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## A Cross Sectional Study To Assess The Morbidity Pattern Of Agricultural Workers In Villages Of Thanjavur, Tamil Nadu, India.

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### ABSTRACT

The agricultural workers have an multitude of the occupational related health issues, In India, Most of the population depend on agricultural sector either directly or Indirectly, little attention given to the occupational related health issues of these Population. To assess the morbidity pattern of agricultural workers. A cross sectional study was conducted in Agricultural workers in selected villages of Thanjavur. In August 2016 to February 2017 The sample size was 380. Multi stage sampling was done. Includes Both male and female workers involved in agriculture above the age of 18 years. Excluded Landlords who are not working in the field, Recent migrants Pregnant and lactating women. Data collected through semi-structured self-administered questionnaires. Official permission obtained from the Institutional Ethics Committee, Informed written consent from the participants. The data entered in MS Excel, analyzed using SPSS Version 16. Descriptive and Inferential analysis done by using Chi square test, Fisher's Exact test, p value less than 0.05 taken as significant. Among study population, 51.6% male and 48.4% female. the prevalence of heat related illness is the most common problem faced by agriculture workers (92.1%) followed by musculoskeletal disorder and respiratory problem (88.4%), dermatoses (78.9%), foot problem (75.8%), dental problem (68.4%), abdominal problem (64.2%), urinary problem (47.9%), Gynecological problem (30.7%), systemic illness except dermatoses high among planting and weeding labourers (p value<0.05). non communicable disease (10.3%) found to be high in mechanical labourers. (p value<0.05), stress and suicidal thoughts high in other manual labourers (p value<0.05). Proper training and application of personal protective measures, strengthen the occupational health services at the primary care level reduces the occupational health hazards in agriculture workers.

**Keywords:** Agro-industries, workplace, respiratory system, musculoskeletal disorders, allergic rhinitis.

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## INTRODUCTION

Agriculture is defined as an art, science and business of producing crops and livestock for economic purposes". Agricultural sector contributes 6.1% of total world economic production. China and India accounts for 21.06 and 7.68 percent respectively of total global agricultural output. China is the largest agricultural producer followed by India and USA respectively". Agriculture is the only livelihood for 60% people working in India [1-3] According to DARE [The Department of Agricultural Research and Education], agriculture plays an important role in Indian economy . about 54.6% of population are engaged on farm works and allied activities {census2011} . India „s agriculture contributes 17.4% of country"s GDP. Over 60%of the India „s land area is arable making it the second largest country in terms of total arable land [4,5]. Agricultural workers contribute immensely to improve the economic status of the country; hence it is essential to improve the health and safety of agricultural workers [6,7]. Indian Council of Agricultural Research [ICAR] and the Indian Agricultural Statistics Research Institute develops new techniques for the design of agricultural experiments, analyses data in agriculture and specializes novel technique for animal and plant breeding. But there are no schemes related to the farmers health and safety. Novel technics have increased the food production but at the same time created new health and safety problems among agricultural workers [8]. At the global level, more than a million of agricultural worker are seriously injured in workplace accidents by machines used for agriculture, pesticide poisoning, zoonotic diseases etc. According to ILO "170,000agricultural workers are killed each year all over the world from various causes". It means agricultural work have twice the risk of dying when compared with other industrial work. Due to under reporting of death or injuries or occupational diseases in the agricultural sector the actual picture of the occupational health and safety of agricultural workers is not reflected in official statistics [9-12] Occupation related health issues in general are common in developing countries like India. In India 1.83 million people are suffering from occupational diseases contributing to 20% of the global burden [13]. A large segment of the labour force in the country including 185.3 million workers in the agriculture sector, 14.6 million in the construction sector, 9.51 lakh in the plantation sector and 41.35 lakhs in the beedi industry belongs to the unorganised sector. (GOI Planning Commission) [14]. "All India Agricultural Workers Union and All India Kishan Sabha reportedly organized about 5.5 million agricultural workers. Also, 3.09 million workers were organized by various co-operative societies. Thus, altogether, only 10.4 million rural workers, i.e., about 4.2 percent only belonged to organized sector" [15]. The occupational safety and health scenario is complex in India. Occupational safety and health for India is a developmental tool and an empowering movement.[16] the occupational hazards assessment in the work place is of great concern today." occupational health is health of an individual in relation to the work and working environment. However nearly or more than ninety percent of the work force in India is within unorganised sector [17]. occupational health remain neglected in most developing countries due to competing social, economic and political challenges [18].

The agricultural workers spend their life time for the welfare of others without agricultural workers there is no agriculture, without agriculture there is no food, without food there is no existence of life [19]. It"s our duty as a health professional to promote their health and prevent them from the occupational health issues by improving their capacity building in using simple personal protective measures. The present study is aimed to know the morbidity pattern of agricultural workers [20].

## MATERIALS AND METHODS

This study was conducted as a community based cross sectional study to assess the morbidity pattern of agricultural workers in villages of Thanjavur, Tamil Nadu. The community –based study was conducted in villages of Thanjavur district, Tamil Nadu, India. The study was carried out from August 2016 to February 2017. The period of field study was from October 2016 to January 2017. The study population comprised of households in selected villages of Thanjavur. The study participants included agricultural workers in the selected house hold. The reason for choosing this population was that the agricultural workers are facing multitude of problem in their day to day life due to their working nature. By giving proper health education on improving their living and working conditions, occupational related health issues can be greatly avoided and the morbidity among agricultural workers can be reduced drastically.

### Inclusion Criteria

Both male and female workers involved in cultivation, harvesting, fertilizer application and

handling of crops above the age of 18 years. Those who are willing to participate in the study.

#### **Exclusion Criteria:**

- Landlords who are not working in the field
- Agricultural workers who are also working as:
  - Office employees,
  - Truck drivers,
  - Recent migrants,
  - Pregnant and lactating women working as a agricultural worker,
  - Mechanics any other not engaged in handling, cultivation, or harvesting activities fertilizer application.
- Farmers not involve in agriculture for the past one year and involvingsome other works.
- Houses that were locked during three visits.

#### **Questionnaire**

Questionnaire for the present study was developed based on previous studies related to agriculture workers. The questionnaire was modified according to the local culture and validated with the help of expert.

#### **The Questionnaire has two parts**

The interview schedule was designed in Tamil and English version. since the language of people is Tamil. Questionnaire is framed in Tamil version. It consists two parts –

#### **Section A**

Includes the information on socio demographic profile and work characteristic of agricultural workers. Socio- demographic profile of study subjects include age, gender, marital status, religion, literacy, type of work, duration of work, interval between work, working hours per day, working days per week, income, other source of income etc. adoption of personal protective measures (PPM), training on pesticide application, attitude towards medical emergencies, barriers preventing usage of personal protective measures, awareness level regarding pesticidal risk, awareness level about ingredients.

#### **Section B**

Includes morbidity profile of the agricultural workers Morbidity profile includes the study variables like heat related illness, respiratory problems, allergic reactions, musculoskeletal injuries, injuries due to sharp weapon, oral cavities problem, gastro intestinal problems, animal bites, electric hazards, psychosocial problems, water related problems, gynaecological problems and other general problems.

#### **Study variables**

Self-reported illness symptoms occurred during past one year preceding the survey were enquired and noted.

#### **Data collected for the study by following method**

Data collection was done in the study area after obtaining permission from the Director, Institute of community medicine and the Dean, Madras Medical College, Village Administrative Officers and approval from the Institute Ethics committee. From the village administrative officer line list of house hold of agricultural workers obtained. Then I approached the agricultural workers at their residence with the help of menials of that village, data was collected by house to house visit in the study area. The members who were not available during the three visits were excluded from the study. Where the house was locked during the three visits, the next house was taken for the study. The individuals were contacted by going to their houses, each participant was given a brief introduction about the study

and informed consent was obtained from all participants .the interview were done ensuring privacy.

Relevant information was obtained from the respondent using the semi - structured questionnaire in the local language at their homes. Questionnaire was read out to the study participants in the same order as listed in the questionnaire and sufficient time was given to the subjects to respond. If the study subject did not understand the question, it was repeated in the same manner without probing for the answer.

**Statistical analysis**

The collected data was entered for analysis in Microsoft Excel. This data was exported to Statistical Package for Social Sciences software version 16 for analysis. descriptive statistics (mean and standard deviations ) were employed to describe continuous variables, while frequency distributions were obtained for dichotomous variables. Associations between variables were done using chi square tests, Fisher's exact test; a p value of less than 0.05 has been considered to be significant.

**ANALYSIS AND RESULTS**

This cross-sectional study included agriculture workers of rural Thanjavur. This study estimated the morbidity profile of the workers.

Results are divided into three sections

- Demographic profile of agricultural workers.
- Morbidity and work pattern of agricultural workers.
- Relation between work and morbidity pattern.

**Demographic Profile Of Agricultural Workers**

**Table 1: Frequency distribution of demographic profile of agricultural workers**

Sl.No	Variables	Frequency	Percentage
1.	<b>Age category (years)</b>		
	< 30	71	18.7
	30 to 39	88	23.2
	40 to 49	128	33.7
	50 to 59	58	15.3
	>60	35	9.2
2.	<b>Gender</b>		
	Male	196	51.6
	Female	184	48.4

3.	<b>Religion</b>		
	Hindus	345	90.8
	Christians	33	8.7
	Muslims	2	0.5
4.	<b>Marital status</b>		
	Married	316	83.2
	Single	30	7.9
	Widow	30	7.9
	Divorced/ separated	4	1.1
5.	<b>Educational status</b>		
	Illiterate	117	30.8
	Primary education	115	30.3
	Middle school education	81	21.3
	Secondary school education	47	12.4
	Diploma and degree	20	5.3

6.	<b>Monthly income from agriculture (rupees)</b>		
	≤ 3000	273	71.8
	>3000	107	28.2
7.	<b>Other source of income</b>		
	Present	183	48.2
	Absent	197	51.8
8.	<b>Health seeking behaviour</b>		
	Govt facility	301	79.2
	Private facility	78	20.5
	Native treatment	1	0.3

Among 380 study population, more than 30% come under age group of 40 to 49 years, with the mean age and standard deviation of study population 41.72 years and 1.19 respectively. More than 50% were men and 48.4% were women, more than 90% belonged to Hindu religion, 83% were married, 30% were illiterate among the 70% of educated workers, 30% had only primary education. More than 70% of workers earned only less than 3000 rupees per month, nearly 80% avail health services at government facility.

**Table 2: Frequency distribution of Work pattern of agricultural workers**

Sl.No	Variables	Frequency	Percent
1.	<b>Work category</b>		
	Full time workers	246	64.7
	Part time workers	134	35.6
2.	<b>Type of work</b>		
	Planting /weeding practices	161	42.4
	Other manual work	196	51.6
	Mechanical work	23	6.1
3.	<b>Duration of work in a year</b>		
	>6 months	210	55.3
	≤ 6 months	170	44.7
4.	<b>Working hours per day</b>		
	> 8 hours	197	51.8
	≤ 8 hours	183	48.2
5.	<b>Interval between working hours</b>		
	yes	349	91.8
	no	31	8.2
6.	<b>Duration of interval(n=349)</b>		
	≤ one hour	299	78.7
	>one hour	50	13.2
7.	<b>Working days per week</b>		
	> 5 days	199	52.4
	≤ 5 days	181	47.6

Nearly 65% were full time workers, 42% involved in planting / weeding, 51% involved in other manual works like harvesting, ploughing, fertilizer, pesticide, manure application. More than 50% of the workers have work more than 6 months in a year. In general 50% of the workers work for more than 8 hours a day. More than 90% of the workers said they had interval during work hours.

**Table 3: Frequency distribution of pesticide usage and PPM(personal protective measures)**

Sl.No.	Variables	Frequency	Percent
1.	<b>Adoption of protective measures</b>		
	yes	265	69.7
	no	115	30.3
2.	<b>Types of protective measures adopted</b>		
	Wearing full sleeves & pants	73	19.2
	Protecting the face by clothes	31	8.2
	Taking bath after pesticide usage	77	20.3
	All three types of protection	71	18.7
	More than one protection adopted	13	3.4
3.	<b>Training on pesticide application</b>		
	yes	97	25.5
	no	283	74.5
4.	<b>Attitude towards medical emergencies while handling pesticides</b>		
	Calling help	100	26.3
	Calling 108 ambulance	84	22.1
	Read the first aid care in pesticide bottle	20	5.3
	Did not know what to do	176	46.3

5.	<b>Store room for pesticide</b>		
	Present	251	66.1
	absent	129	33.9
6.	<b>Barriers preventing PPE</b>		
	money	153	40.3
	Confidence that no harm will happen	144	37.9
	Cultural belief	26	6.8
	shyness	57	15.0
7.	<b>Awareness level regarding pesticidal risk</b>		
	Well known	76	20
	Fairly known	148	38.9
	Not known	156	41.1
8.	<b>Awareness level about ingredients</b>		
	Well known	49	12.9
	Fairly known	104	27.4
	Not known	227	59.7

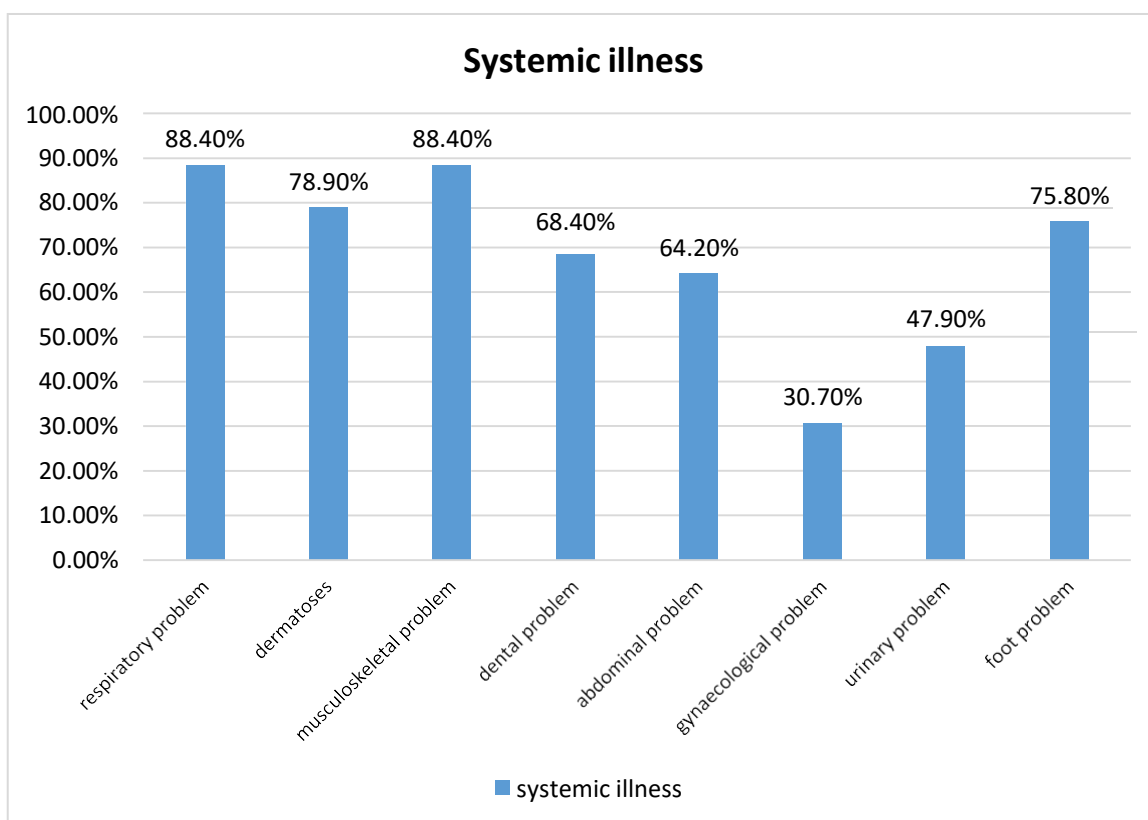
Sixty nine percent workers adopted protective measures ,most common being taking bath after pesticidal usage.53% of the workers aware about first line of action during medical emergencies.66% workers had separate storage facility for pesticides. Money being the barrier to adopt personal protective measures in 40% of the workers.only 20% were well aware about the hazards of pesticidal usage.

#### **MORBIDITY PROFILE OF AGRICULTURAL WORKERS**

Morbidity pattern assessed for the past one year and classified and grouped as Systemic illness,'

- Injuries, Other Accidents and Bites,
- Psychosocial Hazards,
- Non-Communicable Diseases,
- Heat Related illness.

**Graph :1 Systemic illness:**



**Respiratory Problem**

**Table 4: Frequency distribution of respiratory problem**

Respiratory problem (n=336)	Frequency	Percent
Cold	306	80.5
Stiff Nose	203	53.4
Chest Pain	182	47.9
Running Nose	161	42.4
Breathing Difficulty	148	38.9
Blood In Sputum	28	7.4

Among the study population, 336 persons (88.4%) had respiratory problem and common cold being the most common.

**Dermatoses (Contact Dermatitis)**

**Table 5: Frequency distribution of dermatoses**

Dermatoses (n=300)	Frequency	Percent
Skin Irritations	225	59.2
Allergic Itching	200	52.6
Allergic Rash	149	39.2
Boils In Exposed Parts	60	15.8

Among 300 persons (78.9%) were affected with dermatoses, most common problem found to be eye irritation (59.2%) followed by allergic itching (52.6%).

**Musculo Skeletal Disorder**

**Table 6: Frequency distribution of musculoskeletal disorder**

<b>Musculo skeletal disorder(n=336)</b>	<b>Frequency</b>	<b>Percent</b>
Back Pain	287	75.5
Shoulder Pain	240	63.2
Knee Pain	230	60.5
Elbow Pain	212	55.8
Wrist Pain	143	37.6

Among the population studied, nearly 90% agricultural workers reported musculoskeletal disorder. Seventy five percent reported back pain followed by shoulder pain in 63.2%.

**Dental Problem**

**Table 7: Frequency distribution of dental problem.**

<b>Dental problem (n=260)</b>	<b>Frequency</b>	<b>Percent</b>
Dental Stain	193	50.8
Dental Caries	172	45.3
Bleeding Gums	56	14.7

Among the total population studied, 260 agricultural workers (68.4%) were affected with dental problems. More than 50% had dental stain.

**Abdominal Problem**

**Table 8: Frequency distribution of abdominal problem**

<b>Abdominal problem (n=244)</b>	<b>Frequency</b>	<b>Percent</b>
Epigastric Pain	154	40.5
Abdominal Cramps	119	31.3
Nausea	73	19.2
Vomiting	73	19.2
Diarrhoea	66	17.4

Out of 380 agricultural workers, 244 workers (64.2%) reported abdominal problem. Most common being epigastric pain followed by abdominal cramps.

**Gynaecological Problem**

**Table 9: Frequency distribution of gynaecological problem**

<b>Gynaecological problems(n=117)</b>	<b>Frequency</b>	<b>Percent</b>
Leucorrhoea	67	17.6
Itching in private parts	32	8.4
Uterine prolapse	18	4.7

184 persons (48.4%) were total female studied, of them 117 reported gynaecological problem. Most common being leucorrhoea.

**Urinary Problem**

**Table 10: Frequency distribution of urinary problem**

<b>Urinary problem (n=182)</b>	<b>Frequency</b>	<b>Percent</b>
Frequent micturition	122	32.1
Burning micturition	112	29.5



Among the population studied, nearly 50% reported urinary problem. Most common problem being frequent micturition.

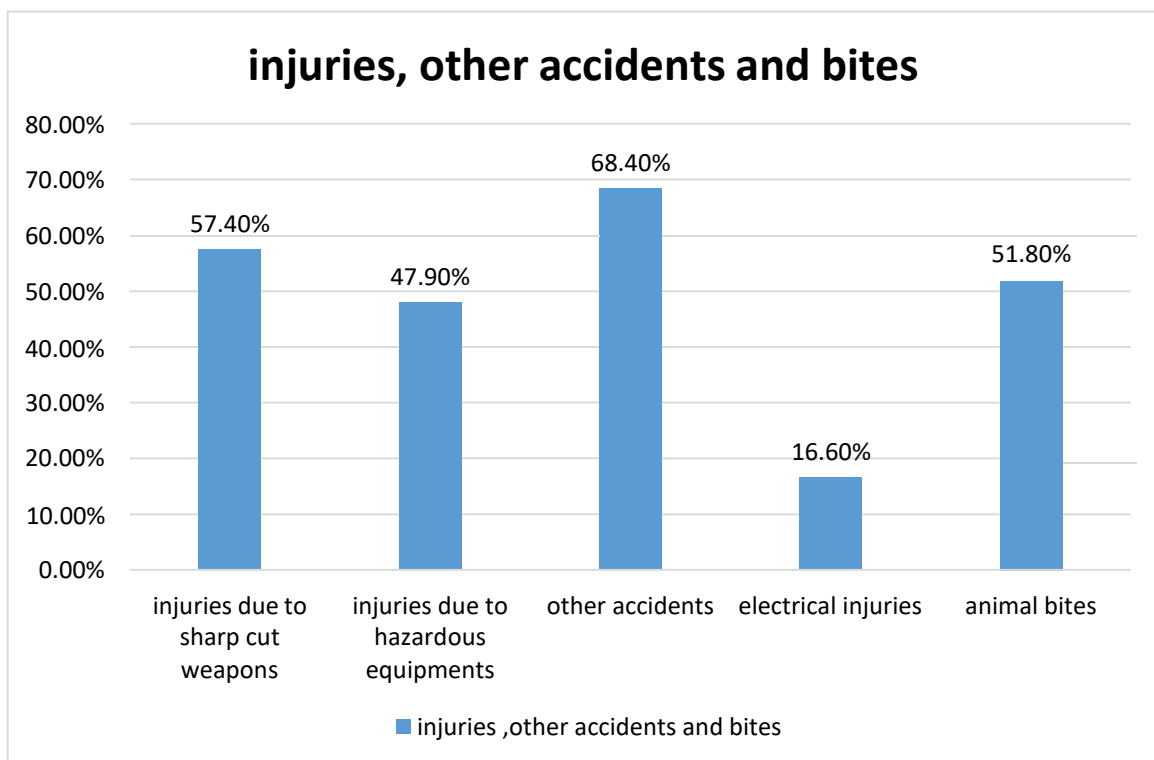
**Foot Problem**

**Table 11: Frequency distribution of foot problem**

Foot problems (n=288)	Frequency	Percent
Tinea Pedis	256	67.4
Immersion Foot	163	42.9

Out of 380 population, more than 75% reported foot problems, most common being tinea pedis.

**Graph 2: Injuries, Other Accidents And Bites**



**Hazardous equipment and machinery**

**Table 12: frequency distribution of injuries due to hazardous equipment**

Injury due to hazardous equipment(n=182)	Frequency	Percent
Minor Accident	169	44.5
Major Accident	17	4.5
Severe Accident	6	1.6

Among the study population, nearly 50% of persons reported injuries due to hazardous equipments used in agriculture.

### Sharp Cut Weapons

**Table 13: Frequency distribution of injuries due to sharp cut weapon**

Injury due to sharp cut weapon(n=218)	Frequency	Percent
Abrasions	169	44.5
Laceration	90	23.7
Contusion	78	20.5
Penetration	22	5.8

Out of total population, more than 50% agricultural workers reported injuries while working with sharp cut weapons. Abrasion being the most common injury (44.5%).

### Other Accidents (Sprain, Accidental Slip, Fall from Height)

**Table 14: Frequency distribution of other accidents**

Other accidents (n=260)	Frequency	Percent
Sprain	203	53.4
Accidental Slip	163	42.9
Fall From Height	60	15.8

Nearly 70% reported other accidents most common being sprain.

### Animal Bites

**Table 15: Frequency distribution of animal bites**

Animal bites (n=197)	Frequency	Percent
Insect Bite	100	26.3
Scorpion sting	89	23.4
Bee Sting	68	17.9
Snake Bite	35	9.2

Among the total population studied, more than 50% reported animals bites. Most common being insect bite followed by scorpion sting.

**Table 16: Frequency distribution of electrical hazards**

Electrical hazards	Frequency	Percent
Absent	317	83.4
Present	63	16.6

Out of 380 agricultural workers, 63 persons (16.6%) reported electrical injuries.

### Non-Communicable Diseases

**Table 17: Frequency distribution of non-communicable diseases.**

Noncommunicable diseases	Present	Absent	Don't know
Hypertension	39 (10.3%)	223 (58.7%)	118 (31.1%)
Diabetes	39 (10.3%)	219 (57.6%)	122 (32.1%)

Out of total population studied, only 39 workers (10.3%) reported hypertension and diabetes.

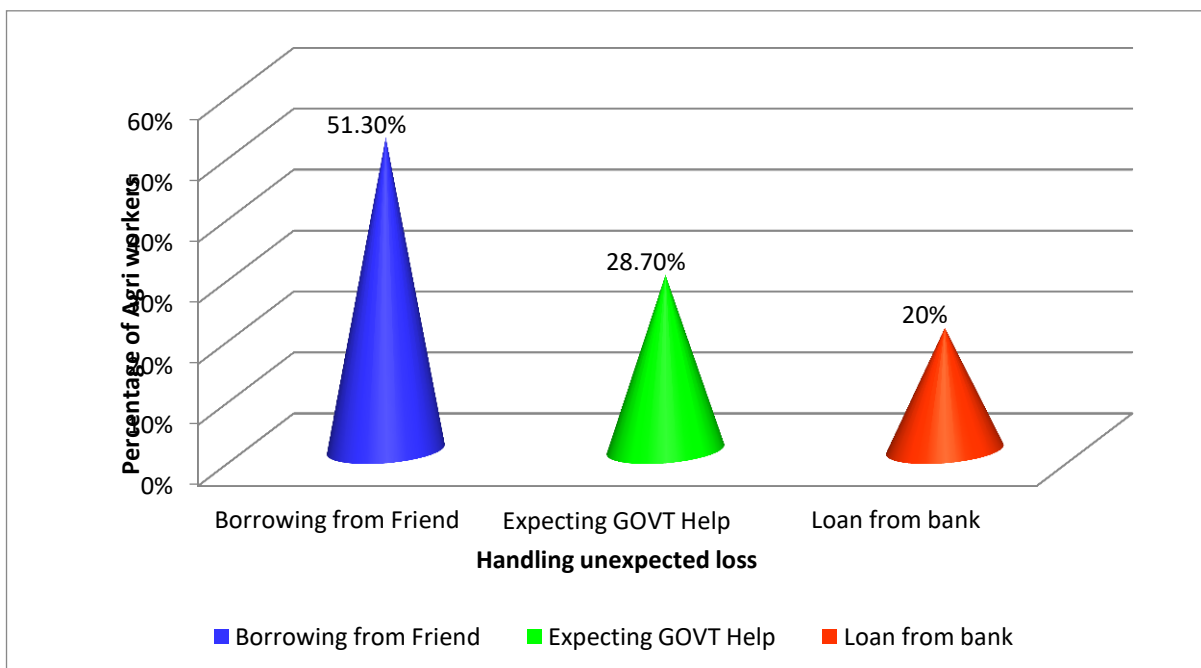
**Psychosocial Hazards**

**Table 18: Frequency distribution of Psychosocial hazards**

Psychosocial hazards	Present	Absent
Suicidal thoughts	117 (30.8%)	263 (69.2%)
Stress due to weather changes	96 (25.3%)	284 (74.7%)

Among the agricultural workers studied, 30.8% reported suicidal thoughts during the last one year and 25.3% reported stress due to weather change.

**Diagram 1: Handling Unexpected Financial Loss**



Total of 380 population studied, most of the farmers more than 50% handled their unexpected loss by borrowing money from friends.

**Table 19: Frequency distribution of heat related illness**

Heat related illness(n=350)	Frequency	percent
Heat fatigue	284	74.7
Burning sensation of eyes	247	65.0
Sun burn	224	58.9
Heat cramps	185	48.7
Sun tanning	157	41.3

Among the study population, more than 90% reported heat related illness among which heat fatigue being the most common.

**Relation Between Type Of Work And Morbidity Pattern**

Inferential statistics for this relation done by chi-square test and fisher exact test.

**Type of work versus systemic diseases present:**

**Table 20: cross tabulation between type of work and systemic diseases**

Sl.No	Morbidity pattern present	Planting /weeding practices (n=161)	Other manual labourers (n=196)	Mechanical workers (n=23)	P value
1.	Dental problem	119 (73.9%)	127 (64.8%)	14 (60.9%)	0.132
2.	Abdominalproblem	107 (66.5%)	122 (62.2%)	15 (65.2%)	0.707
3.	Musculo skeletal problem	146 (90.7%)	172 (87.8%)	18 (78.3%)	0.029*
4.	Foot problem	129 (80.1%)	142 (72.4%)	17 (73.9%)	0.236
5.	Urinary problem	98 (60.9%)	77 (39.3%)	7(30.4%)	<b>0.0001</b>
6.	Gynaecological problem**	70 (43.5%)	17 (8.7%)	5 (21.7%)	<b>0.0001</b>
7.	Respiratoryproblem	144 (89.4%)	173 (88.3%)	19 (82.6%)	0.077*
8.	Allergic dermatoses	126 (78.3%)	158 (80.6%)	16 (69.6%)	0.082*

\* p value by fisher exact test

\*\*gynaecological problem was assessed only for women (n=184)

All systemic diseases except allergic dermatoses are found to be high among people employed in planting /weeding practices. Among these musculo skeletal problem, urinary problem and gynaecological problem found to be statistically significant(p value<0.05). dermatoses are high among people employed in other manual works.

**Type of work versus injuries , other accidents and bites:**

**Table 21: Cross tabulation between type of work and injuries , otheraccidents and bites**

Sl.No	Morbiditypattern present	Planting /weeding practices (n=161)	Other manual labourers (n=196)	Mechanical workers (n=23)	P value
1.	Injury due tosharp cut weapons	63 (39.1%)	140 (71.4%)	15 (65.2%)	0.0001
2.	Injury due to hazardous equipment	61 (37.9%)	110 (56.1%)	11 (47.8%)	0.003
3.	Other accidents	110(68.3%)	137(69.9%)	13(56.5%)	0.426
3.	Electrical injuries present	27 (16.8%)	29 (14.8%)	7 (30.4%)	0.073*
4.	Animal bites	86 (53.4%)	102 (52.0%)	9 (39.1%)	0.438

\* p value by fisher exact test

All injuries and accidents except electrical injuries and animal bites reported high among other manual workers. Injuries due to sharp cut weapons and hazardous equipment found to be statistically significant (p value<0.05)Electrical injuries are most common among mechanical workers and animal bites are high among workers involved in planting and weeding practices.

**Table 22: cross tabulation between type of work and psychosocialhazards**

Sl.No	Morbiditypattern present	Planting /weeding practices (n=161)	Other manual labourers (n=196)	Mechanical workers (n=23)	P value
1.	Stress due toweather change	38 (23.6%)	46 (23.5%)	12 (52.2%)	0.009
2.	Suicidalthoughts	44 (27.3%)	70 (35.7%)	3 (13%)	0.038

Stress due to weather changes is high among mechanical workers, suicidal thoughts is high among other manual labourers and this association is found to be statistically significant with (p value<0.05).

**Type of work versus non communicable diseases:**

**Table 23: Cross tabulation between type of work and non communicable diseases**

Sl.no	Morbidity pattern present	Planting /weeding practices (n=161)	Other manual labourers (n=196)	Mechanical workers (n=23)	P value
1.	Hypertension	21(13%)	15 (7.7%)	3 (13%)	0.010*
2.	Diabetes	15 (9.3%)	21 (10.7%)	3 (13%)	0.001*

\* p value by fisher exact test

Thirteen percent of the people engaged in mechanical work are found to have diabetes and hypertension and this association is found to be statistically significant with (p value<0.05).

**Type of work versus heat related illness:**

**Table 24: cross tabulation between type of work and heat related illness**

Sl.No	Morbidity pattern present	Planting /weeding practices (n=161)	Other manual labourers(n=196)	Mechanical workers (n=23)	P value
1.	Heat related illness	147 (91.3%)	185 (94.4%)	18 (78.3%)	0.105*

\* p value by fisher exact test

Heat related illness is found to be high among other manual workers.

**Monthly income versus health seeking behaviour**

**Table 25: Cross tabulation between monthly income and health seeking behaviour.**

Sl.no	Monthly income from agriculture	≤3000rs	>3000 rs	P value
1.	Govt facility	(229) 83.9%	(72) 67.3%	.001*
2.	Private facility	(43) 15.8%	(35) 32.7%	.001*
3.	native treatment	(1) .4%	(0) 0%	.001*

\* p value by fisher exact test

Among the study population, above 80% persons whose monthly income was ≤ 3000 rs went to government hospital.

Workers with monthly income more than Rs.3000 nearly 65% persons went to government hospital. This difference is statistically significant (p value<0.05).

**DISCUSSION**

The current study is a community based cross sectional study conducted to estimate the morbidity pattern of agricultural workers in villages of Thanjavur, Tamil Nadu.

**Frequency distribution of socio demographic profile of agriculture workers**

The number of participants involved in the study was 380 individuals. among the study participants 51.6%(196) were males and 48.4% (184) were females.

Age of the study participants ranged from above 18 years to 88 years with more number of study

participants belonging to 40 to 49 years of age group. majority of the study participants were hindus 90.8% (345), large group of participants were married 83.2%(316), most of them were illiterate 30.8%(117), majority of the study population 71.8%(273) had only less than 3000 rupees as their monthly income from agriculture . most of the participants 79.2%(301) avail health services from government facility.

In the study of Devendra Bhattarai et al, most of the agriculture workers 24.4%, come under the age group of 40–49 years , among the study population 49.2% were males and 50.8% were females.

Comparing the present study with the study of Kulkarni rajesh R et al, Devendra Bhattarai et al both the study had nearly similar socio demographic profile with the present study because of geographical and cultural similarities between India and Nepal.

#### **Frequency distribution of work pattern of agriculture workers:**

In this study, large proportion 64.7%(246) were employed as fulltime workers. with 51.6%(196) engaged in other manual labour . Most of them 55.3% (210) had work for more than 6 months in a year .

Large proportion 51.8%(197) worked more than 8 hours a day. Majority 91.8% (349) reported that they had interval between working hours. Nearly half of them work for more than 5 days a week. Comparing the current study with Leeberk Raja et al where 50% of the brick kiln workers work for more than 6 days a week and one third work more than 10 hours a day.

Even though there was a regulation of working hours under the act of “Unorganized Workers Social Security Act of 2008” workers were forced to work overtime in the brick kiln due to continuous demand to meet the target of the month.

#### **Frequency distribution of morbidity pattern of agriculture worker:**

The heat related illness was the most common problem faced by agriculture workers 92.1% (350), followed by musculoskeletal disorder and respiratory problem (88.4%), dermatoses (78.9%) , foot problem (75.8%), dental problem (68.4%), abdominal problem (64.2%), urinary problem (47.9%), gynaecological problem (30.7%), non-communicable disease (NCD) (10.3%) .

In the current study , heat related illness was reported to be high among the study participants which was similar to the study conducted by Cole D et al, where according to him, due to working nature in the open field mostly at day times , continuous exposure to the sunlight due to prolonged working time, and inadequate intake of fluids leading to dehydration , may be the cause for heat exhaustion and muscular fatigue.

Musculoskeletal problem, respiratory problem, dental problem, abdominal problem being the most common and contributing more than 50% individually in the studies conducted by Gopalakrishnan et al, Rajesh M et al. Similar to the findings reported in the current study.

In this study more than 50% of workers working for > 8 hours a day for > 5 days a week. Prolonged working hours without adequate rest leads to various musculo skeletal disorder. Low back pain (LBP) was most commonly reported. Arduous nature of agriculture work contributes to MSD.

According to Leeberk Raja et al. 50% of the workers work for 6 to 7 days a week and one third work more than 10 hours a day that too in awkward postures during the work time contributes to MSD.

Similar to the present study, LBP being the most common musculo skeletal disorder in the study conducted by Deepthi et al, Garima gupta et al, Hong xiao et al, Jyoti V Vastrad et al, Seema Prakash et al, Walker-Bone K, et al. According to them farmers while working in the agricultural field were usually exposed to awkward posture such as kneeling, bending, squatting, twisting, carrying heavy loads, exposure to vibrations while driving tractors, heavy machineries. Most of the agricultural work may be repetitive and monotonous. In addition to this accidental slipping and falling while working in the field contributes to the musculo skeletal disorder. “Tissue stress induced by carrying heavy load may affect the spinal disc and the damage may be in both mechanical and biological pathways. Excessive twisting or

lateral bending injures the ligament of neural arch could result in disc prolapse. Disc tissue can also be injured due to prolonged working hours. Modern machinery like tractors, harvesters etc. may overtly seem to ease the work but in fact they only reduce the workforce while putting the farmer to additional disadvantages like excessive whole-body vibration. Vibration is transmitted across the body through seat or feet while driving the vehicle. Heavy load to the joints and whole body vibration are the important risk factors associated with occurrence of low back pain”.

Workers of these study groups involve more of manual work, so similar findings were noted in most of the studies.

Dust particles from working environment, exposure to pesticides, prolonged working in wet lands may attribute to the respiratory problem. common cold being the most common problem reported in the present study.

According to Naik PR et al, more than 50% of the participants had respiratory problem in that cough being the predominant symptom. They found out that grain dust and smoke cause irritation in the respiratory mucus, that leads to increased mucus secretion and formation of mucosal plugs which obstruct the upper and lower respiratory systems ,so the workers were more vulnerable for obstructive and restrictive respiratory problems.

Study participants of both the study belonged to agriculture and agricultural allied activities so the findings were similar.

Allergic dermatoses was reported high among other manual labourers, which may be due to pesticidal, fertilizer usage. Duck droppings used as organic manure may attribute to contact dermatitis.(CD)

According to the study of Cynthia et al 12% of the participants had contact dermatitis, the reasons reported in that study were dust(hay dust, straw dust, grain dust, dust during threshing), danders and feathers of farm animals, chemical allergens such as pesticides, disinfection, rubber additives, metals similar to the present study.

According to Mc Cauley et al, spiewak et al, Quandt SA et al most of the occupational skin disorder in farmers were due to various exposures to pesticides like mixing, spraying, sowing pesticide preserved seeds ,during harvesting of previously pesticide treated crops. Pesticides which were used to increase the crop yield had negative effect on the health of the farmers.

Non communicable diseases found to be only 10.3% in the current study similar to the study done by Gopalakrishnan et al where it was 9.7% due to increased physical nature of work in rural population but at the same time more than 30% did not know about their NCD status may be due to the fact that they were neither aware nor utilizing the health services for screening. Non communicable diseases found to be high among mechanicalworkers due to sedentary nature of their work.

Ghaffar et al reported that “India has a higher number of people with diabetes than any other country in the world and 52% of cardiovascular deaths occur below the age of 70” he added that sedentary lifestyles,poverty, and inadequate health systems in South Asia were the cause for increasing NCD.<sup>40</sup>

In the present study dental problems was found to be 68.4% which is nearly similar to the study of Kulkarni rajesh R et al, Sahil Handa et al and less compared to Chinmaya et al where it was 80%.the reasons found from these studies were traditional method of cleaning teeth, ignorance, indulgence in adverse oral habits such as betal nut chewing, oral tobacco usages, lack of awareness regarding oral hygiene, lack of motivation regarding dental hygiene, lack of availability of dental health facilities in rural areas.<sup>41,42</sup>

Sudhanshu Sanadhya et al, Kumar T. Set al, Kumar Aet al found that prevalence of dental problems was high among rural population compared to urban population. The reason for the same were difference in life style between two groups and their exposure to risk factor such as smoking, chewing tobacco, improper oral hygiene, in addition to that lack of awareness regarding oral hygiene among

rural population may lead to increased risk of dental problems.

Habit of barefoot walking (no usage of boots while working in the field) contributes to foot problem.

In this study epigastric pain reported to be high among abdominal problem similar to Rakesh et al, Gopala Krishnan et al where acid peptic diseases found to be high in digestive system disease.<sup>30</sup>

Unavailability of toilet facilities attributes to urinary problem especially in rural women. strenuous and continuous physical work like heavy lifting in agriculture work leads to gynaecological problem such as uterine prolapse.

Most of the systemic diseases except allergic dermatoses reported in workers involved in planting and weeding practices.

One among every four-worker reported psychosocial problem such as stress (25.3%) and suicidal thoughts (30.8%) may be due to unstable income from agriculture leading to financial insecurity similar to Guddi Tiwary et al where psychosocial problem dealt in their study.

Similar findings reported in both the studies, hence the study population of both the studies were belonged to unorganized sector and they were depending on their daily wages for day to day life.

#### **Frequency distribution of injuries, other accidents and bites:**

Majority of the participants (68.4%) reported other accidents such as Fall from height, accidental slip, sprain. Nearly (58%) reported that, they had injuries due to sharp cut weapons mainly in the form of abrasions (44.5%). Among the study participants (48%) reported injuries due to hazardous equipment, in that 44.5% had only minor accidents, nearly half of the participants (51.8%) reported animal bites. Injuries and accidents reported high among other manual labourers due to handling multiple task manually. Animal bites were high among workers involved in planting and weeding practices. Electrical injuries high among mechanical workers may due to improper training and application of personal protective measures.

Similar to the present study, Banibrata Das et al, Devendra Bhattarai et al, vijayakumar manwani et al studied that injuries were due to hand tools (sickle, spade) followed by farm machineries and others and that too injuries to hand was more common followed by foot. They found that usage of traditional machineries and lack of training of PPM were the reason for injuries and accidents in the working field.<sup>46,47</sup>

#### **Frequency distribution of pesticidal usage and personal protective measures**

In this study a large proportion of 69.7% (265) had adopted personal protective measures. Among them most of the workers 20.3% (77) had the habit of taking bath after pesticidal usage. Most of the workers 74.5% (283) not had any training on pesticidal application.

In the present study, adoption of personal protective measures (PPM) were nearly 70% compared to 17% noted in vijayakumar manwani et al, 16.86% use PPM during pesticide preparation, 38.55% use PPM during spraying noted in rakesh et al, one third of the participants reported usage of PPM in Devendra Bhattarai et al.

In this study 66% of the participants reported having separate store room for pesticides where 20% had separate store room for pesticides noted in Vijayakumar manwani et al. Awareness and attitude towards PPM and pesticidal risk were good due to proper IEC (Information, Education and Communication) given by the agriculture department.

Only 5% of the participants in this study reported reading the instruction in pesticide bottle compared to 13% noted in vijayakumar manwani et al. difference was mainly due to most of the study participants were illiterate, hence not able to read the instruction in pesticide bottle.



Many of them 66.1% (251) had separate store room for pesticide. Most of them 40.3% (153) reported money was the main barrier for adopting personal protective measures. Nearly 50% (156) were not aware about risk of pesticide.

### **Relationship between morbidity of agriculture worker and work pattern**

The present study shows that the prevalence of most of the systemic diseases except dermatoses found to be high among workers involved in planting/weeding practices. There was association between systemic diseases such as musculoskeletal problem, urinary problem, gynaecological problem and planting/weeding practices and was found to be statistically significant (p value<0.05).

This study shows that the prevalence of all injuries, other accidents reported to be high among other manual workers. electrical injuries reported to be high among mechanical workers. Prevalence of animal bites found to be high among planting/weeding work. the association between other manual work and injuries due to sharp cut weapons and hazardous equipment was found to be statistically significant (p value<0.05).

In the current study, stress due to weather change was high among mechanical work, suicidal thoughts reported to be high in other manual work and this association found to be statistically significant (p value<0.05).

Prevalence of NCD found to be high in mechanical work and this association was found to be statistically significant (p value<0.05).

Most of the study participants avail services from government facilities irrespective of their income due to good quality of government health services and this association found to be statistically significant. (p value<0.05).

### **CONCLUSION**

A community based cross sectional study was done to find out the prevalence of morbidity pattern among 380 agriculture workers residing in the villages of Thanjavur. The study carries significance as there is a large iceberg of unmet health need of agricultural workers. Most of the morbid conditions occurring in agricultural workers are easily preventable by proper health education regarding occupational health. A semi structured questionnaire was used to collect information regarding the socio demographic details, work pattern details, PPM details, proper IEC regarding occupational health given at the end of the data collections in each households. In this study, large proportion of workers suffered from work related symptomatic morbidities mainly of eye, respiratory, musculoskeletal system, gastrointestinal and skin. Prevalence of psychosocial hazards, one fourth of every participants reported stress due to weather change 25.3% (96). Thirty percent (117) reported that they had suicidal thoughts. Most of them said that they overcome the financial crisis by borrowing money from their friends. Nearly 70% (265) adopted personal protective measures. one fourth 25.5% (97) had training in pesticide application. Large proportion 46.3% (176) did not know what to do during medical emergencies in the working field. Most of them 66.1% (251) had separate store room for pesticides. Money was the main barrier in adopting personal protective measures. Majority of the study participants 41.1% (156) not known about pesticidal risk. A significant association was found between planting/weeding work and systemic diseases such as musculoskeletal problem, urinary problem and gynaecological problem. Significant association was found between other manual work and injuries due to sharp cut weapons, hazardous equipment. A statistically significant association found between work pattern and psychosocial hazards. A statistically significant association was found between mechanical work and non communicable diseases. There was statistically significant association between monthly income and health seeking behaviour.

### **Limitations Of The Study**

- Only occupational health concern was given importance. except diabetes and hypertension no other age related problems and personal behaviour was not dealt with.
- Due to recall bias the actual magnitude of the morbidity could not be made out.

- The study carries the inherent limitations of cross sectional studies, thereby disabling the understanding of true temporal relationship between the morbidity pattern of agriculture workers.
- The present study being a cross sectional study was not able to assure causality association for the morbidity pattern of the agriculture workers. hence the prospective study on large scale may be undertaken to prove causal association.

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