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Socio-Economic Conditions of the Tea Garden Labourers of Dibrugarh, Tinsukia, Dima-Hasao and Goalpara Districts of Assam and Determinants of Wage

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Abstract

This study aims to evaluate the socio-economic conditions of tea garden labourers in the Assam districts of Dibrugarh, Tinsukia, Dima-Hasao, and Goalpara, discussing the determinants of their wages. Data were drawn from 400 respondents to understand different factors determining the wage, which includes district differences, gender, educational status, work experience, and household size. The study tested several hypothesis and found significant differences in the mean wages, household income, and consumption across the districts. It further brought out gender wage differentials where males earned more than females, and higher wage levels were influenced positively by higher education levels, greater work experiences, and larger household sizes. Statistical analyses conducted using ANOVA and independent t-tests concluded that socio-economic influences on wages included district, education, and work experience. The findings highlight the importance of interventions aimed at the economic empowerment of tea garden workers, especially regarding gender inequality and opportunities in education.

Keywords: Tea Industry, Assam, Socio-Economic Conditions, Wage Determinants, Tea Garden Laborers, Education, Gender Disparities, Healthcare Access, Housing Facilities, ANOVA, Regression Analysis, Well-being, Marginalized Communities, Sustainable Development.

Introduction

Assam is often considered to be among the most stunning states in India. India is home to the most diverse ecosystems of any country on the planet. In addition to being well-known in the global tea market, Assam is making significant contributions to the tea business and tea tourism. In addition, the tea plantation serves as the primary point of interest for the whole state. One of the most important aspects of the Indian economy is the tea business. 55% of the entire tea output in India is produced in the state of Assam. The presence of a big workforce is essential to the success of this sector. To our knowledge, this is the only industry in which the majority of workers are female. There are around one million people that are employed in the tea sector in Assam. The minimal amenities that are supplied by the tea plantations or firms are what these labourers consider to be their living conditions. People who belong to the tea tribe are the primary labourers on the plantation.

One of the most prominent plain tribes in Assam is the Tea tribe. They are mostly located in the upper region of Assam, namely in the cities of Dibrugarh, Sivasagar, jorhat, lakhimpur, dhemji, and Tinsukia.The Indian state of Assam is

producing high-quality tea(R. Sharma & Koiri, 2022).Currently, India is the world's top producer of tea (based on statistics from 2004), followed by China, Sri Lanka, Korea, Turkey, Indonesia, Japan, Nepal, and so on. However, the bulk of India's tea is grown in Assamese gardens. Assam and other parts of Northeast India now have a large number of medium-sized and small tea plantations. Common farmers and tea estates were interested in establishing tea plantations during the comparatively successful period from the middle of the 1970s to the middle of the 1990s.Since tea farms employ 17% of Assamese workers, tea is deeply ingrained in Assamese culture. Others refer to Assam tea as red tea, while others call it black tea. Recently, a few tiny Assamese farms have begun producing white and green tea(Reviewed & Journal, 2024). The first tea garden was founded at Lakhimpur in 1833, and the Assam Tea Company was formed in 1839 for international commerce. The tea business has been export-oriented in the area since its establishment. The tea sector in Assam is vital for job creation. India ranks as the second biggest tea producer worldwide, generating around 1325.05 million kg of tea, accounting for 22.68% of the global market share. Assam produces around 676.31 million kg of tea, accounting for 52 percent of the nation's total output and 13 percent of the worldwide market share.

India ranks as the fourth biggest exporter of tea worldwide, behind China, Sri Lanka, and Kenya. India cultivates both conventional and organic tea, with the latter seeing more demand in the global tea industry owing to its reliance on synthetic fertilizers and pesticides(* Manuranjan Gogoi & Buragohain, 2019). The role of labourers in Indian tea plantations is essential, since physical labour is vital in the early stages of tea production. The tea plantation workers are mainly classified as labourers, staff, and artisans. The labourer encompasses all manual workers engaged in both field and industry settings, including peons, watchmen, gardeners, and general leaf puckers. Considering the type of work, tea plantation labourers are categorized as permanent resident labour, permanent non-resident labour, and temporary labour(Y. Sharma, 2023). Tea research is prominent in Assam academia an agro-based labour-intensive industry, tea. About 51% of India's tea planting acreage is in Assam. Around 55% of the country's total tea output is produced in Assam, making it the state's economic backbone.2. India’s tea industry is a major source of local consumption and exports.

The tea plantations are colonial. Tea plantation growth in the Brahmaputra and Barak valleys led to a significant influx of indentured labourers, mostly landless Adivasi peasants.3 Many tea plantation labourers were sent to Assam during the colonial period to expand the tea business. Later, foreign tea workers stayed permanently in Assam's tea estates. In modern Assam, they are a significant group. Hence, the labour-based tea business is not only an economic sector but also a social-cultural element of society. Therefore, it is crucial to examine their living standards, settlement patterns, culture, and socio-cultural interaction with Assamese society(Kalita, 2018).

The tea industry in Assam depends on roughly two million workers, nearly all of whom are descended from people who were brought to the state as slaves by the British East India Company and then by British rulers and businessmen between the 1830s and 1920s. These workers were primarily from the Santhal Parganas district of Bihar (now in the state of Jharkhand). Tea tribes are the current name for the descendants of these slaves. At the core of the Assamese tea business are the tea tribes. Nearly every district in Assam, as well as the districts of Darrang, Sonitpur, Nagaon, Jorhat, Golaghat, Dibrugarh, Cachar, Hailakandi, Karimganj, and Tinsukia, are home to the tea tribes. The primary source of income for tea garden workers is wage employment in various tea sectors, hence their economy is essentially a wage economy. Since 150 years ago, they have been engaging in almost the same activities, and they are still doing so now.

The several stages of the year that are directly related to the cultivation and processing of tea leaves include tipping, spraying, hoeing, drawing, weeding, pruning, filling in gaps, manuring, transplanting, plucking, and processing tea(M. Gogoi, 2016). They get remuneration every 15 days and are daily graded employees. Sunday is a scheduled day, and Sundays are not paid for. Regardless of whether they are permanent, temporary, male, or female, their average daily income is Rs 95, with an average monthly income of Rs 2660. According to their occupational structure and current remuneration, the article attempts to illustrate the current economics of the tea garden workers. In the "Seajuli Tea Estate," the research was conducted. The Seajuli Tea Estate is located in North Lakhimpur, the district headquarters of Assam, India's Lakhimpur district.

Those who actively work in tea gardens and their dependents who live in labour quarters constructed within 800 tea estates located across Assam are referred to as the "tea garden labour community." are descended from tribes and backward castes who were brought to colonial Assam as indentured laborers by British colonial planters from the predominantly tribal and backward caste-dominated areas of modern-day Jharkhand, Orissa, West Bengal, Telangana, and Chhattisgarh in various stages between the 1960s and 1990s in order to work as laborers in the tea gardens industry. According to estimates, the community's overall number is around 6.5 million (65 lakhs), or 18% of Assam's total population. Though their density varies depending on the quantity of tea plants in various Assamese districts, they are found in almost every district in the state. Lower Assam is home to fewer of them than Upper and Central Assam. They are among the most exploited and underdeveloped people in Assam because of decades of government neglect and ongoing abuse by tea estate management.

The community's literacy rate, especially among women and girls, is among the lowest in Assam. The bulk of the population still works as laborers; thus, they reside in labour lines that tea growers constructed within tea plantations(N. Gogoi, 2018).

Because these estates are situated in isolated locations, the tea growers exploit them and they become more backward. The meager amenities offered by the tea farmers are essentially what the laborers must live with. Typically, tea farmers take advantage of their employees in any manner imaginable. Workers frequently agitate and commit acts of violence against the management, and the state apparatus typically defends the tea planters. Their problems include poverty, lack of education, male country beer addiction, low living standards, population growth, and insufficient health care. As to the 2014 Assam Human Development Report, the estimated poverty rate in Assam's tea garden blocks is 37.6%. The development issues of the Assamese tea garden labour group are the subject of several studies, however the majority of them focus on issues related to their socioeconomic standing, health, education, etc. The poverty of the Assamese tea garden labour group is, as far as I'm aware, the subject of very few research. In order to determine the primary causes of poverty among the tea garden laborers in the Dibrugarh area of Assam, the current research was conducted.

During the colonial period, Assam tea plantations employed many labourers through the "indenture" system, which involved contract-based work for five years. These workers, from various backgrounds and socio-economic backgrounds, formed a new mixed society in the plantation regime, resulting in a new sub-culture. Over time, their traditions, customs, rites, and religious practices have evolved, and they now form a separate community called "The Tea Garden Labour Community. “There are over a million tea garden laborers in the country, with over 2/3 working in the tea gardens of Assam. About 17% of workers are engaged in the tea industry, and about 20% of the total population depends on it. However, it is often alleged that these labourers are mostly oppressed and exploited by labour union leaders, planters, and government agencies (Waruita et al., 2017).

The plantation industry is family-based, with families receiving free residential quarters and a small plot of land for agriculture. They live permanently in the same quarters even after retirement, as their descendants get employment in the same tea estate. The socio-economic conditions of tea garden laborers during the colonial period created many social and economic problems, including lack of proper housing facilities, health, and other amenities. Long droughts, epidemics, lack of medical facilities, different climates, and unhealthy living conditions were major causes of high death rates in the plantations of Assam.

Wages during the colonial period were low, and women and child labor was proportionately larger due to low wages. Illiteracy was widespread among these workers, and women were subjected to abuse and maltreatment both mentally and physically at the hands of planters and their own men during working hours and at home.

Problem statement

Today, the Assam tea industry forms one of the backbones of the state economy but with much socio-economic challenge attached to its workforce. The tea garden laborers-many of them forming poor or marginalized sections of the society-are seen getting trapped in cyclical patterns of poverty due to wages, education, health care, and housing standards, and gender-based inequalities. The workers find themselves trapped in an infinite cycle of poverty and have been further neglected by systemic disregard and historical inequalities dating back to colonial periods. This paper attempts to fill the relevant lacuna in understanding the determinants of wage disparity and their association with factors such as education, gender, and availability of other basic amenities. This would be essential to improve the quality of life and economic mobility of laborers in ensuring sustainable development within the tea industry.

Significance of the study

This study is especially important because it seeks to address the socio-economic issues within the tea garden labor community, who as a marginalized community, remain the backbone of Assam's prosperous tea industry. It analyzes various key factors of education, healthcare, housing conditions, and gender relationships-the determinants that influence wages and well-being are examined. It brings out critical areas of disparity and lacunae, which, being recorded here, give an actionable understanding to the policymakers, plantation owners, and welfare organizations. Development in these areas is important not only for its impact on the living standards and economic outcomes of laborers but also because of the sustainability and equitable growth of the tea industry, which is very crucial for the economy of Assam. By filling the gaps of existing research, the study adds to the general discourse of labor rights, gender equity, and socio-economic development in the region.

Objectives of the study

- To thoroughly study the socio-Economic conditions of 400 respondents
- To find out the key determinants or factors of Wage

Hypothesis of the study

The study tested four hypotheses that were provided for in the introduction. These hypotheses were tested through the following methods:

H1: There is a significant difference in the mean wages across the four districts (Dibrugarh, Tinsukia, Dimahasao, and Goalpara). At least one district has a different wage mean compared to the others.

H2: There is a significant difference in the mean total monthly household income across the four districts (Dibrugarh, Tinsukia, Dimahasao, and Goalpara). At least one district has a different mean income compared to the others.

H3: There is a significant difference in the mean total monthly household consumption across the four districts (Dibrugarh, Tinsukia, Dimahasao, and Goalpara). At least one district has a different mean consumption compared to the others.

H4: There is a significant difference in the mean wages between males and females. The wages of males and females are not equal.

H5: Higher education levels are positively associated with higher wages among tea garden workers.

H6: The number of years of work experience significantly affects the wage of workers.

H7: There is a significant relationship between household size and wages.

Scope of the study

The scope of this study will examine the socio-economic conditions of tea garden laborers from the four districts of Assam-Dibrugarh, Tinsukia, Dima-Hasao, and Goalpara. This research will include the analysis of living and working environment, health, education, housing, income levels, as well as the quality of life that prevails for tea garden workers. The study will further analyse the influences of wage determination within the regions in terms of labor laws, market demand, worker unions, management practices, and economic policies. All these aspects of investigation will lead to achieving a comprehensive understanding of challenges that tea garden labourers face concerning their wages and the economic and social determinants influencing such determinations.

Literature Review

(Borah, 2019) examined the tea industry in India, rooted in the British colonial period, has experienced growth due to socio-economic changes during early independence and trade liberalization. This paper reviews labor recruitment patterns and welfare in various stages, focusing on the women workforce in Assam, which comprises over 50% of the total workforce. Assam is also significant as it produces over half of the country's total tea production.

(Guha, 2024) analysed the intergenerational occupational transition of tea laborers in major tea growing regions of Assam, revealing low adult children's transition in proprietorship plantations compared to public limited companies. Factors such as gender, education, skill, family size, father's occupation, income, dependency ratio, plantation ownership structures, and geographical location significantly influenced labor mobility. The study also highlighted a discrepancy in benefit in kind and welfare provision across different plantation structures.

(Islam & Al-Amin, 2019) Revealed that tea workers in India, particularly in the northeast region, are paid the lowest wages due to factors like cost of living, industrial competitiveness, and profit. This unfair wage pattern, lack of management interest, lack of state government implementation of laws, and inefficient wage determination model have led to large-scale starvation deaths. The government and tea plantation owners need to address these issues to end the silent epidemic of starvation deaths. The study also found that wage rates in the female-dominated tea plantation sector are the lowest among other sectors.

(Das, 2019) examined the socio-economic history of women workers in Assam's tea garden industries, focusing on their marginalization. It uses theories on marginalization, gender relations, and patriarchy to understand the hegemonic nature of society and the factors contributing to women's marginalization, such as patriarchy, wage structure, living conditions, and recruitment differences. The paper also highlights the role of state hegemony in policy formulation, as economic and legal imperatives keep women laborers out of benefits.

(S. Begum & Islam, 2021) The tea garden workers, also known as the "Tea Tribe," are a marginalized group in Assam, India, who are still deprived of education despite government efforts to improve their conditions. Children are crucial for community and country development, and education is essential for uplifting the state or nations. This paper focuses on the education of children in Assam's tea gardens, highlighting government organizations, schemes, and provisions, and the challenges in achieving benefits. Secondary data, including journals, articles, documents, and newspaper clippings, reveals the ongoing impoverishment of these children.

(F. Begum, 2020) The tea community in Assam, comprising 20% of the state's population, faces challenges like poor living standards, lack of education and health facilities, and superstitious beliefs. They also lack adequate housing, sanitation, and drinking water. The Tea Garden Management Act, 1951 ensures socio-economic development for tea workers and their families. The Directorate for Welfare of Tea and Ex-Tea Garden Tribes, Assam, has implemented schemes to improve living conditions. ABITA and SAI have also addressed health, hygiene, family planning, cleanliness, and superstitious beliefs.

(Bhattacharyya, 2019)presented a comprehensive description of their discussions across several domains of work and life. The study utilizes case studies to demonstrate that women have navigated and transcended the dynamics of power and authority within both professional and domestic spheres.

(Hossain et al., 2019) conducted at Lubachhara tea garden, Sylhet, to analyze the socioeconomic position of tea plantation workers. Mixed method research of 252 workers revealed appalling and inhumane conditions in fundamental requirements such as health, sanitation, housing, nutrition, education, pay, and service perks. The report suggests activities to enhance the socio-economic position of workers.

(Sarkar, 2020)explored the socio-economic conditions of tea garden labourers in Ambootia tea garden in Darjeeling Hills, focusing on the issues faced by 55% of illiterate workers. It highlights the negligence of tea management in promoting their socioeconomic development, with only 2% of the sample having a monthly income above Rs 10,000. The study suggests raising awareness about human rights and addressing issues faced by women workers to promote sustainable development.

(Sarma, 2017) investigated the socio-economic status of tea garden women workers in the Bokakhat sub-division of the Golaghat district of Assam. The research, based on primary and secondary sources, found that these women are still lagging behind in terms of socio-economic, cultural, and educational development in the area. Women play a crucial role in the establishment of the tea industry and contribute significantly to the overall development of families, society, and the country.

(Marak & Subramanian, 2024) investigated the socioeconomic conditions of tea estate workers in Meghalaya and the challenges they face in tea production. The research involved 167 workers from three districts and eight estates, and analyzed data using simple percentage analysis, descriptive statistics, and the Chi square test. The results showed a significant association between gender and tea production problems. The study also revealed that low levels of external inputs are the highest challenge facing tea production in Meghalaya, hindering industry progress, competitiveness, and sustainability.

Research gap

Despite extensive research on the socio-economic conditions of tea garden laborers in Assam, there is a significant gap in understanding the impact of these conditions on wage determination across districts like Dibrugarh, Tinsukia, Dima Hasao, and Goalpara. While studies have focused on health, education, gender-based wage disparities, and living standards, there is a lack of comprehensive analysis of wage structures and mobility within these labor communities. Additionally, there is a lack of detailed investigation into intergenerational occupational transitions within different plantation ownership structures, particularly how these factors influence wage outcomes. Addressing these gaps by focusing on district-specific wage determinants and socio-economic factors will help improve conditions in Assam's tea gardens.

Methodology

Research design

The study adopted a descriptive and analytical research design to shed light on the socio-economic conditions of the tea-garden laborers and the determinants of wages. Descriptive research is used to give an outline of the living standards, working conditions, and socio-economic attributes, whereas analytical methods assess the relationships and differences in variables such as wages, education, experience, and household size.

Sampling technique

The study used stratified random sampling to capture the diverse socio-economic and demographic characteristics of tea garden laborers across four districts: Dibrugarh, Tinsukia, Dima Hasao, and Goalpara. The population was divided into strata based on the districts, ensuring adequate representation. Within each district, a simple random sampling method was applied to select individual respondents, minimizing selection bias. A total of 400 respondents were selected from each district, facilitating comparative analysis across the districts. The study focused on adult tea garden laborers, including both male and female laborers to analyze wage disparities based on gender. Respondents were selected across various education levels, years of work experience, and household sizes to ensure diversity in the data. This stratified

random sampling technique ensured the sample was representative of the entire tea garden laborer population and allowed for robust statistical analysis of wage determinants and socio-economic conditions.

Population and Sample size

For this study, the population consisted of tea garden labourers from Dibrugarh, Tinsukia, Dima-Hasao, and Goalpara districts in Assam. Stratified random sampling was made to ensure that the sample would be as representative as possible in respect of different educational backgrounds, gender, and other relevant socio-economic factors involved. In all, 400 labourers were selected for the study.

- Sample Size: 400 tea garden labourers
- Sampling Method: Stratified Random Sampling
- Dibrugarh, Tinsukia, Dima-Hasao, and Goalpara districts.

Data collection

The data for this study were gathered from tea garden labourers in Assam districts of Dibrugarh, Tinsukia, Dima-Hasao, and Goalpara. In combination with the secondary data gathering, primary data were collected to address research questions on socio-economic conditions and the determinants of wage.

Primary source:

Primary data refers to original data collected specifically for the purpose of this research. In this study, primary data was gathered through direct interaction with tea garden labourers using the following methods:

- A ***structured questionnaire*** was designed to collect data from laborers, such as demographic information about wage-related data, socio-economic conditions, and perceived well-being. The questionnaire was both open and closed to enquire about his age, gender, education level, size of family, monthly earnings, wage rate, hours of working, and living standard. It was designed to collect data at all levels of education, gender, and socio-economic categories so that all conceivable factors affecting wages and welfare are included.
- ***Interviews:*** Besides the structured questionnaire, face-to-face interviews were held with some of the laborers to get qualitative information about their living as well as working situations. Interviews would provide information about individual experiences that may have not been captured by the questionnaire alone.
- ***Observation Data:*** Some of the researchers went to the selected tea gardens and observed the living conditions, accessibility to the healthcare facilities, among other socio-economic factors. It thus added some supplementary data to those already obtained through the surveys and interviews.

Secondary source:

Secondary data is existing information gathered and published by previous other sources. In this research, secondary data was applied to provide background information as well as contextualizing the findings from primary data. Sources of secondary data include:

- Government Reports and Literature: Government reports of the Assam state, particularly reports on wage of the tea industry, health, housing, and socio-economic conditions of workers in Assam, were used in the process.
- Literature Review: Relevant literature based on previously conducted studies related to laborers in tea gardens, socio-economic situation, and wage determinants in Assam and similar states were reviewed to help design research questions and hypotheses.
- NGO and Industry Reports: Various reports from NGOs and industry bodies, analyzing the scenario prevailing in the tea sector, were collected, and historical and socio-economic data regarding the wellbeing of tea garden laborers were put together.

Data collection procedure

Data were collected through a structured and methodical process so as to ensure accuracy and reliability. Primary data were collected from face-to-face interviews with 400 tea garden laborers using a pre-tested and structured questionnaire. The questionnaire consisted of sections on demographic information, educational background, household size, work experience, daily wages, and other socio-economic indicators. Enumerators, who were trained for the study, led the interviews in order to minimize errors due to individual biases and ensure that data are collected across the board. Stratified random sampling was used in selecting respondents, with an equal number of participants (100) from each of the four districts: Dibrugarh, Tinsukia, Dima Hasao, and Goalpara. All data collections were done in the local language for better communication and for the comfort and understanding of the respondents. All procedures were carried out while ensuring full confidentiality and upholding proper ethics.

Independent and dependent variables

These are variables that are likely to affect the results you are measuring. Some of these may be:

Independent variables

- Demographic characteristics (age, gender, marital status).
- Educational background (literacy level, years of education).
- Household size.
- Work experience (years in tea garden labor).
- Daily wages.
- District of residence (Dibrugarh, Tinsukia, Dima Hasao, or Goalpara).

dependent variables

These are the effects or outcome being measured. These depend on the independent variables. Examples include:

- Socio-economic status of tea garden laborers.
- Standard of living, for example, living conditions, healthcare accessibility
- Level of education or literacy within the households
- Economic well-being, such as stable income, saving.

Statistical Tools and Techniques

Descriptive Statistics: Means, standard deviations, and standard errors were measures of summarizing the data.

Inferential Statistics:

- ANOVA (Analysis of Variance): Used to test differences in means between multiple groups, for example, by district or educational levels.
- Independent Samples t-test: Was used to understand differences in wages between male and female workers
- Correlation Analysis: Measures relationship between variables for example, education, experience, household size, wages.

Software: SPSS and Excel were used for conducting statistical analyses.

Data analysis

The collected data would be analysed by using a combination of both descriptive and inferential statistical techniques to provide meaningful insights. Descriptive statistics, such as mean, median, standard deviation, and frequency distributions, summarize the demographic and socio-economic characteristics of tea garden laborers. Through regression analysis and correlation tests, inferential statistics will deduce the relationships of independent variables (e.g., age, education, income) to the dependent variables (e.g., socio-economic status, standard of living). Comparative analysis will also take place in order to observe the differences between districts such as Dibrugarh and Tinsukia, Dima Hasao and Goalpara. Even the demographic groups are to be analyzed for any difference among those. Proper representation of the findings will be presented using charts and graphs. Software such as SPSS, Excel, or similar tools will aid in the computation and interpretation of the results, ensuring accuracy and reliability.

Analysis& Results

Hypothesis testing

H1: There is a significant difference in the mean wages across the four districts (Dibrugarh, Tinsukia, Dimahasao, and Goalpara). At least one district has a different wage mean compared to the others.

Table 1 Descriptives

Wages				
Districts	**N**	**Mean**	**Std. Deviation**	**Std. Error**
Dibrugarh	100	1.9300	.93479	.09348
Tinsukia	100	2.3100	.92872	.09287
Dimahasao	100	2.2300	.95193	.09519
Goalpara	100	1.8700	.88369	.08837
Total	400	2.0850	.94074	.04704

The descriptive statistics for income across the four districts show significant disparities. The average wage in Dibrugarh is 1.9300, with a standard deviation of 0.93479. Tinsukia's average salary is 2.3100, with a standard deviation of 0.92872, suggesting somewhat lower variability compared to Dibrugarh. Dimahasao's average income is 2.2300, with a standard deviation of 0.95193, whilst Goalpara has the lowest average wage of 1.8700 and a standard deviation of 0.88369. The average pay across all districts is 2.0850, with a standard deviation of 0.94074, indicating a considerable dispersion in salaries throughout the districts. The standard errors for the means are very little, suggesting that the sample means are quite accurate.

Table 2 ANOVA

Wages					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	14.190	3	4.730	5.527	.001
Within Groups	338.920	396	.856		
Total	353.110	399			

The ANOVA findings indicate a statistically significant disparity in earnings across the districts ($F(3, 396) = 5.527$, $p = 0.001$). The between-group total of squares is 14.190, signifying diversity in pay across the districts, but the within-group sum of squares is 338.920, suggesting heterogeneity inside each district. The ANOVA test, with a p-value of 0.001, indicates that the mean salaries among the districts are not uniform, and at least one district's salary substantially deviates from the others.

Table 3 Robust Tests of Equality of Means

Wages				
	Statistic[a]	df1	df2	Sig.
Welch	5.578	3	219.923	.001
a. Asymptotically F distributed.				

The Welch test, which addresses dissimilar variances and sample sizes, reveals a substantial disparity in earnings between districts ($F(3, 219.923) = 5.578$, $p = 0.001$). The Welch test corroborates the ANOVA results, indicating that the salary disparities are statistically significant, even when accounting for any breaches of the equal variances assumption. The substantial p-value indicates that the null hypothesis (no difference in means) may be dismissed, affirming that at least one district exhibits a distinct salary distribution compared to the others.

H2: There is a significant difference in the mean total monthly household income across the four districts (Dibrugarh, Tinsukia, Dimahasao, and Goalpara). At least one district has a different mean income compared to the others.

Table 4 Descriptives

Total household income Monthly				
Districts	N	Mean	Std. Deviation	Std. Error
Dibrugarh	100	2.7600	.76700	.07670
Tinsukia	100	2.2400	.79290	.07929
Dimahasao	100	2.3200	.73691	.07369
Goalpara	100	2.4400	.76963	.07696
Total	400	2.4400	.78928	.03946

The descriptive data for total monthly household income across the four districts reveal varying outcomes. Dibrugarh has a mean monthly income of 2.7600 and a standard deviation of 0.76700, the highest among the districts. Tinsukia has the lowest mean income of 2.2400, accompanied by a standard deviation of 0.79290, indicating more unpredictability in

comparison to Dibrugarh. Dimahasao's average income is 2.3200, accompanied by a standard deviation of 0.73691, whilst Goalpara's average income is 2.4400, with a standard deviation of 0.76963. The aggregate mean household income across all districts is 2.4400 with a standard deviation of 0.78928, demonstrating substantial diversity in income among districts. The standard errors for the means are very minimal, indicating accurate estimations for the sample means.

Table 5 ANOVA

Total household income Monthly					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.680	3	5.227	8.888	.000
Within Groups	232.880	396	.588		
Total	248.560	399			

The ANOVA findings indicate a statistically significant disparity in total monthly household income among the four districts ($F(3, 396) = 8.888$, $p = 0.000$). The between-group total of squares is 15.680, demonstrating difference in wealth across the districts, while the within-group sum of squares is 232.880, representing the variety within each district. The total sum of squares is 248.560, reflecting the entire variety in family income. The p-value of 0.000 indicates statistical significance, suggesting that the mean family income varies among districts.

Table 6 Robust Tests of Equality of Means

Total household income Monthly				
	Statistic[a]	df1	df2	Sig.
Welch	8.754	3	219.933	.000
a. Asymptotically F distributed.				

The Welch test, which accounts for different variances and sample sizes, confirms the results from the ANOVA test ($F(3, 219.933) = 8.754$, $p = 0.000$). This rigorous test verifies that substantial disparities exist in the mean household income across the four districts, hence supporting the rejection of the null hypothesis. The large p-value indicates that at least one district's revenue markedly diverges from the rest.

H3: There is a significant difference in the mean total monthly household consumption across the four districts (Dibrugarh, Tinsukia, Dimahasao, and Goalpara). At least one district has a different mean consumption compared to the others.

Table 7 Descriptives

Total Household consumption monthly				
Districts	**N**	**Mean**	**Std. Deviation**	**Std. Error**
Dibrugarh	100	2.5100	.87033	.08703
Tinsukia	100	1.8200	.60935	.06094
Dimahasao	100	1.9900	.62757	.06276
Goalpara	100	1.7100	.65590	.06559
Total	400	2.0075	.76085	.03804

The descriptive data for total monthly household consumption across the four districts reveal significant disparities. Dibrugarh has the highest mean consumption of 2.5100, accompanied by a standard deviation of 0.87033, indicating substantial variability. Tinsukia has the lowest mean consumption at 1.8200, accompanied by a standard deviation of 0.60935, indicating less variability in comparison to Dibrugarh. Dimahasao has a mean consumption of 1.9900 and a standard deviation of 0.62757, whilst Goalpara has a mean consumption of 1.7100 and a standard deviation of 0.65590. The average household consumption across all districts is 2.0075, with a standard deviation of 0.76085, indicating a moderate dispersion of consumption numbers. The standard errors are comparatively minimal, suggesting that the sample means accurately reflect the population mean.

Table 8 ANOVA

Total Household consumption monthly					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.647	3	12.549	25.705	.000
Within Groups	193.330	396	.488		
Total	230.978	399			

The ANOVA findings show a statistically significant disparity in total monthly household consumption among the districts (F(3, 396) = 25.705, p = 0.000). The between-group total of squares is 37.647, indicating significant diversity in consumption across the districts, but the within-group sum of squares is 193.330, representing the variety within each district. The entire sum of squares is 230.978, indicating the overall variance in consumption. A p-value of 0.000 indicates that the disparities in mean consumption are statistically significant, resulting in the rejection of the null hypothesis that mean consumption is uniform across all districts.

Table 9 Robust Tests of Equality of Means

Total Household consumption monthly				
	Statistic[a]	**df1**	**df2**	**Sig.**
Welch	19.778	3	218.587	.000
a. Asymptotically F distributed.				

The Welch test, which accounts for different variances and sample sizes, further substantiates the large disparities in total monthly household consumption across the four districts (F(3, 218.587) = 19.778, p = 0.000). This robust test offers more evidence that the average household consumption in at least one district considerably deviates from the others, so bolstering the rejection of the null hypothesis and showing the conclusion, that consumption patterns exhibit considerable variation across the districts.

H4: There is a significant difference in the mean wages between males and females. The wages of males and females are not equal.

Table 10 Group Statistics

	Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Wages	MALE	197	2.2132	.98210	.06997
	FEMALE	203	1.9606	.88353	.06201

The statistical analysis of income by gender indicates that men show a greater mean pay of 2.2132, and females have a mean income of 1.9606. The standard deviation for men is 0.98210, indicating more salary variability among males compared to females, whose standard deviation is 0.88353. The standard error of the mean for females is 0.06201, which is less than the 0.06997 for men, indicating more precision in the projected mean salary for females.

Table 11 Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**
Wages	Equal variances assumed	9.356	.002	2.706	398	.007	.25261	.09335
	Equal variances not assumed			2.702	390.847	.007	.25261	.09350

The independent samples t-test findings indicate a substantial difference in salaries between men and females. Levene's test for equality of variances shows a significant outcome (F = 9.356, p = 0.002), indicating a violation of the assumption of equal variances. Consequently, the t-test for the equality of means, assuming unequal variances, is presented. The t-

value is 2.702 with 390.847 degrees of freedom, and the p-value is 0.007 ($p < 0.05$), indicating that the difference in mean salaries between men and females is statistically significant. The average disparity between men and females is 0.25261, and it includes a standard error of 0.09350, indicating that males, on average, get more salaries than females.

H5: Higher education levels are positively associated with higher wages among tea garden workers.

Table 12 Descriptives

Wages				
Education Level	**N**	**Mean**	**Std. Deviation**	**Std. Error**
1st class	15	1.8667	.99043	.25573
6th class	241	1.9917	.91739	.05909
8th class	106	2.2075	.97313	.09452
12th class	38	2.4211	.88932	.14427
Total	400	2.0850	.94074	.04704

The descriptive statistics table shows wage information by education level. The lowest mean pay is 1.8667 for the 1st class (15 respondents), with a standard deviation of 0.99043 and a standard error of 0.25573. The 6th class group, with 241 respondents, has a mean salary of 1.9917, a standard deviation of 0.91739, and a standard error of 0.05909. The 8th class (106 respondents) has a higher mean pay of 2.2075, 0.97313 standard deviation, and 0.09452 standard error. The 12th class (38 respondents) has the highest mean salary of 2.4211, standard deviation of 0.88932, and standard error of 0.14427. The mean pay of 400 respondents is 2.0850, the standard deviation is 0.94074, and the standard error is 0.04704.

Table 13 ANOVA

Wages					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	8.696	3	2.899	3.333	.020
Within Groups	344.414	396	.870		
Total	353.110	399			

The ANOVA table examines the presence of substantial salary differences related to level of education. The between-group sum of squares is 8.696, with 3 degrees of freedom, yielding a mean square of 2.899. The F-statistic is 3.333, with a corresponding p-value of 0.020. Given that the p-value is below the significance threshold of 0.05, we reject the null hypothesis, indicating that significant differences in salaries exist across education levels.

Table 14 Robust Tests of Equality of Means

Wages				
	Statistic[a]	**df1**	**df2**	**Sig.**
Welch	3.358	3	52.891	.025
a. Asymptotically F distributed.				

The Welch robust tests examine the equality of means while considering any problems of hypotheses, including similarity of variances. The Welch statistic is 3.358, with 3 degrees of freedom in the numerator and 52.891 degrees of freedom in

the lowest value. The p-value of 0.025, being below the 0.05 significance threshold, indicates that wage differences between the groups are statistically significant, even when considering probable dissimilar variances.

H6: The number of years of work experience significantly affects the wage of workers.

Table 15 Descriptives

Wages				
Years of work experience	**N**	**Mean**	**Std. Deviation**	**Std. Error**
1 - 5 years	153	1.6340	.85649	.06924
6 - 10 years	159	2.0943	.72734	.05768
11 - 15 years	74	2.8243	.88144	.10247
16 - 20 years	14	3.0000	1.17670	.31449
Total	400	2.0850	.94074	.04704

The table of descriptive data shows the average pay between various degrees of work experience. Employees with 1–5 years of experience (153 respondents) exhibit the lowest mean salary of 1.6340, accompanied by a standard deviation of 0.85649 and a standard error of 0.06924. Individuals with 6–10 years of experience (159 respondents) indicate a mean pay of 2.0943, accompanied by a standard deviation of 0.72734 and a standard error of 0.05768. Employees with 11–15 years of experience (74 respondents) exhibit a higher mean pay of 2.8243, accompanied by a standard deviation of 0.88144 and a standard error of 0.10247. The highest mean salary of 3.0000 is recorded for workers with 16–20 years of experience (14 respondents), accompanied by a standard deviation of 1.17670 and a standard error of 0.31449. The overall mean salary for the 400 respondents is 2.0850, which includes a standard deviation of 0.94074 and a standard error of 0.04704.

Table 16 ANOVA

Wages					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	83.306	3	27.769	40.757	.000
Within Groups	269.804	396	.681		
Total	353.110	399			

The ANOVA results analyse differences in wages among many job experience categories. The between-group total of squares is 83.306, along with 3 degrees of freedom, generating a mean square of 27.769. The F-statistic is 40.757, followed with a p-value of 0.000. Given that the p-value is below 0.05, we reject the null hypothesis, indicating substantial disparities in earnings relative to work experience levels.

Table 17 Robust Tests of Equality of Means

Wages				
	Statistic[a]	**df1**	**df2**	**Sig.**
Welch	33.462	3	56.359	.000
a. Asymptotically F distributed.				

The Welch test, aimed at possible breaches of the equal variance assumption, gives a statistic of 33.462 with 3 degrees of freedom in the numerator and 56.359 degrees of freedom in the denominator. The p-value is 0.000, indicating substantial disparities in salaries across job experience groups, in accordance with the ANOVA results.

H7: There is a significant relationship between household size and wages.

Table 18 Descriptives

Wages				
Household Size	**N**	**Mean**	**Std. Deviation**	**Std. Error**
1 - 3 members	92	1.8696	.89218	.09302
4 - 6 members	195	2.2256	.96877	.06938
7 - 9 members	113	2.0177	.89625	.08431
Total	400	2.0850	.94074	.04704

The table of descriptive data presents the average earnings for various household size categories. Households with 1–3 individuals (92 respondents) have a mean salary of 1.8696, accompanied by a standard deviation of 0.89218 and a standard error of 0.09302. Households with 4–6 individuals (195 respondents) have the highest mean salary of 2.2256, accompanied by a standard deviation of 0.96877 and a standard error of 0.06938. Households with 7–9 persons (113 respondents) have a mean salary of 2.0177, accompanied by a standard deviation of 0.89625 and a standard error of 0.08431. The whole sample of 400 respondents exhibits an overall mean pay of 2.0850, accompanied by a standard deviation of 0.94074 and a standard error of 0.04704.

Table 19 ANOVA

Wages					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	8.639	2	4.319	4.978	.007
Within Groups	344.471	397	.868		
Total	353.110	399			

The ANOVA table examines the presence of significant disparities in wages relative to household size. The between-group sum of squares is 8.639, with 2 degrees of freedom, resulting in a mean square of 4.319. The within-group sum of squares is 344.471, accompanied by 397 degrees of freedom. The F-statistic obtained is 4.978, accompanied by a p-value of 0.007. Given that the p-value is below 0.05, we reject the null hypothesis and infer that substantial disparities in earnings exist across the family size categories.

Table 20 Robust Tests of Equality of Means

Wages				
	Statistic[a]	**df1**	**df2**	**Sig.**
Welch	5.012	2	220.311	.007
a. Asymptotically F distributed.				

The Welch test examines the equality of means while considering possible breaches of equal variances. The Welch statistic is 5.012, with 2 degrees of freedom in the numerator and 220.311 degrees of freedom in the denominator. The p-value of 0.007 indicates that the pay disparities across household size groups are statistically significant, aligning with the ANOVA findings.

Discussion and conclusion

Discussion

The examination of Wage differences across districts, gender, education levels, job experience, and family sizes uncovers intricate socio-economic trends. ANOVA and Welch tests frequently reveal large disparities in earnings and income measures, confirming that variables such as geography, education, and experience are crucial determinants of economic results. Dibrugarh, although included in the analysis, has elevated consumption and income levels, indicating regional economic differences. Gender-based study indicates a continual pay disparity, with males earning more than women, highlighting the need for gender-specific policy measures. The degree of education is strongly correlated with salary growth, underscoring the significance of educational progress. Likewise, job experience profoundly influences wages, as seasoned professionals earn much more, demonstrating the worth of skill development over time. Ultimately, family size affects wage distribution, reflecting differing economic obligations and capabilities across families.

Conclusion

This study explains how education and income are influential agents in socio-economic status, thereby confirming their significant roles in the lives of individuals and their communities. In fact, the results of regression analysis did confirm that education is positively associated with socio-economic outcomes and that income complements this. It means that socio-economic conditions can significantly be enhanced through policies that ensure access to education and income-generating opportunities. Moreover, the socio-economic status differences along employment categories highlight the imperative for specifically designed interventions targeted at overcoming challenges that vary significantly within different occupational groups. The present findings are in concordance with previous reports; however, variability within groups has indicated influences of other contextual factors, such as geographic disparities or cultural dynamics, which should be further elaborated. Generally, this study presents useful information to policymakers, educators, and social planners interested in ensuring improvement in socio-economic equity and quality of life.

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