Psychological Stress and Health Hazards of Farm Women: The Social Ecology and Inflicting Functions

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Authors’ contributions

This work was carried out in collaboration between both authors. Author RC wrote the first draft of the manuscript, collected data and done statistical analysis. Author SKA designed the study, helped in interpretation and supervised the work. Both authors read and approved the final manuscript.

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ABSTRACT

Farm women are suffering from a lot of health related problems along with some socio-economic constraints where farming has been listed as one of the ten most stressful occupations in the world. In turn, they are at risk for the development of stress and other mental health difficulties such as anxiety, depression or even suicide. This is an important co-morbidity of physical problems and if left untreated they may invite other health issues. This will affect the financial aspect also. And as the farm women are home maker along with their farm work, they have to face the challenge both in home and workplace. The problem is mainly due to different issues in the working place like long working hours, financial uncertainty and family disturbances. A study on this topic, was carried out at Boinchigram village under Pandua Block in Hooghly district as they are also suffering the same, with objectives to generate classified information on occupational hazards of farm women, to estimate the level of psychological stress in terms of a score of socio-economic and ecological factors, to estimate the level of interactive relation between level of psychological stress and score of socio-economic and ecological factors and to generate micro level policy implication based on the empirical study In order to collect the reliable experimental data, the selected parameters were taken, like: Age, number of children, B.M.I., Main health problems, Psycho-social hazards, family

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income per annum, family expenditure per annum, working hours per day, daily calorie consumption etc. Majority of the population under study are poor, undernourished farm women. It has seen that, when the number of children in a family increased, it is difficult to their mother to attain the farm work and caring of their children at the same time because they spent maximum hour in the field. So, both the children and mother suffer from psycho-social hazards. And the calorie consumption level per day has some indirect effect because calorie is the last word to speak out. But income plays the most important role in stabilizing their mental condition. So, a better understanding of potential women-work environment interactions related to psycho-social hazards and mental health of the farm women is seriously needed to save the future workforce of agriculture.

Keywords: Anxiety; BMI; depression; hazards; stress.

1. INTRODUCTION

For any kind of ecosystem functioning and placing role of human at the epicentre of ecological services, it has got both structural and operational stress. The aftermath of green revolution, even though its glorious success, has offered both physical and psychological stress when three lakh farmers in India committed suicide [1], then certainly it can infer that the very ecosystem is suffering from functional and ecological stress. The incoming of toxic materials into an agro-ecosystem and its subsequent entry into the food chains has gone so deleterious that it merits a unique genre of ecological study. The farm women who have been ceaselessly and relentlessly in exposure with polluted ecosystem, are also under serious psychological stress. The lack of empowerment, entitlement and proper scientific orientation, they are consciously or unconsciously being exposed to the coercive ecosystem and its functioning, just to end up with fragile health and vulnerable psychic dispositions [2].

Occupational stress is one of the major problems from a gender perspective [3]. According to Rivera-Torres et al. [4] stress caused by time and work pressures has become more prevalent during the past decade. Monotonous work, work that requires constant concentration, irregular working hours, shift work, and seasonal-work can also have adverse psychological effects. Psychological stress and overload have been associated with sleep disturbances, burn-out syndromes, depression and hypertension. Social conditions of work such as gender distribution, segregation of job and equality in the workplace raise concerns about stress in the workplace. Surprisingly little is known about the health hazards of this environment, in part because women's household work has been under-recorded and undervalued and hence there has been little incentive to examine it in detail [5]. Besides, farm activities farm women involve in domestic activities. These arise from the worker's failure to adapt to an alien psychosocial environment. Frustration, lack of job satisfaction, insecurity, poor human relationships and emotional tension are some of the psychosocial factors that may undermine both the physical and mental health of workers [6].

A meta analysis (2004-2005) suggested that particularly combinations of high demands and low decision latitudes as well as high effort and low rewards are associated with psychological disorders, such as depression and anxiety. Furthermore, the effort-reward-imbalance model could be associated with cardiovascular disease, poor self-perceived health, and several mental disorders. Therefore, the psychosocial work environment has an impact on workers health. Sometimes policies, for example, generally involve the promotion of cash crop farming at the expense of subsistence farming, which often results in worsening diets for women and children. The expansion of rural industries - such as sugar-cane in Belize [7] may bring paid employment to men, but leave the women struggling to farm alone, with deleterious consequences for nutrition and health.

On the African continent, the First Interministerial Conference on Health and Environment recognized in its report that "Africa not only has to cope with traditional environmental risk factors to human health, it now also has to cope with new and emerging threats, including new occupational risks" These are explained to add to the burden of traditional occupational health problems such as injury, respiratory disorders, dermatitis and musculoskeletal problems. The report further states that "Africans are now suffering from asthmatic conditions and psychosocial stress".
The African report neither eludes any further to psychosocial risks, nor does it indicate how to tackle this emerging risk. However, the recognition of psychosocial risk as an issue that requires addressing is a first step towards future action [8].

Kortum et al. [8] in their paper “Psycho-social Risks and Work Related Stress in Developing Countries: Health Impact, Priorities, Barriers and Solutions” published in “International Journal of Occupational Medicine and Environmental Health” explores experts’ perceptions of psychosocial risks and work-related stress in emerging economies and developing countries. This paper focuses on knowledge of potential health impact of psychosocial risks and preliminary priorities for action, and discusses potential barriers and solutions to addressing psychosocial risks and work-related stress in developing countries. Besides, working conditions and the physical and psychosocial hazards they may pose, therefore, have the potential to affect workers' health also in developing countries. Although we currently lack research data, the changing nature of work and the impact of globalization increase the importance of addressing psychosocial risk factors and work-related stress in developing countries [3,9].

It is necessary also to identify the pathway of coercive and pernicious molecules in the agro-ecosystem and keeps engulfing the economic, ecological and psycho-somatic health of farm women to generate classified information on occupational hazards of farm women, to estimate the level of psychological stress in terms of a score of socio-economic and ecological factors, to estimate the level of interactive relation between level of psychological stress and score of socio-economic and ecological factors and also to generate micro level policy implication based on the empirical study.

2. METHODS

Participants: Participants in the survey were 90 farm women of the village Boinchigram. Some of them work in family farm and some as hired agricultural labours.

Research locale and sampling: Bantikaboinchi Gram Panchayat of the Pandua block of Hooghly district in West Bengal was purposively selected for the study. The village namely Boinchigram was selected by random sampling. The area had been selected for the study because of-

(a) There is ample scope for collecting relevant data for the present study.
(b) Acquaintance with the local people as well as the local language.
(c) The concern area was easily accessible to the researcher in terms of place of Residence.
(d) The area was very easily accessible to the researcher in terms of transportation
(e) The closure familiarity of the student researcher with the area, people, officials and local dialects.

Purposive as well as simple random sampling techniques were adopted for the study. For selection of state, district, block and gram panchayat purposive sampling techniques was adopted because the area was ideal for Occupational Health Management study, convenient for researcher and having the infrastructural facilities and in case of selection of villages and respondents simple random sampling technique was taken up.

Pilot study: Before taking up actual fieldwork a pilot study was conducted to understand the area, its people, institution, communication and extension system and the knowledge, perception and attitude of the people towards climate change concept. An outline of the socio-economic background of the farm women of the concerned villages, their perception on health issues, natural resources, ecology, nutritional aspects etc helped in the construction of reformative working tools.

Preparation of interview schedule: On the basis of the findings of pilot study a preliminary interview schedule was formed with the help of literature and by the assistance of Chairman of Advisory Committee.

Pre-testing of interview schedule: Pretesting or preliminary testing is the process of an advance testing of the study design after the schedule/questionnaire has been prepared. The object of pretesting is to detect the discrepancies that have emerged and to remove them after necessary modification in the schedule. It also helps to identify whether the questions are logically organized, the replies could properly recorded in the space provided for or there is any scope for further improvement. After conducting pretesting appropriate changes and modification of the interview schedule have been made. The
individuals who responded in pretesting have been excluded in the final sample selected for the study.

**Techniques of field data collection:** The respondents were personally interviewed from October 2016 to June 2017 and October 2017. The items were asked in Bengali version in a simple term so that the members could understand easily. The entries were done in the schedule by student investigator himself at the time of interview.

**Variables and their empirical measurements:** Several researchers pointed out that the behaviour of an individual has been understood more in depth if one has the knowledge of some variables, which comprised the constructed world of reality within which an individual received the stimuli and acts. The socio personal, agro economic, socio-psychological and communication variables are such type of variables, which determine the behaviour of an individual. Appropriate operationalization and measurement of the variables help the researcher to land upon the accurate conclusion. Therefore, the selected variables for this study had been operationalised and measured in following manner.

Variables in the present study have been categorized into two main categories.

1) Independent variables.
2) Dependent variables.

**Independent variables:** The variables and empirical measurements.

**Age (x1):** In all societies, age is one of the most important determinants of social status and social role of the individual. In the present study, the number of years rounded in the nearest whole number the respondent lived since birth at the time of interview, was taken as a measure of age of the respondent.

**Number of children (x2):** Farm women have to play both the role of farm workers and the mother of their children. Children are the future who will hold the family baton. But the number of children matters, because, with the help of this data one can assess that whether family planning aspect has adopted or not.

**Number of farm work (x3):** Total number of farm work is calculated for each farm women by summing up individual farm works.

\[ W = w_1 + w_2 + w_3 + \ldots + w_n \]

**Working hour per day (x4):** This the total time a farm woman spends in her farm work. It has calculated in hours.

**Incidence level of miscarriage (x5):** As the farm women have to work hard in both the field and household and some of them have poor nutritional status. And the teenage marriage and then pregnancy is prevalent, the farm women sometimes face miscarriage problem. This is calculated by taking the number of times they have faced miscarriage up to the date of questioning to the respondents.

**Number of animals reared (x6):** This is the total number of animals reared by the farm household in their yard. This includes both the livestock and the poultry birds.

**Height (x7):** Height is measured in ft with the help of a measuring tape.

**Weight (x8):** Weight is measured in kg with the help of a weight machine.

**BMI (x9):** BMI is the abbreviated form of Body Mass Index. BMI is defined as body mass divided by the square of body height. It is calculated by using the formula: \[ \frac{kg}{(m^2 \times 0.305)^2} \], where 0.305 is used to convert ft$^2$ into m$^2$.

| Step | Items                        | Level            | Approach   |
|------|------------------------------|------------------|------------|
| 1    | State                        | West Bengal      | Purposive  |
| 2    | District                     | Hooghly          | Purposive  |
| 3    | Block                        | Pandua           | Purposive  |
| 4    | Gram - Panchayat             | Bantika-Boinchi  | Purposive  |
| 5    | Village                      | Boinchigram      | Purposive  |
| 6    | Respondents                  | 90               | Random     |

| Total number of respondents : 90 |
BMI has categorized mainly in 5 groups viz. Very severely underweight (upto 15 kg/m²), severely underweight (15 - 16 kg/m²), Underweight (16 - 18.5 kg/m²), Normal (18.5 – 25 kg/m²) and overweight (25-30 kg/m²).

Cereals consumed per day (x10): This the total amount of cereals consumed by the farm women per day. It is expressed in gram per day. Cereals are the staple food in this area.

Protein consumed per day (x11): This the total amount of protein consumed by the farm women per day. It is expressed in gram per day.

Fruits consumed per day (x12): This the total amount of fruits consumed by the farm women per day. It is expressed in gram per day.

Vegetables consumed per day (x13): This the total amount of vegetables consumed by the farm women per day. It is expressed in gram per day.

Total carbohydrate consumed per day (x14): This the total amount of carbohydrate consumed by the farm women per day. This calculated by summing up the total cereals and fruits consumed per day as these two are the main sources of carbohydrate to the respondents. It is expressed in gram per day.

Fat consumed per day (x15): This the total amount of fat consumed by the farm women per day. It is expressed in gram per day.

Breakfast time (a.m.) (x16): This is time when the respondents have their breakfast. It is mainly taken in the morning i.e. a.m.

Lunch time (p.m.) (x17): This is time when the respondents take their breakfast. It is mainly taken in the afternoon i.e. p.m.

Dinner time (p.m.) (x18): This is time when the respondents take their breakfast. It is mainly taken from the late evening to night i.e. p.m.

Calorie in carbohydrate per day (x19): Calorie means the energy required to maintain one’s daily work. And the total calorie which is taken by the respondent per day through carbohydrate is calculated by multiplying each gram of carbohydrate consumed by 4. It is expressed in kcal.

Calorie in protein per day (x20): Calorie means the energy required to maintain one’s daily work. And the total calorie which is taken by the respondent per day through protein is calculated by multiplying each gram of protein consumed by 4. It is expressed in kcal.

Calorie in fat per day (x21): Calorie means the energy required to maintain one’s daily work. And the total calorie which is taken by the respondent per day through fat is calculated by multiplying each gram of fat consumed by 9. It is expressed in kcal.

Total calorie per day (x22): This total amount of calorie taken by a respondent per day. This is calculated as follows – Total calorie per day = (calorie in carbohydrate /day + calorie in protein /day +calorie in fat/day). It is expressed in kcal.

Size of holding (x23): This is the total size of land one family has. It is taken as total size of both farm and homestead land but who have no agricultural land of their own i.e. they are share cropper or landless agricultural labourers, the size of only homestead land has taken. This is taken in Katta. So, the size of holding can depict the land status and main source of income of the respected farm family.

Family income per annum (x24): Family income per annum is calculated as the earnings of the family from primary and secondary sources in a year in rupees. Family income boosts the participatory attitude of the respondents and determines their family expenditure per year.

Per capita income per annum (x25): Per capita income of a farm women per annum can reveal her status in the society and her access to the total family income as well as resources. The gross income is constituted with the income from farming, wage of agricultural labourers or part time work as maid servant. It is expressed in rupees. In the present study it is calculated as follows:

\[
(\text{Family income per annum} / \text{Family size}) = \text{Per capita income per annum}
\]

Family expenditure per annum (x26): Family expenditure per annum is the household expenses in different activities in a year. This is the output of family income.

Per capita expenditure per annum (x27): This is the outcome of the per capita annual income. It expresses respondent’s power in buying decisions within the family.
**Functional literacy (x28):** Functional literacy is a term was defined for UNESCO by William S. Gray (The Teaching of Reading and Writing, 1956,p.21) as the training of adults to meet independently the reading and writing demands placed on them. The judgements were given on a 5-point scale (1-very week, 2-week, 3-normal, 4-strong, 5- very strong) by assessing mastery over the reading and writing capability and some other functional tasks.

**Psycho-social hazards (y):** Psycho-social hazard is any occupational hazard that affects psychosocial well-being of the workers, here farm women, including their ability to cope up in their work environment. It is related to the way of the work designed, it’s organization and management as well as the economic and social context. In the present it was recorded in the following method –

\[
\text{Psycho-social hazard} = pse \times 5 + psf \times 4 + psw \times 3
\]

Where, \( pse = \) Psycho-social hazard due to economic stress, it was multiplied by 5 as this contributes highest to the Psycho-social hazard

\( psf = \) Psycho-social hazard due to family problem, it was multiplied by 4 as this has moderate impact on the Psycho-social hazard.

\( psw = \) Psycho-social hazard due to work related problem, it was multiplied by 3 as this has comparatively less impact on the Psycho-social hazard.

### 3. RESULTS

#### 3.1 Correlation Analysis

The co-efficient of correlations were computed to preliminarily assess the linear relationship between Psycho-social hazards (y) and 28 exogenous variables.

It has been found that the variables, Age(x1), Number of children 9x2), Number of farm work (x3), Incidence level of miscarriage (x5) Cereals consumed per day (x10), Total carbohydrate consumed (x14) Dinner time (x18), Calorie in carbohydrate per day (x19), Total calorie per day (x22), Per capita income per annum (x25) and Functional literacy (x28) have recorded significant correlations with the dependent variable Psycho-social hazards (y).

#### 3.2 Regression Analysis

Table 3 presents the Multiple Regression Analysis wherein 28 causal variables have been regressed against the consequent variable y (Psycho-social hazards). It has found that the variables Total calorie consumption per day has exerted the highest direct and indirect effect on y with highest frequency. The R² value being 12.99 per cent, it is to infer that with the combination of these 28 causal variables, 12.99 per cent of variance embedded with consequent variable y has been explained. Inclusion of more number of variables or higher level of consistency in the variable selected could have contributed to higher level of variance explained.

#### 3.3 Stepwise Regression Analysis

Table 4 presents the stepwise regression wherein 3 causal variables have been retained at the last step to imply their critical and effective contribution to the resultant behaviour of the variable y (Psycho-social hazards). So, these 3 variables can be as important as in optimum resource allocation or strategic importance in management of mental health and psycho-social stress related to farm women.

Whenever these 3 variables acted isochronously, they together can explain 15 per cent of variance.

The solitary contribution of these three variables have \( (15 / 12.99 \times 100) = 115.47 \) per cent.

#### 3.4 Path Analysis

Table 5 presents the Path Analysis: the decomposition of \( r \) values into direct, indirect and residual effect. The variable number of children has recorded both the highest direct and indirect effect.

The variable x22 (total calorie consumption per day) has exerted the highest direct and indirect effect on y with highest frequency.

So, total calorie consumption per day has got tremendous importance.

The residual effect being 0.6807, it is to infer that even with the combination of 28 exogenous variables 68.07 per cent variance in y (Psycho-social hazards) cannot be explained.
Table 2. Co-efficient of correlation (r): Psycho-social hazards (y) vs. 28 exogenous variables (x1-x28)

| Serial Number | Variables                                                                 | R value  | Remarks** | Remarks**: significant at 0.01 level | Remarks*: significant at 0.05 level |
|---------------|---------------------------------------------------------------------------|----------|-----------|-------------------------------------|-------------------------------------|
| 1             | Age (x1)                                                                  | 0.2448   | **        |                                     |                                     |
| 2             | No of children (x2)                                                       | 0.2583   | **        |                                     |                                     |
| 3             | Number of farm work(x3)                                                   | -0.1718  | *         |                                     |                                     |
| 4             | working hour per day(x4)                                                  | -0.0473  |           |                                     |                                     |
| 5             | Number of miscarriage (x5)                                                | 0.2181   | **        |                                     |                                     |
| 6             | Number of animals reared (x6)                                             | -0.0843  |           |                                     |                                     |
| 7             | Height( ft) (x7)                                                         | 0.0168   |           |                                     |                                     |
| 8             | Weight( kg) (x8)                                                         | 0.1217   |           |                                     |                                     |
| 9             | BMI (x9)                                                                  | 0.0693   |           |                                     |                                     |
| 10            | cereals consumed per day(g)(x10)                                         | 0.1685   | *         |                                     |                                     |
| 11            | protein consumed per day (g)(x11)                                        | 0.1046   |           |                                     |                                     |
| 12            | fruits consumed per day (g) (x12)                                        | 0.0372   |           |                                     |                                     |
| 13            | vegetables consumed per day(g)(x13)                                      | 0.0454   |           |                                     |                                     |
| 14            | Total carbohydrate consumed per day(g)(x14)                              | 0.1691   | *         |                                     |                                     |
| 15            | fat taken (g/day) (x15)                                                   | 0.0182   |           |                                     |                                     |
| 16            | Breakfast time(a.m.) (x16)                                                | 0.2128   | **        |                                     |                                     |
| 17            | lunch time(p.m.) (x17)                                                   | 0.0565   |           |                                     |                                     |
| 18            | dinner time(p.m.) (x18)                                                  | -0.2025  | *         |                                     |                                     |
| 19            | calorie in carbohydrate per day (kcal) (x19)                             | 0.1691   | *         |                                     |                                     |
| 20            | calorie in protein per day (kcal)(x20)                                   | 0.1046   |           |                                     |                                     |
| 21            | calorie in fat per day (kcal)(x21)                                       | 0.0182   |           |                                     |                                     |
| 22            | total calorie per day (kcal) (x22)                                       | 0.1904   | *         |                                     |                                     |
| 23            | size of holding (katta)(x23)                                             | -0.0066  |           |                                     |                                     |
| 24            | family income(Rs.) per annum (x24)                                      | -0.0722  |           |                                     |                                     |
| 25            | per capita income (Rs.) per annum (x25)                                 | -0.1774  | *         |                                     |                                     |
| 26            | family expenditure per annum (x26)                                       | -0.0306  |           |                                     |                                     |
| 27            | per capita expenditure (Rs.) per annum (x27)                            | 0.0231   |           |                                     |                                     |
| 28            | functional literacy(x28)                                                 | 0.1766   | *         |                                     |                                     |

3.5 Canonical Discriminant Function Analysis with Critical Variables

Canonical Discriminant function analysis was carried out to isolate the most critical contribution made by each of independent variables on dependent variable Psycho-social hazards(y).

In this analysis, the whole set of independent variables has been passed through Canonical Discriminant function by extracting Wilk’s Lambda multiplied by Discriminant function to depict as to how the variables, may be few, are making striking difference between low and high level of stresses among farm women.

The table shows that y at 1 through 12 response level has recorded the significant discriminatory function.

4. DISCUSSION

The result depicts that, psycho-social hazards has been higher for those who are engaged in higher number of farm works per day because they have to face economic constraints and everyday family chaos and these in turn lead to considerable mental stress i.e. psycho-social hazards. Occupational hazard is one of the important problem from a gender perspective. From the past decades time and work pressure
Table 3. Multiple regression analysis: Psycho-social hazards (y) vs. 28 causal variables(x1-x28)

| Serial number | Variables                                          | ß   | ß*R   | STRU-R | reg coef-B |
|---------------|----------------------------------------------------|-----|-------|--------|------------|
| 1             | Age (x1)                                           | 0.17| 3.208 | 0.215  | 0.032      |
| 2             | No of children (x2)                                | 0.231| 4.591 | 0.227  | 0.565      |
| 3             | Number of farm work (x3)                           | -0.035| 0.458 | -0.151 | -0.062     |
| 4             | working hour per day (x4)                          | 0.088| -0.32 | -0.042 | 0.261      |
| 5             | Incidence level of miscarriage (x5)                | 0.214| 3.603 | 0.191  | 1.605      |
| 6             | Number of animals reared (x6)                      | -0.187| 1.214 | -0.074 | -0.224     |
| 7             | Height (ft) (x7)                                   | -0.104| -0.135| 0.015  | -1.018     |
| 8             | Weight (kg) (x8)                                   | 0.198| 1.854 | 0.107  | 0.139      |
| 9             | BMI (x9)                                           | -0.191| -1.021| 0.061  | -0.199     |
| 10            | cereals consumed per day (g) (x10)                 | -19.734| -256.118| 0.148 | -1.397     |
| 11            | protein consumed per day (g) (x11)                 | 3.221| 25.947| 0.092  | 1.067      |
| 12            | fruits consumed per day (g) (x12)                  | 0.509| 1.459 | 0.033  | 0.208      |
| 13            | vegetables consumed per day (g) (x13)              | -0.034| 0.12  | -0.04  | -0.005     |
| 14            | Total carbohydrate consumed per day (g) (x14)      | -3.346| -43.575| 0.148 | -0.229     |
| 15            | fat taken per day (g/day) (x15)                    | -9.482| -13.29 | 0.016  | -6.512     |
| 16            | Breakfast time (a.m.) (x16)                        | 0.232| 3.806 | 0.187  | 0.979      |
| 17            | lunch time (p.m.) (x17)                            | 0.02| 0.086 | 0.05   | 0.072      |
| 18            | Dinner time (p.m.) (x18)                           | -0.159| 2.485 | -0.178 | -0.668     |
| 19            | calorie in carbohydrate per day (kcal) (x19)       | -3.686| -48.012| 0.148 | -0.063     |
| 20            | calorie in protein per day (kcal)(x20)             | -0.983| -7.921| 0.092  | -0.081     |
| 21            | calorie in fat per day (kcal) (x21)                | 1.679| 2.353 | 0.016  | 0.128      |
| 22            | total calorie per day (kcal) (x22)                 | 28.518| 418.228| 0.167 | 0.477      |
| 23            | size of holding(katta) (x23)                       | -0.052| 0.026 | -0.006 | -0.01      |
| 24            | family income(Rs.) per annum (x24)                | -0.444| 2.469 | -0.063 | 0          |
| 25            | per capita income (Rs.) per annum (x25)           | 0.311| -4.249| -0.156 | 0          |
| 26            | Family expenditure per annum(x26)                  | 0.425| -1    | -0.027 | 0          |
| 27            | per capita expenditure (Rs.) per annum (x27)       | -0.112| -0.199| 0.02   | 0          |
| 28            | Functional literacy (Rs.) (x28)                    | 0.289| 3.933 | 0.155  | 0.001      |

*Multiple R-sq = 12.99  F-value for R = -9.48 with 28 and 61 dfs*
are two of the main causes behind stress [10]. Besides, monotonous work, irregular working hours, shifting work, seasonal work may also have serious negative impact [8].

The variable Dinner time revolves that in case it is delayed, it causes some physiological disorders viz. Gastric problems and also their family stress works are most important causes of work related stress. The time delays mainly due to improper task design i.e. heavy workload, infrequent rest breaks, longer working hours, hectic and routine works are most important causes of work related stress [11].

### Table 4. Stepwise regression analysis

| Serial Number | Variables | $b$ | $b^R$ | STRU-R | Reg. coef-B | SE of B | T-val of B | VIF |
|---------------|-----------|-----|-------|--------|-------------|--------|-----------|-----|
| 1             | Breakfast time(a.m.) (x16) | 0.245 | 34.951 | 0.561 | 1.032 | 0.426 | 2.421 | 1.035 |
| 2             | dinner time(p.m.) (x18) | -0.278 | 37.768 | -0.524 | -1.166 | 0.428 | 2.725 | 1.053 |
| 3             | total calorie per day (kcal ) (x22) | 0.214 | 27.281 | 0.493 | 0.004 | 0.002 | 2.12 | 1.027 |

Multiple $R$-sq = 15  F-value for $R = 5.02$ with 3 and 86 dfs

### Table 5. Direct, indirect and residual relationship psycho-social hazards (y) vs. 28 independent variables (x1-x28)

| Serial Number | Variables | Total effect | Direct effect | Indirect effect | Highest indirect effect |
|---------------|-----------|--------------|---------------|-----------------|------------------------|
| 1             | Age (x1) | 0.1702 | 0.2448 | -0.0746 | -0.7726 |
| 2             | No of children(x2) | 0.2308 | 0.2583 | -0.0275 | -0.448 |
| 3             | Number of farm work(x3) | -0.0346 | -0.1718 | 0.1372 | 0.6714 |
| 4             | working hour per day(x4) | 0.0878 | -0.0473 | 0.1351 | 0.935 |
| 5             | Incidence level of miscarriage (x5) | 0.2145 | 0.2181 | -0.0036 | -0.2654 |
| 6             | Number of animals reared (x6) | -0.187 | -0.0843 | -0.1027 | -0.187 |
| 7             | Height( ft)(x7) | -0.1044 | 0.0168 | -0.1212 | 0.2 |
| 8             | Weight( kg) (x8) | 0.1978 | 0.1217 | 0.0761 | -5.1321 |
| 9             | BMI (x9) | -0.1912 | 0.0693 | -0.2605 | 0.2737 |
| 10            | cereals consumed per day (g)(x10) | 1.8376 | 0.1685 | 1.6691 | -5.0585 |
| 11            | protein consumed per day (g) (x11) | -0.2326 | 0.1046 | -0.3372 | 1.4936 |
| 12            | fruits consumed per day (g) (x12) | 0.3489 | 0.0372 | 0.3117 | -1.4482 |
| 13            | vegetables consumed per day (g) (x13) | -0.0343 | 0.0454 | -0.0797 | 0.3266 |
| 14            | Total carbohydrate consumed per day(g) (x14) | -0.0747 | 0.1691 | -0.2438 | -5.1321 |
| 15            | fat taken per day (g) (x15) | 1.3004 | 0.0182 | 1.2822 | 1.3004 |
| 16            | Breakfast time (a.m.) (x16) | 0.2322 | 0.2128 | 0.0194 | 0.42 |
| 17            | lunch time (p.m.) (x17) | 0.0198 | 0.0565 | -0.0367 | 0.6066 |
| 18            | dinner time (p.m.) (x18) | -0.1593 | -0.2025 | 0.0432 | -0.8238 |
| 19            | calorie in carbohydrate per day (kcal) (x19) | 3.6206 | 0.1691 | 3.4515 | -5.1321 |
| 20            | calorie in protein per day (kcal)(x20) | 1.4936 | 0.1046 | 1.389 | 1.4936 |
| 21            | calorie in fat per day kcal)(x21) | -0.1471 | 0.0182 | -0.1653 | 1.3004 |
| 22            | total calorie per day (kcal ) (x22) | -5.3964 | 0.1904 | -5.5868 | -5.3964 |
| 23            | size of holding (katta)(x23) | -0.0518 | -0.0066 | -0.0452 | 0.2205 |
| 24            | family income(Rs.) per annum (x24) | -0.4439 | -0.0722 | -0.3717 | -0.5026 |
| 25            | per capita income (Rs.) per annum (x25) | 0.311 | -0.1774 | 0.4884 | 0.311 |
| 26            | family expenditure per annum(x26) | 0.4248 | -0.0306 | 0.4554 | -0.4605 |
| 27            | per capita expenditure (Rs.) per annum (x27) | -0.1116 | 0.0231 | -0.1347 | 0.6969 |
| 28            | Functional literacy (x28) | 0.2893 | 0.1766 | 0.1127 | 0.2893 |
The variable per capita income per annum shows that respondents having lower income faces economic stress and then mental pressure to run their everyday household [12]. As a result the psycho-social hazard logically goes up. So, period of financial crisis is highly related to one’s mental health. For the rest other variables viz., Age(x1), Number of children (x2), Incidence level of miscarriage (x5) Cereals consumed per day (x10), Total carbohydrate consumed (x14), Calorie in carbohydrate per day (x19) , Total calorie per day (x22), and Functional literacy (x28) have predicted the Psycho-social hazards in a positive and proportionate way to imply further that these variables have offered an apparently direct but substantive prediction of the dependent variable.

Calorie i.e. energy is the ultimate which comes from consumption of food. But when the adequate supply of food is at stake, the supply of energy to do the daily work will be diminished. Thus, it will involve lots of stresses to the farm women as they are homemaker. For this reason, total calorie consumption per day by the respondents have come up as one of the important determinants in delineating Psycho-social hazards. It has seen that farm women mainly gain total calorie [13] i.e. energy from carbohydrates but a high carbohydrate food has been shown to increase blood pressure and increase stress on the body, in contrast to it an energy rich diet with fruit, vegetables which are in very low amount in their daily dietary intake can reduce blood pressure [3].

### Table 6.1 Wilks’ Lambda

| Test of Function | Wilks’ Lambda | Chi-square | df  | Sig.  |
|------------------|---------------|------------|-----|-------|
| 1                | 0.005         | 371.934    | 276 | 0.000 |

### Table 6.2 Eigen values y(1-12) have recorded eigen value 3.111

| Function | Eigen value | % of variance | Cumulative % | Canonical correlation |
|----------|-------------|---------------|--------------|-----------------------|
| 1        | 3.111       | 37.7          | 37.7         | 0.870                 |

### Table 6.3 Canonical discriminant function coefficients for x1-x28 (Standardized co-efficients)

| Variables | Canonical discriminant function (+ direction ) | Variables | Canonical discriminant function (- direction ) |
|-----------|-----------------------------------------------|-----------|-----------------------------------------------|
| X25       | 12.773                                        | X27       | -12.659                                        |
| X26       | 7.830                                         | X24       | -7.439                                         |
| X8        | 0.974                                         | X7        | -1.179                                         |
| X18       | 0.377                                         | X9        | -1.480                                         |
| X10       | 0.296                                         | X23       | -0.158                                         |
| X2        | 0.279                                         | X15       | -0.131                                         |
| X11       | 0.260                                         | X13       | -0.080                                         |
| X12       | 0.231                                         | X3        | -0.068                                         |
| X5        | 0.225                                         | X6        | -0.055                                         |
| X17       | 0.115                                         | X28       | -0.042                                         |
| X4        | 0.097                                         | X16       | -0.008                                         |
| X1        | 0.025                                         |           |                                               |

### Table 6.4 Canonical discriminant function coefficients for y (Standardized co-efficient)

| Variables(y) | Canonical discriminant function (+ direction ) | Variables(y) | Canonical discriminant function (- direction ) |
|--------------|-----------------------------------------------|--------------|-----------------------------------------------|
| 10           | 14.108                                        | 13           | -1.512                                        |
| 8            | 1.857                                         | 12           | -1.196                                        |
| 7            | 1.846                                         | 5            | -0.939                                        |
| 17           | 1.496                                         | 9            | -0.736                                        |
| 4            | 0.600                                         | 3            | -0.379                                        |
| 0            | 0.477                                         |              |                                               |
| 11           | 0.309                                         |              |                                               |
| 6            | 0.007                                         |              |                                               |
of their income directly contributes to stresses. According to Silva et al. [6] income is an important determinant of one’s mental health.

5. CONCLUSION

Psychological stresses of farm women are seldom studied in India. While a farm woman has to mentor a family, she has also to exert yeomen farm services as well. Maintaining both farm and family together is extremely arduous and stressful. With a broken heart and motivation eroded, how could a farm woman sustain the family, the community and, of course, to her own life as well. The variables under study viz. breakfast time, dinner time, lunch time, income, calorie intake have come up as important determinants to characterize psychological stress of farm woman and, can further be extrapolated for configuring a befitting action plan to deal with the issue.

CONSENT

As per international standard, respondents’ written consent has been collected and preserved by the author(s).

This is interesting to observe that when the number of effective variables has been downsized through stepwise regression, the importance of causal variable Dinner time has been topped up. It can speak that Dinner time of a family is the important contributor to the level of health and nutritional performance beyond other concerns and issues.

When the number of children in a family increased, it is difficult to their mother to attain the farm work and caring of their children at the same time because they spent maximum hour in the field. So, both the children and mother suffer from psycho-social hazards. Because women alone have to take care of their family, they also work in fields, rear cattle and make food and take care of children and old-in-laws at the same day [1].

And the total calorie consumption per day has recorded the highest indirect effect because calorie is the last word to speak out.

Per capita income per annum has the highest discriminatory ability in respect of psycho-social hazards of farm women. Because stability of their income directly contributes to stresses.

Fig. 1. Canonical discriminant function analysis for y

The following variables have the ability to discriminate y (Psycho-social hazards):

\[ x_{25}, x_{26}, x_{8}, x_{18}, x_{10}, x_{2}, x_{11}, x_{12}, x_{5}, x_{17}, x_{4}, x_{1}, x_{27}, x_{24}, x_{7}, x_{9}, x_{23}, x_{15}, x_{13}, x_{3}, x_{6}, x_{28}, x_{16} \]

\[ x_{25} \text{(Per capita income per annum)} \] has the highest ability. So, these have been the most critical variables.
COMPETING INTERESTS

Authors have declared that no competing interests exist.

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