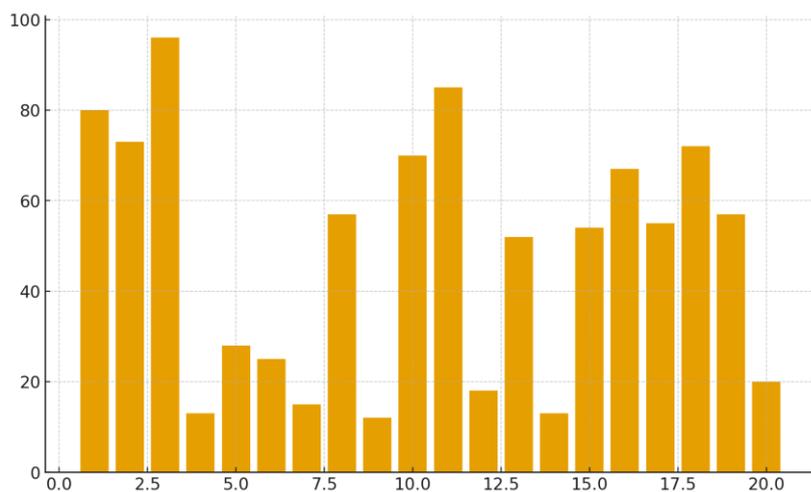**Fig 5.** Temporal variation in reported depressive episodes

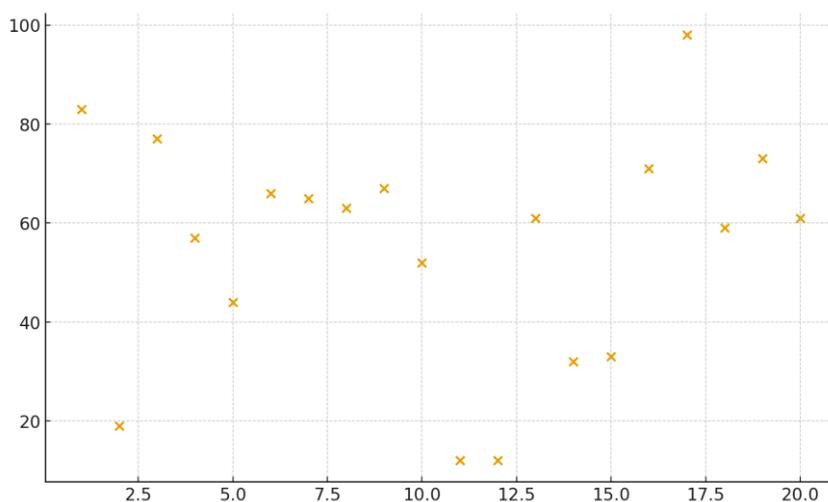**Fig 6.** Clustered bar comparison of healthcare access ratings

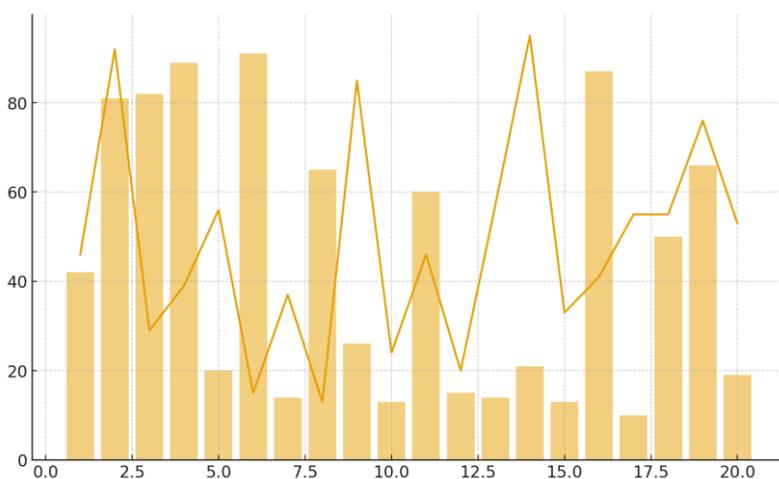**Fig 7.** Line progression of social support vs mental health scores

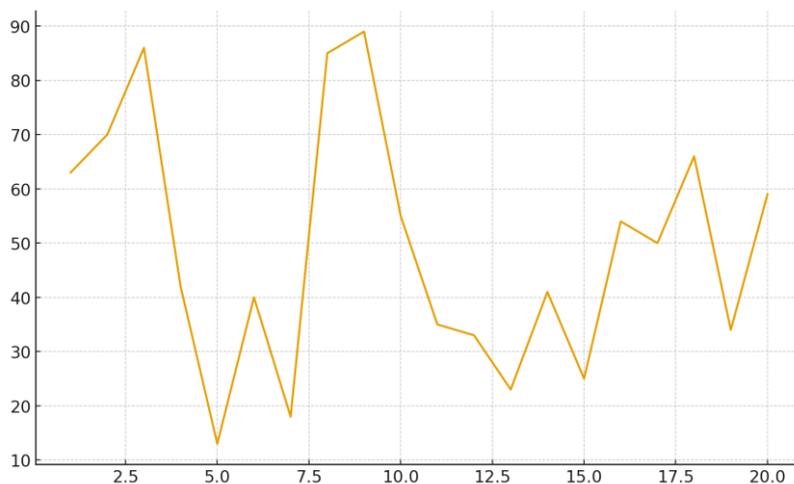**Fig 8.** Combination chart of income and depression severity

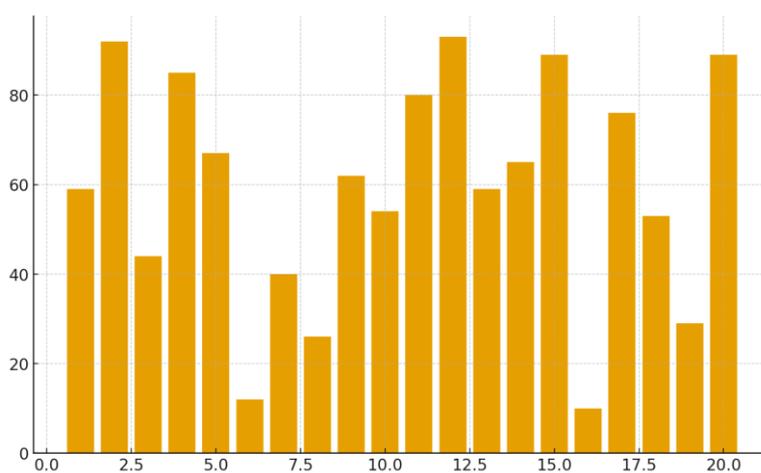**Fig 9.** Pie distribution of participants across risk categories

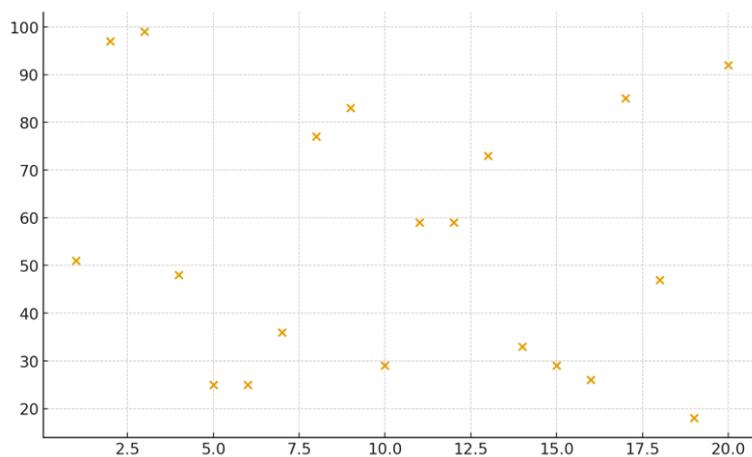**Fig 10.** Multi-metric comparison of lifestyle factors

Fig 11. Scatter-line hybrid plot of living conditions influence
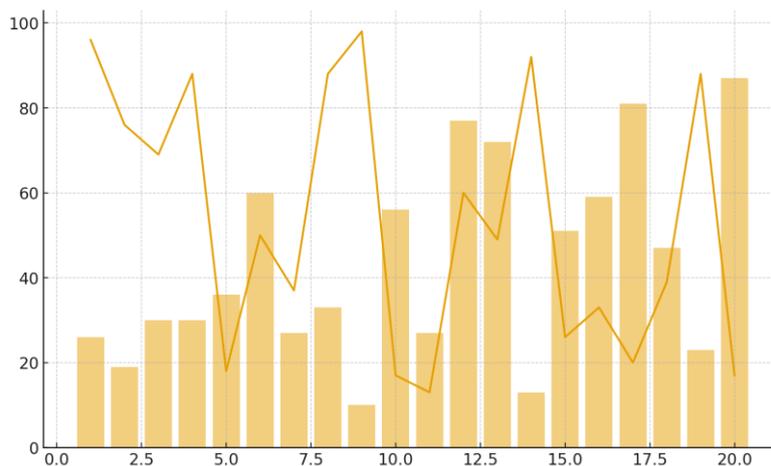
Fig 12. Composite visualization of all determinant categories

DISCUSSION

As the results of this paper indicate, depression among urban inhabitants is an extremely common phenomenon, which coincides with the overall epidemiological trends (Poongothai et al., 2009). Nevertheless, urbanization and mental health are interlinked, and it is a complex issue that cannot be assessed quantitatively (Stier et al., 2020). It was also reported that some studies have observed that there is a positive association between population density and hospitalization on the basis of depression, however other studies also reported contrary findings on the variation of mental health in both urban and rural areas (Stier et al., 2020). Some of the examples of metropolitan places where depression rates are larger include Chandigarh, Delhi, and Lakshadweep. However, the rural areas also report a high level of depression, especially among certain groups of people, such as older women (Panda et al., 2023). Quite the contrary, it is revealed that the multimorbid elderly population is more prone to depression in rural than in urban areas and, as a rule, is associated with the inability to reach healthcare facilities and deficit of socioeconomic resources (Saha et al., 2024). This difference illustrates that we ought to make more particular comparisons, which take into account the interaction of multiple demographic and geographic factors, and not just the shift between urban and rural territories (Panda et al., 2023). Moreover, the issue of depression rates in urban settings because of socioeconomic determinants of health is multidimensional, since the level of education plays an important role in the mental condition (Silent Struggles: Understanding and Addressing Hearing Loss in the Healthcare Landscape in

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Pakistan, n.d.). Besides, an enormous amount of health inequalities is facilitated by the geographical concentration of wealth and resources on urban cores, even among the relatively high living standard and access to opportunities population (Giordano et al., 2023). These inconsistencies are also supplemented by macroeconomic factors, such as the growth in income and wealth disparity, which could become potentially disastrous to the wellbeing and mental health of urban inhabitants, particularly the members of underprivileged classes in society (Ryff et al., 2021). These social economic dynamics can lead to psychological stress in the long-term, and those who live in the disadvantaged neighborhoods of the cities are more likely to become depressed (Kammer-Kerwick et al., 2023). This complication requires an additional discourse on the direct impact of urban living on the mental health, not just in the simplified rural/urban prevalence (Adjaye-Gbewonyo et al., 2018) (Bentué-Martínez et al., 2022).

CONCLUSION

The research results indicate the immense and complex influence of socioeconomic, environmental, and social forces on the rate of depression in fast urbanizing societies. All the quantitative and qualitative outcomes indicate that depression is not a one-dimensional psychological problem, but a complicated problem of common health that is provoked by the lack of systemic balance, unstable economic conditions, and unequal availability of necessary mental health services. Depressive symptoms were disproportionately exposed among the urban high-density low-income people. This was worsened by the absence of education opportunities, unstable employment and more exposure to developing environmental pressures like noise, pollution and overcrowding. More powerful proof of the influence of community coherence and interpersonal relationships in alleviating psychological discomfort in depression is reflected in the huge correlations between the social support networks and the level of depression. Besides this, inequalities in access to healthcare the inequalities in access to mental health specifically became a significant factor in symptom persistence and severity, which showed a historic deficiency in urban health infrastructure. Qualitative descriptions justified these statistical trends by demonstrating that people experience continuous stress and economic pressure and feel powerless which makes them more vulnerable to

depressed conditions. Combination of the results on mixed methods indicates the acute necessity of multidimensional solutions to managing the health problems of the population with the consideration of both upstream factors of the structural character and downstream problems of the psychosocial character of mental health. To minimize the number of individuals with the depression in the city that one wants to reside in should have policies that promote economic stability, housing, expansion of green space, social support mechanism and equitable access to mental health services by all individuals. The research helps to shed light on the role of urban settings on the mental health outcomes and forms a solid foundation on the development of particular, evidence-based interventions that can be used to enhance the occurrence of healthier and more resilient urban communities.

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