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### Physical health problems among tobacco field workers while performing tobacco leaf harvesting related activities

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#### Abstract

Tobacco cultivation is an important agricultural activity in India and contributes significantly to employment generation and the national economy. However, tobacco field workers are frequently exposed to various occupational health hazards during harvesting related activities. The present study was undertaken to assess the physical health problems experienced by tobacco field workers engaged in harvesting related activities. Exploratory research design was adopted for the study. Purposive sampling technique was used to select the respondents, as tobacco field workers were directly involved in tobacco cultivation and could effectively express the health problems encountered during field operations. A total of 200 (100 female and 100 male) respondents were selected from eight villages, with 20 respondents from each village. The findings revealed that tobacco harvesting and stripping/threading activities exposed workers to multiple occupational health problems. Among the different categories, central nervous system problems ranked first with an overall mean score of 2.99. Tiredness, headache, dizziness, and nervousness were the major symptoms reported by the respondents. Respiratory health problems ranked second (Mean = 2.66), with wheezing, dryness of throat, cough, sneezing, and chest tightness being the most prevalent symptoms. Skin problems ranked third (Mean = 2.63), particularly skin discoloration, dryness of skin, numbness, and tingling sensation caused by prolonged contact with tobacco leaves. Eye-related problems such as blurred vision, itchy eyes, and runny eyes were also commonly reported. General health problems, especially dehydration due to heat exposure, and digestive problems such as bitter taste and increased salivation were prevalent among the respondents. The findings highlighted that continuous physical strain, environmental exposure, and direct contact with tobacco leaves significantly contributed to occupational health disorders among tobacco field workers. The study emphasized the need for occupational safety measures, health awareness programmes, and protective interventions to minimize health risks and improve the well-being of tobacco field workers.

**Keywords:** Nicotiana tabacum, physical health problems, harvesting related activities

#### Introduction

Tobacco, commonly known as the “Golden Leaf,” was one of the major commercial crops grown in India and played an important role in the Indian economy. It provided direct and indirect employment to nearly 38 million people, of whom about 70 per cent were engaged in the agricultural sector. During 2015–16, tobacco products generated significant tax revenue and foreign exchange earnings for the country. India ranked second in tobacco production and third in tobacco exports globally, exporting tobacco to more than 119 countries. Botanically, tobacco belonged to the family Solanaceae and genus Nicotiana, with Nicotiana tabacum

and Nicotiana Rustica being the major cultivated species (Yogesh and Srivastava, 2018) <sup>[1]</sup>. Among these, Nicotiana tabacum occupied the largest cultivation area by involving 200 workers. Since, these workers are directly touching the leaf during harvesting they are exposed to various health hazards. Tobacco leaves loading, unloading, threading/stripping of leaves, arranging of stripped sticks into tobacco barn activities are part of tobacco leaf harvesting.

Bernardino Ramazzini first described the occupational health risks associated with tobacco cultivation in 1713 and observed symptoms such as headaches and gastrointestinal

problems among tobacco workers due to tobacco dust exposure. Later, green tobacco sickness (GTS) was identified among tobacco farmers in Florida. GTS was recognized as an occupational illness caused by the absorption of nicotine through the skin while handling wet tobacco leaves. Exposure to rain, dew, or sweat increased the risk of the illness. Although GTS was not generally associated with mortality or long-term morbidity, it caused considerable discomfort and loss of productivity among tobacco workers (Raja et.al, 2022) <sup>[2]</sup>. Hence the present study was taken up to assess the physical health problems experienced by tobacco field workers engaged in harvesting related activities which include Tobacco leaves loading, unloading, threading/stripping of leaves, arranging of stripped sticks into tobacco barn.



Leaf Harvesting



Loading & unloading of leaves



Stripping/Threading of leaves

## Methodology

Exploratory research was undertaken for the recent study. Purposive sampling technique was adopted as tobacco field workers were intentionally selected because they were directly involved in tobacco cultivation activities and could effectively express the health problems experienced during field work. A total of eight villages were selected for data collection and 25 respondents from each village were purposively chosen, constituting 200 as the study sample. An interview schedule was developed to collect information related to the availability, accessibility, and control over resources and assets among the respondents. To assess the health problems faced by tobacco field workers, a Likert scale was used. The scale measured the frequency of health problems through response categories such as “always,” “frequently,” “sometimes,” and “never,” which were assigned numerical values of 4, 3, 2, and 1, respectively. In addition, the occurrence of health problems was also measured using dichotomous responses of Yes (2) and No (1). The collected data were systematically analyzed using statistical tools such as frequencies, percentages, and mean scores to interpret the responses of the respondents.

## Results and Discussion

The data presented in Table 1 for harvesting and stripping/threading activities provide a detailed comparison of physical health problems among male and female respondents, along with overall mean scores and rankings. The research reveals clear patterns in the prevalence and severity of occupational health issues among tobacco field workers.

Central nervous system problems emerged as the most dominant category, ranking first with an overall mean score of 2.99. Within this category, tiredness (Mean = 3.54) and headache (Mean = 3.41) recorded the highest scores, indicating that workers experience considerable physical and mental fatigue during harvesting and stripping/threading activities. Dizziness and nervousness were also moderately prevalent, while fainting showed the lowest mean (1.99), suggesting relatively lower occurrence. The high scores in this category reflect the physically demanding and repetitive nature of these tasks (Paul *et al.*, 2019) <sup>[3]</sup>.

Central nervous system problems recorded a Chi-square value of 1.7272 and a P value of 0.7858, which also indicates no significant association between gender and central nervous system-related problems.

Respiratory health problems ranked second with total mean score of 2.66. Symptoms such as wheezing (Mean = 2.83), dryness of throat (Mean = 2.83), cough (Mean = 2.76), sneezing (Mean = 2.74), running of nose (Mean = 2.72), chest tightness (Mean = 2.71) and shortness of breath (Mean = 2.69) were commonly reported. Female respondents consistently showed higher mean scores compared to males, indicating greater susceptibility or exposure. Asthma recorded the lowest mean (1.99), suggesting it was less prevalent compared to other respiratory issues. These findings indicate continuous exposure to tobacco dust and airborne irritants during these activities (Moyo *et.al.*, 2023) <sup>[4]</sup>.

Respiratory health problems showed a Chi-square value of 1.2761 with a P value of 0.9891, indicating that there was no statistically significant difference between male and

female workers in experiencing respiratory problems which implies that tobacco field workers encounter with health problems irrespective of the gender.

Skin problems ranked third among the health problems reported by the respondents, with an overall mean score of 2.63, indicating a moderate level of prevalence among the women workers. Among these, skin discoloration (Mean = 3.60), dryness of skin (Mean = 3.21) and numbness (Mean = 3.14) were the most prominent issues. Tingling sensation also showed a relatively high mean (2.93). In contrast, redness in hands (Mean = 2.47), skin burning (Mean = 2.44), skin rash (Mean = 2.23), infections (Mean = 2.09) and skin injuries (Mean = 1.85) were less frequently reported. The results clearly indicate that prolonged contact with tobacco leaves significantly affects skin health, especially through irritation and chemical exposure (Kumar *et al.*, 2023) [5].

Skin problems showed a Chi-square value of 27.757 with a P value of 0.001047, which is significant at the 1 per cent level. This indicates a significant difference between male and female respondents regarding skin-related health problems.

Eye problems secured the fourth rank with an overall mean score of 2.47, revealing that the respondents experienced eye-related issues to a moderate extent. Blurred vision (Mean = 2.87), runny eyes (Mean = 2.54) and itchy eyes (Mean = 2.50) were the most frequently reported symptoms, while redness in eyes (Mean = 2.35), pain in eyes (Mean = 2.22) and secretions (Mean = 2.34) were less prevalent. Female respondents again exhibited higher mean scores than

males, suggesting greater exposure to irritants such as dust and plant residues during handling processes (Kumar *et al.*, 2023) [5].

Eye problems had a Chi-square value of 4.3873 with a P value of 0.4951, showing that the difference between male and female respondents was not statistically significant.

General health problems ranked fifth with an overall mean of 2.33. Dehydration due to heat (Mean = 3.23) was the most significant issue, highlighting the impact of environmental conditions during fieldwork. Fever showed moderate prevalence (Mean = 2.74), while hearing loss had the lowest mean (1.01), indicating minimal association with these activities (Kumar *et al.*, 2023) [5].

General health problems recorded a Chi-square value of 3.879 and a P value of 0.144, indicating no significant difference between male and female respondents.

Digestive health problems were ranked sixth and recorded the lowest overall mean score of 2.28, indicating that these problems were comparatively less prevalent among the respondents. Bitter taste (Mean = 3.52) and increased salivation (Mean = 3.12) were the most prominent symptoms, suggesting exposure to nicotine residues. Other issues such as stomach ache, indigestion, diarrhea, bloating, anorexia, and vomiting recorded relatively lower mean scores, indicating less frequent occurrence. sickness (Fotedar and Fotedar, 2017) [6].

Digestive health problems showed a Chi-square value of 20.264 with a P value of 0.005, which is statistically significant. This indicates that digestive health problems differed significantly between male and female respondents.

**Table 1:** Physical health problems faced by the respondents in tobacco leaf harvesting related activities

| Physical health problems                                   | Responses    |          |          |          |             |      |                |          |          |          |             |      | Total (N=200) |      |        | Chi Square Value | P Value |
|------------------------------------------------------------|--------------|----------|----------|----------|-------------|------|----------------|----------|----------|----------|-------------|------|---------------|------|--------|------------------|---------|
|                                                            | Male (N=100) |          |          |          |             |      | Female (N=100) |          |          |          |             |      |               |      |        |                  |         |
|                                                            | 4<br>(A)     | 3<br>(F) | 2<br>(S) | 1<br>(N) | Total score | Mean | 4<br>(A)       | 3<br>(F) | 2<br>(S) | 1<br>(N) | Total score | Mean | Total score   | Mean | Rank   |                  |         |
| Respiratory Health Problems                                |              |          |          |          |             |      |                |          |          |          |             |      |               |      |        |                  |         |
| Shortness of breathing while working in TF (Tobacco Field) | 3            | 26       | 63       | 8        | 224         | 2.24 | 17             | 81       | 2        | -        | 315         | 3.15 | 539           | 2.69 | 1.2761 | 0.9891           |         |
| Running of Nose                                            | 2            | 21       | 76       | 1        | 224         | 2.24 | 20             | 80       | -        | -        | 320         | 3.2  | 544           | 2.72 |        |                  |         |
| Wheezing                                                   | 21           | 2        | 77       | -        | 244         | 2.44 | 23             | 77       | -        | -        | 323         | 3.23 | 567           | 2.83 |        |                  |         |
| Chest Tightness                                            | 3            | 23       | 64       | 10       | 219         | 2.19 | 25             | 74       | 1        | -        | 324         | 3.24 | 543           | 2.71 |        |                  |         |
| Cough                                                      | 2            | 21       | 77       | -        | 225         | 2.25 | 27             | 73       | -        | -        | 327         | 3.27 | 552           | 2.76 |        |                  |         |
| Dryness of Throat                                          | 5            | 27       | 68       | -        | 237         | 2.37 | 29             | 71       | -        | -        | 329         | 3.29 | 566           | 2.83 |        |                  |         |
| Asthma                                                     | 2            | 10       | 34       | 54       | 160         | 1.60 | 9              | 32       | 47       | 12       | 238         | 2.38 | 398           | 1.99 |        |                  |         |
| Sneezing                                                   | 2            | 22       | 76       | -        | 226         | 2.26 | 23             | 77       | -        | -        | 323         | 3.23 | 549           | 2.74 |        |                  |         |
| Total                                                      |              |          |          |          | 1759        | 2.19 |                |          |          |          | 2499        | 3.12 | 4258          | 2.66 | 2      |                  |         |
| Central Nervous System Problems                            |              |          |          |          |             |      |                |          |          |          |             |      |               |      |        |                  |         |
| Headache                                                   | 20           | 58       | 22       | -        | 298         | 2.98 | 84             | 16       | -        | -        | 384         | 3.84 | 682           | 3.41 | 1.7272 | 0.7858           |         |
| Dizziness                                                  | 21           | 39       | 34       | 6        | 275         | 2.75 | 66             | 32       | 2        | -        | 364         | 3.64 | 639           | 3.19 |        |                  |         |
| Nervousness                                                | 16           | 36       | 36       | 12       | 256         | 2.56 | 34             | 46       | 20       | -        | 314         | 3.14 | 570           | 2.85 |        |                  |         |
| Fainting                                                   | 1            | 13       | 36       | 50       | 165         | 1.65 | 9              | 22       | 63       | 6        | 234         | 2.34 | 399           | 1.99 |        |                  |         |
| Tiredness                                                  | 36           | 47       | 16       | 1        | 318         | 3.18 | 91             | 9        | -        | -        | 391         | 3.91 | 709           | 3.54 |        |                  |         |
| Total                                                      |              |          |          |          | 1312        | 2.62 |                |          |          |          | 1373        | 2.74 | 2999          | 2.99 | 1      |                  |         |
| Eye Problems                                               |              |          |          |          |             |      |                |          |          |          |             |      |               |      |        |                  |         |
| Runny eyes/tearing                                         | 2            | 18       | 72       | 8        | 214         | 2.14 | 14             | 66       | 20       | -        | 294         | 2.94 | 508           | 2.54 | 4.3873 | 0.4951           |         |
| Blurred vision                                             | 3            | 56       | 38       | 3        | 259         | 2.59 | 22             | 71       | 7        | -        | 315         | 3.15 | 574           | 2.87 |        |                  |         |
| Itchy eyes                                                 | 2            | 13       | 71       | 14       | 203         | 2.03 | 19             | 59       | 22       | -        | 297         | 2.97 | 500           | 2.50 |        |                  |         |
| Redness in eyes                                            | 2            | 7        | 69       | 22       | 189         | 1.89 | 17             | 48       | 34       | 1        | 281         | 2.81 | 470           | 2.35 |        |                  |         |
| Secretions in eyes                                         | 1            | 9        | 64       | 26       | 185         | 1.85 | 18             | 49       | 31       | 2        | 283         | 2.83 | 468           | 2.34 |        |                  |         |
| Pain in eyes                                               | 1            | 10       | 62       | 27       | 185         | 1.85 | 13             | 38       | 45       | 4        | 260         | 2.6  | 445           | 2.22 |        |                  |         |
| Total                                                      |              |          |          |          | 1235        | 2.05 |                |          |          |          | 1730        | 2.88 | 2965          | 2.47 | 4      |                  |         |

| Skin Problems                       |    |    |    |    |      |      |    |    |    |     |      |      |      |      |
|-------------------------------------|----|----|----|----|------|------|----|----|----|-----|------|------|------|------|
| Skin rash                           | -  | 7  | 65 | 28 | 179  | 1.79 | 11 | 46 | 43 | -   | 268  | 2.68 | 447  | 2.23 |
| Skin burning                        | 1  | 16 | 61 | 22 | 202  | 2.02 | 14 | 59 | 27 | -   | 287  | 2.87 | 489  | 2.44 |
| Tingling                            | 3  | 54 | 34 | 9  | 251  | 2.51 | 39 | 58 | 3  | -   | 336  | 3.36 | 587  | 2.93 |
| Skin Irritation                     | 1  | 7  | 62 | 30 | 179  | 1.79 | 21 | 54 | 24 | 1   | 295  | 2.95 | 474  | 2.37 |
| Skin infection                      | -  | 4  | 50 | 46 | 158  | 1.58 | 19 | 27 | 49 | 5   | 260  | 2.60 | 418  | 2.09 |
| Skin Injuries                       | -  | 2  | 46 | 52 | 150  | 1.50 | 10 | 21 | 48 | 21  | 220  | 2.20 | 370  | 1.85 |
| Numbness                            | 6  | 58 | 33 | 3  | 267  | 2.67 | 61 | 39 | -  | -   | 361  | 3.61 | 628  | 3.14 |
| Skin Discoloration                  | 10 | 59 | 28 | 3  | 276  | 2.76 | 65 | 35 | -  | -   | 365  | 3.65 | 721  | 3.60 |
| Dryness of skin                     | 11 | 56 | 31 | 2  | 276  | 2.76 | 66 | 34 | -  | -   | 366  | 3.66 | 642  | 3.21 |
| Redness in hands and legs           | 7  | 49 | 37 | 7  | 256  | 2.56 | 12 | 20 | 62 | 6   | 238  | 2.38 | 494  | 2.47 |
| Total                               |    |    |    |    | 2194 | 2.19 |    |    |    |     | 2996 | 2.99 | 5270 | 2.63 |
| General health problems             |    |    |    |    |      |      |    |    |    |     |      |      |      |      |
| Fever                               | 1  | 46 | 53 | -  | 248  | 2.48 | 17 | 68 | 14 | 1   | 301  | 3.01 | 549  | 2.74 |
| Dehydration of body due to heat     | 3  | 71 | 26 | -  | 277  | 2.77 | 70 | 29 | 1  | -   | 369  | 3.69 | 646  | 3.23 |
| Hearing loss due to machinery sound | -  | -  | 3  | 97 | 103  | 1.03 | -  | -  | -  | 100 | 100  | 1.00 | 203  | 1.01 |
| Total                               |    |    |    |    | 628  | 2.09 |    |    |    |     | 770  | 2.56 | 1398 | 2.33 |
| Digestive health problems           |    |    |    |    |      |      |    |    |    |     |      |      |      |      |
| Stomach-ache                        | -  | 8  | 88 | 4  | 204  | 2.04 | 26 | 70 | 4  | -   | 322  | 3.22 | 526  | 2.63 |
| Indigestion                         | -  | 16 | 60 | 24 | 192  | 1.92 | 19 | 32 | 47 | 2   | 268  | 2.68 | 460  | 2.3  |
| Increased salivation                | 8  | 71 | 21 | -  | 287  | 2.87 | 39 | 59 | 2  | -   | 337  | 3.37 | 624  | 3.12 |
| Bitter taste                        | 57 | 39 | 2  | 2  | 351  | 3.51 | 53 | 47 | -  | -   | 35   | 3.53 | 704  | 3.52 |
| Diarrhea (loose motions)            | -  | 3  | 51 | 46 | 160  | 1.60 | 6  | 8  | 65 | 21  | 199  | 1.99 | 359  | 1.79 |
| Bloating(Swelling in Abdomen)       | -  | -  | 39 | 61 | 139  | 1.39 | 5  | 5  | 62 | 28  | 187  | 1.87 | 326  | 1.63 |
| Anorexia (Eating disorder)          | -  | -  | 24 | 76 | 124  | 1.24 | 5  | 6  | 59 | 30  | 186  | 1.86 | 310  | 1.55 |
| Vomiting                            | -  | 3  | 40 | 57 | 146  | 1.46 | 5  | 12 | 60 | 23  | 199  | 1.99 | 345  | 1.72 |
| Total                               |    |    |    |    | 1603 | 2.00 |    |    |    |     | 2051 | 2.56 | 3654 | 2.28 |

The table 2 presents the distribution of respondents according to general, cardiovascular and gynecological health problems experienced during harvesting related activities, with comparisons between male and female respondents.

General health problems ranked first, with an overall mean score of 1.14. Among these, gastric problems were the most prevalent (Mean = 1.36), with a notably higher mean among females (1.52) compared to males (1.21), indicating that female respondents experienced more gastric-related issues. Diabetes (Mean = 1.04) and thyroid disorders (Mean = 1.02) showed low prevalence in both groups, though slightly higher values were observed among females. The higher occurrence of gastric problems may be associated with occupational stress, irregular dietary patterns, and possible exposure to nicotine residues during work. General health problems, the calculated Chi-square value was 1.81 with a P value of 0.40. Since the P value is greater than 0.05, there is no statistically significant difference between male and female respondents regarding general health problems such as diabetes, thyroid disorders, and gastric problems.

Cardiovascular health problems ranked second, with an

overall mean score of 1.08. High blood pressure (Mean = 1.16) was moderately prevalent among both males (1.18) and females (1.15), indicating a relatively consistent distribution across gender. Heart stroke recorded the lowest mean score (1.00), with no reported cases among either group, suggesting that severe cardiovascular conditions are absent or extremely rare in the study population. (Shahzad *et al.*, 2021) <sup>[7]</sup>. Cardiovascular health problems, the Chi-square value was 0.20 with a P value of 0.99, indicating no significant association between gender and cardiovascular problems like high blood pressure and heart stroke.

Gynecological problems ranked third, with an overall mean score of 1.01. Termination of pregnancy was reported only among female respondents (Mean = 1.02), while no cases were reported among males (Mean = 1.00), as expected (Ravi *et al.*, 2024) <sup>[8]</sup>. The overall low mean indicates minimal prevalence of gynecological issues within the sample. Gynecological problems, the Chi-square value was 0.02 with a P value of 0.88. As the P value is higher than 0.05, the difference between male and female respondents was found to be not statistically significant.

**Table 2:** General, Cardio Vascular and gynec related health problems faced by the respondents in tobacco leaf harvesting related activities

| Physical health problems        | Response (N=200) |       |             |      |                |       |             |      | Total (N=200) |      |      | Chi Square Value | P Value |
|---------------------------------|------------------|-------|-------------|------|----------------|-------|-------------|------|---------------|------|------|------------------|---------|
|                                 | Male (N=100)     |       |             |      | Female (N=100) |       |             |      |               |      |      |                  |         |
| General health problems         | 2 (Y)            | 1 (N) | Total score | Mean | 2 (Y)          | 1 (N) | Total score | Mean | Total score   | Mean | Rank | 1.81             | 0.4     |
| Diabetes                        | 2                | 98    | 102         | 1.02 | 6              | 94    | 106         | 1.06 | 208           | 1.04 |      |                  |         |
| Thyroid                         | 1                | 100   | 102         | 1.02 | 2              | 98    | 102         | 1.02 | 204           | 1.02 |      |                  |         |
| Gastric                         | 21               | 79    | 121         | 1.21 | 52             | 48    | 152         | 1.52 | 273           | 1.36 |      |                  |         |
| Total                           |                  |       | 325         | 1.08 |                |       | 360         | 1.20 | 685           | 1.14 | 1    |                  |         |
| Cardio Vascular health problems |                  |       |             |      |                |       |             |      |               |      |      |                  |         |
| High blood pressure             | 18               | 82    | 118         | 1.18 | 15             | 85    | 115         | 1.15 | 233           | 1.16 |      | 0.2              | 0.99    |
| Heart Stroke                    | -                | 100   | 100         | 1.00 | -              | 100   | 100         | 1.00 | 200           | 1.00 |      |                  |         |
| Total                           |                  |       | 218         | 1.09 |                |       | 215         | 1.07 | 433           | 1.08 | 2    |                  |         |
| Gynecology                      |                  |       |             |      |                |       |             |      |               |      |      |                  |         |
| Termination of Pregnancy        | -                | 100   | 100         | 1.00 | 2              | 98    | 102         | 1.02 | 202           | 1.01 |      | 0.02             | 0.88    |
| Total                           |                  |       | 100         | 1.00 |                |       | 102         | 1.02 | 202           | 1.01 | 3    |                  |         |

## Conclusion

The study revealed that harvesting related activities in tobacco cultivation exposed workers to multiple occupational health problems. Central nervous system, respiratory, skin, and general health disorders were highly prevalent among the respondents. Female workers reported comparatively highest prevalence of health problems, indicating greater occupational vulnerability. The findings further suggested that continuous physical strain, environmental exposure, and prolonged contact with tobacco leaves significantly contributed to the occurrence of these health issues. The Chi-square analysis further revealed that significant gender differences existed only in skin problems and digestive health problems, indicating that male and female respondents differed significantly in experiencing these health issues. However, no significant gender differences were observed in respiratory, central nervous system, eye, general health, cardiovascular and gynecological problems, as the obtained P values were greater than the 0.05 level of significance. Overall, the study emphasized the need for appropriate occupational safety measures, health awareness programmes, and protective interventions to reduce the health risks faced by tobacco field workers.

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