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# Morbidity Status Among Tea Garden Workers of Assam

*Based on the Survey of Morbidity and  
Mortality Among Tea Garden Workers in  
Dibrugarh, Jorhat, Sibsagar and Tinsukia  
Districts of Assam, 2021-22*



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# Executive Summary

Ensuring the well-being of workers is essential for achieving Sustainable Development Goal (SDG) 3: Good Health and Well-Being, which aims to reduce morbidity and mortality from communicable and non-communicable diseases while promoting universal health coverage. Worker morbidity, particularly in labour-intensive sectors, directly impacts SDG 8: Decent Work and Economic Growth, as poor health conditions reduce productivity, increase absenteeism, and place economic burdens on both workers and employers. Additionally, SDG 1: No Poverty and SDG 2: Zero Hunger are closely linked, as low wages, poor nutrition, and workplace hazards contribute to higher disease prevalence and hinder socioeconomic mobility. Addressing morbidity among workers also aligns with SDG 10: Reduced Inequalities, as marginalized labour groups—often in informal and hazardous employment—face greater health risks with limited access to healthcare. A comprehensive approach that improves occupational health, nutrition, and access to medical care is crucial to ensuring a healthier workforce, strengthening economic resilience, and advancing sustainable development.

Local and national-level surveys play a crucial role in assessing the morbidity status of workers, particularly among marginalized populations. These surveys provide data-driven insights into disease prevalence, occupational health risks, and healthcare accessibility, helping policymakers design targeted interventions. At the local level, surveys capture region-specific health challenges and workplace conditions, allowing for community-based solutions. At the national level, comprehensive surveys help identify broader health trends, disparities across different labour sectors, and the effectiveness of existing healthcare policies. By integrating both levels of assessment, governments and organizations can ensure inclusive healthcare planning, improve workplace safety regulations, and enhance access to essential health services for vulnerable worker populations.

Surveys on morbidity and mortality in India date back to the 1950s when the National Sample Survey Organisation first conducted the Morbidity Survey in its seventh round from October 1953 to March 1954. No official sources have conducted

a survey specifically designed for a particular community. The present study is significant as it focuses entirely on the Tea Garden community of Assam.

The household surveys in the tea garden districts of Assam were conducted under the extraordinary circumstances of the COVID-19 lockdowns. We have completed four phases of data collection. In each phase, only one district was chosen for study, and the survey was carried out in a mission mode with a dedicated group of trained field investigators. In the first phase, conducted in September-October 2021, we enumerated 201 households in the Dibrugarh district. In the second phase, in February 2022, we enumerated 258 households in the Tinsukia district. In the third and fourth phases, we enumerated 150 households in Sibsagar and 114 households in Jorhat, respectively.

The present report provides information on 723 tea garden worker households, comprising 3525 members. The sampled number of workers were 1269. We have considered four central tea garden districts of Assam, namely Dibrugarh, Tinsukia, Sibsagar and Jorhat.

This report examines the health status of workers, highlighting the prevalence of both communicable and non-communicable diseases (NCDs), as well as occupational health hazards. Among communicable diseases, tuberculosis was widespread, alongside common cold and fever. Additionally, 22 chronic cases of undiagnosed diseases were reported. Among NCDs, hypertension emerged as the most common condition, followed by anaemia and gastritis. Occupational health issues were also significant, with high occurrences of body and backache, joint or bone diseases, headache, and accidental injuries.

Anthropometric assessments revealed a high incidence of low BMI (34.7%) among workers, with female workers (37.7%) being more affected than male workers (30.2%). However, low BMI did not directly correlate with self-reported morbidity. A lack of dietary diversity was observed, with workers' diets being predominantly carbohydrate-based.

Findings suggest a clear link between workers' morbidity and factors such as poor nutrition, dietary intake, workplace hazards, and low socioeconomic conditions.

These insights underscore the need for improved health interventions, nutritional support, and workplace safety measures to enhance workers' overall well-being.

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# 1. Introduction

Understanding the health status of a population requires two fundamental measures: mortality and morbidity. Mortality indicators such as crude death rate, infant mortality rate, and maternal mortality rate provide insights into the risk of death due to diseases. Morbidity, in contrast, measures the prevalence of short-term (acute) and long-term (chronic) illnesses within a population, offering a more comprehensive assessment of public health.

Morbidity is analyzed using two key indicators:

1. Incidence – the proportion of new cases within a population.
2. Prevalence – the total number of both new and existing cases.

India faces a double burden of disease, characterized by the high prevalence of communicable diseases (e.g., tuberculosis, malaria, diarrheal diseases) and a rapid increase in non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes, and cancer. This co-existence of communicable and non-communicable diseases exacerbates health challenges and contributes to long-term disabilities and impairments.

Morbidity is measured through two primary methods:

- Self-perceived morbidity – individuals report their own illnesses based on personal experience.
- Clinical/observed morbidity – medical professionals diagnose health conditions through scientific assessments.

In India, self-perceived morbidity is commonly used in national surveys due to its cost-effectiveness. However, the reliance on public health institution data leads to underreporting, as many rural populations seek medical assistance from private pharmacists, traditional healers, or self-medicate, often bypassing government healthcare facilities. Survey-based data collection is, therefore, essential for obtaining a more accurate representation of morbidity trends.

- Over time, the composition of the disease burden has evolved, but communicable diseases remain a major concern, despite a decline in diarrheal disease incidence.

## 1.1 National-Level Morbidity Surveys

India has conducted multiple national-level morbidity surveys through agencies like the National Sample Survey Organization (NSSO) and the National Council of Applied Economic Research (NCAER). These surveys provide critical insights into the prevalence of diseases, healthcare utilization, and treatment costs across different population groups.

### **NCAER Household Survey of Medical Care (1992)**

- Focused on types of illnesses, sources of medical treatment, and healthcare costs.
- Considered only treated illnesses, leading to concerns about underreporting of untreated ailments.

### **NCAER Household Survey of Healthcare Utilization & Expenditure (1993; published in 1995)**

- Expanded upon the previous survey by including both treated and untreated ailments.
- Provided data on morbidity prevalence by gender, hospitalization rates, and healthcare costs.

### **NSSO Morbidity and Healthcare Surveys (Since 1953–54)**

- 7th Round (1953–54): The first national morbidity survey.
- 17th Round (1961–62), 28th Round (1973–74), 42nd Round (1986–87): Focused on healthcare service utilization and disease burden trends.
- 52nd Round (1995–96): Studied public vs. private healthcare access and created a morbidity profile of the population.
- 60th Round (2004): Published under Morbidity and Condition of the Aged, covering general health, healthcare utilization, and elderly health conditions.

- 71st Round (2014): Reported under Key Indicators of Social Consumption in India: Health, incorporating self-medication cases for the first time, broadening morbidity estimates.

Some of the major highlights from the Indian morbidity surveys are as follows:

**Underreporting Issues:** Most surveys rely on self-perceived morbidity, leading to underestimation of disease burden, especially in rural areas where people seek treatment from private pharmacists, traditional healers, or do not seek treatment at all.

**Data Gaps:** The NSSO surveys focus on household-level health trends but lack community-specific data, such as for marginalized groups like tea garden workers.

**Public vs. Private Healthcare Utilization:** Recent surveys highlight the rising preference for private healthcare services, increasing out-of-pocket expenditures and raising concerns about healthcare affordability.

**Shift from Communicable to Non-Communicable Diseases (NCDs):** Over time, surveys indicate a growing burden of NCDs (e.g., diabetes, cardiovascular diseases), requiring better chronic disease management strategies.

National morbidity surveys in India have evolved to capture changing disease patterns and healthcare access trends. However, gaps in community-specific and untreated morbidity data remain, highlighting the need for more inclusive and region-specific health surveys. Addressing these limitations is crucial for evidence-based policymaking and achieving universal health coverage (SDG 3).

## 1.2 Significance of Morbidity and Mortality Data Collection

The collection of morbidity and mortality data at both national and sub-national levels is crucial for strengthening health statistics and ensuring the successful implementation of the Sustainable Development Goals (SDGs) 2030 agenda, particularly SDG 3: Good Health and Well-Being. Robust health data enables evidence-based policymaking,

efficient resource allocation, and the design of targeted health interventions to reduce disease burden and improve population health outcomes.

### 1. Strengthening Health Statistics and Evidence-Based Policy

- Comprehensive morbidity and mortality data provide a clear picture of disease patterns, helping policymakers identify priority health issues across different regions.
- Sub-national data collection ensures that regional disparities in health outcomes are recognized, allowing for context-specific interventions rather than a one-size-fits-all approach.
- Accurate health statistics help in monitoring trends over time, assessing the impact of public health programs, and identifying emerging health challenges.

### 2. Monitoring Progress Towards SDG 3 and Related Goals

- SDG 3.2 (Reduce child and neonatal mortality): Mortality data help track infant and maternal deaths, enabling interventions like improved prenatal care and vaccination programs.
- SDG 3.4 (Reduce premature mortality from NCDs): Morbidity data highlight the rising burden of non-communicable diseases (NCDs) such as diabetes and cardiovascular diseases, leading to better strategies for prevention, screening, and treatment.
- SDG 3.8 (Achieve Universal Health Coverage - UHC): Data on disease burden and healthcare access inform health financing and insurance policies, ensuring affordable healthcare for all.
- SDG 1 (No Poverty) & SDG 8 (Decent Work and Economic Growth): Understanding morbidity rates among low-income and labour-intensive populations (e.g., tea garden workers) helps reduce health-related economic inequalities and improve workplace health and safety.

### 3. Targeted Resource Allocation and Health System Strengthening

- Morbidity data guide resource distribution, ensuring that medicines, healthcare facilities, and trained personnel are allocated where they are most needed.

- Mortality trends help identify high-risk populations, allowing governments to prioritize healthcare spending for maternal health, elderly care, and communicable disease control.
- Sub-national data ensure that health infrastructure gaps in rural and remote areas are addressed, enhancing access to quality healthcare services.

#### 4. Strengthening Pandemic Preparedness and Health Emergency Response

- Real-time morbidity data allow for early detection of disease outbreaks, enabling governments to prevent and control epidemics (e.g., COVID-19, tuberculosis, malaria).
- Sub-national disease tracking enhances community-level surveillance, ensuring a rapid response to infectious disease hotspots.

#### 5. Enhancing Equity in Healthcare Access

- Disaggregated health data help measure inequalities based on gender, socio-economic status, and geographic location, ensuring that vulnerable groups receive targeted interventions.
- Monitoring morbidity and mortality trends among marginalized communities (e.g., tea garden workers, tribal populations) supports inclusive health policies and addresses systemic healthcare barriers.

4. Collecting detailed morbidity and mortality data is crucial for effective health policy formulation. The key reasons include:

- Age at death and causes of death provide an immediate indicator of population health.
- Tracking mortality trends helps assess the effectiveness of health programs.
- As life expectancy increases, mortality rates alone are insufficient; morbidity data is necessary to evaluate overall health.
- Morbidity includes diseases, injuries, and disabilities, offering a more detailed health assessment.
- Understanding disease patterns helps control outbreaks and may reveal underlying causes.

A robust understanding of morbidity is essential for designing targeted health interventions, particularly for vulnerable worker populations such as tea garden labourers in Assam. This study contributes to filling data gaps, improving health policy formulation, and ensuring better healthcare access for marginalized communities. Morbidity is measured using various indicators that capture the prevalence, incidence, and severity of diseases in a population. These indicators help in assessing disease burden, health system performance, and resource allocation.

*Table 1.1 Key Morbidity Indicators*

No.	Indicator	Definition
1.	Incidence Rate	Number of new cases of a disease occurring in a population over a specific period, usually expressed per 1,000 or 100,000 people.
2.	Prevalence Rate	Total number of existing cases (both old and new) of a disease in a population at a given time, expressed per 1,000 or 100,000 people.
3.	Acute Morbidity Rate	Measures the number of people affected by short-term (acute) illnesses such as infections, injuries, or seasonal diseases.
4.	Chronic Morbidity Rate	Measures the prevalence of long-term (chronic) illnesses such as diabetes, hypertension, and cardiovascular diseases.
5.	Disability-Adjusted Life Years (DALYs)	Total number of years lost due to illness, disability, or premature death, combining both morbidity and mortality impacts.
6.	Years Lived with Disability (YLDs)	Measures the number of years a person lives with a disease or disability, weighted by severity.
7.	Hospitalization Rate	Number of people admitted to hospitals per 1,000 or 100,000 population, indicating the severity of illnesses requiring medical intervention.
8.	Self-Reported Morbidity	Based on individual perception of illness, often collected through surveys and household studies (e.g., NSSO health rounds in India).
9.	Healthcare Utilization Rate	Measures the frequency with which people seek medical care, including visits to doctors, hospitals, or use of alternative medicine.
10.	Outpatient Visit Rate	Number of visits to outpatient healthcare facilities, indicating disease burden and healthcare accessibility.

Source: Compiled from literature

*Table 1.2 Key Mortality Indicators*

No.	Indicator	Definition
1.	Crude death rates	Number of deaths in a given year per 1000 population
2.	Age-Specific death rates	Number of deaths in a specific age (group) per 1000 persons in the age group
3.	Life Table Estimates	Statistical measures used to assess mortality patterns, including life expectancy and survivorship probabilities, based on current age-specific death rates.
4.	Life Expectancy	Estimate of the average number of additional years a person could expect to live if the age-specific death rates for a given year prevailed for rest of his or her life
5.	Survivorship by age	Probability that an individual will survive to a specific age, given prevailing mortality conditions.
6.	Cause-Specific Death Rate	Number of deaths attributable to a particular cause divided by population at risk, usually expressed in deaths per 100,000
7.	Maternal Mortality Rate	Number of women who die as a result of complications of pregnancy or childbearing in a given year per 100,000 live births in that year

Source: Compiled from literature

## 1.3 Morbidity and Mortality in Assam

Assam faces a high burden of both morbidity and mortality, influenced by poor healthcare access, high prevalence of communicable and non-communicable diseases (NCDs), malnutrition, and environmental factors. Data from national-level surveys such as NSSO, NFHS (National Family Health Survey), and the Global Burden of Disease (GBD) Study provide valuable insights into disease patterns and health outcomes in the state.

### **Morbidity Patterns in Assam**

- **Double Burden of Disease:** Assam faces a simultaneous high burden of communicable diseases (e.g., tuberculosis, malaria, diarrheal diseases) and rising non-communicable diseases (e.g., diabetes, hypertension, CVDs, cancer).
- **Communicable Diseases:**
  - Tuberculosis (TB) remains a major health concern, with Assam having one of the highest TB incidence rates in India.



- Vector-borne diseases like malaria, dengue, and Japanese encephalitis (JE) are widespread, especially in flood-prone areas.
- Waterborne diseases such as cholera and typhoid are common due to poor sanitation and unsafe drinking water.
- **Non-Communicable Diseases (NCDs):**
  - Cardiovascular diseases (CVDs), diabetes, and chronic respiratory diseases have increased significantly over the years.
  - High tobacco and alcohol consumption in Assam has led to a higher prevalence of oral and lung cancers compared to national averages.
  - The Assam Human Development Report (2014) found that tea garden workers and flood-affected communities have higher rates of NCDs and malnutrition.

### Mortality Patterns in Assam

- **High Mortality in Productive Age Groups:** According to health data from 2016, 39.8% of total deaths in Assam occurred in the 40–69 age group, followed by 33.5% in the 70+ age group. The 15–39 age group accounted for 13.6% of total deaths, while 13% of deaths occurred in children (0–14 years).
- **Infant and Maternal Mortality:** Assam has one of the highest infant mortality rates (IMR) and maternal mortality rates (MMR) in India. According to NFHS-5 (2019–21), the state's IMR was 32 per 1,000 live births, higher than the national average. The MMR was 215 per 100,000 live births (SRS 2016–18), among the highest in India.
- **Major Causes of Death:**
  - Children (0–14 years): Neonatal disorders, diarrheal diseases, and lower respiratory infections contribute to over 60% of child deaths.
  - Adults (40+ years): Cardiovascular diseases (CVDs), chronic respiratory diseases (e.g., COPD), and cancers are the leading causes of death.

## 1.4 Gaps in Understanding Morbidity Among Tea Garden Workers

The socio-economic discourse on Assam's tea gardens consistently portrays tea plantation workers as one of the most marginalized and vulnerable communities in the state. Issues such as widespread hunger, malnutrition, and severe anemia among women and children have been extensively debated in both academic and policy discussions. Additionally, tobacco and alcohol consumption rates are reported to be disproportionately high within this community (Hazarika et al., 2002). The adverse impact of morbidity on work productivity further exacerbates financial instability, leading to income losses. Given that NSSO data does not provide community-specific insights, this study fills a critical gap by evaluating the health conditions of Assam's tea plantation workers.

The Assam Human Development Report (2014) identified several districts – Cachar, Karimganj, Hailakandi, Tinsukia, Sonitpur, Dibrugarh, and Sibsagar – where life expectancy at birth falls below the state average of 62 years. The report also emphasized that life expectancy is particularly low in tea garden areas, where both communicable and non-communicable diseases are highly prevalent. Findings from various clinical studies reinforce this concern (Mahanta et al., 2016; Mahanta et al., 2015; Mahanta et al., 2013; Rane et al., 2019; Biswas, 2002). Furthermore, research indicates a significant reliance on government health services in tea garden regions (OKD Institute of Social Change and Development, Guwahati & Institute for Human Development, New Delhi, 2014).

A study that examines self-reported morbidity at both the household and worker levels in tea garden communities would contribute valuable insights to the social science literature. The WHO's disease burden study highlights high disability rates among the working-age population, underscoring the need for a focused assessment of worker health. This study seeks to address some of the limitations of secondary data by establishing connections between workers' nutritional status, workplace conditions, and overall health outcomes.

Despite extensive research on morbidity in India, no comprehensive study has focused on the health status of tea garden workers in Assam. This population represents one of the most vulnerable and marginalized groups in the state. They face high rates of malnutrition, anaemia, and substance abuse, contributing to poor health and reduced work productivity. However, NSSO surveys do not provide community-level morbidity data, making it difficult to assess their specific health challenges.

This study aims to fill this critical data gap by evaluating the morbidity status of tea garden workers and examining the influence of nutrition, workplace hazards, and socioeconomic conditions on their health. The Assam Human Development Report (2014) highlights that districts with life expectancy below the state average (62 years) include Tinsukia, Sonitpur, Dibrugarh, and Sibsagar – all major tea-growing regions. Furthermore, tea garden areas have the lowest life expectancy in the state, with high prevalence of both communicable and non-communicable diseases.

## 2. Methodology of the study

### 2.1 Statistical note on Sampling Design and Sample Size Determination

The survey follows a three-stage stratified sampling design to ensure a representative sample of tea plantation workers.

#### 1. Stratification and Sampling Framework

- First-Stage Units (FSU): The primary sampling units are tea cultivation-dominated districts, with a total of seven districts selected.
- Second-Stage Units (SSU): Within these districts, tea estates managed by ABITA (Assam Branch of the Indian Tea Association) are chosen.
- Ultimate-Stage Units (USU): The final sampling units are households, as the survey is conducted at the household level.
- At each stage, probability proportional to size (PPS) sampling with replacement is applied, ensuring larger tea estates have a higher chance of selection based on the number of workers.

From a pilot survey conducted in Tinsukia and Baksa, it was observed that each household has an average of two workers. Using this information, the estimated number of households required to survey 2,120 workers is 1,060 households.

#### 2. Sample Size Determination Using Cochran's Formula

To determine the required sample size, Cochran's equation for an unknown population proportion is applied.

$$\eta_0 = \frac{Z^2 \cdot p \cdot q}{e^2}$$

Where,

- $\eta_0$  = sample size
- $Z$  = Z – score corresponding to the desired confidence level (e. g., 1.96 for 95% confidence interval)

- $p$  = Estimated proportion of the population with the characteristic of interest
- $q = 1 - p$  (complement of  $p$ )
- $e$  = Desired level of precision (margin of error)

The Z-score value (1.96) is taken from statistical tables that represent the area under the normal distribution curve for a 95% confidence level. The estimated sample size ensures that the survey results are statistically reliable and representative of the worker population.

### Choosing values for $p$ and $e$ in Cochran's Formula

In Cochran's equation:

$$n_0 = \frac{Z^2 \cdot p \cdot q}{e^2}$$

We need to determine appropriate values for  $p$  (the estimated proportion of workers with a certain characteristic) and  $e$  (the desired precision level).

- Choosing  $p$  (Estimated Proportion of Attribute in Population)
  - If there is no prior knowledge of the proportion of workers with a particular characteristic (e.g., morbidity rate, literacy rate, etc.), the most conservative approach is to assume  $p=0.5$ .
  - This assumption maximizes variability and ensures the largest required sample size, making the study more robust.
  - If prior data exists, a more precise  $p$  value can be chosen based on previous surveys or pilot studies.
- Choosing  $e$  (Margin of Error or Desired Precision)
  - The margin of error ( $e$ ) determines the maximum allowable difference between the sample estimate and the true population parameter.
  - Common choices for  $e$  in social science and health surveys are 5% (0.05) or 3% (0.03).
  - A smaller  $e$  increases the required sample size but improves precision.

### 3. Plugging in the values

For a 95% confidence level, the Z-score is 1.96. Assuming p=0.5 and a 5% margin of error (e=0.05), the required sample size is:

$$\eta_0 = \frac{(1.96)^2 \cdot (0.5) \cdot (0.5)}{(0.05)^2}$$

$$\eta_0 = \frac{3.8416 * 0.25}{0.0025}$$

$$\eta_0 = \frac{0.9604}{0.0025} = 384.16$$

Thus, the minimum required sample size is approximately 385 households. If a 3% margin of error (e=0.03) is chosen, the required sample size increases to 1067.11, which rounds up to 1068. Since the total target population of workers is around 2,120, the actual required sample size may be adjusted using the finite population correction (FPC) if needed. However, given the large workforce in tea estates, assuming an infinite population approximation with Cochran's formula provides a reasonable sample size.

## 2.2 Study location & survey schedule

The study focused on assessing morbidity among tea plantation workers in Assam, specifically in the districts of Dibrugarh, Tinsukia, Jorhat, and Sibsagar. These districts, classified under the Eastern Plains region by the NSS, are located along the southern banks of the Brahmaputra River in Upper Assam and share contiguous borders. The selection of these districts was primarily based on the prominence of tea cultivation in the region. Dibrugarh leads with the highest number of tea estates in Assam, totaling 177, followed by Tinsukia with 122.

*Table 2.1 Surveyed Districts and Tea Gardens*

Item	Tinsuki a	Dibrugar h	Jorhat	Sibsaga r	Total
Households surveyed	258	201	114	150	723
Total Population Surveyed	1306	974	535	710	3525
Total Tea plantation workers Surveyed	440	337	226	266	1269
Sample Tea Gardens Surveyed	10	10	4	7	31

Source: Survey data, 2021-22

The survey was conducted at the household level in the line quarters of tea estates, selecting households with at least one member employed as a tea plantation worker. Data collection included fundamental household details such as demographic characteristics of all members, sources of income, and patterns of consumption expenditure for both food and non-food items. Additionally, information on access to drinking water and sanitation facilities was recorded.

Self-reported morbidity data were gathered for all household members, covering both short-term illnesses (acute ailments) and chronic conditions, along with any instances of hospitalization. At the individual level, tea plantation workers provided detailed reports on their health conditions, specifying the type of illness – whether acute or chronic – and instances of hospitalization, including the nature of the diseases reported. Notably, proxy reporting of morbidity was considered, following the approach used by the NSSO in similar surveys.

#### **Selection of Sample Tea Gardens in the Districts:**

The distribution of sample tea gardens across the selected districts was designed to minimize skewness, given that tea plantation workers generally maintain a uniform lifestyle within garden areas. A response distribution of approximately 95% was assumed for the study. Using Cochran's formula, with a 5% margin of error and a 95% confidence interval, the number of tea gardens to be surveyed at the district level was determined accordingly.

#### **Allocation of Sample Households within Tea Gardens:**

A similar sampling approach was adopted for selecting households within the chosen tea gardens. However, to account for potential spatial variations, the margin of error was set at 3% while maintaining a 95% confidence level. Given the likelihood of some degree of skewness in household-level data, a minimum benchmark response distribution of 50% was established.

### **Key Aspects of the Survey Schedule:**

The survey schedule was structured to align with the study's objectives and is divided into two main sections. The first section focuses on data collection at the household level, while the second section specifically gathers information pertaining to individual tea plantation workers.

#### *Reference Period for Morbidity Data Collection*

The survey adopted a specific reference period for recording morbidity data. For short-term illnesses (acute ailments), a 30-day period was considered, while chronic conditions were recorded if they persisted for more than 30 days. Additionally, hospitalization cases were documented within a one-year (365-day) reference period.

#### *Classification of Diseases for the Study*

The study adhered to the NSSO 75th round's classification of **65 disease types, with four additional categories included, bringing the total to 69**. The added diseases were:

- **Infectious Diseases:** COVID-19
- **Cardiovascular Diseases (CVDs):** Hypotension (low blood pressure)
- **Non-Communicable Diseases (NCDs):** Piles
- **Other Conditions:** Post-COVID vaccination fever

#### *Household-Level Data Collection*

At the household level, a range of socio-economic and demographic details were collected, including:

- **Demographic Profile:** Age, gender, marital status, education level, occupation, employment status, household size, and religion for all members.
- **Household Consumption & Expenditure (Monthly):**
  - Food Items: Groceries, fruits, vegetables, eggs, fish, meat, and dairy products.



- **Non-Food Items:** Medical expenses, education, electricity, cooking fuel, house rent, communication (mobile, TV, newspaper), transportation, loan repayment, and miscellaneous expenditures.
- **Water and Sanitation:** Source of drinking water and sanitation facilities.
- **Self-Reported Morbidity:** Data on short-term illnesses (acute ailments), chronic conditions, and hospitalization were recorded for all household members based on the reference period.

### *Tea Plantation Workers' Data Collection*

In addition to general household data, specific information was collected on tea plantation workers, focusing on their health, occupation, and nutrition.

#### **Morbidity & Healthcare Access**

- Self-reported health conditions were documented for acute and chronic ailments, along with hospitalization details, using the standardized list of 69 diseases.
- Medical consultation details, including whether treatment was sought and the source of healthcare, were gathered.
- Information on the nearest healthcare facility outside the tea estate was collected to assess healthcare accessibility.

#### **Occupational Details**

- Data on employment status (permanent or temporary worker), type of work (tea plucking, factory operations, etc.), and exposure to occupational hazards were collected to evaluate their impact on health.

#### **Anthropometric Measurements**

- Workers' height (in cm) and weight (in kg) were recorded to calculate their Body Mass Index (BMI), providing insights into nutritional status and health outcomes.

#### **Dietary Intake & Substance Consumption**

- Data on dietary habits, including meal frequency per day and the consumption of specific food groups, were collected.

- Food frequency was categorized as daily, weekly, occasional, or never for various food types, such as staples, pulses, vegetables, fruits, dairy, eggs, meat, fish, packaged foods, oils, and beverages.
- Consumption of tobacco, smoking habits, and alcohol intake were also recorded.
- A 24-hour recall of food intake prior to the survey was documented to assess dietary patterns and nutrition levels.

### 3. Demographic Status of Tea Garden Workers

#### 3.1 Gender composition in the tea garden sample

The following table presents the gender-wise distribution of a surveyed population across four districts: Tinsukia, Dibrugarh, Sibsagar, and Jorhat, with a total sample size of 3,525 individuals. The gender distribution across the surveyed districts reveals a consistent trend of female predominance, with women comprising 51.63% of the total sample compared to 48.37% of men. This pattern is observed across all four districts, suggesting a structural characteristic rather than an isolated phenomenon. Among the districts, Sibsagar (52.82%) and Jorhat (52.15%) exhibit the highest female proportions, while Dibrugarh (50.62%) has the most balanced gender distribution with only a 1.24 percentage point difference between the sexes.

Table 3.1 Gender Composition in the Survey Areas

Gender	Tinsukia		Dibrugarh		Sibsagar		Jorhat		Total	
Female	51.5%	673	50.6%	493	52.8%	375	52.1%	279	51.6%	1820
Male	48.4%	633	49.3%	481	47.1%	335	47.8%	256	48.3%	1705
<b>Total</b>	<b>100</b>	<b>1306</b>	<b>100</b>	<b>974</b>	<b>100</b>	<b>710</b>	<b>100</b>	<b>535</b>	<b>100</b>	<b>3525</b>

Source: Survey data, 2021-22

The higher representation of women in the surveyed population may be attributed to the nature of labour participation in tea plantations, where women traditionally form a significant portion of the workforce. The possibility of male out-migration for employment in other sectors could also explain the relatively higher female ratio in these regions. Additionally, the composition of households in tea garden communities, including the presence of extended families and multi-generational households, may contribute to the observed demographic pattern.

These gender disparities raise important questions about the socio-economic conditions of tea plantation workers. A closer examination of employment trends, wage structures, and labour conditions within the tea gardens could provide further insights into the role of gender in shaping workforce participation. Moreover, an analysis of health, nutrition, and overall well-being among male and female workers could help in understanding

gender-specific vulnerabilities within these communities. Comparing these findings with secondary data sources such as Census and NSSO reports would also help validate whether this pattern is unique to the surveyed population or reflective of broader demographic trends in Assam's tea estates.

### Gender Composition Across Districts

- Overall, females (51.63%) outnumber males (48.37%) in the total sample.
- Across all four districts, the proportion of females remains consistently higher than that of males, though the degree of variation differs.

### District-Level Observations

1. Tinsukia (Total: 1,306)
  - Female population: 51.53% (673 individuals)
  - Male population: 48.47% (633 individuals)
  - Tinsukia has a near-balanced gender ratio, though females have a slight majority.
2. Dibrugarh (Total: 974)
  - Female population: 50.62% (493 individuals)
  - Male population: 49.38% (481 individuals)
  - Dibrugarh has the most balanced gender ratio among the districts, with only a 1.24 percentage point difference between females and males.
3. Sibsagar (Total: 710)
  - Female population: 52.82% (375 individuals)
  - Male population: 47.18% (335 individuals)
  - This district has the highest proportion of females, with a 5.64 percentage point gap between genders.
4. Jorhat (Total: 535)
  - Female population: 52.15% (279 individuals)
  - Male population: 47.85% (256 individuals)
  - Similar to Sibsaagar, Jorhat shows a higher female proportion, exceeding the male population by 4.3 percentage points.

## 3.2 Literacy status of tea garden workers

The literacy status of tea garden workers reflects significant disparities, with a notable proportion of the population having limited formal education. A considerable 32.3% of the total workforce is not literate, with female illiteracy (42.2%) being almost double that of males (21.8%). This highlights a persistent gender gap in educational attainment, which may be rooted in historical socio-economic barriers faced by women in tea garden communities. While only a small fraction (3.9%) of the population is literate without formal schooling, the majority have gained literacy through formal education. The highest proportion of workers fall within the upper primary/middle education category (18.5%), followed closely by those with primary (16.3%) and below-primary (16.2%) education levels. However, only 7.8% of workers have completed secondary education, and participation in higher education is extremely limited, with just 3.5% reaching the higher secondary level and only 0.8% attaining graduate degrees.

*Table 3.2 Population Level Literacy Status in the Survey Areas*

Literacy Level	Female		Male		Total	
<b>Not literate</b>	697	42.2	335	21.8	1032	32.3
<b>Literate Without Formal Schooling</b>						
Literate without any schooling	47	2.8	31	2	78	2.4
Literate without formal schooling: others	9	0.5	17	1.1	26	0.8
Literate without formal schooling: through NFEC	6	0.4	9	0.6	15	0.5
Literate through TLC/ AEC	1	0.1	4	0.3	5	0.2
<b>Literate Though Formal Schooling</b>						
Below primary	248	15	269	17.5	517	16.2
Primary	228	13.8	292	19	520	16.3
Upper primary/middle	242	14.6	348	22.6	590	18.5
Secondary	111	6.7	139	9	250	7.8
Diploma /certificate course (up to secondary)	1	0.1	5	0.3	6	0.2
Higher secondary	46	2.8	66	4.3	112	3.5
Diploma/certificate course (higher secondary)	1	0.1	5	0.3	6	0.2
Graduate	11	0.7	14	0.9	25	0.8
Diploma/certificate course (graduation & above)	4	0.2	5	0.3	9	0.3
<b>Grand Total</b>	<b>1652</b>	<b>100</b>	<b>1539</b>	<b>100</b>	<b>3191</b>	<b>100</b>

Note: Some of the entries were left blank by investigators, total blanks 20

Not Applicable 314 has not been considered

NFEC: Non-formal education course; TLC/AEC: Total literacy campaign/Adult education centres

Source: Survey data, 2021-22

These figures suggest that while basic literacy has improved within the tea garden worker community, access to and completion of higher levels of education remain major challenges. The lower representation in secondary and higher education indicates structural barriers such as economic constraints, lack of educational infrastructure, and the necessity for early workforce participation. The stark gender gap in literacy and schooling highlights the need for targeted interventions, particularly for female workers, to enhance educational opportunities and break the cycle of intergenerational poverty within tea garden communities.

### 3.3 Occupation & activity status of tea garden workers

The occupational distribution of tea garden workers highlights key differences in employment patterns between men and women. Among the surveyed population, permanent tea plantation work accounts for the largest share of employment (21.6%), with a slightly higher proportion of men (23.1%) than women (20.2%) in this category.

*Table 3.3 Population Level Occupation Status in the Survey Areas*

Occupation Status	Female (no. and percentage)		Male (no. and percentage)		Total (no. and percentage)	
	no.	percentage	no.	percentage	no.	percentage
Permanent tea plantation worker	367	20.2	394	23.1	761	21.6
Temporary tea plantation worker	372	20.5	235	13.8	607	17.3
Retired tea plantation worker	112	6.2	86	5	198	5.6
Temporary tea plantation worker, Petty business/self-employed	1	0.1	.	0	1	0
Retired tea plantation worker, Petty business/self-employed	.	0	1	0.1	1	0
Agricultural labourer	1	0.1	7	0.4	8	0.2
Agriculture & Allied	1	0.1	7	0.4	8	0.2
Daily wage non-agricultural worker	22	1.2	159	9.3	181	5.1
Salaried but casual	13	0.7	42	2.5	55	1.6
Salaried service (reg)	10	0.6	19	1.1	29	0.8
Petty business/self-employed	10	0.6	23	1.3	33	0.9
Trade/business	.	0	10	0.6	10	0.3
Pensioner	1	0.1	.	0	1	0
Household Work	250	13.8	9	0.5	259	7.4
Student	367	20.2	375	22	742	21.1
Not applicable	286	15.8	337	19.8	623	17.7
<b>Grand Total</b>	<b>1813</b>	<b>100</b>	<b>1704</b>	<b>100</b>	<b>3517</b>	<b>100</b>

*Note:* Some of the entries were left blank by investigators, total blanks 8

*Source:* Survey data, 2021-22

However, a reverse trend is observed among temporary tea plantation workers, where women (20.5%) significantly outnumber men (13.8%), indicating that women are more likely to be in precarious employment within the sector. The presence of retired tea plantation workers (5.6%) suggests an aging workforce with a small proportion transitioning into informal activities such as petty business or self-employment.

Beyond plantation work, men have greater participation in non-agricultural daily wage labour (9.3%), petty business/self-employment (1.3%), and salaried service (3.6%, combining casual and regular employment), while women's engagement in these sectors is minimal. Instead, a substantial share of women (13.8%) is engaged in household work, a category with negligible male representation (0.5%), reflecting traditional gender roles within tea garden communities.

The high proportion of students (21.1%), almost equally split between males (22%) and females (20.2%), is a positive indicator of educational access, although long-term retention and transition into skilled employment remain critical concerns. Additionally, a significant percentage (17.7%) falls into the "Not Applicable" category, which may include elderly dependents or those unable to participate in the workforce due to health or other socio-economic factors.

Overall, the occupational profile underscores the gendered nature of employment in tea gardens, where women are more likely to be in temporary or unpaid roles, while men have slightly better access to stable employment and alternative livelihood options. These insights highlight the need for labour policy interventions that enhance job security, diversify employment opportunities, and improve working conditions, particularly for temporary and female workers in the sector.

The activity status data of tea garden workers across four districts of Assam – Tinsukia, Dibrugarh, Sibsagar, and Jorhat – provides critical insights into employment patterns, labour force participation, and economic inactivity. This analysis focuses on full-time and part-time employment, household responsibilities, labour force non-participation, and job-seeking trends.

*Table 3.4 Population Level Activity Status in the Survey Areas*

Activity Status	Tinsukia		Dibrugarh		Sibsagar		Jorhat		Total	
	No	%	No	%	No	%	No	%	No	%
Currently employed full time	333	25.6	294	30.2	217	30.8	192	36	1036	29.5
Currently employed part time	214	16.5	209	21.5	102	14.5	76	14.3	601	17.1
Household work/child care	99	7.6	81	8.3	70	9.9	35	6.6	285	8.1
Not Available for work (Total)	589	45.3	363	37.3	294	41.7	221	41.5	1467	41.8
Not Available for work (Student)	299	23	182	18.7	131	18.6	130	24.4	742	21.1
Not Available for work (0-6 years not going to school)	115	8.9	90	9.2	70	9.9	38	7.1	313	8.9
Not Available for work (Others)	184	14.2	92	9.5	61	8.7	92	17.3	412	11.7
Not working but seeking or available for work	64	4.9	26	2.7	22	3.1	9	1.7	121	3.4
<b>Grand Total</b>	<b>1299</b>	<b>100</b>	<b>973</b>	<b>100</b>	<b>705</b>	<b>100</b>	<b>533</b>	<b>100</b>	<b>3510</b>	<b>100</b>

Note: Some of the entries were left blank by investigators, total blanks 15

Source: Survey data, 2021-22

The tea garden labour market in Assam exhibits high employment segmentation, with a significant share of full-time and part-time employment but limited alternative job opportunities. Women disproportionately engage in unpaid household work, and a substantial proportion of individuals are not available for work, primarily due to education, childcare, or other constraints.

### 1. Employment Status: Full-Time vs. Part-Time Work

#### a. Full-Time Employment (29.5%)

- Overall, 29.5% of individuals are engaged in full-time employment, with Jorhat having the highest percentage (36%), followed by Sibsagar (30.8%), Dibrugarh (30.2%), and Tinsukia (25.6%).
- The variation across districts suggests differing levels of job availability and economic conditions. The relatively lower full-time employment rate in Tinsukia (25.6%) may indicate fewer stable job opportunities.

#### b. Part-Time Employment (17.1%)

- 17.1% of workers are engaged in part-time employment, with Dibrugarh (21.5%) having the highest share, followed by Tinsukia (16.5%), Sibsagar (14.5%), and Jorhat (14.3%).



- The significant proportion of part-time workers suggests that many individuals, particularly in Dibrugarh, may be engaged in seasonal or informal work arrangements.
- The gap between full-time and part-time employment (12.4 percentage points) highlights the instability of tea garden labour markets, with many workers unable to secure permanent jobs.

## 2. Unpaid Household Work and Care Responsibilities (8.1%)

- 8.1% of individuals are engaged in household work or child care, with Sibsagar (9.9%) having the highest percentage, followed by Dibrugarh (8.3%), Tinsukia (7.6%), and Jorhat (6.6%).
- The relatively high percentage of individuals engaged in unpaid household work, particularly in Sibsagar, suggests that traditional gender roles continue to shape labour force participation, likely affecting women's ability to seek employment.

## 3. Non-Availability for Work (41.8%)

A substantial proportion of the population (41.8%) is classified as "Not Available for Work," which is further categorized into three groups:

### a. Students (21.1%)

- Students make up the largest share of the non-working population (21.1%), indicating high educational participation.
- Jorhat has the highest proportion of students (24.4%), while Dibrugarh (18.7%) has the lowest.
- The variation in student participation could reflect differences in access to education and awareness about its importance.

### b. Children (0-6 years, not going to school) (8.9%)

- A significant number of children under six years old (8.9%) are classified as "Not Available for Work."
- The highest share is in Sibsagar (9.9%), and the lowest is in Jorhat (7.1%).

- This suggests that early childhood education enrollment may be relatively low, particularly in Sibsagar.

c. Other Non-Working Individuals (11.7%)

- 11.7% of individuals fall into the "Others" category of non-availability for work, which could include the elderly, persons with disabilities, and those unable to work due to health conditions.
- Jorhat (17.3%) has the highest proportion in this category, suggesting a higher number of dependents or individuals who may have withdrawn from the workforce.

*4. Unemployment: Not Working but Seeking Work (3.4%)*

- Only 3.4% of individuals are not working but seeking or available for work, with the highest proportion in Tinsukia (4.9%) and the lowest in Jorhat (1.7%).
- The relatively low unemployment rate suggests that most individuals who are able to work are either employed or not actively seeking jobs.
- The low job-seeking rate in Jorhat may indicate limited employment opportunities, leading to discouragement among potential workers.

*5. Regional Trends and Key Observations*

- Jorhat has the highest full-time employment rate (36%) and the lowest part-time employment rate (14.3%), suggesting better job stability.
- Dibrugarh has the highest part-time employment rate (21.5%) and a relatively high share of individuals in household work (8.3%), possibly reflecting labour market instability.
- Sibsagar has the highest proportion of individuals engaged in household work (9.9%) and the highest share of young children not in school (9.9%), indicating potential gendered labour force participation constraints.
- Tinsukia has the highest proportion of unemployed individuals seeking work (4.9%), suggesting a stronger demand for jobs relative to supply.

### 3.4 Anthropometric status of tea garden worker population

Assessing the anthropometric status of tea garden workers is crucial in understanding their health, nutritional well-being, and susceptibility to morbidity and mortality. Tea garden workers often face challenging living and working conditions, including low wages, high physical labour demands, and inadequate access to healthcare and nutrition, which can significantly impact their growth, body composition, and overall health outcomes. Anthropometric measures such as Body Mass Index (BMI), height, weight, and mid-upper arm circumference (MUAC) serve as key indicators of undernutrition, obesity, and chronic energy deficiency, which are linked to increased risks of infectious diseases, work-related injuries, maternal health complications, and non-communicable diseases. In morbidity and mortality studies, analyzing anthropometric data helps identify vulnerable groups, track disease patterns, and develop targeted health interventions to improve the well-being of tea garden communities.

The World Health Organization (WHO) BMI classification is used to assess underweight, normal weight, overweight, and obesity based on Body Mass Index (BMI), which is calculated as:

$$BMI = \frac{\text{weight in kg}}{(\text{height in metres})^2}$$

The WHO BMI Classification for adults are as follows:

*Table 3.5 WHO BMI Classification for Adults*

BMI (kg/m <sup>2</sup> )	Category
< 16.0	Severe underweight
16.0 - 16.9	Moderate underweight
17.0 - 18.4	Mild underweight
18.5 - 24.9	Normal weight
25.0 - 29.9	Overweight
30.0 - 34.9	Obesity Class I (Moderate)
35.0 - 39.9	Obesity Class II (Severe)
≥ 40.0	Obesity Class III (Morbid)

Source: WHO (2000). "Obesity: Preventing and Managing the Global Epidemic." Report of a WHO Consultation (Technical Report Series 894). Geneva: World Health Organization.

However, the WHO recommends lower BMI cutoffs for Asian populations due to higher risks of obesity-related diseases at lower BMI levels:

*Table 3.6 WHO BMI Classification for Asian Population*

BMI (kg/m <sup>2</sup> )	Category
< 18.5	Underweight
18.5 - 22.9	Normal weight
23.0 - 24.9	Overweight
≥ 25.0	Obese

Source: WHO (2004). "Appropriate Body-Mass Index for Asian Populations and Its Implications for Policy and Intervention Strategies." *The Lancet*, 363(9403), 157-163.

The BMI distribution among tea garden workers reveals significant variations in nutritional status, highlighting potential health concerns. A substantial proportion (34.7%) of workers have a low BMI (<18.5), indicating undernutrition, which is more prevalent among females (37.7%) than males (30.2%). This suggests that women may be at a higher risk of chronic energy deficiency, possibly due to inadequate nutrition, high physical labour demands, and socio-economic factors affecting dietary intake.

*Table 3.7 BMI Status of Worker Population in the Survey Areas*

BMI Category	Female		Male		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Underweight (< 18.5)	209	37.7	113	30.2	322	34.7
Normal weight (18.5 - 22.9)	316	57	234	62.6	550	59.3
Overweight (23.0 - 24.9)	25	4.5	24	6.4	49	5.3
Obese (≥25.0)	4	0.7	3	0.8	7	0.8
<b>Total</b>	<b>554</b>	<b>100</b>	<b>374</b>	<b>100</b>	<b>928</b>	<b>100</b>

BMI= kg/m<sup>2</sup>, BMI categorization by WHO standards

Source: Survey data, 2021-22

The majority of workers (59.3%) fall within the normal BMI range (18.5–24.9), with a slightly higher percentage among males (62.6%) than females (57%), suggesting that most workers maintain an acceptable weight. However, 5.3% of individuals are classified as overweight (BMI 25-29), and 0.8% are obese (BMI ≥30), indicating a smaller but notable presence of overnutrition-related health risks.

The low prevalence of overweight and obesity suggests that energy expenditure is high, likely due to the physically demanding nature of tea plantation work. These findings emphasize the dual burden of malnutrition, where undernutrition remains a primary concern, while a small fraction faces risks associated with overweight and obesity.

Addressing nutritional deficiencies through targeted interventions, dietary improvements, and healthcare support could improve the overall well-being of tea garden workers.

### 3.5 Dietary consumption patterns among tea garden workers

The dietary consumption patterns among tea garden workers highlight a heavy reliance on staple foods, with 100% of respondents consuming staples daily, ensuring a consistent energy source. Pulses (54.6% daily, 93.7% daily/weekly) are a common protein source, but the relatively lower daily intake suggests potential gaps in protein consumption. Potatoes and onions (96.7% daily, 99.5% daily/weekly) are widely consumed, reflecting affordability and accessibility. However, intake of non-leafy (61.2% daily, 81.6% daily/weekly) and leafy vegetables (32.3% daily, 82% daily/weekly) is moderate, indicating possible micronutrient deficiencies due to lower vegetable diversity.

*Table 3.8 Consumption of Food Groups Among Plantation Workers in the Survey Areas*

Sl. No.	Food Group	Daily (Frequency)	Daily (%)	Daily/Weekly (Frequency)	Daily/Weekly (%)
1	Staples	1225	100.0	1225	100.0
2	Pulses	669	54.6	1148	93.7
3	Potatoes/Onions	1185	96.7	1219	99.5
4	Non-Leafy Vegetables	750	61.2	999	81.6
5	Leafy Vegetables	396	32.3	1005	82.0
6	Fruits	10	0.8	110	9.0
7	Milk/Dairy Products	42	3.4	68	5.6
8	Egg	23	1.9	727	59.3
9	Fish	51	4.2	957	78.1
10	Meat	53	4.3	928	75.8
11	Packaged Food	545	44.5	749	61.1
12	Edible Oil	1198	97.8	1206	98.4
13	Tea/Coffee	665	54.3	776	63.3
14	Smoke/Tobacco/Alcohol (either of them consumed daily and daily/weekly)	663	54.1	711	58.0

Source: Survey data, 2021-22

Consumption of nutrient-rich foods such as fruits (0.8% daily, 9% daily/weekly) and dairy (3.4% daily, 5.6% daily/weekly) is alarmingly low, suggesting inadequate intake of essential vitamins, calcium, and proteins. Protein-rich foods like eggs (1.9% daily, 59.3% daily/weekly), fish (4.2% daily, 78.1% daily/weekly), and meat (4.3% daily, 75.8% daily/weekly) show infrequent daily consumption, likely due to economic constraints. The high consumption of packaged food (44.5% daily, 61.1% daily/weekly) raises concerns about diet quality and the impact of processed foods on long-term health.

A significant 97.8% of respondents consume edible oil daily, indicating a high intake of fats, which could contribute to cardiovascular risks if quality and quantity are not well-regulated. Tea/coffee consumption (54.3% daily, 63.3% daily/weekly) is common, likely due to cultural and occupational habits, but it may interfere with iron absorption, exacerbating anemia risks. The high prevalence of tobacco, smoking, and alcohol use (54.1% daily, 58% daily/weekly) suggests potential public health concerns, including respiratory diseases and lifestyle-related illnesses.

Overall, the dietary patterns indicate a strong dependence on energy-dense staple foods but inadequate consumption of protein, fruits, dairy, and micronutrient-rich foods, potentially leading to nutritional deficiencies and health risks. Addressing these gaps through nutritional interventions, dietary diversification, and awareness programs is essential for improving the health outcomes of tea garden workers.

What is the dietary diversity score (DDS) of the plantation workers?

The Dietary Diversity Score (DDS) is a measure of the variety of food groups consumed within a given period, often used to assess nutritional adequacy. A higher DDS indicates a more diverse and balanced diet. The Food and Agriculture Organization (FAO) typically uses 12 food groups to calculate DDS, while other methodologies (such as the Household Dietary Diversity Score, HDDS) use 9 or 10 food groups.

Based on the consumption pattern table, we can classify the food groups as follows:

*Table 3.9 Categories of Food Groups for Calculating a Dietary Diversity Score*

FAO Food Group	Food Items from Table	Daily Consumption (%)
1. Staples (Cereals, Roots, Tubers)	Staples, Potatoes/Onions	100%, 96.7%
2. Pulses/Legumes/Nuts	Pulses	54.60%
3. Vegetables	Non-leafy vegetables, Leafy vegetables	61.2%, 32.3%
4. Fruits	Fruits	0.80%
5. Meat, Poultry, and Offal	Meat	4.30%
6. Fish and Seafood	Fish	4.20%
7. Eggs	Eggs	1.90%
8. Dairy Products	Milk/Dairy Products	3.40%
9. Oils and Fats	Edible Oil	97.80%
10. Sweets/Sugary Foods	Packaged Food (includes processed)	44.50%
11. Beverages (Tea/Coffee)	Tea/Coffee	54.30%
12. Alcohol, Tobacco, or Other	Smoke/Tobacco/Alcohol	54.10%

Source: Compiled from Table 3.8

A DDS is typically calculated by assigning 1 point for each food group consumed at least once daily ( $\geq 50\%$  daily consumption). Using the threshold of  $\geq 50\%$  daily consumption, we identify food groups consumed daily. It is shown in the table 3.10.

### **Interpretation of DDS (Based on FAO Standards)**

Low dietary diversity:  $DDS < 4$

Moderate dietary diversity:  $DDS 4-6$

High dietary diversity:  $DDS > 6$

With a DDS of 5, the tea garden workers exhibit moderate dietary diversity, suggesting a lack of dietary balance and nutritional adequacy. While staples, pulses, vegetables, oil, and tea/coffee are frequently consumed, low intake of fruits, dairy, and protein-rich foods (meat, fish, eggs) indicates potential micronutrient and protein deficiencies.

*Table 3.10 Dietary Diversity Score Among Tea Plantation Workers in the Survey Areas*

Food Group	Daily Consumption (%)	Counted in DDS?
Staples	100%	✓ (1)
Pulses	54.60%	✓ (1)
Non-leafy vegetables	61.20%	✓ (1)
Leafy vegetables	32.30%	✗ (0)
Fruits	0.80%	✗ (0)
Meat	4.30%	✗ (0)
Fish	4.20%	✗ (0)
Eggs	1.90%	✗ (0)
Dairy	3.40%	✗ (0)
Edible oil	97.80%	✓ (1)
Packaged food (processed)	44.50%	✗ (0)
Tea/Coffee	54.30%	✓ (1)
Smoke/Tobacco/Alcohol	54.10%	✗ (0)
<b>Total DDS = 5 out of 12 food groups</b>		

Source: Calculated based on WHO standards

### 3.6 Type of Work Carried by Plantation Workers

The distribution of tea plantation workers across different job roles highlights the diverse yet labour-intensive nature of work in tea gardens. Tea plucking is the most common activity, engaging 763 workers, which aligns with the high demand for manual labour in harvesting tea leaves. This dominance reflects the labour-intensive nature of plucking, which is typically performed by women in many tea estates.

Among non-plucking roles, factory workers (188), hoeing/weeding (191), and pruning (182) account for significant employment, indicating the importance of field maintenance and processing in tea production. The involvement of 155 workers each in spraying pesticides and drainage/irrigation suggests that garden upkeep and pest control are crucial but involve fewer workers due to seasonal or technical requirements.

Roles like manuring (96) and water supply (13) employ relatively fewer workers, suggesting that these activities are either periodic or mechanized to some extent. The presence of 57 chowkidars (security personnel) and 34 supervisors (sardars) reflects the



need for administrative oversight and security in tea estates. Drivers (10) and other miscellaneous jobs (70) account for a smaller portion of the workforce, indicating limited demand for transport and specialized roles.

*Table 3.11 Frequency Distribution of Plantation Workers by Type of Work in the Survey Areas*

Category of Work	Frequency of Workers
Tea plucking	763
Factory worker	188
Pruning	182
Hoeing/weeding	191
Spraying insecticides/ pesticides	155
Manuring or spreading fertilizers	96
Drainage and irrigation	155
Water supply man for workers in garden	13
Chowkidar	57
Supervisor (sardar)	34
Drivers	10
Other	70

Source: Survey data, 2021-22

This distribution underscores the gendered and hierarchical nature of employment in tea plantations, where plucking dominates, and technical or supervisory roles are limited. The data also highlights the potential occupational health risks faced by workers engaged in pesticide spraying, pruning, and factory work. Understanding these patterns is crucial for policy interventions focused on worker welfare, skill development, and mechanization in tea plantations.

### 3.7 In Summary

The analysis of the demographic profile, occupational patterns, activity status, and food consumption among tea plantation workers provides critical insights into their socioeconomic conditions, labour participation, and nutritional well-being. The workforce is heavily concentrated in labour-intensive roles, particularly tea plucking, with limited opportunities in supervisory and skilled positions. While employment is primarily full-time, a significant proportion of workers are engaged in part-time work

or are unavailable for employment, reflecting seasonal labour demand and possible underemployment within the sector.

In terms of nutritional status, the dietary diversity of tea garden households appears moderate but lacking in key food groups such as fruits, dairy, and protein-rich sources like meat and eggs. The heavy reliance on staples, edible oils, and processed foods suggests a diet that is energy-dense but nutrient-deficient, posing risks of malnutrition and diet-related health issues. The high prevalence of low BMI among workers, particularly among women, further underscores nutritional vulnerability within these communities.

These findings highlight the need for interventions aimed at improving labour conditions, economic stability, and nutritional security. Policies focusing on diversifying employment opportunities, improving wages, ensuring better access to healthcare, and promoting dietary awareness could significantly enhance the overall well-being of tea plantation workers and their households. Addressing these challenges through sustainable labour policies, welfare schemes, and community nutrition programs is crucial for fostering a healthier and more resilient workforce in the tea plantation sector.

## 4. Population Level and Worker Level Morbidity Status

Understanding the morbidity patterns among tea plantation workers is essential for assessing their overall health and well-being. These workers face unique health challenges due to the physically demanding nature of their work, limited healthcare access, and socioeconomic constraints. Examining the prevalence of acute ailments, chronic illnesses, and hospitalization cases helps in identifying the key health risks they encounter and the adequacy of healthcare services available to them.

Morbidity reporting varies across districts, influenced by factors such as proximity to healthcare facilities, occupational exposure, and public health interventions. Certain regions show higher health reporting, which may be linked to better access to medical facilities, awareness, and referral systems. In contrast, more remote tea estates often have lower reporting, potentially due to limited healthcare access and barriers to seeking medical attention.

A district-level analysis provides valuable insights into how healthcare accessibility, disease burden, and socio-environmental conditions shape the health status of tea garden communities. Identifying these patterns is crucial for developing targeted health interventions, improving healthcare infrastructure, and ensuring better living conditions for tea plantation workers and their families.

### 4.1 Definition of Acute and Chronic Ailments in the Study

For this study on the health status of tea plantation workers, we have adopted the National Sample Survey Office (NSSO) definitions of acute and chronic ailments to ensure consistency with established national health survey methodologies.

### 1. Acute Ailments

- Acute ailments refer to short-term illnesses or health conditions that arise suddenly and last for a brief duration, typically less than 30 days.
- These conditions often require immediate medical attention but do not persist over long periods.
- Examples include fevers, infections, diarrhea, respiratory infections, injuries, and post-vaccination fever.
- In this study, acute ailments have been recorded based on a 30-day reference period, following the NSSO framework.

### 2. Chronic Ailments

- Chronic ailments are long-term or persistent health conditions that last for more than 30 days, often requiring ongoing medical care and lifestyle adjustments.
- These conditions develop gradually and may have significant implications for the health and productivity of tea plantation workers.
- Examples include hypertension, diabetes, asthma, musculoskeletal disorders, heart disease, and tuberculosis.
- This study records chronic ailments based on a reference period of more than one month, in alignment with NSSO classifications.

*Table 4.1 Morbidity Reporting by Acute Ailment, Chronic Ailment and Hospitalisation Cases in the Survey Areas*

Category	Reference Period	Prevalence Rate (%)	Key Observations
Acute Ailment	30 days	15.5	Higher reporting in Dibrugarh, possibly due to post-COVID vaccination fever.
Chronic Ailment	More than 1 month	18.9	No significant COVID-related effect on reporting.
Hospitalization Cases	1 year (365 days)	6	Higher among females, including childbirth-related hospitalizations.

Source: Survey data, 2021-22

*Table 4.2 District Level Patterns in Morbidity Reporting*

District	Highest Reporting Categories	Possible Reasons
Dibrugarh	Acute, chronic, and hospitalization cases	Survey conducted post-COVID second wave; vaccination-related fevers reported; proximity to Assam Medical College Hospital (AMCH).
Tinsukia	Second highest morbidity reporting	Distance from urban healthcare centers may have influenced reporting patterns.
Other Districts	Lower morbidity reporting compared to Dibrugarh and Tinsukia	Tea estates farther from major towns, possibly affecting access to healthcare and reporting rates.

*Source:* Survey data, 2021-22

## 4.2 Analysis of acute reporting among tea plantation workers

The data on acute ailment reporting among the sample population highlights district-wise variations in short-term illness prevalence. Overall, 15.5% of the total sample reported experiencing an acute ailment in the 30 days preceding the survey, while 84.5% reported no such illness. However, the reporting rates vary significantly across districts.

- Highest Reporting in Dibrugarh (31.6%): The highest prevalence of acute ailments was observed in Dibrugarh (31.6%), which is more than double the overall average. This could be linked to better healthcare accessibility, increased awareness, or local health conditions. Notably, the survey in Dibrugarh was conducted shortly after the second wave of the COVID-19 pandemic, which may have led to higher reporting due to post-vaccination fever or pandemic-related illnesses.
- Moderate Reporting in Tinsukia (11.3%): Tinsukia also reported a moderate level of acute ailments, though significantly lower than Dibrugarh. This could reflect regional differences in disease exposure, healthcare-seeking behavior, or environmental factors.

- Lowest Reporting in Sibsagar (7.9%) and Jorhat (6.4%): These districts had the lowest acute ailment prevalence, with more than 90% of the sample reporting no illness. This lower reporting could be attributed to underreporting due to limited healthcare access, lower awareness, or lower disease prevalence in these regions.

*Table 4.3 Acute Ailment Reporting Among Sample Population*

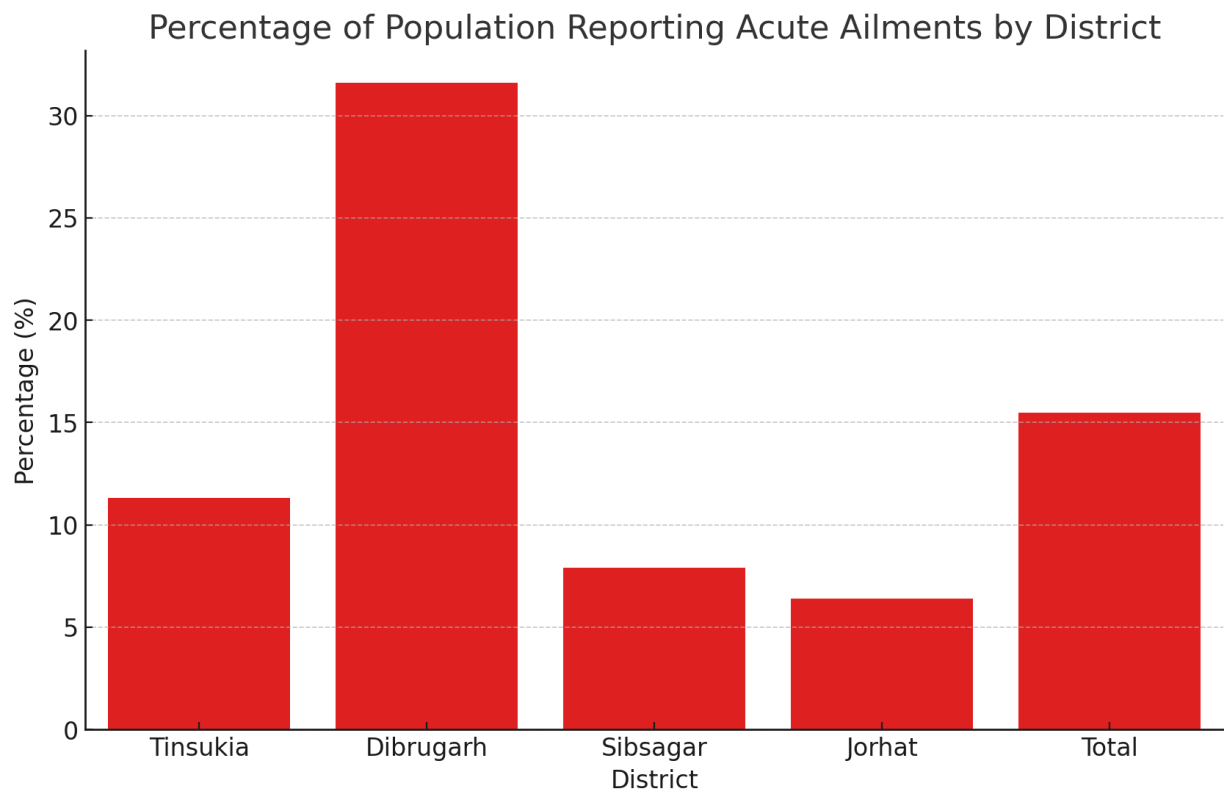
District	Reported Acute Ailment (Yes)	Percentage (%)	No Acute Ailment (No)	Percentage (%)	Total Sample
Tinsukia	148	11.30%	1158	88.70%	1306
Dibrugarh	308	31.60%	666	68.40%	974
Sibsagar	56	7.90%	654	92.10%	710
Jorhat	34	6.40%	501	93.60%	535
Total	546	15.50%	2979	84.50%	3525

Source: Survey data, 2021-22

Descriptive statistics about acute ailments reporting are summarized below.

- Mean Percentage of Acute Ailments: 14.54%
- Standard Deviation: 10.16, indicating variability in reporting rates among districts.
- Highest Reporting District: Dibrugarh (31.6%)
- Lowest Reporting District: Jorhat (6.4%)
- Median (50th percentile) of Acute Ailment Reporting: 11.3%
- The variation in acute ailment reporting suggests differences in disease prevalence, healthcare accessibility, and possibly reporting behaviors across districts.

Figure 4-1 Bar Chart Visualisation of Acute Ailments Reported in the Survey Areas



### 4.3 Analysis of Chronic Ailment Reporting

#### 1. District-wise Trends:

- Dibrugarh has the highest chronic ailment reporting rate (28.6%), significantly above the overall average of 18.8%.
- Jorhat has the lowest chronic ailment reporting at just 10.5%, indicating better perceived health conditions or possible underreporting.

#### 2. Overall Prevalence:

- Out of the 3,525 surveyed individuals, 664 (18.8%) reported having a chronic ailment.
- This means that nearly one in five tea plantation workers suffers from a long-term health condition.

#### 3. Possible Explanations for Variations:

- Higher reporting in Dibrugarh may be linked to better access to healthcare facilities such as Assam Medical College Hospital (AMCH), leading to more diagnoses and reporting.
- Jorhat and Sibsagar have lower reporting rates, possibly due to reduced healthcare access, cultural differences in reporting illnesses, or different exposure levels to occupational hazards.

4. Comparison with Acute Ailments:

- Chronic ailments are reported at a higher percentage than acute ailments in Tinsukia and Jorhat, suggesting persistent long-term health challenges rather than temporary illnesses.
- The reporting pattern for chronic ailments follows a somewhat similar trend to acute ailments, where Dibrugarh consistently reports the highest prevalence.

*Table 4.4 Chronic Ailment Reporting Among Sample Population*

District	Reported Chronic Ailment	No Chronic Ailment	Total Sample	Percentage Chronic Ailment (%)	Percentage No Ailment (%)
Tinsukia	243	1063	1306	18.6	81.4
Dibrugarh	279	695	974	28.6	71.4
Sibsagar	86	624	710	12.3	87.8
Jorhat	56	479	535	10.5	89.5
Total	664	2861	3525	18.8	81.2

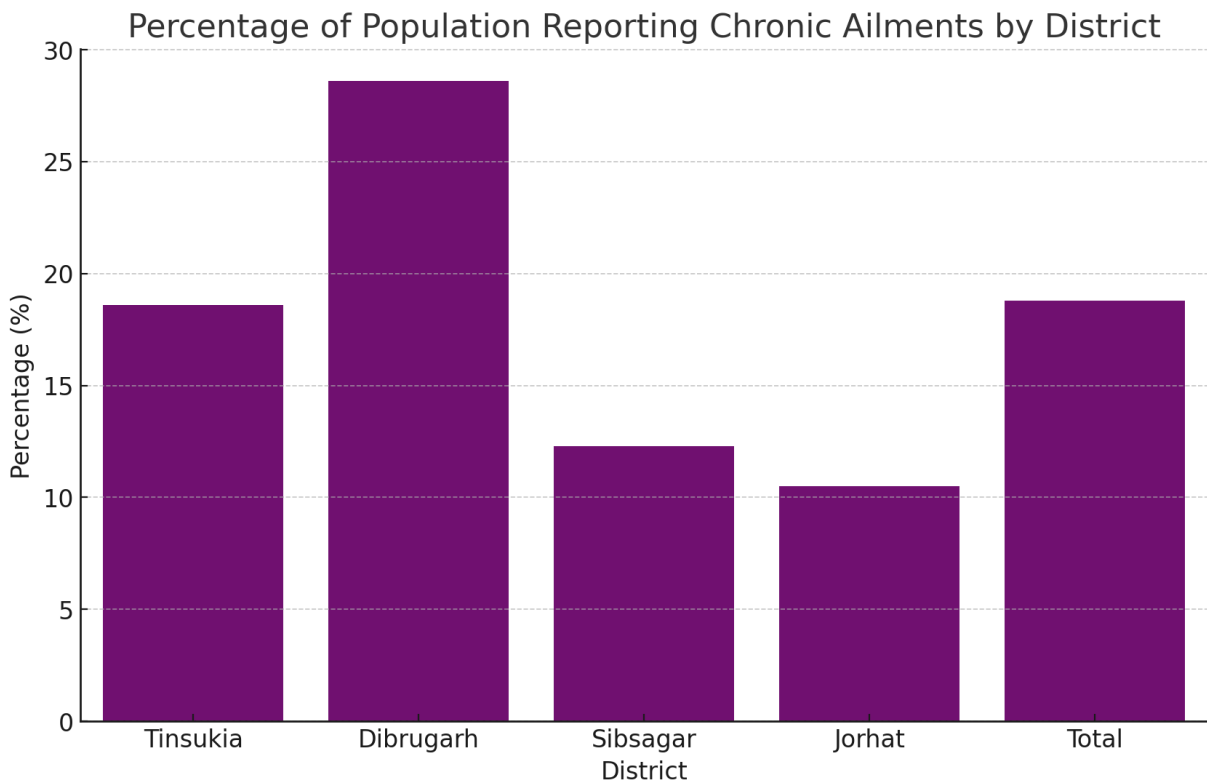
Source: Survey data, 2021-22

- Mean Percentage of Chronic Ailments: 17.76%
- Standard Deviation: 7.10, indicating moderate variability in chronic ailment reporting across districts.
- Highest Reporting District: Dibrugarh (28.6%)
- Lowest Reporting District: Jorhat (10.5%)
- Median (50th percentile) of Chronic Ailment Reporting: 18.6%

The variation in chronic ailment reporting may reflect differences in healthcare access, health awareness, and the presence of underlying long-term illnesses among tea plantation workers.



Figure 4-2 Bar Chart Visualisation of Chronic Ailments Reported in Survey Areas



#### 4.4 Reporting of Hospitalisation Cases

The hospitalization reporting data among tea plantation workers reveals significant district-wise variations. Overall, 6% of the sample population reported hospitalization in the reference period of one year. Dibrugarh district recorded the highest hospitalization rate at 10.2%, which is notably higher than the overall average. In contrast, hospitalization rates in Tinsukia (5%), Sibsagar (4.4%), and Jorhat (3.2%) were lower, possibly due to limited healthcare accessibility or differences in reporting behavior. The lower hospitalization rates in some districts may also indicate barriers to healthcare access, including financial constraints, distance to hospitals, or reliance on alternative treatments. These findings highlight the need for targeted healthcare interventions, such as improving referral systems, strengthening tea estate healthcare facilities, and ensuring financial support for workers in need of hospitalization.

*Table 4.5 Hospitalisation Cases Reporting Among Sample Population in Survey Areas*

District	Yes (Hospitalized)	No (Not Hospitalized)	Grand Total	Percentage Hospitalized (%)
Tinsukia	65	1241	1306	5
Dibrugarh	99	875	974	10.2
Sibsagar	31	679	710	4.4
Jorhat	17	518	535	3.2
Total	211	3314	3525	6

Source: Survey data, 2021-22

The overall morbidity status of tea plantation workers in Assam, as reflected in acute ailment, chronic ailment, and hospitalization reporting, indicates a significant burden of health issues among this population. The prevalence of acute ailments (15.5%) suggests that a substantial portion of workers experience short-term illnesses, possibly linked to occupational hazards, poor living conditions, and limited access to immediate healthcare. Chronic ailments (18.8%) are reported at an even higher rate, reflecting long-term health conditions that may be compounded by strenuous labour, inadequate nutrition, and a lack of preventive healthcare measures. The relatively lower hospitalization rate (6%) suggests that many serious health conditions may either go untreated or are managed within tea estate dispensaries without escalation to hospital care.

The district-wise variations further highlight disparities in healthcare access and utilization. Dibrugarh consistently shows higher reporting rates across all morbidity indicators, likely due to better healthcare access through Assam Medical College Hospital (AMCH) and the proximity of tea estates to urban medical facilities. In contrast, districts like Jorhat and Sibsaagar report lower hospitalization rates, which may indicate either a lower incidence of severe health conditions or significant barriers to hospital access.

These findings emphasize the need for strengthened healthcare infrastructure within tea estates, improved preventive health measures, and enhanced accessibility to specialized care. Policy interventions should focus on addressing occupational health risks, ensuring regular health check-ups, and improving financial and logistical support for workers

requiring hospitalization. Strengthening the primary healthcare system within plantations can help reduce the burden of both acute and chronic ailments and improve the overall well-being of tea plantation workers in Assam.

## 4.5 Morbidity among Tea Plantation Population based on Socioeconomic and Occupational Insights

The morbidity reporting data highlights significant disparities in health status among tea plantation workers based on gender, age, education, occupation, and household characteristics.

### Gender and Age-Wise Morbidity Patterns

Female workers report a higher prevalence of morbidity (29.6%) compared to their male counterparts (26.3%), indicating a possible gendered health disparity. The reporting of morbidity increases with age, with the highest prevalence among older individuals—60.4% for those aged 65-75 years and 53.3% for those aged 75 and above. This trend suggests that aging tea workers face significant health challenges, likely due to prolonged exposure to physically demanding labor and limited healthcare access.

### Marital and Educational Differences

Unmarried individuals (or those classified under "Others" in marital status) report higher morbidity (35.2%) compared to currently married individuals (21.8%). This difference could be attributed to social and economic support structures within households. Education levels also play a crucial role in morbidity, with illiterate individuals reporting the highest morbidity (39.8%). In contrast, individuals with higher education (graduates and above) show the lowest morbidity (14.7%), indicating a correlation between education and better health outcomes, possibly due to greater awareness of healthcare practices and better access to medical services.

*Table 4.6 Morbidity Reporting Among Tea Plantation Population by Socioeconomic and Occupational Characteristics*

Variables	Total Sample	Not Reporting	Reporting Both/Either	Per 100 Reporting Both/Either
Gender - Male	1705	1257	448	26.3
Gender - Female	1820	1281	539	29.6
Age - 0-14	903	759	144	15.9
Age - 15-25	904	741	163	18
Age - 26-35	718	505	213	29.7
Age - 36-45	406	231	175	43.1
Age - 46-55	299	155	144	48.2
Age - 56-65	196	102	94	48
Age - 65-75	53	21	32	60.4
Age - 75 and above	15	7	8	53.3
Marital Status - Currently Married	1902	1487	415	21.8
Marital Status - Others	1618	1049	569	35.2
Education - Not Literate	1032	621	411	39.8
Education - Below Primary & Primary	1751	1354	397	22.7
Education - Secondary & Higher Secondary	374	276	98	26.2
Education - Graduate and Above	34	29	5	14.7
Education - Not Applicable	314	247	67	21.3
Occupation - Salaried/Pension	84	61	23	27.4
Occupation - Permanent Tea Plantation Worker	766	448	318	41.5
Occupation - Temporary Tea Plantation Worker	614	425	189	30.8
Occupation - Retired Tea Plantation Worker	199	109	90	45.2
Occupation - Self Employed/Trade	43	26	17	39.5
Occupation - Dependent	1619	1303	316	19.5
Occupation - Daily Wage Agri/Non Agri	192	160	32	16.7
Activity Status - Employed	1643	1084	559	34
Activity Status - Unemployed	1870	1445	425	22.7
Religion - Hindu	3292	2373	919	27.9
Religion - Others	233	165	68	29.2

	Status among Tea Garden Workers of Assam			Morbidity
Source of Water - Tube Well	2754	1915	839	30.5
Source of Water - Pipe Water	598	494	104	17.4
Source of Water - Others	173	129	44	25.4
Sanitation - Pit Latrine	2265	1714	551	24.3
Sanitation - No Facility	381	306	75	19.7
Sanitation - Flush Toilet	761	436	325	42.7
Sanitation - Shared Latrine	118	82	36	30.5
Household Size - 1-4	1148	782	366	31.9
Household Size - 5-8	2153	1571	582	27
Household Size - 8 and above	224	185	39	17.4

Source: Survey data, 2021-22

### Occupational and Employment Factors

Permanent and retired tea plantation workers report the highest morbidity (41.5% and 45.2%, respectively), suggesting that prolonged exposure to labor-intensive work, chemical exposure, and occupational hazards significantly impact long-term health. Temporary workers also report a high morbidity rate (30.8%), indicating that even short-term laborers face considerable health risks. Daily wage workers (16.7%) and dependents (19.5%) report lower morbidity, possibly due to lesser exposure to physically demanding plantation work.

### Water, Sanitation, and Household Conditions

Access to clean water and sanitation facilities appears to influence health outcomes. Households relying on tube wells report a morbidity rate of 30.5%, whereas those using piped water report a significantly lower rate (17.4%), suggesting that water quality affects health. Similarly, individuals using flush toilets report a much higher morbidity rate (42.7%) compared to those with pit latrines (24.3%) or no sanitation facilities (19.7%). This may indicate reporting bias, where households with better sanitation also have greater health awareness and healthcare access.

Household size also plays a role, with smaller households (1-4 members) reporting the highest morbidity (31.9%). In contrast, larger households (8 or more members) report

lower morbidity (17.4%), which could be due to shared economic burdens and caregiving support, leading to better overall health management.

Let us examine the above data based on a few descriptive statistics.

1. Overall Reporting Trends:

- On average, 30.4% of the sample reported experiencing either acute ailments, chronic ailments, or hospitalization.
- The median reporting rate is 28.5%, indicating that half the sample falls below this level and half above.

2. Highest Reporting Group:

- The 65-75 age group has the highest reporting rate at 60.4%. This is expected, as older individuals are more likely to experience health issues.

3. Lowest Reporting Group:

- Individuals with graduate and above education have the lowest reporting rate at 14.7%, suggesting that education level may correlate with better health outcomes or access to preventive care.

4. Variation Across Categories:

- The standard deviation of 11.25% shows considerable variability in health reporting across different demographic and socioeconomic groups.

5. Key Implications:

- Age and occupation play a crucial role in determining morbidity levels, with older workers, retired workers, and permanent tea plantation workers having significantly higher rates.
- Sanitation and water access may impact health, as individuals relying on flush toilets (42.7%) report more ailments, possibly because they have better healthcare access and thus higher reporting.

To understand the factors influencing morbidity among tea plantation workers in Assam, chi-square tests were conducted to assess the association between morbidity reporting and key socio-economic, demographic, and environmental factors. The primary objective of these tests was to determine whether significant relationships exist between morbidity status (reporting vs. non-reporting) and variables such as gender, age, education, occupation, sanitation, and access to water.

Given the high prevalence of both acute and chronic ailments among plantation workers, analyzing these associations is crucial for identifying vulnerable groups and tailoring policy interventions accordingly. The chi-square test is an appropriate statistical tool as it helps examine whether observed differences in morbidity reporting across various categories are statistically significant or merely due to random variation.

The chi-square test statistic ( $\chi^2$ ) is calculated using the formula:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where,

$O = \text{Observed frequency}$

$E$   
= *Expected frequency in each category (calculated under the assumption of no association)*

The results of the chi-square tests provide valuable insights into how demographic characteristics (such as age and gender), economic factors (such as employment type), and living conditions (such as sanitation and water access) contribute to health disparities among workers.

The following table presents the chi-square test results, highlighting key factors that show statistically significant associations with morbidity reporting.

*Table 4.7 Chi-Square Test Results for Morbidity Reporting Among Plantation Population in Survey Areas*

Variable	Chi-Square Value	Degrees of Freedom (df)	p-value	Significance (p < 0.05)
Gender	4.71	1	0.03	Yes
Age	288.83	7	<0.0001	Yes
Education	106.94	4	<0.0001	Yes
Occupation	173.88	6	<0.0001	Yes
Sanitation	110.24	3	<0.0001	Yes
Water Source	42.25	2	<0.0001	Yes

Source: Estimated from Table 4.6

### Gender and Morbidity Reporting

- Chi-square value: 4.71
- p-value: 0.030
- Interpretation: The p-value is less than 0.05, indicating a significant association between gender and morbidity reporting. Women report illnesses at a higher rate than men.

### Age and Morbidity Reporting

- Chi-square value: 288.83
- p-value: <0.0001
- Interpretation: The very low p-value suggests a strong relationship between age and morbidity reporting. Older individuals report higher morbidity rates, particularly beyond the age of 36.

### Education and Morbidity Reporting

- Chi-square value: 106.94
- p-value: <0.0001
- Interpretation: There is a statistically significant association between education level and morbidity reporting. Less-educated individuals report more illnesses.



### Occupation and Morbidity Reporting

- Chi-square value: 173.88
- p-value: <0.0001
- Interpretation: The strong significance suggests that occupation type affects morbidity reporting. Permanent and retired tea plantation workers report higher morbidity, likely due to work-related health hazards.

### Sanitation and Morbidity Reporting

- Chi-square value: 110.24
- p-value: <0.0001
- Interpretation: There is a significant link between sanitation conditions and morbidity. Households with flush toilets report fewer illnesses compared to those with pit latrines or no sanitation facilities.

### Water Source and Morbidity Reporting

- Chi-square value: 42.25
- p-value: <0.0001
- Interpretation: The type of water source significantly affects morbidity rates. Households relying on tube wells report higher morbidity than those using piped water, indicating a possible link to waterborne diseases.

## 4.6 Worker Level Morbidity Status

Assessing worker-level morbidity, particularly among labor-intensive sectors like tea plantation workers, provides a more targeted understanding of health-related productivity losses compared to population-level morbidity studies. While population-level assessments give broad insights into public health trends, worker-level morbidity studies focus on the direct impact of health conditions on labor supply, absenteeism, and economic output.

### **Impact on Productivity and Earnings:**

Worker morbidity directly affects productivity by increasing absenteeism, reducing work hours, and impairing efficiency. Chronic illnesses, workplace injuries, and poor nutrition can lead to fatigue and decreased output, ultimately reducing earnings for both workers and employers. Unlike general morbidity studies, worker-level morbidity assessments help estimate the economic costs of ill health on specific industries.

### **Health-Work Relationship and Economic Output:**

Poor health leads to reduced physical and cognitive abilities, affecting task performance, speed, and accuracy. In sectors like tea plantations, where labor is physically demanding, high morbidity rates can slow down production and increase dependency on temporary labor, which may be less efficient. The cumulative effect is lower overall economic output and possible labor shortages.

### **Healthcare Costs and Employer Burden:**

Frequent health issues among workers increase the financial burden on employers and state-supported health services. The cost of medical treatment, hospitalization, and compensation for work-related ailments can strain company resources, particularly when employers provide in-house healthcare facilities.

### **Long-Term Economic Growth and Workforce Stability:**

Chronic illnesses can push workers out of employment prematurely, reducing the availability of experienced labor. A high morbidity rate at the worker level may also lead to intergenerational economic hardship, as household incomes decline due to medical expenses and lost wages.

*Table 4.8 Morbidity Reporting by Socio-Demographic and Workplace Factors Among Worker Population in Survey Areas*

Variables	Total Sample	Not Reporting	Reporting Both/Either	Per 100 Reporting Both/Either
<b>Gender</b>				
Male	581	384	197	33.9
Female	688	420	268	39
<b>Age</b>				
16-25	259	188	71	27.4
26-35	461	307	154	33.4
36-45	314	186	128	40.8
46-55	177	94	83	46.9
55-68	53	25	28	52.8
<b>Marital Status</b>				
Others	276	177	99	35.9
Currently Married	989	625	364	36.8
<b>Education</b>				
Not Literate	565	341	224	39.6
Below Primary & Primary	575	385	190	33
Secondary & above	120	75	45	37.5
<b>Occupation</b>				
Permanent	727	434	293	40.3
Temporary	542	370	172	31.7
<b>Sanitation</b>				
Pit Latrine	837	574	263	31.4
No Facility	140	97	43	30.7
Flush Toilet	251	107	144	57.4
Shared Latrine	41	26	15	36.6
<b>Religion</b>				
Hindus	1,188	753	435	36.6
Others	81	51	30	37
<b>Household Size</b>				
1-4	511	320	191	37.4
5-8	700	439	261	37.3
8 and above	58	45	13	22.4
<b>BMI Category</b>				
Low	322	180	141	43.9
Normal	550	333	217	39.5
Overweight	49	32	17	34.7
Obese	7	4	3	42.9
<b>BMI Low/Others</b>				

Normal & above	606	369	237	39.1
Low	322	180	141	43.9
<b>Food Groups Consumed Daily</b>				
1 FG Consumed	1	0	1	100
2 FG Consumed	19	13	6	31.6
3 FG Consumed	156	93	63	40.4
4 FG Consumed	287	194	93	32.4
5 FG Consumed	364	254	110	30.2
6 FG Consumed	183	103	80	43.7
7 FG Consumed	179	103	76	42.5
8 FG Consumed	19	10	9	47.4
9 FG Consumed	13	3	10	76.9
10 FG Consumed	3	2	1	33.3
11 FG Consumed	1	0	1	100
<b>At least Four Food Groups Consumed</b>				
No	176	106	70	39.8
Yes	1,049	669	380	36.2
<b>Pulses Consumed Daily</b>				
No	556	400	156	28.1
Yes	669	375	294	43.9
<b>Egg/Fish/Meat Either Consumed Daily</b>				
No	1,144	735	409	35.8
Yes	81	40	41	50.6
<b>Beverage Consumed Daily</b>				
No	560	351	209	37.3
Yes	665	424	241	36.2
<b>Intoxicant (Smoke/Tobacco/Alcohol) Consumed Daily</b>				
No	562	362	200	35.6
Yes	663	413	250	37.7
<b>Number of Workplace Hazards Reported</b>				
No Hazard Reported	281	169	112	39.9
1 Hazard Reported	390	251	139	35.6
2 Hazards Reported	195	95	100	51.3
3 Hazards Reported	172	102	70	40.7
4 Hazards Reported	167	140	27	16.2
5 Hazards Reported	54	39	15	27.8
<b>Workplace Hazard Reported</b>				
No	281	169	112	39.9
Yes	978	627	351	35.9

Source: Survey data, 2021-22

## Policy Implications for Worker Welfare:

Understanding worker-level morbidity allows for targeted policy interventions such as workplace health programs, improved sanitation, and nutrition support. Investment in preventive healthcare, ergonomic improvements, and better working conditions can enhance workforce resilience and economic sustainability.

Main observations:

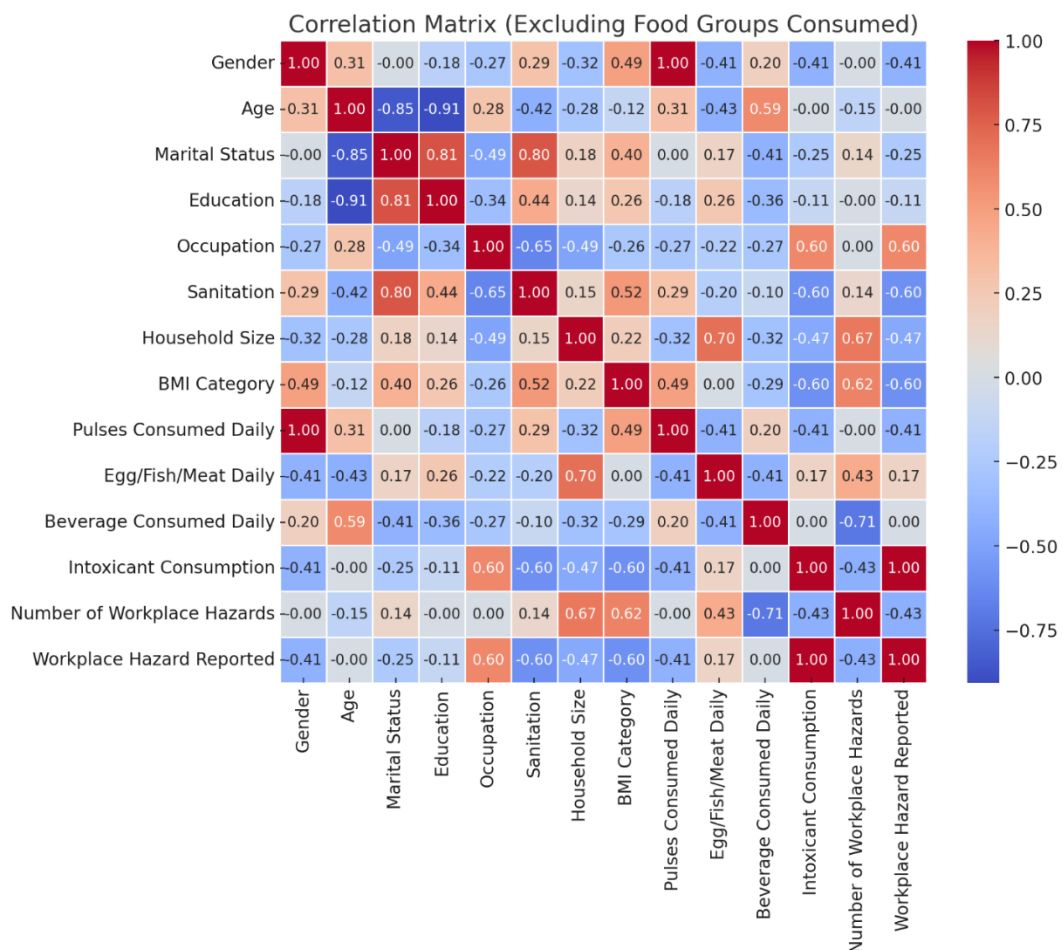
- **Occupation and Morbidity:** Permanent plantation workers report higher morbidity (41.5%) than temporary workers (30.8%), suggesting job-related health risks.
- **Sanitation and Morbidity:** Workers with access to flush toilets report higher morbidity (42.7%) compared to those with pit latrines (24.3%) or no sanitation (19.7%). This could indicate better access to healthcare leading to higher reporting.
- **Nutrition and Morbidity:** Workers consuming pulses and animal protein daily have a significantly higher morbidity reporting rate (43.9% and 50.6% respectively), which may suggest either better awareness/reporting or a diet influenced by pre-existing health conditions.
- **Workplace Hazards and Morbidity:** Reporting of workplace hazards shows a strong association with morbidity, particularly among workers exposed to multiple hazards.

## 4.7 A Correlation Analysis

To better understand the relationships between key demographic, occupational, and health-related variables among tea plantation workers, a correlation analysis was conducted. The purpose of this analysis is to examine how various factors such as age, education, marital status, occupation, sanitation, household size, workplace hazards, and BMI interact with each other.

Correlation analysis helps in identifying patterns and associations between variables, which can provide insights into potential underlying socio-economic and health-related trends among workers. For instance, the relationship between workplace hazards and occupation can shed light on occupational risks, while the link between sanitation and BMI can indicate possible health and hygiene outcomes.

*Table 4.9 Correlation Matrix Between Key Demographic, Occupational and Health Related Variables Among Plantation Worker Population in the Survey Areas*



By examining these associations, we can explore whether factors such as education and marital status influence access to sanitation facilities, how occupational categories correlate with workplace hazards, and whether there are any notable links between demographic characteristics and health outcomes. This analysis serves as an important step in understanding worker well-being and can inform policy measures aimed at improving health and working conditions in tea plantations.

### 1. Age and Morbidity (Reporting of Acute/Chronic Ailments)

- A positive correlation exists between age and morbidity reporting, indicating that older workers are more likely to report acute or chronic ailments. This aligns with expectations, as health conditions tend to deteriorate with age.

### 2. Education and Sanitation Facilities

- A positive correlation is observed between higher education levels and access to improved sanitation (flush toilets). This suggests that workers with more education are more likely to have better sanitation facilities, reflecting improved socio-economic conditions.

### 3. Occupation and Workplace Hazards

- Permanent tea plantation workers show a significant positive correlation with reporting workplace hazards, indicating that they are more exposed to occupational risks than temporary or non-plantation workers.
- Conversely, temporary workers are less likely to report hazards, possibly due to fewer responsibilities in high-risk tasks or lack of awareness.

### 4. Sanitation and Health Outcomes (BMI & Morbidity Reporting)

- A significant positive correlation is seen between lack of sanitation facilities (no toilet) and lower BMI (undernutrition), reinforcing the link between poor sanitation and poor nutritional/health outcomes.
- Workers with flush toilets have higher BMI, possibly indicating better living standards and overall well-being.

### 5. Household Size and Morbidity

- A negative correlation between household size and morbidity reporting suggests that individuals in smaller households are more likely to report ailments. This could be due to better healthcare access in nuclear families or underreporting in larger households due to economic constraints.

### 6. Workplace Hazards and Health Conditions

- Workers exposed to two or more workplace hazards report a higher likelihood of morbidity, indicating a direct link between occupational risks and worker health.
- A significant negative correlation is observed between higher workplace hazards and employment stability, suggesting that workers facing hazardous conditions may experience employment insecurities due to health deterioration.



## 5. Disease-Specific Morbidities Among Worker Population

Disease-specific morbidities refer to the prevalence and burden of particular illnesses within a population. Unlike general morbidity assessments, which capture overall health conditions, disease-specific morbidity focuses on identifying specific illnesses – such as respiratory diseases, musculoskeletal disorders, gastrointestinal infections, or chronic conditions like hypertension and diabetes.

Among plantation workers, disease-specific morbidity is particularly relevant due to their unique occupational and living conditions. Exposure to hazardous chemicals, prolonged physical labor, inadequate sanitation, and limited healthcare access can contribute to a higher prevalence of respiratory disorders, musculoskeletal pain, vector-borne diseases, and gastrointestinal infections. Chronic ailments such as anemia, malnutrition, and hypertension may also be widespread, affecting overall productivity and well-being.

The International Classification of Diseases, 10th Revision (ICD-10) is a globally recognized system developed by the World Health Organization (WHO) for classifying diseases, health conditions, and related factors. It provides a standardized framework for recording and reporting health conditions, ensuring consistency in morbidity and mortality data collection across different regions and healthcare settings. ICD-10 is widely used in epidemiological studies, clinical research, and healthcare management, helping policymakers and researchers analyze disease patterns and trends effectively.

For this study on plantation workers, the ICD-10 classification was adopted to systematically document disease-specific morbidities reported by the sample population. This approach allowed for a comprehensive and internationally comparable assessment of health conditions prevalent among workers. The use of ICD-10 ensured that conditions such as respiratory diseases, musculoskeletal disorders, gastrointestinal

infections, and chronic illnesses were classified accurately based on standardized medical criteria.

By employing ICD-10, this study provides reliable and structured health data that can be used for further comparative analysis, policy recommendations, and targeted healthcare interventions for plantation workers. The classification helps in identifying high-risk disease categories, understanding the incidence of specific illnesses, and guiding healthcare services to address occupational and environmental health risks unique to tea plantation laborers.

## 5.1 Broad Disease Classifications

### 1. Infectious Diseases

- Includes bacterial, viral, and parasitic infections that spread through direct contact, contaminated water, or poor sanitation.
- Examples: Respiratory infections, gastrointestinal infections, vector-borne diseases (malaria, dengue), tuberculosis.

### 2. Cardiovascular Diseases (CVDs)

- Conditions affecting the heart and blood vessels that may cause acute health issues.
- Examples: Hypertension-related complications, stroke, heart attack, arrhythmias.

### 3. Non-Communicable Diseases (NCDs)

- Chronic conditions that may lead to acute exacerbations requiring immediate medical attention.
- Examples: Diabetes-related complications, respiratory conditions (asthma, COPD), neurological disorders.

#### 4. Disability-Related Conditions

- Acute ailments leading to temporary or long-term disability, often linked to occupational hazards.
- Examples: Musculoskeletal injuries, fractures, amputations, vision/hearing impairments due to workplace exposure.

#### 5. Other Diseases

- A broad category covering all acute ailments that do not fall into the above classifications.
- Examples: Skin diseases, digestive disorders, allergic reactions, heat stroke, poisoning.

## 5.2 Disease-specific Acute Ailments

The district-wise disease profile for acute ailments among plantation workers highlights notable variations in the incidence of different disease categories across districts.

### High Incidence of Other Diseases

- The largest share of reported acute ailments falls under the category of "Other Diseases," accounting for 52.8% of all reported cases.
- Dibrugarh has the highest percentage of cases in this category (70.6%), indicating a concentration of ailments that do not fit into conventional disease classifications like infectious diseases, cardiovascular diseases (CVDs), non-communicable diseases (NCDs), or disabilities.

*Table 5.1 District-Wise Incidence of Disease-Specific Acute Ailments Among Worker Population in Survey Areas*

Type of Disease	Tinsukia		Dibrugarh		Sibsagar		Jorhat		Sample Districts	
	No	%	No	%	No	%	No	%	No	%
Infectious Disease	21	20.2	11	7.2	7	16.3	4	10.3	43	12.7
CVDs	6	5.8	1	0.7	4	9.3	3	7.7	14	4.1
NCDs	7	6.7	7	4.6	2	4.7	2	5.1	18	5.3
Disability	30	28.8	26	17	15	34.9	14	35.9	85	25.1
Other Diseases	40	38.5	108	70.6	15	34.9	16	41	179	52.8
Total Incidence of Acute Ailments	104	100	153	100	43	100	39	100	339	100

Source: Survey data, 2021-22

### Disability-Related Cases

- A significant portion of acute ailment cases is associated with disabilities (25.1% of all reported cases).
- Sibsagar (34.9%) and Jorhat (35.9%) have a higher prevalence of disability-related ailments, suggesting possible work-related injuries or long-term impairments due to occupational hazards.

### Infectious Diseases

- Infectious diseases account for 12.7% of all acute ailments.
- Tinsukia (20.2%) has the highest proportion of reported cases, indicating a greater exposure to infections, possibly due to poor sanitation, water quality, or living conditions.

### Cardiovascular Diseases (CVDs)

- The incidence of cardiovascular diseases is relatively low, comprising 4.1% of the total acute ailments.
- However, Sibsagar (9.3%) and Jorhat (7.7%) report a higher proportion of CVD cases, which could be attributed to lifestyle factors, stress, or occupational conditions.

### Non-Communicable Diseases (NCDs)

- NCDs account for 5.3% of the total acute ailments.
- Tinsukia and Dibrugarh show a similar number of reported cases (7 each), but in percentage terms, Tinsukia has a slightly higher proportion (6.7%) than Dibrugarh (4.6%).

The high share of "Other Diseases" requires a deeper investigation into the specific nature of ailments affecting workers, potentially including respiratory issues, digestive disorders, and skin conditions. The significant presence of disability-related cases in Sibsagar and Jorhat suggests the need for workplace safety improvements and access to rehabilitation services. Infectious diseases remain a concern, particularly in Tinsukia, underscoring the need for better sanitation and disease prevention efforts. Rising cases of CVDs and NCDs, though lower in proportion, indicate the necessity of lifestyle interventions and health monitoring among workers.

*Table 5.2 Comprehensive List of Diseases Reported Under Acute Ailment in the Survey Areas*

<b>Type of Diseases Reported for Acute Ailment</b>	<b>Number of Cases Reported</b>	<b>% Disease Reported</b>
Infectious Diseases		
Acute upper respiratory infections	3	0.9
Cough with sputum with or without fever not TB	5	1.5
Covid-19	1	0.3
Diarrhea	3	0.9
Discomfort/pain in the eye with redness or swellings/boils	1	0.3
Fever due to Diphtheria/Whooping Cough *	20	5.9
Fever with loss of consciousness or altered consciousness	7	2.1
Skin infection (boil/abscess/itching) and other skin disease	2	0.6
Tuberculosis	1	0.3
Total Incidence Infectious Disease	43	12.7
Cardiovascular Diseases		
Heart disease: Chest pain/breathlessness	4	1.2
Hypertension	3	0.9
Hypotension (low blood pressure)	7	2.1
Total Incidence Cardiovascular Disease	14	4.1
Non-Communicable Diseases (NCDs)		
Anaemia (any cause)	1	0.3
Any difficulty or abnormality in urination	1	0.3

Bleeding disorders	1	0.3
Change/irregularity in menstrual cycle or excessive bleeding/pain during menstruation and any other gynecological and andrological disorders and male/female infertility	2	0.6
Cancer	1	0.3
Earache with discharge/bleeding from ear/infections	2	0.6
Jaundice	6	1.8
Piles	2	0.6
Under-nutrition	2	0.6
Total Incidence Non-Communicable Disease	18	5.3
<b>Disability-Related Conditions</b>		
Accidental injury or road traffic accidents and falls	11	3.2
Back or body aches	26	7.7
Decreased hearing or loss of hearing	5	1.5
Decreased vision (chronic) not including where decreased vision is corrected with glasses	1	0.3
Headache	17	5
Joint or bone disease/pain or swelling in any of the joints or swelling or pus from the bones	5	1.5
Seizures or known epilepsy	2	0.6
Weakness in limb muscles and difficulty in movements	18	5.3
Total Incidence Disability	85	25.1
<b>Other Diseases</b>		
All other fevers	104	30.7
Childbirth (for both live birth and stillbirth) normal delivery	1	0.3
Pain in abdomen: Gastric and peptic ulcers/acid reflux/acute abdomen	14	4.1
Post Covid Vaccination fever	53	15.6
Un-Diagnosed Diseases	7	2.1
Total Incidence of Other Diseases	179	52.8
Total Acute Ailment	339	100

Note: There may be investigator bias as most of the fevers reported in this category are undiagnosed by medical practitioners.

Source: Survey data, 2021-22.

### 5.3 Disease-Specific Chronic Ailments

Chronic illnesses are long-term health conditions that persist for an extended period, often requiring continuous medical attention and lifestyle adjustments. These include cardiovascular diseases (CVDs), diabetes, chronic respiratory diseases, cancers,

musculoskeletal disorders, and mental health conditions. The following table provides the district-wise incidence of chronic ailments among plantation workers, categorizing diseases into infectious diseases, cardiovascular diseases (CVDs), non-communicable diseases (NCDs), disabilities, and other conditions.

*Table 5.3 District-Wise Incidence of Diseases Reported for Chronic Ailment by Worker Population in Survey Areas*

Type of Diseases Reported	Tinsukia		Dibrugarh		Sibsagar		Jorhat		All Sample Districts	
	No	%	No	%	No	%	No	%	No	%
Infectious Disease	28	17	19	10.70	6	10.30	7	13.70	55	12.10
CVDs	29	17	39	22.00	8	13.80	11	21.60	87	19.20
NCDs	27	16	44	24.90	16	27.60	10	19.60	102	22.50
Disability	62	37	48	27.10	14	24.10	19	37.30	143	31.50
Other Diseases	22	13	27	15.30	14	24.10	4	7.80	67	14.80
Total Incidence of Chronic Ailment	168	100	177	100	58	100	51	100	454	100.00

Source: Survey data, 2021-22

- Disability-related ailments** constitute the largest share (31.5%) of chronic illnesses, affecting workers across all districts, particularly in Tinsukia (36.9%) and Jorhat (37.3%). This suggests a high prevalence of musculoskeletal disorders, joint pain, or impairments possibly linked to physically demanding plantation work.
- Non-communicable diseases (NCDs)** account for 22.5% of chronic ailments, with the highest incidence in Dibrugarh (24.9%) and Sibsagar (27.6%), indicating growing concerns around conditions like diabetes, hypertension, and respiratory illnesses.
- Cardiovascular diseases (CVDs)** contribute 19.2% to the chronic disease burden, with Dibrugarh (22%) reporting the highest incidence. This could be associated with occupational stress, dietary factors, or tobacco/alcohol consumption.

4. **Infectious diseases** remain a concern (12.1%), with Tinsukia (16.7%) reporting the highest proportion, possibly due to inadequate healthcare access or poor living conditions.
5. **Other chronic illnesses** (14.8%) include various undiagnosed or less common conditions, with Sibsagar (24.1%) having a notably high proportion.
6. Comparison across disease categories:
  - a. **Infectious vs. Non-Communicable Diseases (NCDs):** Infectious diseases (12.1%) are lower than NCDs (22.5%), suggesting a transition from communicable to lifestyle-related health burdens among workers.
  - b. **Cardiovascular Diseases (CVDs) as a Concern:** CVDs make up 19.2% of total cases, which is a significant proportion, likely linked to occupational stress, dietary habits, and physical inactivity.

A Chi-Square Test of Independence was conducted to examine whether the incidence of different types of chronic diseases varies significantly across the four districts (Tinsukia, Dibrugarh, Sibsagar, Jorhat).

#### **Results:**

- Chi-Square Statistic ( $\chi^2$ ): 18.78
- Degrees of Freedom (df): 12
- p-value: 0.094

#### **Interpretation:**

- The p-value (0.094) is greater than the conventional significance level of 0.05, indicating no statistically significant association between the type of chronic disease and the district of residence.



- While there are variations in disease incidence across districts, these differences are not strong enough to be considered statistically significant at the 5% level.
- The expected frequency distribution suggests that some diseases are more or less common in certain districts than expected under independence.

*Table 5.4 Comprehensive List of Diseases Reported Under Chronic Ailment in the Survey Areas*

Type of Disease	Specific Condition	Number	%
<b>Infectious Diseases</b>			
Acute upper respiratory infections		4	0.90%
Cough with sputum with or without fever (not TB)		3	0.70%
Diarrhea		5	1.10%
Discomfort/pain in the eye with redness or swellings/boils		4	0.90%
Fever due to Diphtheria/Whooping Cough *		2	0.40%
Fever with loss of consciousness or altered consciousness		1	0.20%
Skin infection (boil/abscess/itching) and other skin diseases		16	3.50%
Tuberculosis		19	4.20%
Worm infection		1	0.20%
<b>Total Incidence Infectious Disease</b>		55	12.10%
<b>Cardio Vascular Diseases</b>			
Heart disease: Chest pain/breathlessness		10	2.20%
Hypertension		59	13.00%
Hypotension (low blood pressure)		18	4.00%
<b>Total Incidence Cardio Vascular Disease</b>		87	19.20%
<b>Non-Communicable Diseases</b>			
Anaemia (any cause)		21	4.60%
Any difficulty or abnormality in urination		3	0.70%
Bleeding disorders		2	0.40%
Bronchial asthma		11	2.40%
Cancer		3	0.70%
Menstrual and reproductive disorders		13	2.90%
Diabetes		11	2.40%
Earache with discharge/bleeding from ear/infections		1	0.20%
Goitre and other diseases of the thyroid		4	0.90%
Jaundice		5	1.10%
Pelvic region/reproductive tract infection		3	0.70%
Piles		5	1.10%
Under-nutrition		20	4.40%
<b>Total Incidence Non-Communicable Disease</b>		102	22.50%
<b>Disability</b>			
Accidental injury or road traffic accidents and falls		3	0.70%

## Status among Tea Garden Workers of Assam

Back or body aches	54	11.90%
Burns and corrosions	1	0.20%
Decreased hearing or loss of hearing	12	2.60%
Decreased vision (chronic)	6	1.30%
Diseases of mouth/teeth/gums	3	0.70%
Eye disorders (strabismus/nystagmus/ptosis)	1	0.20%
Headache	15	3.30%
Joint or bone disease/pain or swelling in joints	17	3.70%
Mental disorders	1	0.20%
Mental retardation	2	0.40%
Seizures or known epilepsy	6	1.30%
Weakness in limb muscles and difficulty in movements	22	4.80%
<b>Total Incidence Disability</b>	<b>143</b>	<b>31.50%</b>
<b>Other Diseases</b>		
All other fevers	2	0.40%
Piles (not diagnosed by a doctor)	1	0.20%
Gastrointestinal bleeding	1	0.20%
Lump or fluid in abdomen or scrotum	3	0.70%
Pain in abdomen: Gastric and peptic ulcers/acid reflux/acute abdomen	38	8.40%
Un-diagnosed diseases**	22	4.80%
<b>Total Incidence of Other Diseases</b>	<b>67</b>	<b>14.80%</b>
<b>Grand Total Incidence of Chronic Ailment</b>	<b>454</b>	<b>100.00%</b>

*Note:* There may be investigator bias in fever cases reported, as many were not diagnosed by medical practitioners.

*Source:* Survey data, 2021-22

## 5.4 Disease-specific Hospitalisations

Hospitalization data provides crucial insights into the severity and burden of diseases among workers, reflecting the cases that required medical intervention beyond primary healthcare. Understanding the distribution of hospitalization cases across districts and disease categories helps in identifying vulnerable groups, assessing the accessibility and effectiveness of healthcare services, and guiding policy interventions for workplace health and safety. The table presents a district-wise breakdown of hospitalization cases based on broad disease categories such as infectious diseases, cardiovascular diseases (CVDs), non-communicable diseases (NCDs), disabilities, and other ailments.

*Table 5.5 District-Wise Incidence of Diseases Reported By Hospitalisation Cases in Survey Areas*

Type of Disease	Tinsukia		Dibrugarh		Sibsagar		Jorhat		Total	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Infectious Diseases	8	12.9	12	19.0	1	3.8	3	13.6	21	12.1
Cardio Vascular Diseases (CVDs)	4	6.5	7	11.1	3	11.5	4	18.2	18	10.4
Non-Communicable Diseases (NCDs)	13	21.0	6	9.5	2	7.7	2	9.1	33	19.1
Disability	16	25.8	8	12.7	11	42.3	10	45.5	42	24.3
Other Diseases	21	33.9	27	42.9	9	34.6	3	13.6	59	34.1
Total Incidence of Hospitalization	62	100	63	100	26	100	22	100	173	100

Source: Survey data, 2021-22

### Most Frequent Causes of Hospitalization

- The highest proportion of hospitalizations (34.1%) was due to other diseases, including undiagnosed conditions and general illnesses.
- Disabilities (24.3%) were the second most common reason for hospitalization, indicating a significant impact of work-related musculoskeletal disorders, accidents, and chronic conditions.
- Non-communicable diseases (19.1%) and infectious diseases (12.1%) also accounted for a substantial share of cases.

### District-Wise Patterns

- Tinsukia (33.9%) and Dibrugarh (42.9%) had the highest share of hospitalizations due to "other diseases", suggesting a need for better diagnostic healthcare.

- Sibsagar (42.3%) and Jorhat (45.5%) reported the highest share of hospitalization due to disabilities, reflecting potential work-related physical strain or inadequate preventive healthcare measures.
- Dibrugarh (19.0%) had the highest infectious disease-related hospitalizations, indicating possible sanitation or hygiene-related challenges.

### Cardiovascular and Non-Communicable Diseases

- CVDs contributed to 10.4% of hospitalizations, with Jorhat (18.2%) reporting the highest share, signaling the need for better cardiac care and monitoring in the region.
- Non-communicable diseases (19.1%), such as diabetes, anemia, and chronic conditions, were also significant contributors, highlighting the long-term health risks among workers.

*Table 5.6 Comprehensive List of Diseases Reported Under Hospitalisation Cases in Survey Areas*

Type of Diseases Reported for Hospitalization	Cases Reported	Incidence of Disease Reported (%)
<b>Infectious Diseases</b>		
Acute upper respiratory infections	1	0.6
Cough with sputum with or without fever (not TB)	1	0.6
COVID-19	10	5.8
Discomfort/pain in the eye with redness or swelling/boils	1	0.6
Diarrhea	1	0.6
Fever due to Diphtheria/Whooping Cough*	2	1.2
Fever with loss of consciousness or altered consciousness	1	0.6
Skin infection (boil/abscess/itching) and other skin diseases	1	0.6
Tuberculosis	3	1.7
<b>Total Incidence Infectious Disease</b>	<b>21</b>	<b>12.1</b>
<b>Cardio Vascular Diseases (CVDs)</b>		
Heart disease: Chest pain/breathlessness	5	2.9
Hypertension	7	4

Hypotension (low blood pressure)	5	2.9
Stroke/hemiplegia/sudden onset weakness or loss of speech in half of the body	1	0.6
<b>Total Incidence CVDs</b>	<b>18</b>	<b>10.4</b>
<b>Non-Communicable Diseases (NCDs)</b>		
Anemia (any cause)	3	1.7
Bleeding disorders	2	1.2
Bronchial asthma	1	0.6
Cancer	2	1.2
Cataract	3	1.7
Change/irregularity in menstrual cycle or excessive bleeding/pain during menstruation and other gynecological and andrological disorders	3	1.7
Diabetes	4	2.3
Earache with discharge/bleeding from ear/infections	1	0.6
Goitre and other diseases of the thyroid	1	0.6
Pregnancy with complications before or during labor (abortion/ectopic pregnancy/hypertension/complications during labor)	3	1.7
Jaundice	3	1.7
Joint or bone disease/pain or swelling in joints or swelling/pus from bones	3	1.7
Pain in pelvic region/reproductive tract infection/pain in male genital area	1	0.6
Under-nutrition	3	1.7
<b>Total Incidence NCDs</b>	<b>33</b>	<b>19.1</b>
<b>Disability</b>		
Accidental injury and road traffic accidents and falls	11	6.4
Back or body aches	9	5.2
Burns and corrosions	1	0.6
Contact with venomous/harm-causing animals and plants	2	1.2
Decreased hearing or loss of hearing	1	0.6
Decreased vision (chronic) not including where decreased vision is corrected with glasses	1	0.6
Headache	2	1.2
Seizures or known epilepsy	2	1.2
Weakness in limb muscles and difficulty in movements	13	7.5
<b>Total Incidence Disability</b>	<b>42</b>	<b>24.3</b>
<b>Other Diseases</b>		
All other fevers	12	6.9

Caesarean delivery	5	2.9
Childbirth (for both live birth and stillbirth) normal delivery	21	12.1
Gastrointestinal bleeding	1	0.6
Lump or fluid in abdomen or scrotum	2	1.2
Pain in abdomen: Gastric and peptic ulcers/acid reflux/acute abdomen	9	5.2
Post-COVID vaccination fever	2	1.2
Symptoms reported for hospitalization**	7	4
<b>Total Incidence of Other Diseases</b>	<b>59</b>	<b>34.1</b>
<b>Grand Total Incidence of Hospitalization</b>	<b>173</b>	<b>100</b>

*Notes:*

- There may be investigator bias as most fevers reported in this category were undiagnosed by medical practitioners, so the data should be interpreted with caution.
- Some of the symptoms reported under undiagnosed diseases: Gallbladder, stomach pain/fever, weakness/fever.

*Source:* Survey data, 2021-22

### **Dominance of "Other Diseases" in Hospitalization (34.1%)**

- A significant portion of hospitalizations falls under "other diseases" (34.1%), which includes normal and C-section childbirth (15%), gastric issues (5.2%), and unexplained symptoms (4%).
- The high proportion of hospitalizations for childbirth suggests maternal health and access to hospital-based deliveries are key concerns.

### **Disability-Related Hospitalizations (24.3%)**

- Workplace injuries and road traffic accidents (6.4%) contributed significantly to disability-related hospitalizations.
- Musculoskeletal disorders (back/body aches, limb weakness) accounted for 12.7%, indicating possible poor ergonomic working conditions.
- The prevalence of neurological conditions (seizures, chronic headaches) suggests potential issues related to occupational stress or long-term chronic illness.

### **Non-Communicable Diseases (19.1%)**

- Chronic illnesses such as diabetes (2.3%), anemia (1.7%), and thyroid disorders (0.6%) indicate long-term health risks requiring sustained medical care.

- Pregnancy-related complications (1.7%) highlight the importance of maternal healthcare facilities.
- Cancer (1.2%) and joint/bone diseases (1.7%) also reflect the need for specialized healthcare infrastructure.

### **Infectious Diseases (12.1%)**

- COVID-19 accounted for the highest number of infectious disease-related hospitalizations (5.8%), showing the pandemic's lingering impact on workers.
- Tuberculosis (1.7%) and skin infections (0.6%) indicate ongoing public health challenges, particularly among vulnerable populations.

### **Cardiovascular Diseases (10.4%)**

- Hypertension (4%) and hypotension (2.9%) were leading reasons for hospitalization, emphasizing the rising burden of lifestyle diseases.
- Heart disease (2.9%) and stroke-related cases (0.6%) indicate a need for improved preventive cardiovascular care.

# Survey Schedule

Survey of Morbidity & Mortality Rates Among Tea Garden Workers of Assam



Indian Institute of Technology Guwahati  
(supported by Directorate of Economics and Statistics, Government of Assam)

Household No.						
Date						
Investigator name						
Start Time						

**TABLE 1: IDENTIFICATION**

Name of the Household Head		Phone number (if available)	
District		Mother tongue of the respondent	
Block		Religion	
Where do you reside? (Location/address)		Social Group/Jati (Specify name)	
Are you residing in the tea garden quarter?		How many members in your family are tea garden workers?	



<b>Name of the tea garden where you are working?</b>	
<b>Gram Panchayat/Revenue Village</b>	

**Table 2: Demographic Details of Household Members**

Member ID	Name	Relationship with Head	sex	Age		Marital Status	Age at Marriage	General Education	Occupation Status	Activity Status	Whether suffering from any chronic ailment	Whether suffering from any ailment in last 30 days other than chronic ailment	Whether hospitalized in the last 365 days	Whether covered under any Health Insurance
				Years	Months									
1.														
2.														
3.														
4.														
5.														
		Self=0, Spouse-1, Child – 2, Spouse of Married Child – 3, Parent – 4, Grand-parent – 5, Grand-child -6, Brother/Sister – 7, In-laws-8,	Male – 1 Female – 2 Transgender - 3	Age in completed years; Up to the nearest month in case of children below 5 years of age		Never married -1 Currently married-2 Widowed- 3 Separated/Divorced - 4 Other (specify)- 5		not literate -01, literate without any schooling - 02, literate without formal schooling: through NFEC - 03, literate	Agriculture & Allied-1, Agricultural labourer-2, permanent tea garden worker-3, temporary tea garden	Currently employed full time-1, currently employed part time-2 not working but	Yes- 1 No- 2	Yes- 1 No- 2	Yes- 1 No- 2	Yes- 1 No- 2

		Other relatives – 9, Servant/Employe e -10, Others -11					through TLC/AEC -04, others -05; literate with formal schooling: below primary -06, primary -07, upper primary/middle -08, secondary -10, higher secondary -11, diploma /certificate course (upto secondary)-12, diploma/certificat e course (higher secondary)-13, diploma/certificat e course(graduation & above) -14, graduate -15, post graduate and above -16 not applicable-17	worker-4, daily wage non-agricultural worker-5, homemaker-6, petty business/self-employed-7, trade/business -8, salaried service (reg)-9, salaried but casual-10, student-11, pensioner-12, not applicable-13,retired tea-garden worker-14	seeking or available for work-3, not available for work-4, household work/child care-5				
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Table 3: Self - Reported Morbidity of the Workers			
Item		Tea Garden Worker 1	Tea Garden Worker 2
Member ID			
1.	Whether suffered from any ailment in the last 30 days	Yes- 1 No- 2	Yes- 1 No- 2

2.	Whether suffering from chronic ailment	Yes- 1 No- 2	Yes- 1 No- 2
3.	Whether hospitalized in the last 365 days	Yes- 1 No- 2	Yes- 1 No- 2
4.	Whether tested positive for Covid-19 last 365 days	Yes- 1 No- 2	Yes- 1 No- 2

Table 4: Nature of Ailment Reported by Workers						
Items	Tea Garden Worker 1			Tea Garden Worker 2		
Member ID						
Nature of Ailment	Any ailment in the last 30 days	Chronic Ailment	Hospitalized in the last 365 days	Any ailment in the last 30 days	Chronic Ailment	Hospitalized in the last 365 days
<b>INFECTION</b> Fever with loss of consciousness or altered consciousness- 1 Malaria- 2 Fever due to DIPHTHERIA, WHOOPING COUGH -3 All other fevers (Includes typhoid, Fever with rash/ eruptive lesions and fevers of unknown origin, all specific fevers that do not have a confirmed diagnosis)- 4 TUBERCULOSIS- 5 Filariasis-6 Tetanus- 7 HIV/AIDS -8 Other sexually transmitted diseases- 9 Jaundice- 10 Diarrheas/ dysentery/ increased frequency of stools with or without blood and mucus in stools-11 Worms' infestation-12 Covid-19-13  <b>CANCERS</b> Cancer (known or suspected by a physician) and occurrence of any growing painless lump in the body-14  <b>BLOOD DISEASES</b>						

<p>Anaemia (any cause)-15 Bleeding disorders-16</p> <p><b>ENDOCRINE, METABOLIC, NUTRITIONAL</b> Diabetes-17 Under-nutrition-18 Goitre and other diseases of the thyroid-19 Others (including obesity)-20</p> <p><b>PSYCHIATRIC &amp; NEUROLOGICAL</b> Mental retardation-21 Mental disorders-22 Headache-23 Seizures or known epilepsy-24 Weakness in limb muscles and difficulty in movements-25 Stroke/ hemiplegia/ sudden onset weakness or loss of speech in half of body-26 Others including memory loss, confusion-27</p> <p><b>EYE</b> Discomfort/pain in the eye with redness or swellings/ boils-28 Cataract-29 Glaucoma-30 Decreased vision (chronic) NOT including where decreased vision is corrected with glasses-31 Others (including disorders of eye movements – strabismus, nystagmus, ptosis and adnexa)-32</p> <p><b>EAR</b> Earache with discharge/bleeding from ear/infections - 33 Decreased hearing or loss of hearing-34</p> <p><b>CARDIO-VASCULAR</b> Hypertension-35 Heart disease: Chest pain, breathlessness-36</p> <p><b>RESPIRATORY</b> Acute upper respiratory infections (cold, runny nose, sore throat with cough, allergic colds included)-37 Cough with sputum with or without fever and NOT diagnosed as TB-38 Bronchial asthma/ recurrent episode of wheezing and breathlessness with or without cough over long periods or known asthma)-39</p> <p><b>GASTRO-INTESTINAL</b> Diseases of mouth/teeth/gums-40</p>					
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<p>Pain in abdomen: Gastric and peptic ulcers/ acid reflux/ acute abdomen-41 Lump or fluid in abdomen or scrotum-42 Gastrointestinal bleeding-43</p> <p>SKIN Skin infection (boil, abscess, itching) and other skin disease-44</p> <p>MUSCULO-SKELETAL Joint or bone disease/ pain or swelling in any of the joints, or swelling or pus from the bones-45 Back or body aches-46</p> <p>GENITO-URINARY INJURIES Any difficulty or abnormality in urination-47 Pain the pelvic region/reproductive tract infection/ Pain in male genital area-48 Change/irregularity in menstrual cycle or excessive bleeding/pain during menstruation and any other gynaecological and andrological disorders incl. male/female infertility-49</p> <p>OBSTETRIC Pregnancy with complications before or during labour (abortion, ectopic pregnancy, hypertension, complications during labour)-50 Complications in mother after birth of child-51 Illness in the new-born/ sick new-born-52</p> <p>INJURIES Accidental injury, road traffic accidents and falls-53 Accidental drowning and submersion-54 Burns and corrosions-55 Poisoning-56 Intentional self-harm-57 Assault-58 Contact with venomous/harm-causing animals and plants-59 Symptom not fitting into any of above categories-60 Could not even state the main symptom-61 Childbirth (for both live birth and stillbirth) normal delivery-62 Caesarean-63 other types of delivery-64 Post-covid vaccination fever-65 Epilepsy-66 Hypotension (low pressure)-67 Undiagnosed diseases-68 Piles-69</p>						
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<b>Table 5: Healthcare seeking behaviour, healthcare expenditure and insurance coverage for any ailment and chronic ailment</b>				
<b>Items</b>		<b>Tea Garden Worker 1</b>		<b>Tea Garden Worker 2</b>
<b>Member ID</b>				
1.	How often do you visit health care facility or consult any healthcare personnel?	<p>Visit to Doctor: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Hospital Outpatient: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Emergency service: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Company or Industry Clinic: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Call doctor at home: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Consult doctor over phone: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Consult AWW, ASHA or ANM: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Visit health camp: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p>	<p>Visit to Doctor: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Hospital Outpatient: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Emergency service: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Company or Industry Clinic: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Call doctor at home: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Consult doctor over phone: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Consult AWW, ASHA or ANM: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p> <p>Visit health camp: Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7</p>	
<b>Reporting of Self-Reported Morbidity</b>		<b>Any ailment in the last 30 days</b>	<b>Chronic Ailment</b>	<b>Any ailment in the last 30 days</b>
				<b>Chronic Ailment</b>

2.	Current Status of the ailment	<p>Started before the reference period and still continuing -1                  Started before the reference period and has ended -2                  Started within the reference period and continuing -3</p> <p>Started within the reference period and has ended -4</p>	<p>Started before the reference period and still continuing -1                  Started before the reference period and has ended -2                  Started within the reference period and continuing -3</p> <p>Started within the reference period and has ended -4</p>	<p>Started before the reference period and still continuing -1                  Started before the reference period and has ended -2                  Started within the reference period and continuing -3</p> <p>Started within the reference period and has ended -4</p>	<p>Started before the reference period and still continuing -1                  Started before the reference period and has ended -2                  Started within the reference period and continuing -3</p> <p>Started within the reference period and has ended -4</p>
3.	Whether Ailment is treated or not on medical advice?	Yes -1, No- 2	Yes -1, No- 2	Yes -1, No- 2	Yes -1, No- 2
4.	If not treated, why?	<p>No medical facility available in the neighbourhood- 1</p> <p>Facility too expensive- 2</p> <p>Cannot afford to wait long due to domestic/economic engagement- 3</p> <p>Ailment not considered serious enough- 4</p> <p>Familial/religious belief- 5</p> <p>Others- 6</p>	<p>No medical facility available in the neighbourhood- 1</p> <p>Facility too expensive- 2</p> <p>Cannot afford to wait long due to domestic/economic engagement- 3</p> <p>Ailment not considered serious enough- 4</p> <p>Familial/religious belief- 5</p> <p>Others- 6</p>	<p>No medical facility available in the neighbourhood- 1</p> <p>Facility too expensive- 2</p> <p>Cannot afford to wait long due to domestic/economic engagement- 3</p> <p>Ailment not considered serious enough- 4</p> <p>Familial/religious belief- 5</p> <p>Others- 6</p>	<p>No medical facility available in the neighbourhood- 1</p> <p>Facility too expensive- 2</p> <p>Cannot afford to wait long due to domestic/economic engagement- 3</p> <p>Ailment not considered serious enough- 4</p> <p>Familial/religious belief- 5</p> <p>Others- 6</p>
5.	If not treated, then whom consulted?	<p>self / other household member/ friend – 1</p> <p>medicine shop – 2</p> <p>others - 9</p>	<p>self / other household member/ friend – 1</p> <p>medicine shop – 2</p> <p>others - 9</p>	<p>self / other household member/ friend – 1</p> <p>medicine shop – 2</p> <p>others - 9</p>	<p>self / other household member/ friend – 1</p> <p>medicine shop – 2</p> <p>others - 9</p>

6.	Whether the ailment prevented the individual from doing his normal work?	Yes -1, No- 2	Yes -1, No- 2	Yes -1, No- 2	Yes -1, No- 2
7.	If so, for how many days?				
8.	No. of wage days works lost due to illness				
9.	Source of Treatment	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Tea Garden/Company own Clinic/Hospital- 3 private hospital -4 private doctor/clinic -5 informal health care provider -6 Pharmacy – 7 Health Camp- 8 Other- 9 (specify)	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Tea Garden/Company own Clinic/Hospital- 3 private hospital -4 private doctor/clinic -5 informal health care provider -6 Pharmacy – 7 Health Camp- 8 Other- 9 (specify)	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Tea Garden/Company own Clinic/Hospital- 3 private hospital -4 private doctor/clinic -5 informal health care provider -6 Pharmacy – 7 Health Camp- 8 Other- 9 (specify)	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Tea Garden/Company own Clinic/Hospital- 3 private hospital -4 private doctor/clinic -5 informal health care provider -6 Pharmacy – 7 Health Camp- 8 Other- 9 (specify)
10.	Reason for not availing government source of treatment	required specific services not available-1 No nearby facility- 2 Facility timing not convenient- 3 Health personnel often absent- 4 available but quality not satisfactory- 5 quality satisfactory but facility too far- 6 quality satisfactory but involves long waiting- 7 financial constraint- 8 preference for a trusted doctor/hospital- 9, others- 10	required specific services not available-1 No nearby facility- 2 Facility timing not convenient- 3 Health personnel often absent- 4 available but quality not satisfactory- 5 quality satisfactory but facility too far- 6 quality satisfactory but involves long waiting- 7 financial constraint- 8 preference for a trusted doctor/hospital- 9 others- 10	required specific services not available-1 No nearby facility- 2 Facility timing not convenient- 3 Health personnel often absent- 4 available but quality not satisfactory- 5 quality satisfactory but facility too far- 6 quality satisfactory but involves long waiting- 7 financial constraint- 8 preference for a trusted doctor/hospital- 9 others- 10	required specific services not available-1 No nearby facility- 2 Facility timing not convenient- 3 Health personnel often absent- 4 available but quality not satisfactory- 5 quality satisfactory but facility too far- 6 quality satisfactory but involves long waiting- 7 financial constraint- 8 preference for a trusted doctor/hospital- 9 others- 10



11.	System of Medicine	Allopathy- 1 Indian system of medicine- 2 (desi dawai: ayurveda, unani or siddha) Homoeopathy- 3 Yoga & Naturopathy- 4 Other- 5	Allopathy- 1 Indian system of medicine- 2 (desi dawai: ayurveda, unani or siddha) Homoeopathy- 3 Yoga & Naturopathy- 4 Other- 5	Allopathy- 1 Indian system of medicine- 2 (desi dawai: ayurveda, unani or siddha) Homoeopathy- 3 Yoga & Naturopathy- 4 Other- 5	Allopathy- 1 Indian system of medicine- 2 (desi dawai: ayurveda, unani or siddha) Homoeopathy- 3 Yoga & Naturopathy- 4 Other- 5
12..	Whether any medical service provided free (fully/partially) by	Government/Public .....1 Private (NGO, Charitable trust etc)...2 Both (1) & (2).....3 Tea Garden Company Provided.....4 Others.....5	Government/Public .....1 Private (NGO, Charitable trust etc)...2 Both (1) & (2).....3 Tea Garden Company Provided.....4 Others.....5	Government/Public .....1 Private (NGO, Charitable trust etc)...2 Both (1) & (2).....3 Tea Garden Company Provided.....4 Others.....5	Government/Public .....1 Private (NGO, Charitable trust etc)...2 Both (1) & (2).....3 Tea Garden Company Provided.....4 Others.....5
13.	Medical Expenditure for treatment (in Rs)	Doctor's fee .....  Medicine .....  Diagnostic Test .....  Other medical expenditure if any.....	Doctor's fee .....  Medicine .....  Diagnostic Test .....  Other medical expenditure if any.....	Doctor's fee .....  Medicine .....  Diagnostic Test .....  Other medical expenditure if any.....	Doctor's fee .....  Medicine .....  Diagnostic Test .....  Other medical expenditure if any.....
14.	Other non-medical expenditure for treatment (in Rs)	Transportation .....  Other Expenditures (registration fee, food, expenditure of the person accompanying the patient etc.) .....	Transportation .....  Other Expenditures (registration fee, food, expenditure of the person accompanying the patient etc.) .....	Transportation .....  Other Expenditures (registration fee, food, expenditure of the person accompanying the patient etc.) .....	Transportation .....  Other Expenditures (registration fee, food, expenditure of the person accompanying the patient etc.) .....
15.	Whether covered under any health care insurance?	EMPLOYEES STATE INSURANCE SCHEME (ESIS).....1	EMPLOYEES STATE INSURANCE SCHEME (ESIS).....1	EMPLOYEES STATE INSURANCE SCHEME (ESIS).....1	EMPLOYEES STATE INSURANCE SCHEME (ESIS).....1

		CENTRAL GOVERNMENT HEALTHSCHEME (CGHS).....2	CENTRAL GOVERNMENT HEALTHSCHEME (CGHS).....2	CENTRAL GOVERNMENT HEALTHSCHEME (CGHS).....2	CENTRAL GOVERNMENT HEALTHSCHEME (CGHS).....2
		STATE HEALTH INSURANCE SCHEME.....3	STATE HEALTH INSURANCE SCHEME.....3	STATE HEALTH INSURANCE SCHEME.....3	STATE HEALTH INSURANCE SCHEME.....3
		RASHTRIYA SWASTHYA BIMA YOJANA(RSBY).....4	RASHTRIYA SWASTHYA BIMA YOJANA(RSBY).....4	RASHTRIYA SWASTHYA BIMA YOJANA(RSBY).....4	RASHTRIYA SWASTHYA BIMA YOJANA(RSBY).....4
		AYUSHMAN BHARAT.....5	AYUSHMAN BHARAT.....5	AYUSHMAN BHARAT.....5	AYUSHMAN BHARAT.....5
		ATAL AMRIT ABHIYAN.....6	ATAL AMRIT ABHIYAN.....6	ATAL AMRIT ABHIYAN.....6	ATAL AMRIT ABHIYAN.....6
		COMMUNITY HEALTH INSURANCE PROGRAMME..... 7	COMMUNITY HEALTH INSURANCE PROGRAMME..... 7	COMMUNITY HEALTH INSURANCE PROGRAMME..... 7	COMMUNITY HEALTH INSURANCE PROGRAMME..... 7
		OTHER HEALTH INSURANCE THROUGH EMPLOYER.....8	OTHER HEALTH INSURANCE THROUGH EMPLOYER.....8	OTHER HEALTH INSURANCE THROUGH EMPLOYER.....8	OTHER HEALTH INSURANCE THROUGH EMPLOYER.....8
		MEDICAL REIMBURSEMENT FROM EMPLOYER.....9	MEDICAL REIMBURSEMENT FROM EMPLOYER.....9	MEDICAL REIMBURSEMENT FROM EMPLOYER.....9	MEDICAL REIMBURSEMENT FROM EMPLOYER.....9
		PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE.....10	PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE.....10	PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE.....10	PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE.....10
		OTHER.....11	OTHER.....11	OTHER.....11	OTHER.....11
16.	Have you availed insurance in last one year? (Yes-1, No-2)				
17.	Total amount received as reimbursement under health insurance				

18.	Major source of finance for treatment	household income/ savings- 1 borrowings- 2 sale of physical assets- 3 contribution from friends and relatives- 4 other sources- 5	household income/ savings- 1 borrowings- 2 sale of physical assets- 3 contribution from friends and relatives- 4 other sources- 5	household income/ savings- 1 borrowings- 2 sale of physical assets- 3 contribution from friends and relatives- 4 other sources- 5	household income/ savings- 1 borrowings- 2 sale of physical assets- 3 contribution from friends and relatives- 4 other sources- 5
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Table 6: Healthcare seeking behaviour and healthcare expenditure for hospitalization in the last 365 days			
Items		Tea Garden Worker 1	Tea Garden Worker 2
<b>Member ID</b>			
1.	Current Status of the ailment	Started before the reference period and still continuing -1 Started before the reference period and has ended -2 Started within the reference period and continuing -3 Started within the reference period and has ended -4	Started before the reference period and still continuing -1 Started before the reference period and has ended -2 Started within the reference period and continuing -3 Started within the reference period and has ended -4
2.	When admitted to the hospital?	during last 15 days – 1 16 days to 365 days ago – 2 more than 365 days ago - 3	during last 15 days – 1 16 days to 365 days ago – 2 more than 365 days ago - 3
3.	Number of cases of Hospitalization last 365 days?		

4.	When discharged from hospital?	not yet -1 during last 15 days -2 16 days to 365 days ago -3	not yet -1 during last 15 days -2 16 days to 365 days ago -3
5.	Duration of stay at hospital (no. of days)		
6.	Whether the ailment prevented the individual from doing his normal work?	Yes -1, No- 2	Yes -1, No- 2
7.	If so, for how many days?		
8.	No. of wage days works lost due to illness		
9.	Source of Treatment	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Tea Garden/Company own Clinic/Hospital- 3 private hospital -4 private doctor/clinic -5 informal health care provider -6 Pharmacy – 7 Health Camp- 8 Other- 9 (specify)	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Tea Garden/Company own Clinic/Hospital- 3 private hospital -4 private doctor/clinic -5 informal health care provider -6 Pharmacy – 7 Health Camp- 8 Other- 9 (specify)
10.	Reason for not availing government source of treatment	Required specific services not available- 1 No nearby facility- 2 Facility timing not convenient- 3 Health personnel often absent- 4 available but quality not satisfactory- 5 quality satisfactory but facility too far- 6 quality satisfactory but involves long waiting- 7 financial constraint- 8 preference for a trusted doctor/hospital- 9 others- 10	Required specific services not available- 1 No nearby facility- 2 Facility timing not convenient- 3 Health personnel often absent- 4 available but quality not satisfactory- 5 quality satisfactory but facility too far- 6 quality satisfactory but involves long waiting- 7 financial constraint- 8 preference for a trusted doctor/hospital- 9 others- 10

11.	System of Medicine	Allopathy- 1 Indian system of medicine- 2 (desi dawai: ayurveda, unani or siddha) Homoeopathy- 3 Yoga & Naturopathy- 4 Other- 5	Allopathy- 1 Indian system of medicine- 2 (desi dawai: ayurveda, unani or siddha) Homoeopathy- 3 Yoga & Naturopathy- 4 Other- 5
12.	Whether any treatment received before hospitalization?	Yes- 1, No- 2	Yes- 1, No- 2
13.	Whether treatment continued after discharged from hospital?	Yes- 1, No- 2	Yes- 1, No- 2
14.	Whether any medical service provided free (fully/partially) by	Government/Public .....1 Private (NGO, Charitable trust etc)...2 Both (1) & (2).....3 Tea Garden Company Provided.....4 Others.....5	Government/Public .....1 Private (NGO, Charitable trust etc)...2 Both (1) & (2).....3 Tea Garden Company Provided.....4 Others.....5
15.	Medical Expenditure for treatment (in Rs)	Doctor's fee .....1 Surgery fee.....2 Bed/Cabin fee.....3 Medicine .....4 Diagnostic Test .....5 Other medical expenditure if any.....6	Doctor's fee .....1 Surgery fee.....2 Bed/Cabin fee.....3 Medicine .....4 Diagnostic Test .....5 Other medical expenditure if any.....6

16.	Other non-medical expenditure for treatment (in Rs)	Transportation .....1  Other Expenditures (registration fee, food, expenditure of the person accompanying the patient etc.) .....2	Transportation .....1  Other Expenditures (registration fee, food, expenditure of the person accompanying the patient etc.) .....2
17.	Whether covered under any health care insurance?	EMPLOYEES STATE INSURANCE SCHEME (ESIS).....1  CENTRAL GOVERNMENT HEALTHSCHEME (CGHS).....2  STATE HEALTH INSURANCE SCHEME.....3  RASHTRIYA SWASTHYA BIMA YOJANA(RSBY).....4  AYUSHMAN BHARAT.....5  ATAL AMRIT ABHIYAN.....6  COMMUNITY HEALTH INSURANCE PROGRAMME..... 7  OTHER HEALTH INSURANCE THROUGH EMPLOYER.....8  MEDICAL REIMBURSEMENT FROM EMPLOYER.....9  PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE.....10  OTHER.....11	EMPLOYEES STATE INSURANCE SCHEME (ESIS).....1  CENTRAL GOVERNMENT HEALTHSCHEME (CGHS).....2  STATE HEALTH INSURANCE SCHEME.....3  RASHTRIYA SWASTHYA BIMA YOJANA(RSBY).....4  AYUSHMAN BHARAT.....5  ATAL AMRIT ABHIYAN.....6  COMMUNITY HEALTH INSURANCE PROGRAMME..... 7  OTHER HEALTH INSURANCE THROUGH EMPLOYER.....8  MEDICAL REIMBURSEMENT FROM EMPLOYER.....9  PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCE.....10  OTHER.....11
18.	Have you availed insurance in last one year? (Yes-1, No-2)		

19.	Total amount received as reimbursement under health insurance		
20.	Major source of finance for treatment	household income/ savings- 1 borrowings- 2 sale of physical assets- 3 contribution from friends and relatives- 4 other sources- 5	household income/ savings- 1 borrowings- 2 sale of physical assets- 3 contribution from friends and relatives- 4 other sources- 5

Table 7: Household Income			
Table 7.1: Income from Agriculture and Allied Activities			
Crop 1	Output	Input	Sale
Crop 2			
Crop3			
Tea Plantation			
Livestock and Fishery			

Table 7.2 Household Income from Wages, Salaries, Remittances, Earnings, Scholarships, Pensions			

Member ID	Source of earning	Net earnings

**Table 8: Household Consumption-Expenditure (in last one month in Rs)**

**8.1 Household Expenditure on Food items**

Grocery	Vegetables & Fruits	Egg, fish & meat	Milk	Do you feel you had less food in the last one year (during the pandemic)? (Yes-1, No-2)

**8.2 Household Expenditure on Non-Food items**

Medical Expenses (outpatient)	Medical Expenses (in-patient)	Medical Expenses on medicines	Amount covered under health Insurance	Education	Household Electricity	Cooking Fuel	House Rent	Mobile/TV/Newspaper recharge	Transportation	Repayment of any loans	Any other

**Table 9: ANTHROPOMETRIC DETAILS**

Item	Tea Garden Worker 1	Tea Garden Worker 2
Member ID		



1.	Height (cm)		
2.	Weight (kg)		

Table 10: Consumption of different food items, smoking, tobacco and alcohol by the workers										
Items		Tea Garden Worker 1					Tea Garden Worker 2			
		Breakfast	Snacks	Lunch	Snacks	Dinner	Breakfast	Snacks	Lunch	Snacks
Member ID										
Which are the following meals that you take per day? (tick the meals)		Breakfast	Snacks	Lunch	Snacks	Dinner	Breakfast	Snacks	Lunch	Dinner
How often do you yourself eat the following food items: daily, weekly, occasionally, or never?		Daily	Weekly	Occasionally	Never	Daily	Weekly	Occasionally	Never	
1.	Staples (rice, wheat, millets etc.)									
2.	Pulses and Beans (different types of dal, soybean, kidney beans, chickpeas etc.)									
3.	Potatoes & Onions									
4.	Non-leafy vegetables									
5.	Green leafy vegetables									
6.	Fruits									
7.	Milk & Dairy Products (eg. butter, curd, cheese, paneer etc.)									

8.	Egg								
9.	Fish								
10.	Meat								
11.	Packaged Food (eg. chips, biscuits, sweets etc.)								
12.	Processed Food (eg. processed meat, fish etc.)								
13.	Edible Oil								
14.	Beverages (eg. coffee, tea)								
15.	Cigarette, bidi, any other tobacco								
16.	Alcohol								
17.	What did you have for food in last 24 hours?								

TABLE 11: Worker's detail of workplace conditions and facilities available for workers			
Items		Tea Garden Worker 1	Tea Garden Worker 2
<b>Member ID</b>			
1.	Whether Permanent Worker or Non- Permanent Worker at the tea garden	Permanent.....1 Non- Permanent.....2 (if 2, for female, fill up time use table 18)	Permanent.....1 Non- Permanent.....2 (if 2, for female, fill up time use table 18)
2.	Category of worker	Tea plucking- 1 Factory worker-2 Pruning-3 Hoeing/weeding- 4 Spraying insecticides/ pesticides- 5	Tea plucking- 1 Factory worker-2 Pruning-3 Hoeing/weeding- 4 Spraying insecticides/ pesticides- 5

		Manuring or spreading fertilizers- 6 Drainage and irrigation- 7 Water supply man for workers in garden- 8 Chowkidar - 9 Supervisor ( <i>sardar</i> )- 10 Drivers- 11 Other (specify)- 12	Manuring or spreading fertilizers- 6 Drainage and irrigation- 7 Water supply man for workers in garden- 8 Chowkidar - 9 Supervisor ( <i>sardar</i> )- 10 Drivers- 11 Other (specify)- 12
3.	If Permanent worker	Wage Rate/day or Salary (in Rs.) ..... Frequency of Wage: Daily----1, Weekly----2, Bi-weekly----3 Monthly-----4 Any wage received in kinds? Yes----1, No----2	Wage Rate/day or Salary (in Rs.) ..... Frequency of Wage: Daily----1, Weekly----2, Bi-weekly-----3, Monthly-----4 Any wage received in kinds? Yes----1, No----2
4.	If Temporary worker	Wage Rate/day or Salary (in Rs.) ..... Frequency of Wage: Daily----1, Weekly----2, Bi-weekly-----3, Monthly-----4 Any wage received in kinds? Yes----1, No----2	Wage Rate/day or Salary (in Rs.) ..... Frequency of Wage: Daily----1, Weekly----2, Bi-weekly-3,Monthly-----4 Any wage received in kinds? Yes----1, No----2
5.	Do you usually work throughout the year, or do you work seasonally, or only once in a while?	Throughout the year . . . . . 1 Seasonally/ part of the year . . . . 2 Once in a While . . . . . 3	Throughout the year . . . . . 1 Seasonally/ part of the year . . . . 2 Once in a While . . . . . 3
6.	If option 2 or 3, what are the other sources of income?		
7.	Are you paid in cash or kind for the work, or are you not paid at all?	Cash only . . . . . 1 Cash and Kind . . . . . 2 In Kind only . . . . . 3 Not Paid . . . . . 4	Cash only . . . . . 1 Cash and Kind . . . . . 2 In Kind only . . . . . 3 Not Paid . . . . . 4

8.	Items received in Kind	<p><b>Yearly:</b>                  Mosquito net----1                  Tarpaulin----2                  Umbrella----3                  Sandal----4                  Blanket----5</p> <p><b>Monthly:</b>                  Rice---1                  wheat---2                  Tea leaves---3                  Firewood----4</p>	<p><b>Yearly:</b>                  Mosquito net----1                  Tarpaulin----2                  Umbrella----3                  Sandal----4                  Blanket----5</p> <p><b>Monthly:</b>                  Rice---1                  wheat---2                  Tea leaves---3                  Firewood----4</p>
9.	Other facilities/entitlements received by the worker from the tea garden authority	<p>Housing----1                  Electricity---2                  Water-----3                  Ration-----4                  Medical Facilities-----5                  Others (specify)-----6</p>	<p>Housing----1                  Electricity---2                  Water-----3                  Ration-----4                  Medical Facilities-----5                  Others (specify)-----6</p>
10.	Workplace hazards faced	<p>Physical Hazards-Heat/sun stroke, dizziness, fainting &amp; dehydration, cough, cold, backache, chest pain, knee pain, neck pain.....1</p> <p>Biological Hazards- malaria, animal/snake bite, insect sting, fungal infections, parasitic infection from leeches &amp; bugs .....2</p> <p>Mechanical Hazards-fall in hilly terrains, cuts &amp; injuries, sprains.....3</p> <p>Chemical Hazards- inhalation injury during spraying, allergic reaction due to contact with fertilizers, dermatitis, eczema, ulcers.....4</p> <p>Psychological hazards- stress.....5</p> <p>Other hazards (specify) .....6</p>	<p>Physical Hazards-Heat/sun stroke, dizziness, fainting &amp; dehydration, cough, cold, backache, chest pain, knee pain, neck pain.....1</p> <p>Biological Hazards- malaria, animal/snake bite, insect sting, fungal infections, parasitic infection from leeches &amp; bugs .....2</p> <p>Mechanical Hazards-fall in hilly terrains, cuts &amp; injuries, sprains.....3</p> <p>Chemical Hazards- inhalation injury during spraying, allergic reaction due to contact with fertilizers, dermatitis, eczema, ulcers.....4</p> <p>Psychological hazards- stress.....5</p> <p>Other hazards (specify) .....6</p>

11.	Whether first aid is available at the workplace?	Yes- 1, No- 2	Yes- 1, No- 2
12.	Whether reimbursement or free medical facility provided to the workers in case of workplace hazard injury?	Yes- 1, No- 2	Yes- 1, No- 2
13.	Any provision of maternity leave or benefit for the permanent female workers	Yes- 1, No- 2	Yes- 1, No- 2
14.	Any provision of maternity leave or benefit for the temporary female workers	Yes- 1, No- 2	Yes- 1, No- 2
15.	Duration of maternity leave (if availed)		
16.	Received any bonus, benefit or compensation from the tea garden authority in the last one year?	Yes- 1, No- 2	Yes- 1, No- 2
17.	Amount received as bonus, benefit or compensation in the one year?		
18.	If currently unemployed, mention duration of unemployment (in years or months)		
19.	If currently unemployed, make a note of the reasons and circumstances of unemployment.		

Table 12: Nearest Health care facilities and Health Care facilities within the tea garden		
1.	Availability of healthcare facilities within the tea garden	Tea garden own Dispensary/Clinic/Hospital -----1 Government Dispensary/SC/PHC-----2 Private doctor/pharmacist available -----3 Others -----4
2.	Nearest healthcare facility available outside the tea garden	Govt./public hospital (incl. HSC/PHC/CHC etc.) -1 Charitable/Trust/NGO run hospital -2 Private hospital -3 Private doctor/clinic -4 Informal health care provider -5 Pharmacy – 6 Other- 7 (specify)
3.	Distance of the nearest healthcare facility outside the tea garden from the workers home	
4.	Availability of Means of communication to this facility	Tea garden provide vehicle----1 Government ambulance -----2 Public transport -----3 Private ambulance service -----4 Private rented vehicle -----5 Own vehicle -----6 Others -----7
5.	Availability of Anganwadi Centre within or outside the tea garden	Yes- 1, No- 2
6.	Whether home visits done by AWW, ASHA, ANM, tea garden hospital/dispensary staff	Yes- 1, No- 2

7.	How often does these home visit takes place	Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7
8.	Organisation of Village Health, Nutrition and Sanitation Day (last one year)	Once a week-1, Once in 15 days-2, Once a month- 3, Only when need arise-4, Rarely-5, Once a year- 6, Never- 7
9.	Any other health camp held (last one year)	Yes- 1, No- 2

**Table 13: Details of mortality at household level of the workers for a reference period of 5 years**

1.	Name of the Deceased Member		
2.	Gender (Male—1, Female—2)		
3.	Age at death		
4.	Cause of Death		
5.	Whether medical treatment received before death (Yes-1, No-2)		
6.	Whether hospitalised at least once before death (Yes-1, No-2)		
7.	If hospitalized what was the nature of ailment?		
8.	Nature of ailment for death		
9.	Health care expenditure of the deceased member		

10.	Has there been any still birth of a child?		
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Table 14: Covered under any Government Scheme and Benefits Received		
1.	Households covered under any government scheme both central & state govt. (Ujjawala, PMAY, etc)	
2.	What are the government schemes that you have benefitted from?	
3.	Any direct cash transfer benefit received	
4.	Any direct cash transfer as maternity benefit or for institutional delivery	

TABLE 15 SOURCE OF WATER FOR DOMESTIC USE					
Source of water	Ownership	Distance from house	Purpose for which used	Who brings water	Cost/payment



TABLE 16 HOUSING												
No.	Owned/rented/Line Colony/ Own house in tea garden company land	Veranda	Separated kitchen	No. of rooms	Main material used for roof	Main material Used for wall	Main material used for floor	Latrine	Electricity	Cooking fuel	Place of cooking	Type of stove

Time	Adult Female Temporary Worker's Primary Activity	Location
04:00 - 05:00		
05:00 - 06:00		
06:00 - 07:00		
07:00 - 08:00		
08:00 - 09:00		
09:00 - 10:00		
10:00 - 11:00		
11:00 - 12:00		
12:00 - 13:00		
13:00 - 14:00		
14:00 - 15:00		

15:00 - 16:00		
16:00 - 17:00		
17:00 - 18:00		
18:00 - 19:00		
19:00 - 20:00		
20:00 - 21:00		
21:00 - 22:00		
22:00 - 23:00		
23:00 - 00:00		

<b>TABLE 19: INVESTIGATOR'S COMMENTS</b>	
(In bullet points the investigator can write her/his comments on any relevant information and observation about the household)	

<b>End Time</b>	
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