

## AGRICULTURAL WORKERS AND BURDEN OF MORBIDITY: A COMMUNITY-BASED CROSS-SECTIONAL STUDY IN A RURAL BLOCK OF WEST BENGAL

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Received: 02 August 2024, Revised and Accepted: 15 September 2024

### ABSTRACT

**Objective:** Agriculture is one of the most hazardous occupations in developing and industrialized countries. Most agricultural workers in developing countries have poor housing conditions and an inadequate diet and are exposed to both general and occupational diseases. The study was undertaken to find out the prevalence of occupational morbidity and its associated risk factors among agricultural workers in a rural Block of West Bengal.

**Methods:** The study was conducted among agriculture workers of Habra Block-I of the state of West Bengal. Multistage random sampling method was followed to select a total of 302 individuals who were distributed among the four villages according to the Probability Proportional to Size (PPS) method.

**Results:** The majority of workers (58.6%) were suffering from nutritional pallor/anemia and dental carries/dental stains were 45.4%. Among other morbidities, 42% of workers were suffering from respiratory morbidity, 26.8% of workers were suffering from cardiovascular diseases, and 26.5% were suffering from hypertension. Duration of work (more than 8 h/day) was significantly associated with morbidity also other covariates such as age, sex, type of family, smoking status, and alcohol consumption had significant effects on morbidity among agriculture workers in both bivariate and multivariable linear regression.

**Conclusion:** This research revealed not only the high prevalence of morbidities among the study population but also the occurrence of a large population with modifiable risk factors such as alcohol consumption, smoking, high load and long duration of work, poor personal hygiene, and non-use of personal protection equipment; the latter, if taken care, will reduce the morbidities of the agriculture workers.

**Keywords:** Agriculture workers, Morbidity, Rural area, West Bengal.

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### INTRODUCTION

Agriculture is one of the most menacing occupations in both developing and industrialized countries. Exposure to insecticides and other agrochemicals constitutes major occupational morbidity which may result in poisoning and death and, in certain cases, work-related cancer, and reproductive impairment [1]. On the other hand, prolonged exposure to pesticides could effect gastrointestinal, cardiopulmonary problems, neurological and hematological symptoms, and adverse dermal effects, which could significantly again hinder farmers' work capacity in the field and reduce their management and supervision capabilities [2].

In developing countries, a large number of rural people live below the poverty line [3]. Socioeconomic, cultural, and environmental factors also impact the working and living conditions of agricultural workers. Most agricultural workers in developing countries have poor housing conditions and deficient diet and are exposed to both general and occupational ailments. India lives in its 600,000 villages. Nearly 72 of Indian community lives in rural areas, where their main occupation is farming [4]. India is the second biggest agriculture-dependent country after China [5]. Around 58.45 of the Indian population substantially depends on agriculture for their livelihood [6].

Present's rural population suffers from the double burden of ailment due to their lack of proper occupational procedure, poor life, and also lack and underutilization of healthcare services. Poverty, illiteracy, and environmental stress play their own deleterious effect in making their

lives more miserable with high morbidity and mortality due to their occupation and its co-morbidity.

There are no robust, appropriate, and organized health education programs either at the individual or at the community level to overcome the lack of awareness of the basics of prevention and control of occupation-related ailment and risk factors of the substance used for agriculture occupation among the general population. Very limited studies have been done on this issue in India. The few studies done in other parts of India have worked on very selective parameters such as only pesticide, equipment-related injury, and mental disability; further, there is not a single study related to occupational morbidity in agriculture workers in rural areas, especially in this part of the country.

### Objectives

1. To find out the socioeconomic-demographic and behavioral characteristics of the agricultural workers in a rural block of West Bengal.
2. To determine the morbidity pattern of the study population.
3. To find out the relationship of the morbidities with the occupational activities.
4. To elicit the explanatory and contextual correlates of the morbidity encountered by the study population.

### METHODS

#### Study type

The study design was an exploratory epidemiological study.

**Study design**

It is a cross-sectional design.

**Study area**

The study was conducted on agriculture workers of Bergum-II Gram Panchayat (GP) of Habra Block-I in North 24 Parganas District of the state of West Bengal, where the total male and female agriculture workers aged between 18 and 60 years was 1510 according to census 2011 [7].

**Study period**

The study period was October 2021–September 2023.

**Study population**

Persons aged 18–60 years agriculture workers residing in the study area.

**Inclusion criteria**

- All the agriculture workers aged 18–60 years
- The workers who were residing in the area for more than 1 year.

**Exclusion criteria**

- Pregnant and lactating women, critically sick patients, and individuals who did not give consent.

**Sample size**

In a recent study, the prevalence of morbidity among rural agricultural workers in South India was found to be 62% [8]. Now, considering this prevalence, the estimated sample size was around 105 using the formula ( $n = Z_{\alpha}^2 pq / l^2$ ). As multistage sampling was used and considering the design effect of 2.5 and 15% non-response rate, final sample size was 302.

**Sampling design**

In this study, a multistage random sampling method was followed for the selection of study subjects. In the first stage, out of 22 Blocks in North 24 Parganas, Habra-I Block was selected randomly; i.e., the primary sampling unit was Block. In the second stage, one GP (Bergum-II) out of seven GPs from the selected Block was selected randomly. All villages of Bergum-II GP were selected for the study purpose. Following the PPS method, the samples from Janaphul village were 105, Pairagachi village was 24, Bergum village 99, and Krishnanagar village was 74, respectively. All agriculture workers whose age was 18–60 years were the study population.

**Study techniques**

- Interview with a pre-designed and pre-tested questionnaire
- Physical Examination –
  - Anthropometric measurements – Height and Weight
  - Blood pressure
- Review of records such as OPD tickets and Doctor's prescriptions.

**Study tools**

A pre-designed and pre-tested questionnaire was used to collect data on demographic information, and socioeconomic information, identification of morbidity, and work-related hazards were assessed by interview, clinical examination, anthropometric measurement, and review of past records.

**Statistical analysis**

All the data were initially entered into Microsoft Excel, and later, these spreadsheets were used for analysis. Statistical analysis was done using the Statistical Package for the Social Sciences version 16.0. For all the statistical tests of significance, a  $p < 0.05$  was considered to reject the null hypothesis. The Chi-square test was used to determine the association between categorical variables. As the presence of all different morbidity is a continuous variable, linear regression analysis was used.

**RESULTS**

In this study, among 302 selected agricultural workers, male workers were 175 (57.9%) and female were 127 (42.1%). The mean age ( $\pm$ standard deviation) of the study population was  $40.67 \pm 11.83$  years.

Among the total workers, 265 (87.7%) were Hindu and 37 (12.3%) were Muslim. Most of them were illiterate, i.e., 207 (68.5%) followed by primary, i.e., 65 (21.5%), secondary, i.e., 28 (9.3%), and higher secondary 2 (0.7%). Among the total workers, 173 (57.2%) belong to class V socioeconomic status, followed by 111 (36.8%) and 18 (6%) belonging to Class IV and Class III socio-economic status, respectively, according to B G Prasad's socioeconomic status scale 2023. Around half of the study population was alcoholic (Table 1).

Most workers reported having worked in a variety of workplaces and with a variety of crops; paddy fields were the most common workplace. Here, almost all workers were involved in the normal cleaning of crops, cleaning of weeds, harvesting, and beating of plants. Around 60% were involved in manual digging, planting of seeds, application of fertilizers, and application of pesticides (Table 2).

More than half of the study population work more than 8 h (Table 3).

Most of the population were suffering from nutritional anemia or pallor, i.e., 177 (49%) and by oral cavity disease, i.e., 137 (45.4), followed by respiratory morbidity 127 (42), cardiovascular diseases 81 (26.8%), and 80 (26.5%) were suffering from hypertension. In gastrointestinal system examination, 17 (5.6%) were suffering from icterus and

**Table 1: Sociodemographic characteristics of study participants (n=302)**

Sociodemographic characteristics	Number	Percentage
Age (Years)		
18–30	78	25.8
31–40	95	31.5
41–50	71	23.5
51–60	58	19.2
Gender		
Male	175	57.9
Female	127	42.1
Religion		
Hindu	265	87.7
Muslim	37	12.3
Caste		
ST	167	55.3
SC	115	38.1
Others	20	6.6
Educational status		
Illiterate	207	68.5
Primary	65	21.5
Secondary	28	9.3
Higher secondary	2	0.7
Socioeconomic status (Modified B. G. Prasad's) <sup>a</sup>		
Class III	18	6
Class IV	111	36.8
Class V	173	57.2
Marital status		
Single	8	2.6
Married	294	97.4
Type of family		
Nuclear	74	24.5
Joint	228	75.5
Addiction		
Alcohol	129	42.7
Smoking	106	35.1

<sup>a</sup>None of the study participants belonged to SES Class I and II

**Table 2: Distribution of study participants according to nature of work (n=302)<sup>a</sup>**

Nature of work	Number	Percentage
Manual land digging	180	59.6
Application of fertilizer	181	59.9
Planting of seed/plant	182	60.3
Application of pesticides	184	60.9
Cleaning weeds	301	99.7
Harvesting	301	99.7
Beating of plant	300	99.3
Cleaning	301	99.7

<sup>a</sup>Multiple responses were taken

**Table 3: Distribution of study participants according to duration of work (n=302)**

Duration of work	Number	Percentage
>8 h	128	42.4
8 h or more	174	57.6
Total	302	100

3 (1%) were suffering from endocrine system morbidity. Among them, 3 (0.9%) were diabetes and 1 (0.3%) were hypothyroidism (Table 4).

In bivariate linear regression, morbidity was significantly increasing among the workers who work more than 8 h/day [Beta (95% confidence interval)=0.31 (0.16, 0.46)].

In the multivariate linear regression model, duration of work (>8 h) age, sex, type of family (joint), smoking status, and alcohol consumption were seen to be statistically significant (Durbin Watson value=1.82, adjusted r square=0.45). Duration of work (>8 h) had the largest beta coefficient (0.52) which means it made the strongest unique contribution in explaining the dependent variable. Other covariates such as age, sex, smoking status, alcohol consumption, and type of family made fewer contributions compared to it with lower coefficients -0.03, -0.16, -0.34, -0.09, and 0.04, respectively, were significant contributors in explaining the dependent variable. However, three variables (education, socioeconomic status, and severity of job) did not have any significant contribution to the prediction of the dependent variable in the regression model (Table 5).

## DISCUSSION

Agriculture is the main occupation in India, and it is related to many agro-based industries. Being a developing nation demographic features similar to the other developing nations of the world and faced with traditional public health problems such as communicable diseases, malnutrition, poor environmental sanitation, inadequate medical care, different types of gastrointestinal, chronic obstructive lung diseases, pesticide poisoning, etc. [9].

In this study, male workers were 175 (57.9%) and female were 127 (42.1%). Male and female ratio was 1.38:1. Among the total workers, 265 (87.7%) were Hindu and 37 (12.3%) were Muslim in religion. Most of them were illiterate, i.e., 207 (68.5%) and 173 (57.2%) belonged to Class V socioeconomic status according to B G Prasad's socioeconomic status scale 2023.

In a study by Kulkarni *et al.* [8] among the study participants, 55.75% were men and 44.25% were women, with male-to-female ratio of 1.25:1. Most of the agricultural workers (89.5%) were Hindus and 47% were illiterates; 295 (73.75%) belonged to Class V socioeconomic status.

In this study, the prevalence of nutritional pallor/anemia was 177 (58.6%). A study by Kulkarni *et al.* [8] showed that 31% had pallor

**Table 4: Distribution of study participants according to morbidity pattern (last 1 year) (n=302)**

Different system	Provisional diagnosis	Number	Percentage
Disease of oral cavity	Dental caries	137	45.4
Respiratory system <sup>a</sup>	Upper respiratory tract infections	19	6.2
	Lower respiratory tract infections	77	25.4
	Asthma	7	2.3
	Tuberculosis	24	7.9
Cardiovascular system	Hypertension	80	26.5
	Heart disease	1	0.3
Gastrointestinal system	Jaundice	17	5.6
Endocrine system	Diabetes mellitus	2	0.6
	Hypothyroidism	1	0.3
Nutritional	Pallor/Anaemia	177	58.6

<sup>a</sup>: Multiple responses were taken

**Table 5: Linear regression to show the association of presence of morbidity with different independent variables (n=302)**

Independent variable	(Beta [95% confidence interval])	Adjusted beta (95% confidence interval)
Duration of work (>8 h)	0.31 (0.16, 0.46)*	0.52 (0.35, 0.69)*
Age	-0.03 (-0.04, -0.03)*	-0.03 (-0.03, -0.02)*
Sex (Male)	0.35 (0.20, 0.51)*	-0.16 (-0.38, -0.05)*
Caste (ST)	0.03 (-0.12, 0.18)	-----
Education (Illiterate)	0.2 (0.37, 0.04)*	-0.12 (-0.42, 0.18)
Type of family (Joint)	-0.03 (-0.20, 0.14)	0.04 (1.10, 0.18)*
Socioeconomic status (Class V)	0.19 (0.06, 0.31)*	0.03 (-0.16, 0.22)
Type of workers (landowner)	-0.17 (-0.38, 0.03)	-----
Smoking (no)	-0.53 (-0.71, -0.35)*	-0.34 (-0.51, -0.18)*
Alcohol consumption (no)	-0.22 (-0.37, -0.06)*	-0.09 (-0.23, -0.05)*
Severity of job (severe)	0.21 (0.11, 0.31)*	0.55 (0.35, -0.74)

\*Significant at 95% confidence interval

and Das *et al.* [10] in their study showed 182 out of 244, i.e., 74.6% of women of tea garden workers suffered from anemia (Hb <11 g%).

In the present study among the study participants, dental caries/dental stains were 137 (45.4%). Kulkarni *et al.* [8] in their study showed 62% of agricultural workers suffered from morbidities associated with oral cavities among them most of them suffered from dental caries (25.50%) and dental stains (21.75%). Another study by Jabeen *et al.* [11] showed that 95% had dental stain, 73% had dental plaque, 66% had dental calculus, and 59% had dental caries. Their study findings showed that oral health status was better among the respondents who were not tobacco consumers.

In the present study, 68.5% of workers were illiterate, 55.3% were scheduled caste category and 57.2% of workers lived in very poor socioeconomic status. Among the workers, 48.3% were chewing both commercial and non-commercial smokeless tobacco products such as pan, jarda, betel nut, gul, ghutka, and khaini and 35.1% were smokers and 21.5% were both smoked and smokeless tobacco user. This substance had a close relationship with that of occurrence of oral morbidity. These low socioeconomic, poor educated, back ward, and aged class workers also believe that chewing betel quid was beneficial for health.

In the present study, a total of 127 (42%) workers had suffered from respiratory morbidities, and among them, 19 (6.2%) were the upper respiratory origin, 77 (25.4%) from lower respiratory (such as chronic bronchitis), 7 (2.3%) from asthma, and 24 (7.9%) had pulmonary tuberculosis. Kulkarni *et al.* [8] in their study showed respiratory system morbidity was 19%, Prakash *et al.* [6] in their study showed 42.66% had respiratory morbidity, Gainet *et al.* [12] reported the prevalence of chronic bronchitis was higher in dairy farmers. Hoppin *et al.* [13] in their study stated that 19% population had wheeze in the last year. Another study by Hoppin *et al.* [14] showed that 19% of farmers and 22% of commercial pesticide applicators reported wheeze in the previous year. Monso *et al.* [15] in their study showed that respiratory symptoms were associated with poultry and rabbit farming, flower growing, and the cultivation of grain. Chronic bronchitis was related to toxic pneumonitis, work inside confinement buildings, and greenhouses. Chronic bronchitis and toxic pneumonitis are highly prevalent in European farmers and are mainly attributable to indoor work.

In the cardiovascular system examination in the present study, total of 81 (26.8%) workers were suffering from cardiovascular diseases. The blood pressure measurement finding showed that 80 (26.5%) were suffering from hypertension and 1 (0.3%) were previously diagnosed with heart disease. Kulkarni *et al.* [8] in their study showed 17.25% of subjects had Hypertension. Tomei *et al.* [16] in their study showed that the farmers were found to have a higher prevalence of systolic and diastolic arterial hypertension.

In other system examinations, 5.6% were suffering from icterus and 1% were from endocrine system morbidity. Among them, 0.7% were diabetes and 0.3% were hypothyroidism. Kulkarni *et al.* [8] in their study showed icterus (0.5%) and diabetes 1.5%. London *et al.* [17] in their study showed that 0.8% were diabetic.

## CONCLUSION

This research revealed not only the high prevalence of morbidities among the study population but also the occurrence of a large population with modifiable risk factors such as alcohol consumption, smoking, high load and long duration of work, poor personal hygiene, and non-use of personal protection equipment (PPE); the latter if taken care will definitely reduce the morbidities of the agriculture workers. Therefore, targeted interventions that promote healthy lifestyles and reduce the risk factors, along with early diagnosis and treatment will help in ameliorating the suffering of these personnel of the agriculture sector who are actually feeding the whole nation. About 71% of the Indian population lives in rural areas out of which more than 50% are working in the fields day and night, in sun and rain to provide food to the whole nation. The irony is that we give the least importance to the travails of this sacred occupation. It is high time that the utmost priority is given to mitigate the suffering of this large population and to provide them with health and happiness. So let us all rise and come forward

to bring smiles to each and every individual who works in the field, making this occupation honorable, healthy, and happy.

## CONFLICT OF INTEREST

None

## FUNDING

No funding sources.

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