A STUDY ON PREVALENCE AND ASSOCIATED FACTORS OF MUSCULOSKELETAL DISORDERS AMONG AGRICULTURAL FARMERS AND WORKERS IN VELLANAD, THIRUVANANTHAPURAM

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Dissertation submitted in partial fulfillment of the requirements for the award of the degree of

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"To the hardworking agricultural workers who feed the world, this study is dedicated with gratitude and respect for your tireless efforts."

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DECLARATION

I declare that this dissertation work titles “A STUDY ON PREVALENCE ND ASSOCIATED FACTORS OF MUSCULOSKELETAL DISORDERS AMONG AGRICULTURAL FARMERS AND WORKERS IN VELLANAD, THIRUVANANTHAPURAM” is the Bonafede record of my original field research. It has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

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CERTIFICATE

Certified that the dissertation entitled "**A STUDY ON PREVALENCE ND ASSOCIATED FACTORS OF MUSCULOSKELETAL DISORDERS AMONG AGRICULTURAL FARMERS AND WORKERS IN VELLANAD, THIRUVANANTHAPURAM**" is a record of the research work undertaken by **KARTHIAYANI V S (50189),** in partial fulfillment of the requirements for the award of the degree of "Master of Public Health", under my guidance and supervision.

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ABBREVIATIONS

MSD	Musculoskeletal Disorders
GDP	Gross Domestic Product
OSHA	Occupational Safety and Health Administration
WHO	World Health Organization
BLS	Bureau of Labor Statistics
WMSDs	Work-related musculoskeletal disorders
UEMSD	Upper extremity musculoskeletal disorders
ILO	International Labour Organization
MSS	Musculoskeletal symptoms
MSP	Musculoskeletal Pain
BMI	Body Mass Index
SNQ	Standardized Nordic Questionnaire

ABSTRACT

Background: Musculoskeletal disorders (MSDs) are common among different occupational groups. Studies on MSD among agricultural workers is found to be scarce in India. The aim of the present research is to estimate the prevalence and to study the associated factors of MSDs among agricultural farmers and workers in Thiruvananthapuram district.

Methods: Cross sectional study conducted among the farmers and workers engaged in banana and tapioca cultivation from four villages in Vellanad block using ODK 1.5.2. Prevalence was estimated using Nordic map and the association of MSD with elbow, lower back and knee was analyzed using Pearson's chi square and binary logistic regression on SPSS 25.

Results: Overall prevalence of MSD was 100%, and prevalence of three parts viz. elbow, lower back and knee was 28.3%. Sociodemographic factors, age, marital status, hours of sleep and sleeping during day were associated with MSD. Annual income and occupational factors, years engaged in agriculture, extra hours worked, distance travelled for work, and domestic activity engagement were associated with MSD.

Conclusion: MSD was reported due to the exposure such as rigorous work and tasks that are specific to agriculture. It's important to know that agriculture still remains as an unorganized sector with minimal regulation on working hours, appliance usage and others. Musculoskeletal disorder in agriculture sector only be addressed by introducing appropriate modern methods and regulation.

Chapter 1

INTRODUCTION AND LITERATURE REVIEW

1.1 Agriculture sector: Global scenario

Agriculture remains one of the world's largest and most crucial industries, playing a fundamental role in sustaining livelihoods worldwide. Over time, the addition of advanced technologies and the implementation of innovative equipment have not only boosted efficiency but also transformed the practices employed in farming and land management. The modernization efforts have significantly enhanced the support systems and benefits available to farmers. Encompassing diverse sectors like horticulture, poultry, animal husbandry, fisheries, apiculture, and more, the agricultural domain contributes significantly to the GDP of nations.(Bhattacharya et al., 2022) The size of the population directly influences agricultural production, leading to increased demand for food as populations grow. Additionally, the per capita consumption of food is a crucial factor that shapes this demand.(Sharma and Thulaseedharan, 2022) Agriculture is vital for supporting the global human population, involving the cultivation of crops and the management of domestic animals to secure a consistent food supply and other essential resources.(Harris and Fuller, 2014)

1.2 Agriculture sector: Indian scenario

Agriculture serves as a foundation of the Indian economy, supporting nearly 17% of the global population while utilizing only 2.3% of the world's land area and 4.2% of its water resources. This sector has experienced a notable annual GDP growth, ranging from 6% to 8%. Indian agriculture is marked by a diverse array of agro-ecological factors, including variations in soil types, rainfall patterns, temperature ranges, and cropping systems(Borthakur

and Singh, 2012). Agriculture serves as the foundational pillar of the Indian economy, playing a pivotal role in driving the socioeconomic advancement of the nation. The Green Revolution made a significant contribution to the Indian economy by ensuring food self-sufficiency and enhancing the well-being of rural communities.(Borthakur and Singh, 2012) The agricultural sector accounts for 15% of India's Gross Domestic Product (GDP). India is renowned for its diverse production of fruits, vegetables, spices, milk, and more. According to the 2011 overview by the World Bank, India has consistently demonstrated robust economic growth, positioning itself as the world's fourth-largest economy in terms of purchasing power parity. (Bosch et al., 2018)

1.3 Agriculture sector: Kerala

Kerala is famous for its intricate network of rivers, streams, and backwaters, which glisten with emerald hues. The state's economy is primarily driven by agriculture, thanks to the abundance of water supplied by reservoirs, numerous small channels, a multitude of backwaters, and various water bodies. Kerala's agricultural economy is characterized by cropping patterns that favor the cultivation of cash crops such as lentils, rice, tapioca, cashew nuts, and ginger. (D. and Varghese, 2023)

The development challenges faced by Kerala have been intricately linked to the performance of its agricultural sector throughout its history. (Parappurathu, 2015) Kerala's agro-climatic conditions are well-suited for cultivating a diverse range of seasonal and perennial crops. In the state, agricultural land occupies 55% of the total area, while forested areas encompass 28%, with 11% designated for non-agricultural purposes. In the year 2020-2021, Kerala's economy ranked 9th in India, with an annual gross state product totaling 9.77 lakh crore. The growth of Kerala's GDP can be comprehensively explained through the Kerala model, encompassing different aspects such as social, political, and environmental factors. In 2017,

the agriculture sector in Kerala accounted for 10.58% of the nation's total GDP (*Unacademy*, 2023)

1.4 Occupational hazards

The relationship between health and agriculture is reciprocal, with agriculture impacting health, and health, in turn, affecting agriculture. Occupational health is a fundamental element of the nation's infrastructure, where the well-being and safety of workers not only boost productivity but also contribute positively to economic and social progress. Occupational health is an ongoing effort directed at fostering and preserving the utmost levels of physical, mental, and social well-being for individuals engaged in all types of work. Agricultural risks stem from a variety of sources, including agricultural equipment, farm machinery, climatic factors, chemicals, animal/snake bites, dust, solar radiation, and the psychological stress brought on by socioeconomic issues.

The Ministry of Labour and Employment, Government of India categorizes agricultural hazards into several groups, including farm machinery (such as tractors and threshers), agricultural tools and implements (like picks, axes, spades, and sickles), chemical agents (including pesticides, fertilizers, and potent weed killers), climate-related factors (such as high temperatures, heavy rain, humidity, strong winds, storms, and lightning), electricity, incidents involving animals/snakes, and other factors like dust, solar radiation, as well as psychological stress resulting from socioeconomic issues.(Meenakshi and Panneer, 2020) A multitude of ecological and job-related health concerns have been identified among agricultural workers, encompassing musculoskeletal and traumatic injuries, respiratory problems like allergies and asthma, dermatitis, pesticide-related poisonings, heat-related illnesses and mental health conditions.(Hofmann et al., 2009)

1.5 Musculoskeletal disorders

Musculoskeletal health refers to the functioning of the entire musculoskeletal system, encompassing muscles, bones, joints, and the surrounding connective tissues. (Musculoskeletal health, n.d., 2023) These musculoskeletal issues can result in around 150 various diseases and conditions that impact the system, potentially causing temporary or lifelong limitations in an individual's ability to function and participate. Musculoskeletal conditions are defined by persistent pain, restricted mobility, and reduced dexterity, ultimately diminishing an individual's capacity to work and participate in society.(Gómez-Galán et al., 2017)

Musculoskeletal pain is the most prevalent type of non-cancer-related pain. Musculoskeletal conditions can encompass a spectrum, ranging from acute and brief issues such as fractures, sprains, and strains, to persistent, long-term conditions like primary low back pain and osteoarthritis. (Musculoskeletal health, n.d.)

Musculoskeletal conditions can affect various regions of the body, including:

Joints: degenerative arthritis, atrophic arthritis, gout, spondylarthritis.

Bones: osteoporosis, osteopenia, and related fragility fractures, traumatic fractures.

Muscles: sarcopenia. The OSHA definition reads, “Musculoskeletal disorders (MSDs) affect the muscles, nerves, blood vessels, ligaments, and tendons.(Lu et al., 2022)

Multiple body areas or systems: regional issues (e.g., back and neck pain) and widespread conditions (e.g., fibromyalgia), inflammatory conditions such as connective tissue disorders and vasculitis that exhibit musculoskeletal symptoms, such as systemic lupus erythematosus, or amputations resulting from disease or injury.(Gómez-Galán et al., 2017)

Musculoskeletal conditions necessitate a substantial demand for rehabilitation services worldwide. Musculoskeletal conditions are also a contributing factor to the evolution of mental health problems in individuals (WHO). According to WHO, MSD is “health problems

of the locomotor apparatus, i.e., muscles, tendons, bone skeleton, cartilage, ligaments and nerves. This includes any type of complaint, from slight transitory discomforts to irreversible and incapacitating injuries"(Gómez-Galán et al., 2017). Since 2011, the Bureau of Labor Statistics (BLS) has defined musculoskeletal disorders (MSDs) to include a range of conditions such as pinched nerves, herniated discs, meniscus tears, sprains, strains, tears, hernias (both traumatic and non-traumatic), pain, swelling, numbness, carpal or tarsal tunnel syndrome, Raynaud's syndrome or phenomenon, musculoskeletal system and connective tissue diseases and disorders. These conditions are attributed to various work-related factors including overexertion, repetitive motion, and exposure to vibration.(Lu et al., 2022)

The International Labour Organization defines the musculoskeletal system as being made up of "two components, the muscular system and the skeletal system". It categorizes musculoskeletal disorders as encompassing acute, chronic, and conditions that may impede the proper functioning of various body parts. Musculoskeletal conditions in the workplace can be influenced by both the type of work being done and the characteristics of the individual worker. (Gómez-Galán et al., 2017)

1.6 Musculoskeletal disorders among Agricultural workers

India holds the distinction of being the leading producer of a wide range of fruits, vegetables, milk, spices, jute, and more. India is renowned for its status as the top producer of both rice and wheat (FAO 2010). India witnessed a remarkable surge in agricultural production following the Green Revolution, attributed to the adoption of innovative farming techniques, the introduction of high-yielding seed varieties, increased fertilizer usage, expanded irrigation infrastructure, and enhanced access to electricity. (Yadav, 2014) Musculoskeletal problems mainly afflict workers in sectors with lower technological sophistication, such as agriculture, construction, handicrafts, and similar fields. This is often due to their continuous engagement

in stooped postures and repetitive manual activities. The elevated occurrence of musculoskeletal disorders among agricultural laborers can be linked to a variety of repetitive movements, including frequent bending of the back, lifting and carrying heavy loads, and extended periods of poor working postures like squatting and kneeling, which are sustained over long working hours. (Jain et al., 2018)

Farming is an occupation that results in musculoskeletal system disorders for individuals. Musculoskeletal disorders represent a widespread issue affecting people globally, resulting in enduring and debilitating pain and physical impairment. This also influences their sensitive and communal well-being, potentially influencing their families and professional lives. Numerous studies have highlighted farming as an occupation characterized by an extensive workload that can lead to musculoskeletal disorders. (Kongtawelert et al., 2022)

Across different occupational groups, agricultural workers demonstrate a heightened prevalence of musculoskeletal symptoms, notably with upper extremity disorders emerging as the most frequently documented across all body regions. Upper extremity musculoskeletal disorders (UEMSD) are the second most frequently reported in agriculture worldwide, following lumbar pain, with a one-year prevalence among farmers ranging from 4% to 72%. These disorders can result in various adverse outcomes for agricultural workers, such as persistent pain, decreased work capacity, income reduction, diminished quality of life, as well as heightened levels of stress and depression. (Bosch et al., 2018)

Musculoskeletal disorders are widespread within this labor-intensive segment of agriculture. The pains and sufferings that are caused due to these injuries and illness, it results in the reduced working ability and consequently leading to decreased farm revenue. It can also affect the standard of living which leads to limited social interactions and other mental health complications like stress. Farmers and farm workers engage in more rigorous physical tasks, consequently increasing their vulnerability to developing musculoskeletal conditions.

(Osborne et al., 2012)

From the International Labour Organization (ILO) estimates, there is nearly 1.3 billion engagements of people in agricultural sector(Kongtawelert et al., 2022) Musculoskeletal disorders are mainly ergonomic problems that is workplace dependent on factors like excessive force, repetitive movements, improper working postures, handling heavy loads, body/hand/arm vibrations, etc. Awkward postures are also a common cause of musculoskeletal problems(Seo et al., 2022)

Musculoskeletal disorders encompass nearly 150 distinct health issues and syndromes, involving various body components. These disorders typically arise when the workload surpasses the capacity that the musculoskeletal system can withstand. Multiple risk factors contribute to the occurrence of musculoskeletal disorders, with occupation recognized as a significant factor dating back to the early 18th century.

The causal link between occupation and MSDs was substantiated in the 1970s. Health issues stemming from musculoskeletal disorders arise from factors such as mechanical overload, repetitive motions, poor posture, prolonged work duration, and chronic exposure to these stressors. Agricultural farmers and workers are particularly vulnerable due to their engagement in tasks requiring sustained physical exertion over prolonged durations. They encounter numerous factors that increase the risk of developing MSDs, including adopting abnormal postures, lifting heavy loads, exposure to vibrations, slips, falls, and other manual labor tasks, heightening their susceptibility to developing MSDs. (Latha, 2017)

1.7 Prevalence of Musculoskeletal disorders

Musculoskeletal symptoms (MSS), such as aches, pains, or discomfort, represent subjective

perceptions of functional disruption within the musculoskeletal system. These symptoms may signal an underlying disease or condition, wherein affected individuals experience alterations in the typical function, appearance, or sensation of their musculoskeletal apparatus.

The incidence of musculoskeletal symptoms (MSS) over the past year was notably elevated among plantation workers. The most commonly affected regions for MSS in this group were identified as the lower back, knees, and shoulders, respectively. There's a relation between the emergence of musculoskeletal issues and various factors like assuming uncomfortable work positions, performing physically strenuous tasks, extended periods of standing, and lifting heavy objects, especially in those specific areas. Heavy lifting, extended periods of standing, and maintaining awkward body postures can contribute to the development of musculoskeletal disorders (MSDs). Characteristics of the work routine could have influenced in the elevated occurrence of MSDs with respect to lower back, knees, and shoulders.(Sharma and Thulaseedharan, 2022)

Ergonomics, also known as human factors, is the scientific discipline focused on aligning tasks, tools, and machinery in the workplace with the needs of the worker. (CCOHS, 2020). When workstations are designed without adhering to ergonomic principles, workers may be compelled to assume awkward postures such as extreme reaching, twisting, bending, working overhead, kneeling, or squatting. Poorly designed equipment and tools can also contribute to WMSDs. It is essential for the physical dimensions of workstations to align with human anthropometric measurements to prevent workers from adopting awkward postures.(Satheeshkumar and Krishnakumar, 2020) The nature of agricultural work necessitates various postures and movements, placing strain on the lower back, knees, and elbows, thereby increasing the susceptibility of musculoskeletal conditions in these regions (Musculoskeletal pain among Midwest farmers and associations with agricultural activities - Fethke - 2015 - American Journal of Industrial Medicine - Wiley Online Library, 2014).

1.8 Factors associated with MSDs

Factors contributing to MSDs can be broadly categorized as personal factors that contribute to risk and ergonomic risk factors.(Nygaard et al., 2022)

1.8.1 Sociodemographic factors

Sociodemographic factors encompass characteristics such as age, gender, marital status, and education status and number of persons living in the house.

Age

As individuals age, their functional capabilities may decline significantly. Adults commonly experience musculoskeletal changes, including reduced joint mobility, decreased muscular strength, and slower reaction and movement times.(Okunribido et al., 2010)

Gender

Females often exhibit a higher frequency of musculoskeletal pain (MSP), a correlation that is associated with psychological factors such as heightened somatization.(Nygaard et al., 2022)

Marital status

Single or divorced individuals tend to experience a higher prevalence of musculoskeletal disorder compared to their married counterparts.(Madadizadeh et al., 2017)

Education status

Education is also a factor that influences musculoskeletal problems as it plays a pivotal role in preventing musculoskeletal disorders by promoting ergonomic practices and fostering awareness of proper body mechanics.(Sharma and Thulaseedharan, 2022)

Number of persons living in the house

The number of family members contributes to the occurrence of musculoskeletal disorders,

potentially increasing due to shared responsibilities and demands on occupational and household activities.(Luan et al., 2018)

Total hours of sleep

The quantity of sleep obtained each night can significantly impact the occurrence of musculoskeletal disorders, with insufficient sleep linked to heightened vulnerability due to its effects on tissue repair and pain perception.(Chun et al., 2018)

Sleeping during day

Daytime sleeping has been correlated with an increased likelihood of experiencing musculoskeletal pain, potentially due to disruptions in circadian rhythms and inadequate support for proper posture during daytime rest.(Stavås et al., 2024)

1.8.2 Economic factors

Socioeconomic status

A significant portion of the health and economic problem linked with musculoskeletal disorders stems from elevated BMI. It is imperative to formulate effective policies and encourage active involvement from healthcare professionals to prevent excessive weight gain and mitigate the impact of musculoskeletal disorders. Some of the economic factors include ration card type, annual income and roof type.(Chen et al., 2023)

1.8.3 Occupational factors

Moderate exposure to walking or standing, comprising 25–50% of work time, was solely linked with back pain. Standing has been documented to diminish blood supply to muscles, hastening fatigue and discomfort, consequently altering muscle activity and postural stability. This has been linked to health hazards including cardiovascular issues, musculoskeletal disorders, and prolonged sick leave. Working with the back twisted or bent for more than 25% of the workday was linked to pain in multiple areas, including the back (in cases of

moderate and high exposure), shoulder (for both moderate and high exposure), and hip (with high exposure).

Working with the back twisted or bent has been linked to heightened intradiscal pressure, thereby increasing the hazard of spinal disc degeneration or herniation particularly when there exists an imbalance between physical capacity and exposure to ergonomic stressors. Mechanisms contributing to musculoskeletal issues include muscle fatigue, prolonged muscle activation, inflammatory responses, decreased microcirculation, and the application of static and repetitive mechanical pressure on tendons.

Working with the arms positioned above shoulder levels was a significant predictor for shoulder pain. The shoulder, characterized by its complex structural architecture, is susceptible to injury, particularly when subjected to excessive loads and repetitive activities. Such stressors can lead to tears, degeneration, and tendinopathy, compromising the stability and functionality of the shoulder joint.

Engaging in activities such as squatting or kneeling has been specifically linked to knee pain. These positions subject the knee to elevated forces, imposing continuous strain on its anatomical structures. This strain includes heightened varus moments, misalignment, discomfort and cumulative mechanical strain and hence leading to pain resulting from inflammatory and degenerative conditions such as arthritis, bursitis, and injuries to ligaments, cartilage, and other adjacent structures. Back pain is linked to activities such as squatting and kneeling.

Prior research has indicated an association between pushing/pulling activities and pain in both the back, shoulders and knees.

Carrying and lifting tasks have been linked to discomfort in the back, hip, and knee. Lifting, in particular, causes mechanical loads, moments, and compression forces on the spine. Psychosocial factors, such as a lack of worker control over work schedules and the work

environment, may play a crucial role in influencing musculoskeletal health. Muscular disorders exhibit high prevalence rates and are associated with diminished overall health, decreased work capacity, and increased absenteeism.(Nygaard et al., 2022) The duration of engagement in a particular occupation is connected with musculoskeletal pain, suggesting that prolonged exposure to occupational demands might lead to the emergence of discomfort over time.(Sharma, 2021) Extended average working hours in an occupation leads to a higher prevalence of musculoskeletal pain, suggesting that extended periods dedicated to job-related tasks may lead to discomfort in the musculoskeletal system.(Jain et al., 2018) The additional hours spent working beyond regular schedules also causes elevated risk of musculoskeletal pain, highlighting the potential strain imposed by prolonged periods of occupational activity on the body's musculoskeletal system.(Amiri, 2023) The tools utilized in a particular occupation can significantly impact the prevalence of musculoskeletal pain, as improper or poorly designed tools may contribute to repetitive strain injuries and ergonomic stress on the body(Xiao et al., 2013). Walking a considerable distance can be a prominent contributing factor for developing musculoskeletal disorders(Akyol, 2018; Pierrynowski, 2008). Engagement in domestic activities as part of one's occupation has been correlated with a higher incidence of musculoskeletal pain, highlighting the physical strain incurred from tasks such as lifting, bending, and repetitive movements within the home or workplace environment.(Habib et al., 2012)

In Vellanad Block Panchayat, 79.52% of the total cultivable area is classified under the marginal farmer category. Rice cultivation in wetlands has significantly declined due to various factors, leading to the emergence of crops like banana, tapioca (with tapioca cultivation shifting from dryland to wetland), and vegetables. Wetland leasing is prevalent in the village, with marginal and small farmers leasing out land to former agricultural laborers and peasants who have ample family labor for cultivating crops such as banana, vegetables,

and other marketable produce.

The banana market holds significant prominence, particularly because of the extensive utilization of the produce in preparing banana chips, which has established a strong export market in Gulf countries. Unlike other regions of India, the southern part of Kerala cultivates approximately 10 varieties of plantain. Despite this diversity, the banana variety known as "nentravazha" remains the most extensively cultivated in wetlands due to its high demand, short crop cycle (12 months), and notably, its resilience against plant diseases.

In Vellanad Block Panchayat the primary crops cultivated include coconut, natural rubber, and fruit trees in dryland areas, while wetlands are dedicated to plantain, vegetables, paddy (on a limited scale), and tapioca. To ensure their livelihoods, agricultural laborers, marginal, and small farmers in VGP have diversified into banana cultivation in wetlands, often leasing land to do so, following a trend similar to counterparts in other parts of the state.(Mohanakumar and Vipinkumar, 2011)

1.9 Rationale

Inferred from the existing research, it is evident that there is a scarcity of studies conducted in Kerala, particularly concerning the specific occupations of banana and tapioca cultivation. Prior studies have explored Musculoskeletal Disorders (MSDs) among plantation workers in the districts of Kottayam and Idukki in Kerala (Sharma and Thulaseedharan, 2022). But there have been no studies done on Musculoskeletal disorders among agricultural farmers and workers engaged in food crops cultivation and elements linked with MSDs among them in Thiruvananthapuram district to my knowledge.

Therefore, based on the above justifications the present research aims to explore the following objectives.

1.10 Objectives

a. Major Objective:

To estimate the prevalence of musculoskeletal disorders among agricultural farmers and workers of age above 18 years in Vellanad block panchayath of Thiruvananthapuram district, Kerala.

b. Minor Objective:

To study the sociodemographic, economic and occupational factors that are associated with MSDs in these people.

Chapter 2

METHODOLOGY

This chapter outlines a comprehensive methodology for achieving the study's stated objectives also discussing the design, study setting, data collection, analysis and so on.

2.1 STUDY DESIGN

The present study adopted a cross-sectional design. A survey conducted among agricultural farmers and workers of age above 18 years in Vellanad block panchayat using a structured interview schedule.

2.2 STUDY SETTING

The study took place in Vellanad block panchayat of Thiruvananthapuram district. The number of agricultural villages in Vellanad block panchayat was identified to be 8. Out of those 8 agricultural villages, 4 villages were selected according to the farmers list that was available from the Krishi bhavan.

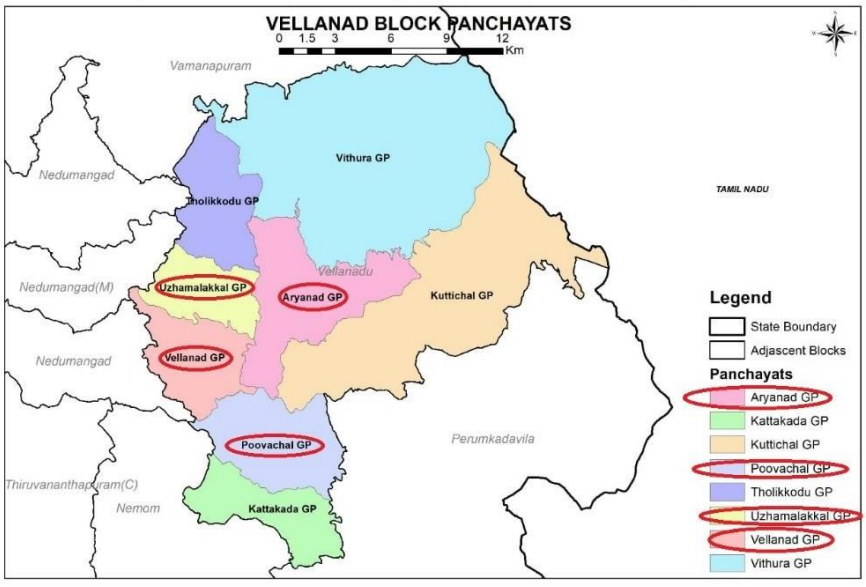

Figure 2.1 Map of Vellanad Block Panchayat(Source: Land Use Board, Thiruvananthapuram)

2.3 STUDY POPULATION

Men and women of age above 18 years residing in Vellanad Block Panchayat of Thiruvananthapuram district cultivating crops like banana and tapioca for at least past 1 year.

2.4 TIME FRAME

The data was gathered from 12 January 2024 to 7 March 2024

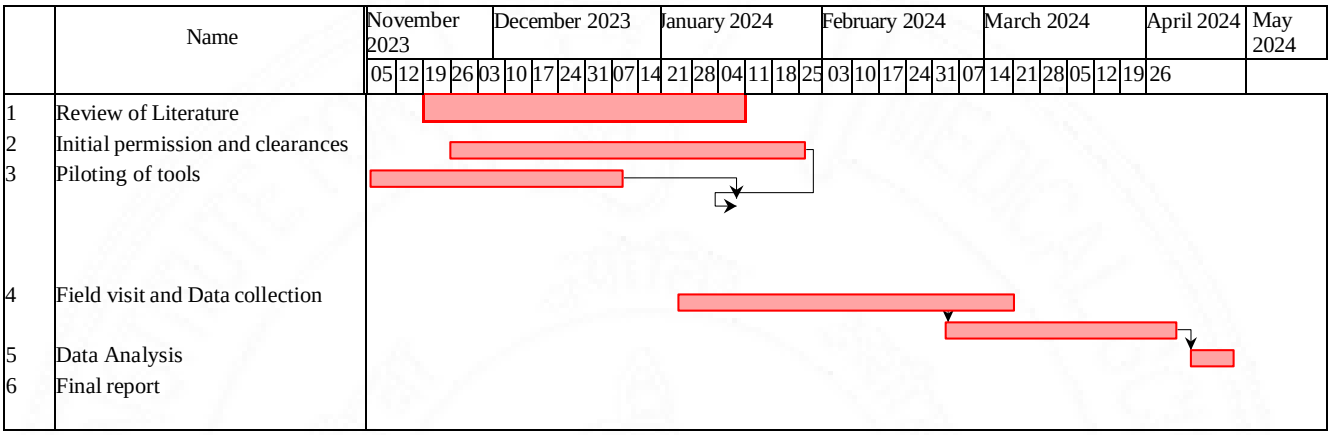

Figure 2.2 Gantt chart of time frame(Project Libre version 1.9.3)

2.5 SAMPLE SIZE ESTIMATION

Anticipated prevalence- 87.7% (Valiathan,1984), (Sharma and Thulaseedharan, 2022)

Precision= 5%

Estimated Sample size= 332~336 (168 banana cultivators and 168 tapioca cultivators)

The total population size was to 1000 according to finite correction factor population from the available total list of farmers in this block panchayat and the resulting sample size was also nearly the same and had no notable difference.

The present research adapted simple random sampling. Detailed sampling is explained in figure 2.3

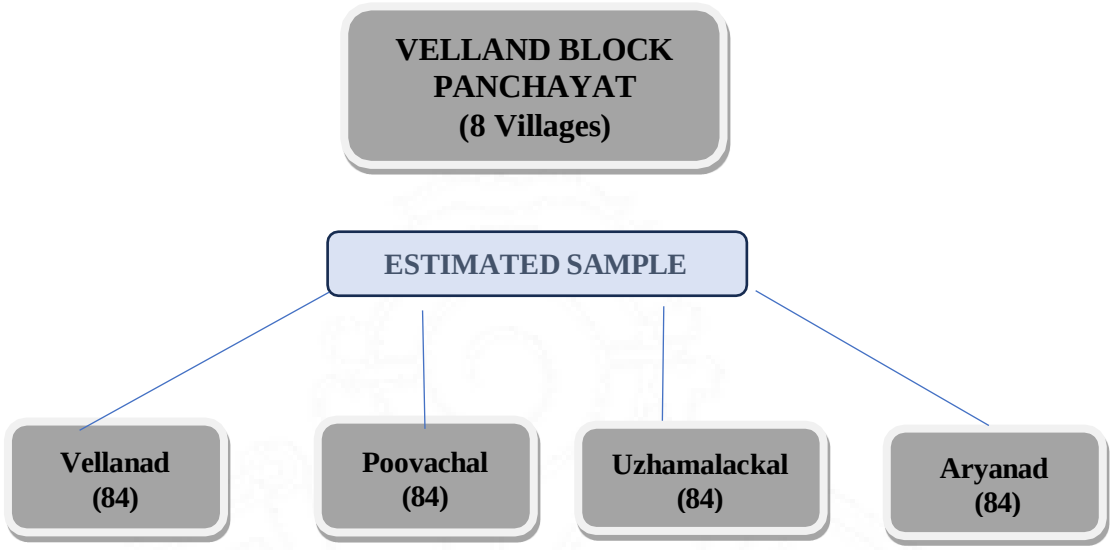

Figure 2.3 Sampling Strategy

2.6 SAMPLE SELECTION PROCEDURE:

Out of 8 agricultural villages in Vellanad block panchayat in Thiruvananthapuram district, 4 villages were selected considering the availability of farmers list and from those farmers list that was available, farmers were selected from the list randomly. So, farmers were selected till I got 42 banana cultivating farmers and 42 tapioca cultivation farmers from each of the 4 villages and hence making 84 total participants from each village which made a total of 336 study participants.

2.7 Inclusion criteria:

Men and women of age above 18 years cultivating crops like banana and tapioca.

Men and women of above age group who were engaged in this activity for at least past 1 year.

2.8 DATA COLLECTION

A series of questions was formulated and administered to capture socio-demographic, economic and work-related information of the participants. Work related details included the questions to capture the information regarding work duration, nature of work, leave, average

working time, total years of working, mode of travel to workplace, physical demands to be made as a part of work, etc. .The tool also comprised of a Nordic Body Map to identify the region of pain. For observing the work-related activities, principal investigator maintained a field diary. The data was collected using ODK 1.5.2.

2.9 DATA CLEANING

Every record underwent verification for the intended purpose of eliminating missing values of any, for further analysis. For that I ran a frequency analysis. Based on the cleaning process, the errors have been rectified and the data was cleaned for the objective of further analysis.

2.10 DATA ANALYSIS

The data refining was done using IBM SPSS statistics software version 25. Initially, frequencies of all the variables generated and for continuous variables the measure of central tendency was generated. For the variables which had skewed values, median was preferred against mean for analysis. For the association between Musculoskeletal disorder with respect to elbow, lower back and knee and other variables were examined using Pearson's chi-square test or fisher's exact test, whichever was appropriate. The variable which had a p-value of <0.05 were taken to be statistically significant.

Multi variable analysis performed to variables which were found significant. For that the predictors for Musculoskeletal disorder with respect to elbow, lower back and knee were included in the regression model which had a P value lesser than 0.05. The adjusted odd's ratio was used for interpreting risk rate of occurrence of the outcome.

2.11 DATA STORAGE

The hardcopies of interview schedules, consent forms have been kept by the principal investigator. To maintain the confidentiality and privacy of the collected data a respondent identity number was assigned for each participant. The principal investigator and her research

guide can only access to the identity number. The personal details of any participant were not shared under any circumstances. All the information other than personal was used for analysis. The data would be preserved for the next five years from the date of data collection and afterwards the entire dataset will be destroyed.

2.12 ETHICAL CONSIDERATIONS

The investigator initially shared the information sheet containing the objectives and to possible outcome of the study. After obtaining the consent form duly signed by the participant, the investigator collected data. The participation in the data collection was purely voluntary and participants were free to withdraw at any point of data collection or refuse to answer some questions. Ethical approval has been obtained from Institute Ethics Committee (IEC) of Sree Chitra Tirunal Institute for Medical Sciences and Technology before data collection (Ref No. SCT/IEC/2175/DECEMBER-2023)

2.13 DISSEMINATION OF RESULTS

The final results of the study shall be disseminated by publishing in journals and presenting at conferences.

2.14 OPERATIONALIZATION OF TERMS

Marital Status : Participants were categorized as either married or others, encompassing individuals who were either divorced, widowed, or separated.

Education Status: Participants who either had higher secondary or college degree or higher education or who had high school education or wo had up to secondary or primary education or others which comprised those who had no schooling.

Number of persons living in a house: Number of household members in the house of each participant.

Sleeping other than at night: The participants who slept during daytime also.

Roof type: Participants who either stayed in concrete roofed houses or in others which

counted in those who stayed in thatched or tiled houses.

Major Crop cultivated: Participants who either cultivated banana or tapioca as their major agricultural crop.

Engagement of members from the family in agriculture: Participants who had their family members who were either engaged in the same or different crop cultivation or who were not engaged in any form of agriculture.

Tilling pattern: Participants who either did agriculture in their own land or those who did agriculture for both wages and their own land or only for wages.

Engagement in other jobs: Participants who were engaged in other jobs also along with agriculture.

Engagement in domestic activities: Participants who were also engaged in domestic activities like cooking, sweeping, washing clothes, dish washing, bringing water from farther places, etc.

APL: Above the Poverty Line.

BPL: Below the poverty line.

Antyodaya Anna Yojana: The poorest of poor households.

OUTCOME VARIABLE

Standardized Nordic Questionnaire (SNQ)

Standardized Nordic Questionnaire (SNQ)was used for assessing prevalence of musculoskeletal symptoms.

The questionnaire included a visual body map featuring nine distinct regions referenced in the questionnaire for enhanced clarity.

The Structured Nordic Questionnaire (SNQ) is designed to identify symptoms across nine

specific regions of the body, namely the neck, shoulder, elbow, wrist, upper back, lower back, hip, knee, and ankle.

There were three questions mainly for one year and seven days pain. SNQ is used for investigation of musculoskeletal disorder occurring in an occupational or ergonomic context. It can either be self-administered or can be interview administered. For the present study, the SNQ was administered by the interviewer.

CHAPTER 3

RESULTS

The study subjects were selected from the four villages in Vellanad block panchayat of Thiruvananthapuram District of Kerala namely Uzhamalackal, Vellanad, Aryanad and Poovachal villages. Over all, data had been collected from 336 agricultural workers among whom 176 participants(52.4%) were doing banana cultivation and 160 participants(47.6%) were doing tapioca cultivation. Tables 3.1-3.3 describes the sociodemographic, economic and work-related details of study participants.(Section 3.1-3.3)

3.1 Sociodemographic details of study participants

The mean age of study participants was 61.35 years but for further analysis median age which was sixty years was considered and majority were males (70.2%). Majority among them were married(86%) and around 14 percent were either divorced or staying separated or widowed. On considering educational grade, a majority (67.6%) were having primary education or secondary education or others and 28 percent had high school education and remaining 4.5 percent were having higher secondary or college degree or higher education. The average number of persons living in a house was nearly four but for further analysis median number of persons living in a house which was four was taken into consideration. The average hours of sleep were nearly seven among these participants and 74.1 percent of participants did not sleep at any times of a day other than at night.

Table 3.1 Sociodemographic details of study participants

Variables	N(%)
Age(N=336)	
Mean±SD	61.35±13.35
Range	30-87
Sex(N=336)	
Male	236(70.2%)
Female	100(29.8%)
Marital status(N=336)	
Married	289(86%)
Others(divorced/staying separate or widowed)	47(14%)
Education status(N=336)	
College degree or higher or Higher secondary education	15(4.5%)
High school education	94(28%)
Primary education or Secondary school or others	227(67.6%)
Number of persons living in a house(N=336)	
Mean±SD	4.3±1.3
Range	1-6
Total hours of sleep(N=336)	

Mean±SD	6.65±0.54
Range	5-8
Sleeping other than at night(N=336)	
Sleeping	87(25.9%)
Not sleeping	249(74.1%)

3.2 Economic details of study participants

Majority of the participants around 48.2 percent were having pink ration card(BPL), 39.6 percent participants were having blue(APL) or white ration card and the remaining 12.2 percent were having yellow ration card(AAYB). Most of the participants around 71.7 percent were living in houses with concrete roof and the remaining 28.3 percent were only staying in other types of houses with thatched or tiled roof tops. The average annual income of the participants was Rs. 41,510 but for further analysis the median annual income which was Rs. 36000 was taken into consideration.

Table 3.2 Economic details of study participants

Variables	N(%)
Ration card type(N=336)	
Blue(APL) or White	133(39.6%)
Pink(BPL)	162(48.2%)
Yellow (AAYB)	41(12.2%)
Roof Type(N=336)	
Concrete roof	241(71.7%)
Others(thatched or tiled)	95(28.3%)
Annual Income(N=336)	

Mean±SD	41510.71±31555.784
Range	3600-500000

3.3 Occupational details of study participants

Majority of the participant's (90.2%) family members were not engaged in agriculture and only a small percent (9.8%) was engaged in any form of agriculture either in same crop or different crop cultivation. The average number of years engaged in agriculture among these participants were twenty-three years but for further analysis the median of twenty-two years was taken into consideration. Around 78.6 percent of the subjects did agriculture in their own land and only 21.4 percent did agriculture for wages and in own land or only for wages. Only 2.1 percent were using tools or other specific instruments for their work and the remaining the average hours spent for agriculture among these participants was five but for further analysis the median of the hours spent for agriculture which was five was taken into consideration and the average number of extra hours worked by these participants was two but for further analysis the median of the extra hours worked in a week which was two hours was taken into consideration. A majority of the participants(98%) were not using tools or other specific instruments for their work and only 2.1 percent of these participants were using tools or any other specific instruments for agriculture. Around 74.4 percent were not engaged in any jobs other than agriculture. The average distance from work to home travelled by these participants was 394 meters but for further analysis the median distance travelled which was 400 meters was taken into consideration. About 60.1 percent participants were not engaged in domestic activities and 39.4 percent were engaged in domestic activities.

Table 3.3 Occupational details of study participants

Variables	N(%)
Major crop cultivated(N=336)	
Banana	176(52.4%)
Tapioca	160(47.6%)
Engagement of family members in agriculture(N=336)	
Engaged in any form of agriculture	33(9.8%)
Not engaged	303(90.2%)
Number of years engaged in agriculture(N=336)	
Mean±SD	23.27±9.7
Range	2-50
Tilling pattern(N=336)	
Own land	264(78.6%)
Others(own and for wages or only wages)	72(21.4%)
Area of land owning(N=336)	
< =25 cents	48(14.3%)
26-50 cents	186(55.4%)
51-75 cents	81(24.1%)
75-100 cents	21(6.3%)
Tools or instrument usage pattern(N=336)	7(2.1%)
Using tools or other instruments	329(98%)

Not using tools or other instruments	
Hours spent for agriculture in a normal day(N=336)	
Mean±SD	5.21±1.03
Range	2-10
Extra hours worked in a week(N=336)	
Mean±SD	1.73±1.318
Range	0-8
Engagement in other jobs(N=336)	
Engaged	86(25.6%)
Not engaged	250(74.4%)
Distance from work to home(in meters) (N=336)	
Mean±SD	394.29±220.4
Range	30-1000
Engagement in domestic activities(N=336)	
Engaged	134(39.9%)
Not engaged	202(60.1%)

3.4 Musculoskeletal disorder in study participants

When it comes to general prevalence of musculoskeletal disorder in agricultural workers, as per Standardized Nordic Questionnaire, all the 100 percent of participants(N=336) reported to have pain in at least one among the nine regions (neck, shoulder, elbows, wrists/hands, upper-back, lower-back, hip, knee, ankles) in their body.

Table 3.4 Musculoskeletal disorder reported by the study participants

Body Regions	**Overall(N=336)**	
	n	**percent**
Neck	148	44
Shoulder	82	24.4
Elbow	122	36.3
Wrist or hands	83	24.7
Upper back	76	22.6
Lower back	242	72
Hips	131	39
Knees	242	72
Ankles	33	9.8

When coming to site wise prevalence, most affected site among farm workers were lower back (72%) and knees (72%) followed by neck (44%), hips(39%), elbow(36.3%), wrist or hands(24.7%), shoulder(24.4%), upper back(22.6%) and the least affected site among them was ankle (9.8%).

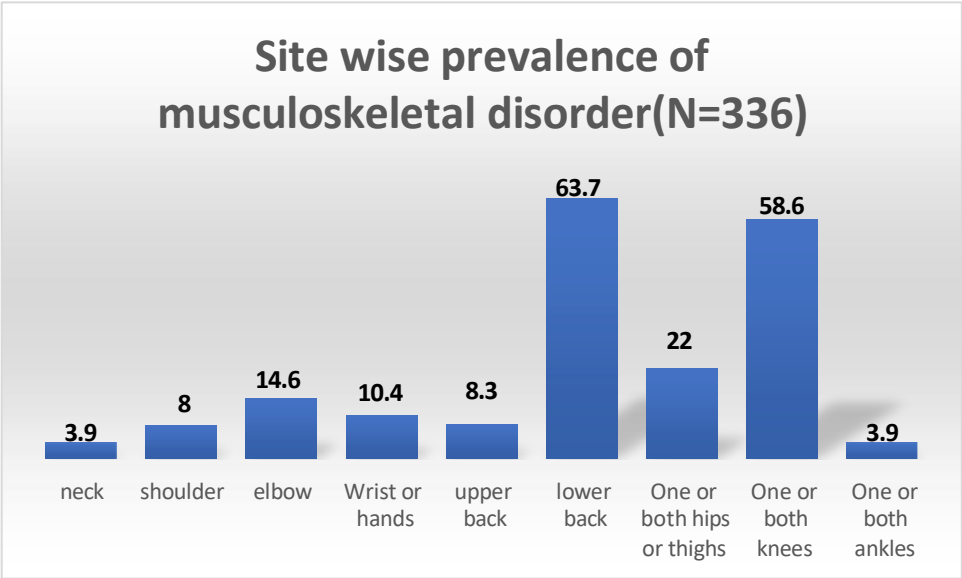

Figure 3.1 Site wise prevalence of musculoskeletal disorder among agricultural workers

Considering lower back, knee and elbow together, participants who had discomfort in all of these regions were taken for further analysis. So, 95 out of 336 participants (28.3%) had pain in all these three parts.

3.5 Treatment taken by study participants

Above 90% of the study participants took some sort of treatment (Allopathy, Ayush, or both or self-treatment) for the pain. About 46.1 percent opted for allopathy treatment which was the highest. Then followed by allopathy and self-treatment which was nearly 26.5 percent. Self-treatment was opted by 13.4 percent participants and only 0.9 percent opted for Ayush treatment alone. (Table 3.5)

Table 3.5 Treatment taken for musculoskeletal disorder by study participants

Variables	Overall (N=336)	
	n	Percent
Taken treatment		
Taken	307	91.4
Not taken	29	8.63
Type of treatment taken		
Allopathy	155	46.1
Ayush	3	0.9
Self-treatment	45	13.4
Allopathy, Ayush, self-treatment	5	1.5
Allopathy, self-treatment	89	26.5
Ayush, allopathy	4	1.2
Ayush, self-treatment	6	1.8
Self-treatment	45	13.4
No treatment taken	29	8.6

3.6 Factors associated with Musculoskeletal Disorder

As mentioned earlier, musculoskeletal disorder was taken as outcome variable among those participants who had pain in lower back, knee and elbow that was assessed by the questionnaire. Pearson Chi-square test was performed to find the association between musculoskeletal disorder in elbow, lower back and knee and other factors.

3.6.1 Sociodemographic factors

Age was a non-determining factor for musculoskeletal disorder where participants of age greater than 60 years have more pain(31.7%) as compared to participants of age less

Table 3.6 Sociodemographic factors

VARIABLES	CATEGORIES	N%	MSD(ELBOW,LOWERBACK AND KNEES)(FOR 1 YEAR)		X^2 Sig
			YES (N=95) 28.3%	NO (N=241) 71.7%	
Age (in years)	< =60 years	175 (52%)	44 (25.1%)	131 (74.9%)	0.184
	>60 years	161 (48%)	51 (31.7%)	110 (68.3%)	
Sex	Female	100 (30%)	35 (35%)	65 (65%)	0.075
	Male	236 (70%)	60 (25.4%)	176 (74.6%)	
Marital status	Married	289 (86%)	73 (25.3%)	216 (74.7%)	0.002
	Others(divorced or staying separated or widowed)	47 (14%)	22 (46.8%)	25 (53.2%)	
Education	College degree or higher or Higher secondary education	15 (4.5%)	6 (40%)	9 (60%)	*0.145
	High school education	94 (28%)	20 (21.3%)	74 (78.7%)	
	Primary education or Secondary school or others	227 (68%)	69 (30.4%)	158 (69.6%)	
Number of persons living in the house	<=4 persons	180 (53.6%)	44 (24.4%)	136 (75.6%)	0.094
	>4 persons	156 (46.4%)	51 (32.7%)	105 (67.3%)	

Total hours of sleep	<=7 hours	327 (97.3%)	89 (27%)	238 (72.8%)	0.042
	>7 hours	8 (2.7%)	5 (62.5%)	3 (37.5%)	
Sleeping other than at night	Sleeping	87 (26%)	39 (44.8%)	48 (55.2%)	0.000
	Not sleeping	249 (74.1%)	56 (22.5%)	193 (77.5%)	

*Fishers exact significant value

than or equal to 60 years(25.1%). When looking at the sex of the participants, females were more affected(35%) than males(25.4%)(P=0.075).When looking into the marital status, participants who were either widowed or divorced or staying separated had more pain (46.8%) compared with married individuals(25.3%). Hence marital status disclosed significant association with musculoskeletal disorder(P=0.002). Those participants with higher secondary or college or higher education had more pain(40%) as compared to those with primary or secondary education or others (30.4%) and high school education (21.3%). The participants with above four household members had more pain(32.7%) as compared to ones with a lesser amount or equal to 4 persons in the house.(P=0.094) Total hours of sleep was associated with musculoskeletal disorder. Participants who slept for above seven hours a day had more pain (62.5%) compared to participants who slept for less than or equal to seven hours per day (27%) (P=0.042). There is highly significant association with sleeping other than at night and musculoskeletal disorder as participants who slept during day had more pain(44.8%) compared to who slept only at night(22.5%) (P=0.000)(Table 3.6)

3.6.2 Economic factors

Upon analyzing the association between ration card and musculoskeletal disorder, those participants who belonged to yellow (AAYB) ration card had more pain(39%) as compared to those with pink (BPL) ration card(29.6%) and blue(APL) or white ration card(23.3%). Participants who lived in thatched or tiled roofed housed had more pain(30.5%) compared to participants who lived in concrete roofed houses(27.4%). Those participants with annual income below Rs. 36,000 had more pain(34%) compared to ones who had income above

Rs. 36,000 (20.4%) and hence annual income was significantly associated with musculoskeletal disorder. (P=0.006) (Table 3.7)

Table 3.7 Economic factors

VARIABLES	CATEGORIES	N%	MSD(ELBOW,LOWERBACK AND KNEES)(FOR 1 YEAR)		X^2 Sig
			YES (N=95) 28.3%	NO (N=241) 71.7%	
Ration card type	Blue(APL) or White	133 (40%)	31 (23.3%)	102 (76.7%)	0.129
	Pink(BPL)	162 (48.2%)	48 (29.6%)	114 (70.4%)	
	Yellow(AAYB)	41 (12.2%)	16 (39%)	25 (61%)	
Roof type	Concrete	241 (72%)	66 (27.4%)	175 (72.6%)	0.565
	Others(thatched or tiled)	95 (28.3%)	29 (30.5%)	66 (69.5%)	
Annual income	<=Rs.36000	194 (58%)	66 (34%)	128 (66%)	0.006
	>Rs.36000	142 (42%)	29 (20.4%)	113 (79.6%)	

3.6.3 Occupational factors

On analyzing the occupational factors, those participants who cultivated banana had more pain (29%) as compared to those cultivated tapioca (27.5%) as their major crop. Subjects engaged in agriculture for above twenty-two years had more pain(35.5%) than those engaged for below twenty-two years (20.7%) and hence years engaged in agriculture was significantly related with musculoskeletal disorder.(P=0.003). Participants with family members not engaged in agriculture had more pain (29%) than those who had family members

Table 3.8 Occupational factors

VARIABLES	CATEGORIES	N%	MSD(ELBOW,LOWERBACK AND KNEES)(FOR 1 YEAR)		X^2 Sig
			YES (N=95) 28.3%	NO (N=241) 71.7%	
Major crop	Banana	176 (100%)	51 (29%)	125 (71%)	0.764
	tapioca	160 (100%)	44 (27.5%)	116 (72.5%)	
Years engaged	<=22 years	169 (50.3%)	35 (20.7%)	134 (79.3%)	0.003
	>22 years	166 (49.4%)	59 (35.5%)	107 (64.5%)	
Family members engagement in agriculture	Not engaged	303 (90.2%)	88 (29%)	215 (71%)	0.343
	Others(engaged in same or different crop cultivation)	33 (10%)	7 (21.2%)	26 (78.8%)	
Tilling pattern	Own land	264 (78.6 %)	82 (31.1%)	182 (68.9%)	0.030
	Others(own and for waged or only wages)	72 (21.4%)	13 (18.1%)	59 (81.9%)	
Average hours spent in a day	<=5 hours	212 (63.1%)	61 (28.8%)	151 (71.2%)	0.790
	>5 hours	124 (37%)	34 (27.4%)	90 (72.6%)	
Extra hours worked in a week	<=2 hours	282 (84%)	66 (23.4%)	216 (76.6%)	0.000
	>2 hours	54 (16%)	29 (53.7%)	25 (46.3%)	
Doing jobs other than agriculture	Doing other jobs	86 (26%)	15 (17.4%)	71 (82.6%)	0.010
	Not doing other jobs	250 (74.4%)	80 (32%)	170 (68%)	
Distance from work to home	<=400 meter	209 (62.2%)	50 (23.9%)	159 (76.1%)	0.023
	>400 meter	127 (38%)	45 (35.4%)	82 (64.6%)	
Engagement in domestic activities	Engaged	134 (40%)	102 (76.1%)	32 (23.9%)	0.006
	Not engaged	202 (60.11%)	46 (22.8%)	156 (77.2%)	

also engaged in agriculture(21.2%). Participants doing agriculture in their own property had more pain(31.1%) than those who did agriculture in their own property and also for wages or only for wages and this tilling pattern is significantly associated with musculoskeletal disorder. (P=0.030) Participants who spent less than five hours for agriculture in a day had slightly more pain (28.8%) compared to those who had spent above five hours (27.4%).

Participants who worked for above two extra hours in a week had more pain (53.7%) as compared to those participants worked for lesser hours in a week (23.4%). And thus extra hours worked in a week was highly significantly associated with musculoskeletal disorder(P=0.000). Participants who did jobs other than agriculture had less pain(17.4%) compared to who did only agriculture(32%). And doing other jobs also significantly associated with musculoskeletal disorder(P=0.010). Participants who walked for more than 400 meters from work to home had more pain(35.4%) compared to all who walked for lesser distance from work to home and this also significantly associated with musculoskeletal disorder (P=0.023). Participants engaged in domestic activities also had more pain (76.1%) as compared to who did not engage(22.8%) and thus engagement in domestic activities was significantly associated with musculoskeletal disorder(P=0.006). (Table 3.8)

Upon analyzing the association with extra hours worked in a week and tilling pattern, participants who had worked for above two extra hours in a week had cultivated for wages or for both in own land and for wages(19.4%) compared to all who worked in their own land(15.2%). And so no significant association between tilling pattern and extra hours worked in a week was seen. (P=0.379)(Table 3.9)

Table 3.9 Association between tilling pattern and extra hours worked in a week

Tilling pattern	N(%)	Extra hours worked in a week		X^2 Sig
		<= 2 hours	>2 hours	
Own land	264 (79%)	224 (84.8%)	40 (15.2%)	0.379
Others(own or for wages or both)	72 (21%)	58 (80.6%)	14 (19.4%)	

Among participants those engaged in domestic activities, 41.2 percent of males had musculoskeletal disorder as compared to females who were only 35 percent (Table 3.10) which indicated that doing domestic activities along with agriculture contributed to more musculoskeletal disorder irrespective of gender.

Table 3.10 Participants engaged in domestic activities and musculoskeletal disorder

Sex distribution	MSD		Total(%)
	No	Yes	
Females	65(65%)	35(35%)	100(100%)
Males	20(58.8%)	14(41.2%)	34(100%)
Total	85(63.4%)	49(36.6%)	134(100%)

Upon analyzing the area of their land ownership, subjects who did cultivation in own land and usage of tools or any specific instruments by the participants, 4.2 percent of participants who were using tools or other specific instruments were owning less than twenty-five cents of land for agriculture and 98.9 percent participants not using any tools or specific instruments were owning 25-50 cents of land for agriculture and hence no association between area of land owning and tools or specific instruments usage was seen.(P=0.260)(Table 3.11)

Table 3.11 Association between area of land owning and tools or specific instrument usage

Area of land owning	**N(%)**	**Tools or specific instruments usage**		**X^2 Sig**
		Using	Not using	
<25 cents	48 (14.3%)	2 (4.2%)	46 (95.8%)	0.260
26-50 cents	186 (55.6%)	2 (1.1%)	184 (98.9%)	
50-75 cents	81 (24.1%)	3 (3.7%)	78 (96.3%)	
75-100 cents	21 (6.6%)	0 (0%)	21 (100%)	

3.7 Assessing connection between variables

The mean age of participants was different across two categories of musculoskeletal disorder making it significant with the p value = 0.025. Also the mean of the years engaged in agriculture by the participants was different across the two categories with musculoskeletal disorder with significant p value=0.012. The mean of extra hours worked in a week was also different across the two categories of musculoskeletal disorder so it was statistically significant with the p value=0.009. The mean of the distance from work to home was different across the two categories of musculoskeletal pain and was significant with the p value=0.003. Total hour of sleep mean by the participants was also different across the two categories making significant statistically with the p value=0.031.(Table 3.12)

Table 3.12 Assessing the relation between variables

VARIABLE(N=336)	Sig (2-tailed)	Means of MSD	
		YES	NO
Age	0.025	63.94	60.33
Number of persons living in the house	0.533	4.36	4.26
Years engaged	0.012	25.38	22.44
Hours spent in agriculture in a day	0.427	5.14	5.24
Extra hours worked in a week	0.009	2.03	1.61
Annual income	0.881	46069.5	39713.8
Distance from work to home	0.003	451.05	371.91
Total Hours of sleep	0.031	6.55	6.69

3.8 Predictors of Musculoskeletal Disorder

Further, the variables found significant in bivariate analysis were counted in in the multivariable model. The variables in the binary logistic regression included age, marital status, annual income, years engaged in agriculture, tilling pattern, extra hours worked in a week, doing jobs other than agriculture, distance from work to home, engagement in domestic activities, sleep hours and sleeping other than at night.

Controlling other variables, years engaged in agriculture, extra hours worked in a week, distance from work to home and sleeping other than at night had significantly association with MSD in multivariable analysis. The agricultural workers engaged in agriculture for more than twenty-two years had 3 times odds of developing musculoskeletal disorder than those agricultural workers engaged in agriculture for less than or equal to twenty-two yearse. Participants worked for above two extra hours in a week had 5 times odds of developing musculoskeletal disorder than those worked for lesser hours in a week. Doing other jobs than agriculture was closer to significance with musculoskeletal disorder in binary logistic regression. Those participants who had to travel above than 400 meters from work to home had 2 times odds of developing musculoskeletal disorder than those who walked lesser distance from work to home. Those participants who slept during day had 3 times odds of developing musculoskeletal disorder than those who slept only at night.

Thus the multivariable analysis found four variables to be predictors for the musculoskeletal disorder. (Table 3.13)

The results in this chapter were discussed in detail with respect to available literature in the following chapter.

Table 3.13 Predictors of musculoskeletal disorder

Variables	Unadjusted Odds Ratio (95%CI)	Sig (P value)	Adjusted Odds Ratio (95% CI)	Sig (P value)
Age(N=336)		0.2		0.12
<=60 years	1		1	
>60 years	1.4 (0.9-2.2)		1.8 (0.9-3.7)	
Marital status(N=336)		0.003		0.09
Married	1		1	
Others(divorced or staying separated or widowed)	2.6 (1.4-4.9)		2.2 (0.9-5.6)	
Annual income(N=336)		0.007		0.142
<=Rs.36000	1		1	
>Rs.36000	0.5 (0.3-0.82)		0.63 (0.35-1.16)	
Years engaged in agriculture(N=336)		0.003		0.003
<=22 years	1		1	
>22 years	2.11 (1.3-3.4)		2.9 (1.4-5.8)	
Tilling pattern(N=336)		0.032		0.114
Own land	1		1	
Others(own and for waged or only wages)	0.5 (0.25-0.94)		0.52 (0.23-1.17)	
Extra hours worked in a week(N=336)		0.000		0.000
<=2 hours	1		1	
>2 hours	3.8 (2.08-6.93)		4.62 (2.28-9.34)	
Doing jobs other than agriculture(N=336)		0.011		0.052

Doing other jobs	1		1	
Not doing other jobs	2.227		2.303	
	(1.20-4.13)		(0.99-5.36)	
Distance from work to home(N=336)		0.024		0.012
<=400 meter	1		1	
>400 meter	1.75		2.1	
	(1.08-2.83)		(1.18-3.71)	
Engagement in domestic activities(N=336)		0.006		0.444
Engaged	1		1	
Not engaged	0.51		0.75	
	(0.32-0.83)		(0.36-1.57)	
Total hours of sleep(N=336)		0.044		0.303
<=7 hours	1		1	
>7 hours	4.5		2.8	
	(1.04-19.04)		(0.39-20.18)	
Sleeping other than at night(N=336)		0.000		0.001
Not Sleeping	1		1	
Sleeping	2.8		2.8	
	(1.67-4.7)		(1.48-5.2)	

Chapter 4

DISCUSSION

Musculoskeletal disorder is an important problem in various occupations. The kind of musculoskeletal disorder and prevalence varies with occupation. It is contributed by rigorousness and specific tasks in each occupation. Agriculture in India is a human intensive occupation by using minimal mechanized implements.

The present study explores the MSDs among agricultural workers who were engaged in banana and tapioca cultivation. There are studies on MSDs among plantation workers in Kerala. (Sharma and Thulaseedharan, 2022) and specific references to banana and tapioca are not done.

All the agricultural workers have musculoskeletal disorders in the current study. Two studies one done among plantation workers in Kottayam and Idukki districts of Kerala and another one among rural male agricultural workers in Nayagarh district, Odisha, India found to have prevalence of 87.7% which as lower than the present study's prevalence which was 100%. (Sharma and Thulaseedharan, 2022; Valiathan, 1984)

In our study majority were of age less than 60 years. The mean age was 61 years which was in confirmation with a study done among plantation workers in Kerala, majority of the participants were of age less than 50 years (Sharma and Thulaseedharan, 2022).

Major proportion of subjects in this study had either no education or primary or secondary education which is comparable to another study among plantation workers in Kottayam and Idukki districts of Kerala.(Sharma, 2021)

Agriculture demands different postures but cause musculoskeletal disorder in elbow, lower back and knees as discussed in this study(Musculoskeletal pain among Midwest farmers and associations with agricultural activities - Fethke - 2015 - American Journal of Industrial Medicine - Wiley Online Library, 2014). Following this, the present study explored the

prevalence of musculoskeletal disorder combined the three body regions i.e. in elbow, lower back and knee which is 28.3%.

The further analysis on the factors associated with MSD was done with the musculoskeletal disorder in the selected three regions of the body (elbow, lower back and knee). Various features linked with this phenomenon encompass aspects such as sociodemographic, economic, and occupational factors. The socio demographic factors such as age(Latha, 2017), marital status(Madadizadeh et al., 2017) was significantly associated with MSD which was not in confirmation with the findings of the above study, total hours of sleep(Chun et al., 2018) and sleeping other than at night (Stavås et al., 2024)had significant association with musculoskeletal disorder which was in confirmation with findings of the above studies. Also economic factor such as income was associated significantly which was in confirmation with these studies (Chen et al., 2023; Shivakumar et al., 2024). Other sociodemographic factors like sex, education were found to be associated with musculoskeletal disorder which was in confirmation with these studies(Latha, 2017; Luan et al., 2018; Sharma and Thulaseedharan, 2022). Other economic factors like ration card type and roof type had association with musculoskeletal disorder in other studies(Sharma, 2021)

Musculoskeletal disorder was also contributed by occupational related factors such as type of crop being cultivated, years engaged in agriculture, family members engagement in agriculture(Sharma, 2021), tilling pattern(Jo et al., 2016), daily hours spent for agriculture(Jain et al., 2018), weekly hours worked (Amiri, 2023), engagement in jobs other than agriculture(Xiao et al., 2013), distance walked from work to home(Akyol, 2018; Pierrynowski, 2008) and also engagement in domestic activities(Habib et al., 2012). In the present study years engaged in agriculture, extra hours worked in a week, distance from work to home and engagement in domestic activities were associated with musculoskeletal disorder. This is in confirmation with the other study findings.(Amiri, 2023; Jain et al., 2018;

Sharma, 2021)

It is interesting to find that domestic activities like cooking, sweeping, washing clothes, dish washing, bringing water from farther places, etc. were associated with musculoskeletal disorder while further analysis revealed more male involvement in domestic activities compared to females. Hence, the assumption of musculoskeletal disorder among people engaged in domestic work and female being exposed to domestic work were not found in the current research that was not in confirmation with another study(Jazeela A, 2022).

In one context, people tilling on others soil were having higher musculoskeletal disorder compared to who worked in own land. Similarly, people engaged for extra hours of farming were having higher musculoskeletal disorder. When we further explored the association between number of extra hours working with tilling in own or other land found that people working in other land was engaged in additional hours of work. It was found land owning and extra hours not relating with each other. However, both factors independently contribute to the occurrence of musculoskeletal disorders.

So, overall it is being found that socio-demographic factors like age, marital status, total hours of sleep and sleeping other than at night and economic factor like annual income and occupational factors like years engaged in agriculture, extra hours worked in a week, distance from work to home and engagement in domestic activities were contributing for musculoskeletal disorder.

Upon analysis of land ownership among all who were engaged in agriculture on their own land, it was noted with majority possessing less than one hundred cents of land, with a significant proportion owning between twenty-six to fifty cents. This pattern suggests subdivisional fragmentation of land, indicating smaller and fragmented holdings. Additionally, it was noted that only a minority of participants (2.1%) utilized tools or specialized instruments for agriculture. These findings propose that due to the fragmentation

of land and limited land holdings, many participants found it economically impractical to invest in specific agricultural tools or instruments. This caused MSDs among agricultural workers in the present study.

4.1 CONCLUSION

Musculoskeletal disorder among agricultural workers is an important subject in public health. Only a few studies were found in that. Contrary to the belief only few demographic and economic factors contribute to musculoskeletal disorder. Occupational related factors such as years engaged in agriculture, extra hours worked in a week, distance from work to home and engagement in domestic activities are contributing significantly to musculoskeletal disorder. This also clearly displays that agriculture sector still follows conventional approach of farming which is contributing to musculoskeletal disorders.

It is also significant to know that agriculture still remains as an unorganised sector without having any regulation on the number of hours worked, accessibility and so on.

Musculoskeletal disorder in agriculture sector can only be solved using modern methods and regulatory approach.

4.2 STRENGTH OF THE STUDY

- The principal investigator herself collected the data using Odk central.
- Because the principal investigator was directly involved in the data collection so was able to visit some farms and witnessed the real farming activities.

4.3 LIMITATIONS

- Due to limitation of time- max. sample size visited 336, larger sample size may add some more clarity, only four villages were counted
- Due to nature of work- more men particpated in the study
- Due to geographical limitations- only two crops were contained for the study.

4.4 RECOMMENDATIONS

- Ergonomically appropriate technologies need to be introduced to the small farmers.
- There should knowledge about proper fixed working time for the workers engaged in agriculture.

Chapter 4

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Chapter 5
ANNEXURE I

श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)
Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Institutional Ethics Committee

CDSCO Registration No: ECR/189/Inst/KL/2013/RR-21
DHR Registration No: EC/NEW/INST/2022/2775

SCT/IEC/2175/DECEMBER-2023 09.01.2024

Dr. Karthiayani VS
MPH Student, AMCHSS
SCTIMST, Thiruvananathapuram

Dear Dr. Karthiayani,

The project proposal with the title "**A STUDY ON PREVALENCE AND ASSOCIATED FACTORS OF MUSCULOSKELETAL DISORDERS AMONG AGRICULTURAL FARMERS AND WORKERS IN VELLANAD, THIRUVANANTHAPURAM**" submitted to Institutional Ethics Committee (IEC) has been reviewed in the IEC Meeting held on 30th December, 2023 and assigned number as IEC/2175.

Principal Investigator	Dr. Karthiayani V S, MPH Student, AMCHSS, SCTIMST
Co-Principal Investigator(s)	Dr. Srinivasan K, Professor, AMCHSS, SCTIMST

List of documents submitted:

1. Checklist Form
2. Covering letter addressed to the Chairman, IEC, SCTIMST dated 02.12.2023
3. Responses /amendments made based on the Reviewer's comments
4. IEC Application Form
5. Declaration Form
6. Research Proposal
7. Information Sheet in English and Malayalam
8. Consent Form in English and Malayalam
9. Interview schedule in English and Malayalam
10. CV of Principal Investigator and Co-PI
11. SRC Recommendation Letter

IEC Recommendations

Please submit a revised proposal after incorporating answers to the following:

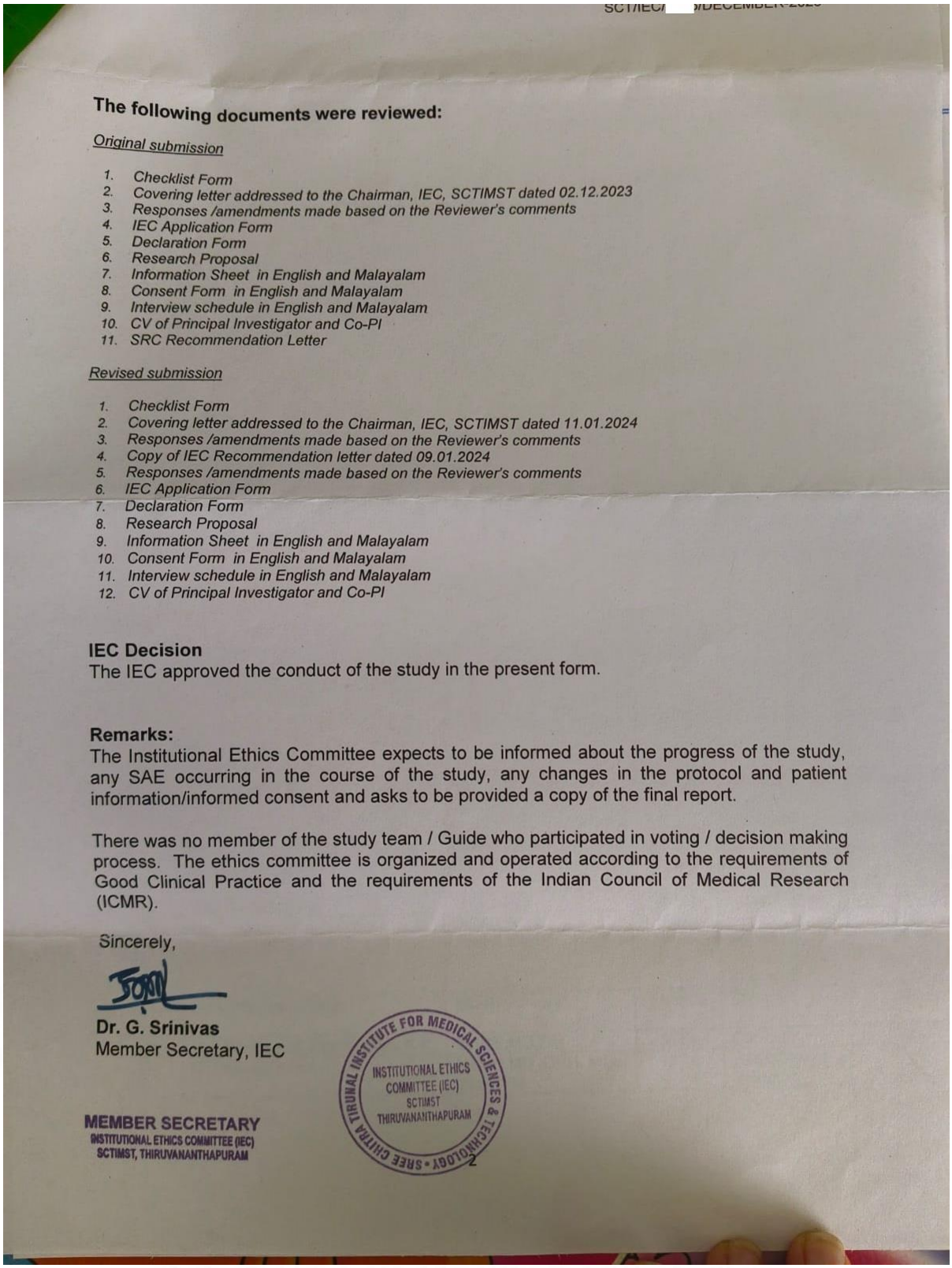
1. The questionnaire /interview has 8 sections. Please comment on the feasibility of this (concerned with the lengthy questionnaire)
2. There is a 10 graded likert scale for pain with 4 different questions. Comment on the feasibility of this in this population of unorganized workers.
3. What is the strategy if any major health issue is diagnosed during the study? The investigator may spell out specific dissemination plan for the study
4. It seems measurements (height and weight) are involved, this should be mentioned in the Participant Information Sheet.
5. In view of the higher prevalence (88%) assumed, the use of 5% as absolute prevalence may be revisited. This has implications for number of study participants to be studied and the cost implications for the same.
6. The investigator may clarify as to what will be done for identified problems among study participants

One set of all the documents including those revised may be submitted. The covering letter should indicate the revisions made.

Sincerely,

Dr. G.Srinivas
Member Secretary, IEC

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY • INSTITUTIONAL ETHICS COMMITTEE (IEC) SCTIMST THIRUVANANTHAPURAM



SCT/IEC/ /DECEMBER-2023

The following documents were reviewed:

Original submission

1. Checklist Form
2. Covering letter addressed to the Chairman, IEC, SCTIMST dated 02.12.2023
3. Responses /amendments made based on the Reviewer's comments
4. IEC Application Form
5. Declaration Form
6. Research Proposal
7. Information Sheet in English and Malayalam
8. Consent Form in English and Malayalam
9. Interview schedule in English and Malayalam
10. CV of Principal Investigator and Co-PI
11. SRC Recommendation Letter

Revised submission

1. Checklist Form
2. Covering letter addressed to the Chairman, IEC, SCTIMST dated 11.01.2024
3. Responses /amendments made based on the Reviewer's comments
4. Copy of IEC Recommendation letter dated 09.01.2024
5. Responses /amendments made based on the Reviewer's comments
6. IEC Application Form
7. Declaration Form
8. Research Proposal
9. Information Sheet in English and Malayalam
10. Consent Form in English and Malayalam
11. Interview schedule in English and Malayalam
12. CV of Principal Investigator and Co-PI

IEC Decision
The IEC approved the conduct of the study in the present form.

Remarks:
The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team / Guide who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,

Dr. G. Srinivas
Member Secretary, IEC

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM

SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES & TECHNOLOGY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST
THIRUVANANTHAPURAM

2

ANNEXURE II

Achutha Menon Centre for Health Science Studies,
Sree Chitra Tirunal Institute for Medical Sciences &Technology,
Trivandrum, Kerala, India- 695011

Information sheet

Namaste, my name is Karthiayani V S, a Public Health student studying in Sree Chitra Institute of Science and Technology, Trivandrum, Kerala. I am doing a study on "Prevalence and associated factors of musculoskeletal disorders among agricultural farmers and workers in Vellanad, Thiruvananthapuram." for my MPH Dissertation.

Purpose

To estimate the prevalence and understand the associated factors and occupational factors contributing to the musculoskeletal disorders among agricultural farmers and workers of age above 18 years in Vellanad Block Panchayath of Thiruvananthapuram district, Kerala.

Village Selection

This study will be conducted in four villages of Vellanad block Panchayath.

Individual Selection

This study focuses on both men and women working in agricultural sector of age more than 18 years. I will be including only those participants who are engaged in either banana or tapioca cultivation from at least past 1 year.

Process of the study

As a part of my data collection procedures, I am requesting voluntary participation from you. This means you may choose to participate or not. You will be asked some questions for obtaining relevant information regarding your basic details and details of work for conducting the study.

Benefit of Participation

If you participate in this study, you will be able to understand the magnitude of problems you are facing in the work. The findings will contribute to the development of measures and policies aimed at improving the well-being and quality of life for the workers.

Ethical considerations

I hereby assure you that all information you provided will be kept confidential and will be only used for research purposes. Personal information will not be revealed to anyone under any circumstances.

Results

Results of the study will be used for my MPH dissertation and will also be published in journals.

Contact for further information
Karthiayani V S
MPH Scholar, AMCHSS
Contact no-8848019990
Email: kathuvkumar@yahoo.com

Dr Srinivas G
Member Secretary
Institutional Ethics Committee
SCTIMST, TRIVANDRUM- 695011
Office: 04712524689
Email: iec.mem.sec@sctimst.ac.in

ANNEXURE III
Achutha Menon Centre for Health Science Studies,
Sree Chitra Tirunal Institute for Medical Sciences &Technology,
Trivandrum, Kerala, India- 695011

Consent Form

I _____have read/heard and understood all the information provided in the Research information sheet. By signing/putting thumb impression I confirm my voluntary participation in this study. I understand that I can withdraw my participation at any time during the data collection process without any explanation and also, I understand that my identity and personal information will be kept confidential. I have been informed who should be contacted for further clarifications.

Signature /Thump impression of the participant:

Place:

Signature of witness:

ANNEXURE IV

Musculoskeletal symptoms and associated factors assessment among agricultural farmers and workers- A cross sectional study

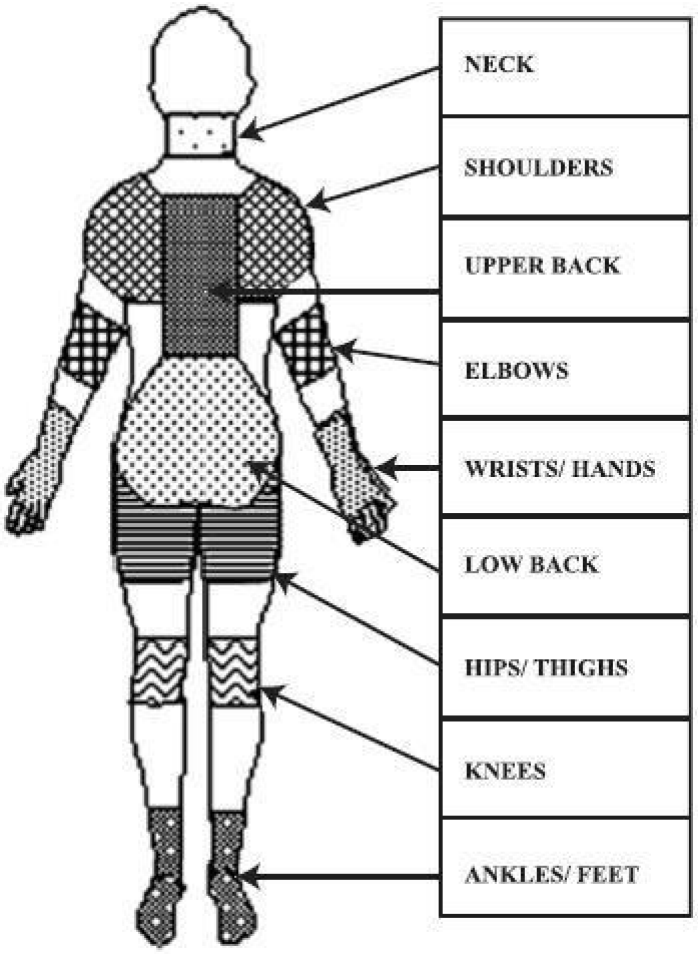
Q. No.	Section1: Demographic& Social Details	
1	Age (in completed years)	
2	Sex	☐Male ☐Female ☐Others
3	Major crop	☐Banana ☐Tapioca ☐any other
4	Education status	☐ Illiterate ☐ Primary Education ☐ Secondary School ☐ High School Education ☐ Higher Secondary Education ☐ College Degree or higher
5	Family type	☐Nuclear family ☐Joint family
6	Marital status	☐ Single ☐ Married ☐ Divorced/staying separate ☐ Widowed
7	Type of ration card	☐ Yellow card (AAY) ☐ Pink card (BPL) ☐ Blue card (APL) ☐ White card
8	House ownership	☐ Own ☐ Rented
9	Type of roof	☐ Thatched roof ☐ Tiled roof ☐ Concrete roof ☐ Others
10	Number of persons living in your house	
11	Does anyone of your family members work in same crop cultivation or in any other agricultural sector?	☐ Yes, in the same crop cultivation ☐ Yes, in another crop cultivation

		☐ No

Q. No.	Section 2: Details of work	
12	How many years you are engaged in agriculture?	
13	In the last one year, did you do agriculture?	☐ Yes ☐ No
14	Are you working in your own land? (if No, go to question 16)	☐ Yes ☐ No ☐ Own & for wages
15	If yes, how many acres of land do you have?	☐Wet land _____ ☐Dry land_____
16	In a normal day how many hours you spend on agriculture in an average?	
17	In a week how many extra hours you have worked?	
18	What is your average annual income?	
19	Do you take off from work any time in a month?	☐Yes ☐No
20	If yes, how frequently do you take?	
21	Were you unable to work on any days due to medical reasons?	☐ Yes ☐ No
22	If yes, how many days were you unable to work due to musculoskeletal pain in the last one year?	
23	Does your work involve use of any tools or specific instruments?	☐Yes ☐No
24	If yes, what kind of tool do you use?	
25	Are you doing any other job other than agriculture?	☐ Yes ☐ No
26	If yes, what job?	
27	What is the distance from your home to the field?	
28	Mode of travel to workplace	
29	What are the common types of work you do in the field? (You can choose more than one options)	☐**Manuring** - ☐manual ☐machine☐ labourers ☐ **Levelling the soil** - ☐manual ☐ machine☐labourers ☐ **Digging pits** - ☐manual ☐ machine ☐ labourers ☐ **Creating furrow**- ☐manual

		☐ machine☐labourers ☐**Irrigation** - ☐manual ☐machine☐ labourers ☐**Seeding** - ☐manual ☐machine☐ labourers ☐**Weeding** - ☐manual ☐machine☐ labourers ☐ **Transportation** - ☐manual ☐ machine☐labourers ☐ **Harvesting** - ☐manual ☐machine ☐ labourers ☐ **Others**
30	Do you engage in work at home also?	☐ Yes ☐ No
31	If yes, what are the domestic activities you do? (You can choose more than one option)	☐ Cooking ☐ Sweeping ☐ Washing cloths ☐ Dish washing ☐ Carrying water from distant places ☐ Others, specify_____
32	In a normal day, how many hours you sleep?	
33	Do you get any opportunity to sleep other than at night?	☐ Yes ☐ No
34	If yes, how many hours?	

Section 3: Standardized Nordic questionnaire



This picture shows parts of the body that are referred to in the questionnaire. You should decide yourself about which part you have trouble (if any).

Have you at any time during the last 12 months had trouble (ache, pain, discomfort) in:	Have you at any given time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble:	Have you had trouble at any time during last 7 days?
1. NECK ☐No ☐Yes	☐No ☐Yes	☐No ☐Yes
2. SHOULDER ☐No ☐YES, IN RIGHTHOULDER ☐YES, IN LEFT SHOULDER ☐YES, IN BOTH SHOULDERS	☐No ☐Yes	☐No ☐Yes

3. ELBOW ☐No ☐YES, IN RIGHT ELBOWS ☐YES, IN LEFT ELBOWS ☐YES, IN BOTH ELBOWS	☐No ☐Yes	☐No ☐Yes
4. WRIST/HANDS ☐NO ☐YES, IN RIGHT WRISTS ☐YES, IN LEFT WRISTS ☐YES, IN BOTH WRISTS	☐No ☐Yes	☐No ☐Yes
5. UPPER BACK ☐No ☐Yes	☐No ☐Yes	☐No ☐Yes
6. LOWER BACK ☐No ☐Yes	☐No ☐Yes	☐No ☐Yes
7. ONE OR BOTH HIPS/THIGHS ☐No ☐Yes	☐No ☐Yes	☐No ☐Yes
8. ONE OR BOTH KNEES ☐No ☐Yes	☐No ☐Yes	☐No ☐Yes
9. ONE OR BOTH ANKLES ☐No ☐Yes	☐No ☐Yes	☐No ☐Yes

10. Have you taken any treatment for above mentioned symptoms?

☐No

☐Yes

11. If yes specify the type of treatment.

☐Allopathy

☐Ayush

☐Self-treatment

☐Others (specify)

ANNEXURE V

തിരുവനന്തപുരത്തെ ത്തവള്ളനാട്ടിത്തെ കർഷകരുത്തെയും കാർഷിക ത്തതാഴിെ◌ാളികളുത്തെയും ഇയിൽ മാുംസപപശീസുംബന്ധമായ പവദനയുത്തെ വയാപനവും അനുബന്ധ ഘെകങ്ങളും

പഠനവിവരും

നമഃകാരം, എൻ്'റെ പേര' കാർത്ത്യായനി വി എസ', ഞാൻ തിരുവനന്തേുരറത്ത് ശ്രീചിശ്ര ഇൻസ്റ്റിെ◌'െയൂട്ട' ഓഫ' സയൻസ' ആൻഡ' റെക'പനാളജിയിൽ േഠിക്കുന്ന 'റോതുജനാപരാഗ്യം' എന്ന വിഷയത്ത്ിൽ ബിരുദാനന്തര ബിരുദ വിദയാർത്ഥിനി ആണ'. "തിരുവനന്തേുരറത്ത് റവള്ളനാട്ടിറെ കർഷകരുറെയും കാർഷിക റതാഴിെ◌ാളികളുറെയും ഇയിൽ മാംസപേരീസംബന്ധമായ പവദനയുറെ വയാേനവും അനുബന്ധ ഘെകങ്ങളും" എന്ന വിഷയത്ത്ിൽ ഞാൻ ഒരു േഠനം നെത്ത്ുകയാണ'.

പഠനെിൻത്തെ ഉപേശും

തിരുവനന്തേുരം ജില്ലയിറെ റവള്ളനാെ◌' പലാക്ക' േഞ്ചായത്ത്ിറെ 18 വയസ്സിനു മുകളിൽ ശ്േ◌ായമുള്ള കർഷകരുറെയും കാർഷിക റതാഴിെ◌ാളികളുറെയും ഇയിൽ മാംസപേരീസംബന്ധമായ തകരാെ◌ുകൾക്ക' കാരണമാകുന്ന അനുബന്ധ ഘെകങ്ങളും റതാഴിൽ ഘെകങ്ങളും
കണക്കാക്കാനും മനസ്സിെ◌ാക്കാനും ആണ' ഞാൻ ഈ േഠനം നെത്ത്ുന്നത'.

വിപേജ് തിരത്തെെ◌ൂപ്പ്

റവള്ളനാെ◌' പലാക്ക' േഞ്ചായത്ത്ിറെ നാെ◌' വിപല്ലജുകളിൽ ഈ േഠനം നെത്ത്ും.

വയക്തിഗത തിരത്തെെ◌ൂപ്പ്

18 വയസ്സിനു മുകളിൽ ശ്േ◌ായമുള്ള കാർഷിക പമഖെയിൽ പജാെ◌ി റചയ്യുന്ന സ'ശ്ീകറളയും േ◌ുരുഷന്മാറരയും പകശ്രീകരിച്ചാണ' ഈ േഠനം. കുെഞ്ഞത' കഴിഞ്ഞ 1 വർഷമായി വാഴ അറല്ലങ്കിൽ മരച്ചീനി കൃഷിയിൽ ഏർറെട്ടിരിക്കുന്നവറര മാശ്ൂപമ ഞാൻ ഉൾറെെ◌ുത്ത്ുകയുള്ളൂ.

പഠന പ്പപ്ലിയ

എൻ്'റെ വിവരപരഖരണ നെേെ◌ിശ്ക്കമങ്ങളുറെ ഭാഗമായി, ഞാൻ നിങ്ങളിൽ നിന്ന' സവപമധയാ േങ്കാളിത്ത്ം അഭയർത്ഥിക്കുന്നു. ഇതിനർത്ഥം നിങ്ങൾക്ക' േറങ്കുക്കപണാ പവണ്ടപയാ എന്ന' തീരുമാനിക്കാം. നിങ്ങളുറെ ങ്കിസ്ഥാന വിരദാംരങ്ങളും േഠനം നെത്ത്ുന്നതിനുള്ള പജാെ◌ിയുറെ വിരദാംരങ്ങളും സംബന്ധിച്ച ശ്േസക്തമായ വിവരങ്ങൾ െഭിക്കുന്നതിന' നിങ്ങപളാെ◌' ചിെ പചാദയങ്ങൾ പചാദിക്കും.

പങ്കാളിെെ◌ിൻ്ത്തെ പ്പപയാജനും

നിങ്ങൾ ഈ േഠനത്ത്ിൽ േറങ്കുത്ത്ാൽ, പജാെ◌ിയിൽ നിങ്ങൾ പനരിെ◌ുന്ന ശ്േശ്നങ്ങളുറെ വയപ്തിത മനസ്സിെ◌ാക്കാൻ കഴിയും. റതാഴിെ◌ാളികളുറെ പേമവും ജീവിത നിെ◌ാരവും റമച്ചറെെ◌ുത്ത്ാൻ െേയമിട്ടുള്ള നെേെ◌ികളുറെയും നയങ്ങളുറെയും വികസനത്ത്ിന' കറണ്ടത്ത്െ◌ുകൾ സംഭാവന റചയ്യും.

ധാർമ്മിക പരിഗണനകൾ

നിങ്ങൾ നൽകിയ എല്ലാ വിവരങ്ങളും രഹസ്യമായി സൂ◌ിക്കുറമന്നും ഗ്ലവഷണ ആവരയങ്ങൾക്കായി മാശ്ലം ളേപയാഗ്◌ിക്കുറമന്നും ഞാൻ ഇതിനാൽ ളെ◌' നൽകുന്നു. ഒരു കാരണവരാ◌◌ും◌ം വയക്തി◌േരമായ വിവരങ്ങൾ ആപരാ◌◌ും◌ം റവളിറെ◌◌ുത്ത്◌ില്ല.

<u>പഠനിൻത്തെ ഫെും</u>
◌േഠനത്ത്◌ിന'റെ ഫെങ്ങൾ എൻ്'റെ MPH ശ്◌േബന്ധത്ത്◌ിനായി ളേപയാഗ്◌ിക്കുകയും പജണ്ണുകളിൽ ശ്◌േസിദ്ധീകരിക്കുകയും റചയ്യും.

കൂ◌◌ുതൽ വിവരങ്ങൾക്ക' ബന്ധറെ◌◌ുക

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Member Secretary
Institutional Ethics Committee
SCTIMST, TRIVANDRUM- 695011
Office: 04712524689
Email: iec.mem.sec@sctimst.ac.in

ANNEXURE VI

സമ്മതപത്രം

ഗ്രവഷണ വിവര ഷീറ്റിൽ നൽകിയിരിക്കുന്ന എല്ലാ വിവരങ്ങളും ഞാൻ _____വായിക്കുകയും പകർക്കുകയും മനസ്സിൊാക്കുകയും റചയ'തു. റേരുവിരൽ േതിൊിക്കുന്നതിൊൂറെ / ഒിൊുന്നതിൊൂറെ ഈ േഠനത്ത്ിറെ എൻ്'റെ സവപമധയാ േങ്കാളിത്ത്ം ഞാൻ സ്ഥിരീകരിക്കുന്നു. വിവര പരഖരണ ശ്ൈേശ്ലിയയിൽ ഏതു സമയത്ത്ുംം എൻ്'റെ േങ്കാളിത്ത്ം ഒരു വിരദീകരണവുമില്ലാറത േിൻവെിക്കാറമന്നും എൻ്'റെ ഐഡന'ൊിറ്റിയും വയക്തിഗ്ത വിവരങ്ങളും സുരേിതമായി സൂേിക്കുറമന്നും ഞാൻ മനസ്സിൊാകുന്നു. കൂൊുതൽ വയക്തതയ'ക്കായി ആറരയാണ' ബന്ധറെപെണ്ടറതന്ന' എന്നും എറന്ന ഞ്ഞിയിച്ചിട്ടുണ്ട'.

േങ്കാളിയുറെ ഒ' / തമ്പ' ഇംശ്ൈേഷൻ:

സ്ഥലം:

സാേിയുറെ ഒ':

ANNEXURE VII

കർഷകരുത്തെയും കാർഷിക ത്തതാഴിെ◌ാളികളുത്തെയും ഇെയിൽ മാുംസപപശീസുംബന്ധമായ െക്ഷണങ്ങളുും അനുബന്ധ ഘെകങ്ങളുും വിെയിരുെൽ- ഒരു പപ്ലാസ് ത്തസക്ഷണൽ പഠനും

Q. No.	വിഭാഗും 1: വയക്തിപരവുും ജനസുംഖ്യാപരവുമായ പF◌ാദയങ്ങൾ	
1	ശ്ര◌ായം (◌ൂർത്ത്◌ിയായ വർഷങ്ങളിൽ)	
2	ലെംഗ്◌ികത	☐ ◌ുരുഷൻ ☐ സ'ശ്ലീ ☐ മറ്റുള്ളവ
3	ശ്ര◌ധാന വിള	☐ വാഴെഴും ☐ മരച്ചീനി ☐ മപറ്ററതങ്കി◌ുും
4	വിദയാഭയാസ നി◌	☐ നിരേരൻ ☐ ശ്ര◌ാഥമിക വിദയാഭയാസും ☐ റസക്കൻഡി ക്കൂൾ ☐ ലഹറകൂൾ വിദയാഭയാസും ☐ ഹയർ റസക്കൻഡി വിദയാഭയാസും ☐ പകാപളജ' ബിരുദപമാ അതിൽ കൂ◌ുതപൊ
5	കു◌ുും◌ംബ തരും	☐ അണുകു◌ുും◌ംബും ☐ കൂട്ടുകു◌ുും◌ംബും
6	ലവവാഹിക നി◌	☐ അവിവാഹിതൻ /ആവിവാഹിത ☐ വിവാഹിതൻ/ വിവാഹിത ☐വിവാഹപമാചിതർ/പവർ◌ിരിയൽ ☐ വിധവ
7	പെഷൻ കാർഡിന'റെ തരും	☐ മഞ്ഞ കാർഡ' (AAY) ☐ ◌ിങ്ക' കാർഡ' (BPL) ☐ നീ◌ കാർഡ' (APL) ☐ റവള്ള കാർഡ'
8	വീ◌ിന'റെ ഉെമസ്ഥാവകാരും	☐ സവന്തും ☐ വാ◌കയ'ക്ക'
9	പമൽക്കൂരയുറെ തരും	☐ ഒാ പമഞ്ഞ പമൽക്കൂര ☐ ഒാടിട്ട പമൽക്കൂര ☐ പകാൺക്രീറ്റ' പമൽക്കൂര ☐ മറ്റുള്ളവ
10	നിങ്ങളുറെ വീട്ടിൽ താമസിക്കുന്ന ആളുകളുറെ എണ്ണും	

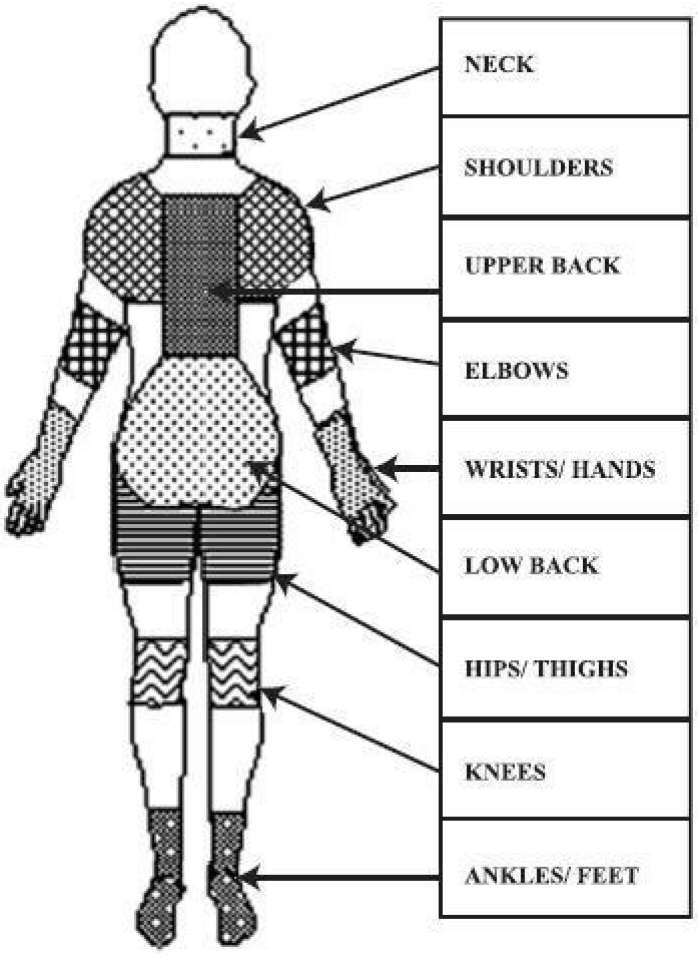
11	നിങ്ങളുറെ കുെുംബാംഗ്ങ്ങളിൽ ആറരങ്കിെുംം ഇപത കൃഷിയിപൊ മപറ്ററതങ്കിെുംം കാർഷിക പമഖെയിപൊ പജാെി റചയ്യുന്നുപണ്ടാ?	☐ അറത, ഇപത കൃഷിയിൽ ☐ അറത, മററ്റാരു കൃഷിയിൽ ☐ ഇല്ല

Q. No.	വിഭാഗും 2: പജാെിയുത്തെ വിശദാുംശങ്ങൾ	
12	നിങ്ങൾ എശ്ര വർഷമായി കൃഷിയിൽ ഏർറെട്ടിരിക്കുന്നു?	
13	കഴിഞ്ഞ ഒരു വർഷമായി നിങ്ങൾ കൃഷി റചയ്തിരുപന്നാ?	☐ അറത ☐ ഇല്ല
14	നിങ്ങൾ സവന്തം വതുവിൽ ആപണാ പജാെി റചയുന്നത'? (ഇറല്ലങ്കിൽ, പചാദയം 16-പെക്ക' പോകുക)	☐ അറത ☐ ഇല്ല ☐ സവന്തം & കൂെിക്ക'
15	ഉറണ്ടങ്കിൽ, നിങ്ങൾക്ക' എശ്ര ഏക്കർ ഭൂമിയുണ്ട'?	☐ നനഞ്ഞ ഭൂമി _____ ☐ വരണ്ട ഭൂമി _____
16	ഒരു സാധാരണ ദിവസത്ത്ിൽ നിങ്ങൾ രരാരരി എശ്ര മണിക്കൂർ കൃഷിക്കായി റചെവഴിക്കുന്നു?	
17	ഒരു ആശ്ചയിൽ നിങ്ങൾ എശ്ര മണിക്കൂർ അധികമായി പജാെി റചയ്തു?	
18	നിങ്ങളുടെ ശരാശരി വാർഷിക വരുമാനം എന്താണ്?	
19	നിങ്ങൾ ഒരു മാസത്ത്ിൽ എപൊറഴങ്കിെുംം പജാെിയിൽ നിന്ന' അവധി എെുക്കാെുപണ്ടാ?	☐ അറത ☐ ഇല്ല
20	അറത എങ്കിൽ, നിങ്ങൾ എശ്ര ആവർത്ത്ിയാണ' എെുക്കുന്നത'?	
21	ടമഡിക്കൽ കാരണങ്ങളാൽ നിങ്ങൾക്ക് ഏടെങ്കിലും ദിവസങ്ങളിൽ ജ ാലി ടെയ്യാൻ കഴിഞ്ഞിജ്ജേ?	☐ അറത ☐ ഇല്ല
22	അടെ എങ്കിൽ, കഴിഞ്ഞ ഒരു വർഷത്തിനിടെ	

	മകുജലാകടലറൽ ജവദന കാരണം നിങ്ങൾക്ക് എത്ര ദിവസം ജ ാലി ടെയ്യാൻ കഴിഞ്ഞിര?	
23	നിങ്ങളുറെ പജാര്യിൽ ഏറതങ്കിലും ഉകരണങ്ങളുറെപയാ ശ്രപതയക ഉകരണങ്ങളുറെപയാ ഉപയാഗ്ം ഉൾറെട്ടിട്ടുപണ്ടാ?	☐ അറത ☐ ഇല്ല
24	ഉറണ്ടങ്കിൽ, നിങ്ങൾ ഏതുതരം ഉകരണമാണ' ഉപയാഗ്ിക്കുന്നത'?	
25	നിങ്ങൾ കൃഷിയല്ലാറത മററ്ററന്തങ്കിലും പജാര്യി റചയ്യുന്നുപണ്ടാ?	☐ അറത ☐ ഇല്ല
26	ഉറണ്ടങ്കിൽ, എന്ത' പജാര്യി?	
27	നിങ്ങളുറെ വീട്ടിൽ നിന്ന' കൃഷി റചയ'യുന്ന സ്ഥലത്ത്ക്ക' എശ്ര ദൂരം ഉണ്ട'?	
28	പജാര്യിസ്ഥലത്ത്ക്കുള്ള യാശ്രാ രീതി	
29	കൃഷി സ്ഥലത്ത്ു നിങ്ങൾ റചയ്യുന്ന റോതുവായ പജാര്യികൾ ഏറതാറക്കയാണ'? (നിങ്ങൾക്ക' ഒന്നിര്യികം ഓ'ഷനുകൾ തിരറഞ്ഞുക്കാം)	☐ **വളപ്പയാഗും** – ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **മണ്ണ് നിരപ്പാക്കൽ** - ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **കുഴി കുഴിക്കൽ** - ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **Fാര്യുണ്ടാക്കുന്നത്** – ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **ജപസFനും**- ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **വിര്യ നുന്നത്**- ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **കളത്തയുപ്പ്** – ☐ സവന്തമായി ☐ റമഷീൻ ഉപയാഗ്ിച്ച'☐ കൂര്യിക്കാർ ☐ **കയറ്റുമതി** - ☐ സവന്തമായി ☐ റമഷീൻ

		ഉപയാഗ്ിച്ച'□ കൂെ്ിക്കാർ □ **വിളത്തവുപ്പ്** – □ സവന്തമായി □ റമഷീൻ ഉപയാഗ്ിച്ച'□ കൂെ്ിക്കാർ □ **മറ്റുള്ളവ**
30	നിങ്ങൾ വീട്ടിറെ പജാെ്ിയിെ്ുംം ഏർറെ്ാെ്ുപണ്ടാ?	□ അറത □ ഇല്ല
31	ഉറണ്ടങ്കിൽ, നിങ്ങൾ വീട്ടിൽ റചയ്യുന്ന പജാെ്ികൾ എറന്താറക്കയാണ'? (നിങ്ങൾക്ക' ഒന്നിെ്ധികം ഓ'ഷനുകൾ തിരറഞ്ഞുക്കാം)	□ േ്ാചകം □ തൂത്ത്ുവാരൽ □ തുണികൾ കഴുകൽ □ േ്ാശ്ം കഴുകൽ □ ദൂര സ്ഥങ്ങളിൽ നിന്ന' റവള്ളം റകാണ്ടുവരുക □ മറ്റുള്ളവ, വയക്തമാക്കുക_____
32	ഒരു സാധാരണ ദിവസത്ത്ിൽ, നിങ്ങൾ എശ്ര മണിക്കൂർ ഉങ്ങും?	
33	രാശ്ിയിെ്ല്ലാറത നിങ്ങൾക്ക' ഉങ്ങാൻ അവസരം െ്ഭിക്കാെ്ുപണ്ടാ?	□ അറത □ ഇല്ല
34	ഉറണ്ടങ്കിൽ, എശ്ര മണിക്കൂർ?	

വിഭാഗും 3: മാുംസപപശി സുംബന്ധമായ പവദനത്തയ കുെിച്ചുള്ള പF ാദയങ്ങൾ



പചാദയാവെിയിൽ ോമർരിച്ചിരിക്കുന്ന രരീരഭാഗ്ങ്ങൾ ഈ ചിശ്ം കാണിക്കുന്നു. നിങ്ങൾക്ക' ഏത' ഭാഗ്ത്ത്ാണ' ശ്ോര'നമുള്ളറതന്ന' (എറന്തങ്കിെുംം ഉറണ്ടങ്കിൽ) നിങ്ങൾ സവയം തീരുമാനിക്കണം.

കഴിഞ്ഞ 12 മാസത്ത്ിനിെയിൽ നിങ്ങൾക്ക' എപൊറഴങ്കിെുംം ശ്ോര' നങ്ങൾ (പവദന, അസവസ്ഥത) ഉണ്ടായിട്ടുപണ്ടാ:	ശ്ോര'നങ്ങൾ കാരണം കഴിഞ്ഞ 12 മാസത്ത്ിനിെയിൽ ഏറതങ്കിെുംം സമയത്ത്' നിങ്ങളുറെ സാധാരണ പജാെിയിൽ നിന്ന' (വീട്ടിൽ അറല്ലങ്കിൽ വീട്ടിൽ നിന്ന' ോുെത്ത്') നിങ്ങറള തെഞ്ഞിട്ടുപണ്ടാ:	കഴിഞ്ഞ 7 ദിവസങ്ങളിൽ നിങ്ങൾക്ക' എപൊറഴങ്കിെുംം ശ്ോര' നമുണ്ടായിട്ടുപണ്ടാ?
1. **കഴുെ്** ☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
2. **പതാൾ** ☐ ഇല്ല ☐ അറത, വെറത്ത്	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത

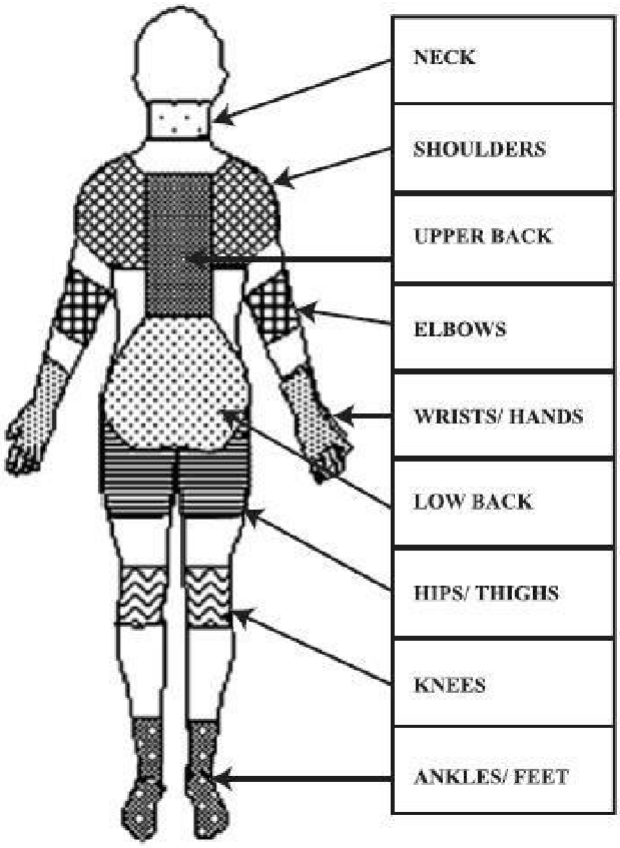
പതാളിൽ ☐ അറത, ഇറത്ത് പതാളിൽ ☐ അറത, രണ്ട' പതാളിെ ുംം		
3. **കകമുട്ട്** ☐ ഇല്ല ☐ അറത, വെതു ലകമുട്ടിൽ ☐ അറത, ഇെത' ലകമുട്ടിൽ ☐ അറത, രണ്ട' ലകമുട്ടുകളിെുു ം	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
4. **കകൈണ്ട / കകകൾ** ☐ ഇല്ല ☐ അറത, വെത' ലകത്ത്ണ്ടയിൽ ☐ അറത, ഇെതു ലകത്ത്ണ്ടയിൽ ☐ അറത, രണ്ട' ലകത്ത്ണ്ടയിെുു ം	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
5. **പിൻഭാഗും (മുകളിൽ)** ☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
6. **നുവ്** ☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
7. **ഇുപ്പ്/തുെകൾ** ☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
8. **കാൽമുട്ടുകൾ** ☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത
9. **കണങ്കാൽ** ☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത	☐ ഇല്ല ☐ അറത

10. മുകളിൽ േെഞ്ഞ െേണങ്ങൾക്ക' നിങ്ങൾ എറന്തങ്കിെുംം ചികിത്സ സവീകരിച്ചിട്ടുപണ്ടാ?
    ☐ ഇല്ല
    ☐ അറത
11. അറത എങ്കിൽ ഏതു തരം ചികിത്സ എന്ന' വയക്തമാക്കുക
    ☐ അപൊെതി
    ☐ ആയുഷ'
    ☐ സവയം ചികിത്സ

□ മപറ്ററതങ്കിിുംം (വയക്തമാക്കുക)

Annexure VIII

Nordic Body Map



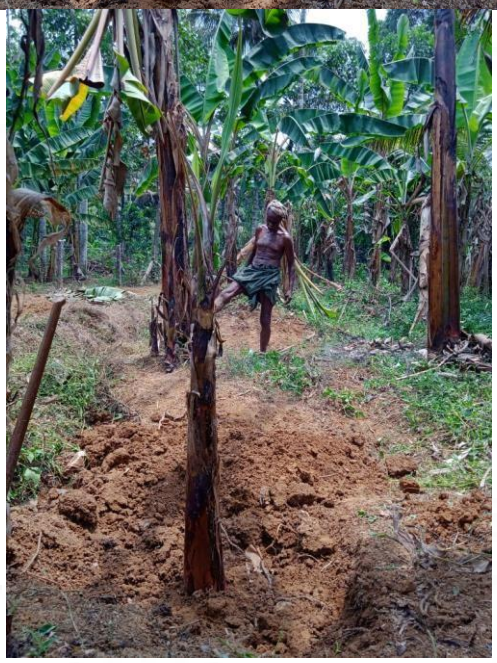
Nordic Map: Source (Prakoso et al., 2019)

Annexure IX

Pictures of agricultural farmers and workers doing agriculture







Annexure X

Plagiarism report

DrillBit

The Report is Generated by DrillBit Plagiarism Detection Software

Submission Information

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Title	MSD Among Agricultural workers
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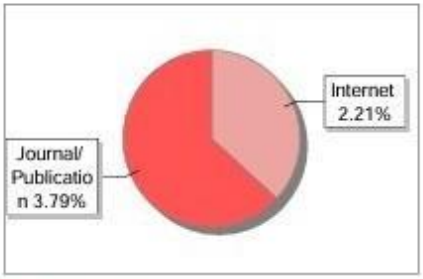

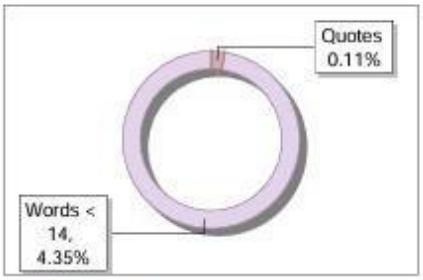

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