RESEARCH PAPER   OPEN ACCESS

Investigating the Levels of Depression and Anxiety Among Rag-pickers Working in Challenging Environmental Conditions from Multiple Districts in Uttar Pradesh, India

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Abstract

Rag-pickers play a crucial role in global waste management by salvaging recyclable materials from waste. Therefore, ensuring their occupational and environmental hygiene is vital not only for their well-being but also to mitigate potential environmental risks associated with waste handling. The present study intends to gauge and compare the levels of depression (using the PHQ-9 scale) and anxiety (using the GAD-7 scale) among rag-picking communities in four districts of Uttar Pradesh: Ghaziabad, Meerut, Baghpat and Hapur. A total of 797 participants were scanned: 544 rag-pickers and 253 non-rag-pickers. Statistical analysis revealed that the mean depression and anxiety levels of rag-pickers in both, Ghaziabad and Meerut, were significantly higher than that in the rag-picking communities from Baghpat and Hapur. Baghpat rag-pickers were significantly more depressed than those in Hapur, but the anxiety levels showed no significant difference. Ghaziabad's and Meerut's rag-pickers did not show any significant difference in the depression and anxiety levels. We further compared the above mood disorder scales between the rag-picking population and the non-rag-picking population (control population living in the same community) in each of the four districts separately. While Ghaziabad rag-pickers were found with significantly higher levels of depression and anxiety than the non-rag-picking population living there, rag-pickers in Baghpat and Hapur were found to suffer significantly lower levels of depression than the non-rag-picking population. We conclude with possible reasons for the above mentioned findings. Our study findings can inform the development of targeted policies and interventions aimed at improving the mental health of rag-pickers.

Introduction

Due to their nature of work, rag-pickers mostly find themselves in unsanitary, polluted and unsafe surroundings, often full of hazardous toxic chemicals or sharp objects. The challenging and hazardous environmental conditions that the rag-pickers work in, can play a significant role in their mental health (Tayal et al., 2023; Puri et al., 2024; Kaur et al., 2023). Akin to any individual working in challenging and deplorable conditions, this section of the society as well is extremely susceptible to mental health issues, including depression and anxiety (Mote et al., 2016; Hussain and Sharma, 2016; Bala and Singh, 2017; Tripathi and Agarwal, 2019). The nature of their work, coupled with the socio-economic challenges they face, contributes to the mental health vulnerabilities of this population.

Further, ragpickers mostly come from economically disadvantaged backgrounds and face constant financial struggles (Chokhandre et al., 2017; Naaz, 2019; Shepherd et al., 2022). The stress of not having a stable income or living in poverty can contribute to feelings of hopelessness and anxiety. They also experience social stigma and discrimination due to the nature of their work (Choudhary and Singh, 2022). The lack of social acceptance can lead to feelings of isolation, low self-esteem, and increased vulnerability to mental health issues. Further, the hazardous working conditions of ragpickers expose them to various health risks (Dhruvarajan and Arkanath, 2000; Ray et al., 2004; Selvi et al., 2012; Kandasamy et al., 2013; Mondal et al., 2016; Kumari and Kiran, 2022; Pandey et al., 2023; Mishra et al., 2023). Constant exposure to pollutants, sharp objects, and unsanitary conditions contributes to physical health issues, which may, in turn, impact their mental well-being. Limited access to healthcare facilities and services to ragpickers (Iyer et al., 2023) can also prevent ragpickers from receiving adequate medical attention for physical and mental health issues, exacerbating their conditions. Most ragpicker families also face educational disparities with limited access to quality education, leading to a perpetual cycle of poverty and limited opportunities for personal and professional growth, contributing to a sense of despair. To add to the various above-mentioned factors, substance abuse is often used as a coping mechanism for the stresses that ragpickers face (Mote et al., 2016; Iyer et al., 2023; Seth et al., 2005) which can further contribute to mental health issues and complicate the overall well-being of ragpickers.

Keeping in view the various factors that can contribute to mental health issues in rag-pickers, in this study we assess the levels of depression and anxiety in four districts of Uttar Pradesh, one of the most populous states of India. The four districts are Ghaziabad, Meerut, Baghpat and Hapur. These four districts were primarily chosen due to their various demographic differences. Ghaziabad and Meerut have plenty of landfill, are heavily populated, and are also reeling under the pressure of increasing rate of industrialization and urbanization due to their proximity to metropolitan regions causing waste management difficulties. On the other hand, Baghpat and Hapur have fewer number of landfills with a relatively smaller rate of urbanization. By studying these four districts we hope to cover a range of ragpicker conditions. We first compare the levels of anxiety and depression between the rag-pickers of the four different districts to assess if the mental health conditions of rag-pickers is invariant of the region they work in. We then compare the anxiety and depression levels of the rag-pickers with that of the non-rag-pickers (control subjects) in each district separately to assess how the difference between these two communities change with each region.

Materials and methods
Setting and Sample
In the current study we selected four districts Ghaziabad, Meerut, Baghpat and Hapur. A total of 797 participants were scanned, 544 rag-pickers (RP) and 253 non-rag-pickers (NRP). Out of these 304 were from Ghaziabad (203 RP and 101 NRP), 202 from Meerut (151 rag-pickers and 51 non-rag-pickers), 141 from Baghpat (90 rag-pickers and 51 non-rag-pickers) and 150 from Hapur (100 rag-pickers and 50 non-rag-pickers). In each district the NRPs were carefully selected such that they live in the same community as the rag-pickers lived in but did not indulge in any form of rag-picking. The participants included both males and females, in the age-group 18-64. See Table 1 for the demographic characteristics of the participants.

Measures
We administered the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder (GAD-7) tools to screen for depression and anxiety (generalized anxiety disorder (Kroenke et al., 2001; Spitzer et al., 2006). PHQ-9 and GAD-7 have been found valid and reliable tools to measure depression and anxiety disorders in western countries (Kroenke et al., 2010) as well as in India (De Man et al., 2021). Both the questionnaires were available in hindi.

The PHQ-9 questionnaire asks the participants to rate how often in the last two weeks they have had a list of 9 problems, like "little interest or pleasure in doing things", "feeling tired or having

little energy", or "thoughts that you would be better off dead or of hurting yourself in some way". Each of the nine items are to be scored either 0 ("not at all"), 1 ("several days"), 2 ("more than half the number of days") and 3 ("everyday"). Thus, each participant gets a score between 0 and 27. Scores of 5, 10, 15 and 20 are the cutoffs for 'mild', 'moderate', 'moderately severe' and 'severe' depression, respectively.

Table 1: Demographic characteristics of the participants

Demographic Characteristic	Ghaziabad		Meerut		Baghpat		Hapur	
	RP	**NRP**	**RP**	**NRP**	**RP**	**NRP**	**RP**	**NRP**
Sample size	203	101	151	51	90	51	100	50
Gender								
Male	109	50	70	26	51	24	50	24
Female	94	51	81	25	39	27	50	26
Age group (in years)								
Below 24	37	20	25	8	20	12	23	4
25-44	96	42	73	20	40	21	47	24
45-64	53	26	41	17	22	12	22	20
Above 65	17	13	12	6	8	6	8	2
Education status								
Literate	52	49	40	29	29	35	47	34
Illiterate	151	52	111	22	61	16	53	16
Marital Status								
Married	164	78	135	45	69	38	79	45
Unmarried	13	14	4	1	12	3	8	3
Widowed/Separated/ Divorced	26	9	12	5	9	10	13	2

RP: Rag-Pickers, **NRP**: Non-Rag-Pickers

Similarly, the GAD-7 questionnaire assessed 7 problems like "feeling nervous, anxious, or on edge", "not being able to stop or control worrying", etc., and each question had to be answered with a score between 0 to 3. A participant would hence get a total score between 0 and 21. Scores of 5, 10 and 15 are the cutoffs for 'mild', 'moderate 'and 'severe' anxiety, respectively.

Procedure
A team of 7 students was constituted to help the authors in this large-scale survey. Each team member was carefully instructed on the nature of the survey and the complete questionnaire was discussed in detail. At the rag-picking site, the purpose of the study was communicated to each participant individually and a written consent was taken. After obtaining the consent the psychological tools were administered by the helping team on each participant. The sample collection spanned a total of four months. The data collected was curated by the authors for proper statistical analysis.

Results
Table 2 shows the mean and standard deviation of the depression and anxiety scores for the rag-picker community and the non-rag-picker community separately for each of the four districts. Using our data, we will compare the levels of depression and anxiety between the rag-picker community of the four districts. Further, for each district separately, we will compare the rag-picker and the non-rag-picker communities.

1. Comparing depression and anxiety levels of the rag-picker communities between the four districts
We first made a district-wise comparison of depression and anxiety levels in the RP community.

(i) Depression
Levene's test indicated a violation of the assumption of homogeneity of variances between the depression scores of the rag-pickers data of the four districts (F=11.07, p=4.64e-07). We thus used

the *Welch's ANOVA* (which does not assume equal variances) which clearly indicated (F=11.425331, p = 4.56e-07) that the null hypothesis (that all means are identical) can be safely rejected. We ran a *post hoc tests* (pairwise t-tests with Holm correction to adjust *p*) to compare the mean depression levels between the six pairs of districts. The post hoc tests indicated that:

i.   mean depression level of Ghaziabad is significantly larger than that in Baghpat (T=3.11, p=8.18e-03) and Hapur (T=5.29, p=2.11e-06).
ii.   mean depression level of Meerut is significantly larger than that in Hapur (T=4.84, p=1.41e-5) and in Baghpat (T=2.46, p=2.92e-2).
iii.   mean depression level of Baghpat is significantly larger than that in Hapur (T=2.81, p=1.64e-02).
iv.   no significant difference was found between the mean depression levels of Ghaziabad and Meerut (T=0.85, p=3.95e-01).

Table 2: Depression and anxiety scores of the rag-pickers (RP) and the non-rag-pickers (NRP) in the four districts

District	Depression Levels		Anxiety Levels	
	RP	NRP	RP	NRP
Ghaziabad	12.72 ± 5.75	11.16 ± 4.83	11.66 ± 5.85	8.53 ± 3.84
Meerut	12.26 ± 4.29	12.02 ± 5.25	11.35 ± 5.62	9.94 ± 4.27
Baghpat	11.01 ± 3.52	13.55 ± 5.70	9.39 ± 4.52	10.65 ± 4.62
Hapur	9.19 ± 5.31	11.52 ± 5.23	9.37 ± 6.15	8.96 ± 4.07

RP: Rag-Pickers, **NRP**: Non-Rag-Pickers

(ii) Anxiety
Since the *Levene's test* for homogeneity of variances failed for the rag-pickers anxiety data as well, (F = 5.48, p =1.02e-03), we hence again used the *Welch's ANOVA* which indicated (F= 6.55, p = 2.77e-04) that the null hypothesis can be rejected. Running a *post hoc tests* (pairwise t-tests with Holm correction to adjust *p*) to compare the mean depression levels between the six pairs of districts, we obtained:

i.   mean anxiety level of Ghaziabad is significantly larger than that in Baghpat (T=3.61, p=2.25e-03) and Hapur (T=3.09, p=1.12e-02).
ii.   mean anxiety level of Meerut is significantly larger than that in Hapur (T=2.58, p=3.13e-2), and than that in Baghpat (T=2.97, p=1.31e-2).
iii.   no significant difference was found between the mean anxiety levels of Ghaziabad and Meerut (T=0.50, p=1.00), and between Baghpat and Hapur (T=0.02, p=1.00).

We further explored if some of our measured variables significantly influenced the depression and anxiety levels. We investigated whether (i) literacy, (ii) gender, (iii) age-group, or the (iv) site of rag-picking significantly affects depression and anxiety levels. Welch's ANOVA test showed a: (i) non-significant effect of education on depression levels (F=0.54, p=0.65) and on anxiety (F=0.36, p=0.78), (ii) non-significant effect of gender on depression (F = 0.96, p =0.33) and on anxiety (F=3.56, p=0.06), and (iii) non-significant effect of age on depression (F=0.60, p=0.62) and anxiety (F=0.56, p=0.65).

Table 3: Categorising the population based upon their primary site of rag-picking

Primary site of rag-picking	Ghaziabad	Meerut	Baghpat	Hapur	Total	Depression score	Anxiety score
Open dump	203	151	45	43	442	11.85 ± 5.14	10.81 ± 5.78
Dhalaos-Society waste (Trash Depot)	0	0	20	22	42	9.07 ± 3.49	8.81 ± 3.90
Bus-Train Stations/ Others	0	0	15	20	35	13.49 ± 4.81	13.49 ± 5.54
Streets	0	0	10	15	25	10.20 ± 5.97	9.68 ± 6.26

However, we found a significant effect of the choice of primary site of rag-picking on depression and anxiety levels. Our survey indicated that, in general, every rag-picker prefers a specific site of rag-picking. I.e., each rag-picker has a primary rag-picking site. These sites could be one of the following four: (i) open dump areas, (ii) streets, (iii) dustbins in bus-train stations, and (iv) dhalaos society waste (trash depot). We categorised our data into these four rag-picking sites (Table 3) and investigated if the chosen primary rag-picking site has any significant effect on the depression and anxiety scores.

Welch's ANOVA test indicated a significant effect of the choice of primary working site on the depression levels (F=13.16, p = 9.18e-7) and on the anxiety levels (F=35, p=8.10e-04) of the rag-pickers. We therefore ran a post hoc tests (pairwise t-tests with Holm correction to adjust p) to compare the mean depression levels and the mean anxiety levels between the six pairs of primary sites of rag-picking. The post hoc tests indicated that rag-picker working in open dump area have significantly larger levels of depression (T=4.69, p=9.70e-05) and significantly larger levels of anxiety (T=3.03, p=1.81e-02) as compared to those working in dhalaus. Also, rag-picker working in bus/train/station area have significantly larger levels of depression (T=4.53, p=1.43e-04) and significantly larger levels of anxiety (T=4.20, p=5.44e-04) as compared to those working in dhalaus.

2. Comparing depression and anxiety levels of the rag-picker community with that of the non-rag-picker community in each district separately

We next compared the rag-picking community with the non-rag-picking community (i.e., the *controls*) in each of the four districts separately. **Table 4** shows the statistical results of the application of the Welch's t-test for each pair of data (RP and NRP) for each district separately.

Table 4: Comparing depression and anxiety levels between rag-pickers and non-ragpickers in the four districts

RP vs NRP in:	Depression		Anxiety	
	Test Statistic value of Welch's t-test	p-value	Test Statistic value of Welch's t-test	p-value
Ghaziabad	2.49	0.01*	5.57	5.90e-08*
Meerut	0.30	0.76	1.87	0.06
Baghpat	-2.88	0.005*	-1.57	0.12
Hapur	-2.56	0.01*	0.49	0.63

* Significant values (assuming threshold = 0.05)

The above analysis shows that, while, the depression levels of rag-pickers in Ghaziabad are significantly higher than that in the non-rag-pickers in that region, on the other hand in Baghpat and Hapur the depression levels of rag-pickers are significantly lower than that in the non-rag-pickers.

Anxiety levels showed significant differences only in Ghaziabad, where the rag-pickers had higher values than that in the non-rag-pickers. In all the other three districts the difference in anxiety levels of RPs and the NRPs were insignificant.

Discussion and conclusion

The current study corroborates the previous findings of other research groups (Mote et al., 2016; Hussain and Sharma, 2016; Bala and Singh, 2017, Tripathi and Agarwal, 2019) that challenging environmental conditions negatively affects the mental well-being of the rag-pickers. Our results indicate a significant difference in the levels of depression and anxiety between the rag-pickers of the four chosen districts of Uttar Pradesh: Ghaziabad, Meerut, Baghpat and Hapur. Mean levels of depression and anxiety amongst the rag-picking community in Ghaziabad were found to be higher than the rag-picking communities from Baghpat and Hapur. Similarly, Meerut's rag-picking community had significantly higher depression and anxiety levels than that in Baghpat's and Hapur's rag-picking community. Between Baghpat and Hapur, Baghpat rag-pickers had a significantly higher depression levels, but the anxiety levels of the rag-picking communities of the two districts did not show a significant difference. Similarly, Ghaziabad's and Meerut's rag-pickers did not show significant difference in the depression and anxiety levels.

While we will continue to explore the specific reasons for the significant variations in the above studied mood disorders in forthcoming papers, we wish to state some general observations that could explain these differences. Firstly, we found that waste was well-managed by the Ghaziabad authorities which usually made it difficult for the rag-pickers in the region to find and collect useful waste, and hence contributing to financial hardships, which could contribute to deteriorating state of mental health. Further, Ghaziabad and Meerut have witnessed rapid urbanization leading to increased cost of living, acutely impacting the standard of living of the rag-picking population. On the other hand, Hapur and Baghpat have been spared the brunt of urbanization comparatively. Village cultures in these two districts have made the survival of rag-pickers relatively easy. Our study thus is a step towards a region-wise assessment of rag-picker's mental health conditions with an aim to quantify the social determinants contributing towards the mental health disparity amongst the rag-picking population in India.

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Author Contributions
PPP and UR conceived of the project and constructed the questionnaire. UR implemented the field work. PPP performed the statistical analysis, wrote and edited the manuscript.

Availability of data and materials
Not applicable.

Competing interest
The authors declare no competing interests.

Ethics approval
Not applicable.

Citation: Pandey PP and Rani U (2024) Investigating the Levels of Depression and Anxiety Among Rag-pickers Working in Challenging Environmental Conditions from Multiple Districts in Uttar Pradesh, India. Environ Sci Arch 3(1): 95-102.