
# Socio-economic impact of Rubber-plantation on the lives of Farmers in North-Tripura district

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(Sumit Kumar Pandey)

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# ABSTRACT

India is the world's fourth-largest producer and user of rubber. With about 85000 hectares under cultivation, Tripura is the country's second-largest producer of natural rubber, just behind Kerala. About 9% of the total rubber production is contributed by the state in the nation's production. In Tripura, rubber plantations were first established in 1963 by the State Forest Department. Since then, it has gained enormous popularity, and currently, 1.15 lakh families in Tripura are directly and indirectly engaged in the rubber plantation industry.

In last few years north-eastern is receiving more attention from the central government, state governments, and the rubber board in terms of Rubber plantation. The Rubber Board has set an objective of 2 lakh MT of rubber production in these states by 2025. Out of the 2 lakh MT, 1 lakh MT will originate in Tripura. Tripura has become the Centre of rubber production thanks to initiatives like **"The Accelerated Development of Rubber Plantations"** and the involvement of organizations like Tripura Forest Development and Plantation Corporation Ltd. (TFDPC), Tripura Rehabilitation Plantation Corporation Ltd. (TRPC), and Tripura Tribal Area Autonomous District Council (TTAADC).

Many of the farmers who are growing rubber now had previously been involved in Jhum agriculture, which is not very rewarding commercially. Rubber plantations appear profitable to the populace given that "Rubber" has been designated as the state's top priority for generating income and as a focus for investment, along with "Rubber-based industries."

According to an estimate, 82% of the land under rubber is owned by underprivileged groups in the society (ST & SC categories). In light of the above, Tripura's rubber plantation deserves in-depth socioeconomic research.

This dissertation focuses on knowing socio-economic impact of rubber-plantation on farmers who are growing it, both by comparing it with their earlier living standard (when they were not growing rubber) and by comparing it with farmers who are not involved in rubber-production.

This dissertation will also touch upon the challenges faced by rubber cultivators and possible solution for it.

# Chapter 1

# Introduction

North Tripura is a district located in the northern part of the state of Tripura. The district has a total area of 1422.19 square kilometers. North Tripura District is primarily hilly and has borders with Bangladesh, Assam, and Mizoram.

According to the 2011 Census, the population of the North Tripura District is 444579. Geographically, the North Tripura District is mainly hilly, bordered to the north and east by Assam and Mizoram, to the west by Unokoti District, to the north-west and southern part by Bangladesh. This district is traversed by significant rivers such the Longai, Juri, and Kakari. It has abundant native vegetation.

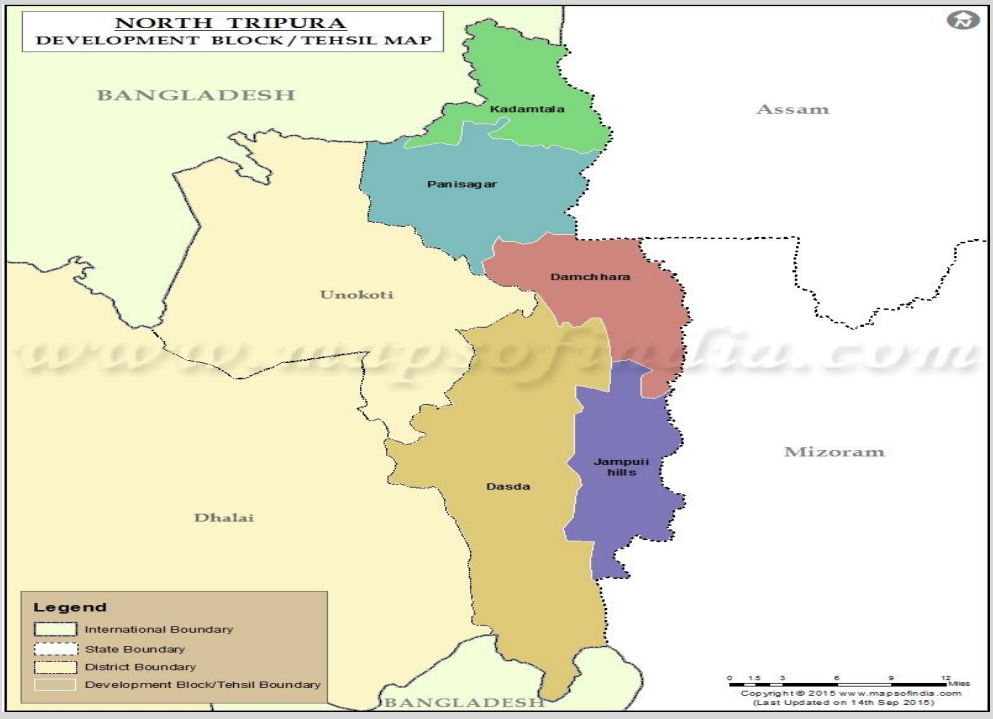


**Figure 1: Map of North-Tripura District**

Agriculture, livestock and fisheries are the main economic pillars of North Tripura. The main crops grown here are paddy, orange, pine apple, jack fruit, banana, lemon, areca nut, and mango. Tea gardens are also prevalent in the North Tripura district**. Bamboo and rubber plantations are additional sources of revenue in North Tripura.**

The region has ideal soil and climate conditions for growing rubber. In the district's hilly regions, particularly in the Kanchanpur and Panisagar regions, rubber plantations are most prevalent. To encourage farmers to start growing rubber, the Rubber Board of India, a government agency charged with marketing the industry, has also established several rubber nurseries in the district. The Board also offers technical assistance and training to farmers so they can enhance their farming methods and boost productivity.

## 1.1 : Pretext of Study:

The forest department of the Tripura Government first planted rubber (Heave brasiliensis) in this state in 1963. In Tripura, Rubber Board began operations in 1967 as a one-man operation. The state government of Tripura has two PSUs, Tripura Forest Development Plantation Corporation Ltd. (TFDPC) and Tripura Rehabilitation Plantation Corporation Ltd. (TRPC), that are dedicated to the expansion of the state's rubber plantations and rubber industry. The Tripura Government established the Tripura Rubber Mission in January 2006 as an interdepartmental coordinating organisation. By 2025–2026, this was initiated with the goal of covering 1 lakh hectares of Tripura with rubber farms.

The Tripura Government's Industries & Commerce Department has designated rubber-based industries as a "Thrust Sector" for investment, and the State Government has designated rubber plantations as the top priority sector for generating income.

Most of the tribal people received employment prospects as a result of the beginning of rubber manufacturing. It was also a component of rehabilitation programs for tribes that switched from shifting farming, or "Jhoom cultivation". Tribes or people who were underprivileged or illiterate were encouraged to apply to work in the latex productions by Tripura Forest Development and Plantation Corporation Limited (TFDPC). The locals received training for working on plantations and information about how the rubber industry will benefit them. The government also gave these folks shelter, food, and clothing. Consequently, it raised the locals' standard of living.

**Figure 2: Latex to ready to use rubber (process) in Smoke houses**

The majority of the 1.15 lakh individual rubber farmers are from rural Tripura. According to estimates, unprivileged groups in society (ST & SC categories) possess 82% of the land that is planted with rubber. Today, local growers maintain the great bulk of Tripura's rubber plantations. A 0.75-hectare average holding size has been determined.

**Area & Production of Natural Rubber in Tripura**

| Sl | Year | Immature Area (ha) | Mature Area (ha) | Total Area (ha) | Production (mt) | Productivity |
|---|---|---|---|---|---|---|
| 1 | 2019-20 | 15616.63 | 69837.00 | 85453.63 | 83701.23 | 1198.52 |
| 2 | 2020-21 | 16046.56 | 70750.57 | 86797.13 | 90711.54 | 1282.13 |
| 3 | 2021-22 | 14659.10 | 74605.13 | 89264.23 | 93371.19 | 1251.54 |

**Chart 1: Area and Production of Rubber**

In this context, this dissertation aims to find out the socio-economic impact rubber plantation has brought to the lives of small farmers involved in the activity.

## 1.2 Research objective:

The research is primarily impact-analysis research. The dissertation will aim to find out whether or not Rubber-plantation has brought some positive social and economic changes in the lives of people involved in rubber plantation mainly the small farmers. The research will also try to answer whether area, productivity, labor involved, mechanization of rubber farm

etc. has a positive correlation with various socio-economic dimensions. The research also compares economic gain from Rubber cultivation with other crops.

Lastly, the research also suggests if shifting from mainstream crop to rubber plantation is advisable or not mainly from the perspective of small farmers who have limited land holding.

## 1.3 Research questions:

1. What factors have contributed in making Tripura the second largest Rubber producing state in the country?
2. What are the agencies involved in Rubber Production and the demographic profile of Individual Rubber growers?
3. Has there been improvement in income from Agriculture after Farmers have started growing Rubber?
4. Does Rubber have better economic return compared to other crops?
5. What is the socioeconomic status of the people growing Rubber? Are They better-off compared to the people who are growing other crops?
6. Policy suggestion for the small land-holders as to should they shift from other crops to Rubber-cultivation?

## 1.4 Structure of Dissertation:

This dissertation would be organised as follows: The whole dissertation has been divided into 6 broad chapters, which would further include many sub-chapters.

- **Chapter 1 – Introduction:** Briefly discusses the study's setting, identifies the research topics, and presents the dissertation's structure.
- **Chapter 2 – Literature review:** Literature on scope and impact of Rubber plantation in Tripura, Rubber-plantation as an alternative to Jhum-cultivation, Rubber-plantation as policy to alleviate poverty in Tripura.
- **Chapter 3 – Research Methodology:** Outlines the study's objectives, methodology, sources for data collection, and methods for data analysis that were employed to address the research questions. The present research's methodological and structural shortcomings are also explored.
- **Chapter 4 – Research findings and Analysis:** Discusses the project's aims and methodology as well as the research's conclusions based on data gathered from farmers' surveys, focus-group discussion, field visits etc. This chapters also draws various inferences based on data and the literature studied.
- **Chapter 5 – Discussions and Implications for Policy:** This chapter goes into a little more detail about each of the research questions listed above. After discussion the dissertation will also try to suggest s suitable policy for the dissertation topic based on research inferences.
- **Chapter 6 - Conclusion:** Summarises study findings and suggests other research areas that are necessary for a deeper understanding of the subject.

# Chapter 2

# Literature Review

## 2.1 Introduction:

An overview of the relevant literature is given in this chapter. There has been a lot of research on the Rubber production in Kerala and in Tripura in general, but little has been done on the socio-economic impact it brings on the farmers especially in the case of Tripura. A few studies from the perspective of income generation have been conducted, but it focuses only on income and does not extend to other socio-economic dimensions.

A few studies evaluating the socioeconomic effects of rubber plantation under Block-planting scheme has also been conducted but does not extend to individual farmers. So, very few studies exist which covers the individual rubber growers from the socioeconomic perspective.

To have a better understanding of the topic research papers, news articles and government websites have been referred. Debates, podcasts and interviews of people having good understanding of rubber cultivation has also been referred to.

## 2.2 Socio-economic impact of rubber plantation outside Tripura:

Vongkhamheng et al. (2016) mentions that despite its negative impact on environment rubber cultivation has a very positive socio-economic impact for rural communities in south east Asia.

It goes on to highlight that with effective planning, involvement of community and sustainable management practices it can be the biggest source of income for farmers. It highlights that when individual farmers organize themselves in the form of a society, they are more likely to get competitive prices for their rubber products. Fluctuation in rubber prices remains one of the major challenges of rubber-production.

Islam et al. (2013) did a similar study for Goalpara district in Assam. It finds that in the district rubber plantation has a big correlation with employment opportunities available, which in turns improves living standards, food habits, education and health facilities, social and mental development etc. It also mentions that rubber plantation is unique with other kind of agriculture activities. Rubber plantation has very less scope of complete mechanization and hence it needs continuous manpower in terms of labor. Moreover, rubber production is not seasonal, it goes on for year-round. It helps in dealing with seasonal employment problem of agriculture and allied activities.

Shi Min et al. (2017) did research on small farm holders who were growing rubber in mountainous region of south-west China. The biggest finding of the research was that rubber production contributed over 40% of the overall income of the small farm holders, which was not the case with farmers who were growing other crops. Although due to continuous price fluctuation income from the rubber production was not very stable, still rubber production was the most profitable among all the agricultural activities.

Its findings were also interesting due to its correlation of income generation of farmers from rubber cultivation with elevation and ethnicity. The paper finds a very high correlation of

income from rubber production with elevation in the mountainous region and ethnicity of the people growing it. Probably, income generation was the main factor that pushed more than 80% of agriculture land to be used for rubber production in some of the areas.

Rubber cultivation from socio-economic perspective have been analyzed in most detailed way by Siju et al. (2018). In the paper "Rubber Cultivation Driven Socio-Economic Development of Tribal Communities in Odisha" they analyzed the socio-economic development of tribal population living in Mayurbhanj district of Odisha.

According to the report, households who reported their income from the rubber cultivation had an average yearly household income that was 188% more than households who did not cultivate rubber. Average household spending on personal transportation, education, and healthcare was 879, 491, and 481% greater for households with rubber income than for households without rubber income, respectively. As money from the rubber cultivation began to flood in, there was a change in the style of buildings built from the traditional mud huts to pucca houses with contemporary conveniences to raise the standard of living. Tribal households who made money from rubber invested their extra earnings in both physical and human capital.

Huang et al. (2023) did a similar study for Rubber based agroforestry. The findings were very interesting. Diversified rubber agroforestry was found to have more economic profit as compared to monoculture rubber. It saved small farm holders from volatility of market prices of rubber. Coffee, Bamboo and Tea were found to have idea mix for inter-cropping with rubber. How profitable the inter-cropping will be compared to monoculture was dependent on availability of labor, investment capacity and managerial efficiency.

Jayathilake et al. (2023) had very unique observation. It was opposite of what we are trying to establish. Instead of researching about socio-economic impact of rubber cultivation on farmers it tried to find if socio-economic condition of farmers had some role to play in rubber production. It found that better socio-economic status of farmer helped farmers in better productivity of rubber-farms. This was because of land tenure, use of agricultural extension system and good verities of rubber.

Rafeeque AK (2021) mentions that in Palakkad district of Kerala, the biggest benefit that rubber cultivation has provided is job opportunities for the poor people. The people either grow rubber if they have sufficient land or work as tapper/laborer in the field. Either way people who were involved directly or indirectly with rubber production were better-off in terms of living standard than those who were not involved in rubber production.

Binitha, Raj (2018) did a study on rubber laborer in Kanyakumari district. It found that socioeconomic condition of plantation laborer was very unsatisfactory. It was majorly because of low wages and unhygienic working condition. It solved the employment problem to a great extent but they were not satisfied with their living condition.

Disssanayake et al. (2013) did a study in Sri Lanka. It was in initial days when rubber cultivation was just introduced in the country. It was being found that people with better educational, economic and social background were better suited for the introduction of new crop. They were more receptive of new idea, were in a better position to use agricultural extension system and technologies. The paper mentions that it was vital that people with better socioeconomic background are chosen for introduction of rubber cultivation to minimize

resource wastage and better economic return. The people with not so good socioeconomic background wasted most of the resource and did not do well despite all the government support and training provided to them.

## 2.3 Socio-economic impact of rubber plantation in Tripura:

Not much of literature is available with respect to socio-economic impact of rubber plantation in Tripura. Some of the studies that were done earlier were with respect to tribal population or with respect to environmental degradation due to rubber cultivation. Research with respect to socio-economic impact has been done by Tripura university in recent past but most of it is not available on web.

Chaudhury et al. (2023) in a paper published in "Journal of management research and analysis" analyzed the socio-economic and religious diversity of rubber cultivators in Tripura. It mentions that most of the rubber cultivators have a monthly income between 10000-20000. Monthly income among cultivators varies due to quality and quantity of latex. Most of the cultivators have basic reading and writing skill, moreover their family members are well education. They are also active in politics. Popularity of LPG as a fuel is gaining popularity in these houses. Most of them are getting drinking water through tap connection. The majority of the children of these families are going to school. It concludes by saying that socio-economic condition of these families has improved after they have started growing rubber.

Joseph (2010) researched about block planting scheme with respect to rubber, this is probably the most comprehensive document with respect to condition of rubber cultivators in Tripura. The most salient point mentioned by the document is that average household income difference between households who grow and who does not grow rubber is about 112%. The document also mentions that consumption expenditure difference between households with and without income from rubber was only 10%. It throws an observation that higher income from rubber cultivation does not directly translates into increase in consumption expenditure.

It mentions that consumption is guided by the customs and traditions and also the availability of own sources of food articles rather than income. The difference between income saving between those who grow and those who do not grow rubber was around 72%. It explains that most of the income generated form the rubber cultivation goes into saving for those households.

The document also says that when organizations like Rubber producer's societies' (RPS) were formed it resulted in growth of local level infrastructures such as roads, transport and communication facilities. The document highlights that income generated from rubber cultivation has been very systematically utilized in formal and higher education of children.

The biggest satisfaction among rubber growers was the assured income coming from rubber cultivation. Despite all the price fluctuations they were assured of a minimum level of income and hence it gave them a mental peace with respect to income generation. Mobilization of family labor as wage labor was also one of the major findings of the research.

**Figure 3: Ready to sell rubber (input material for rubber-based products)**

Das, Bordoloi (2021) did a research study for Ministry of agriculture and farmer's welfare. It went into details of socio-economic condition of reang primitive tribal group after they have been introduced to rubber cultivation. Most of these tribal people used to practice Jhum cultivation (shifting cultivation) earlier. Jhum cultivation had multiple negative environmental impacts. The government in the effort to minimize the practice of shifting cultivation established a department named "Tripura Forest Development and Plantation Corporation Limited (TFDPC Ltd)". Idea was to introduce rubber cultivation on trial basis to these tribal communities. It gave excellent result and that is how the story of rubber cultivation began among tribals. Establishment of regional rubber board institute also gave thrust to the initiative. The average per hectare gross and net return was much higher in case of rubber compared to shifting cultivation. The same was case with average per hectare per year employment. Man-days requirement in the case of rubber was much higher compared to jhum cultivation.

The report also mentions that school going children in case of families involved in rubber cultivation attended the school more regularly than those from the families who were practicing shifting cultivation. May be because of higher income status of the families who were growing rubber were in a better position in terms of school education. The majority of sample respondents' home conditions fell well short of being suitable. However, compared to the Jhumias, rubber crop producers were generally in a better financial position in terms of home amenities.

Report very clearly mentions that according to the current state of affairs, it is clear that those who cultivate rubber are in a favorable position in terms of connectivity, health and sanitation

infrastructure etc. This may be due to the assistance they have received through various schemes and development programmes created by the Tripuran government and the Rubber Board specifically to promote rubber plantations and also because of bargaining power they have gained through society of rubber cultivators.

The farmers who are growing rubber are in general more aware about government programs and initiatives and hence they are taking the benefits intended for them. They are more aware about their rights and ask for it when those rights are denied.

Mohapatra (2022) mentions that rubber cultivation provides gainful self-employment and sustainable livelihoods. According to this paper it generates direct employment of around 1,000 days of labor for each hectare of land. It initially gave direct permanent employment for seven individuals every ten acres of land. Additionally, it creates indirect jobs by production and distribution of plantation inputs, growing various intercrops in rubber plantations, processing of rubber, cutting rubber wood, selling rubber, and producing furniture related to that industry.

Department of land resources, Tripura (2015) mentions that rubber growing families have average monthly income of 10000-30000. It provides employment to women as skilled work-force.

## 2.4 Summary:

After going through literatures available in the context of chosen topic it becomes clear that most of them point out that rubber cultivation has a very positive impact on people who have started growing it. Be it Tripura, other states of Tripura or even outside India every research points out that Rubber cultivation has increased the income of families to a great extent and has generated employment opportunities in various ways.

In Tripura Rubber cultivation started as rehabilitation program for tribal people. Most of the research done in Tripura studied the topic keeping this context in mind. However, now area under cultivation has increased many folds in Tripura. Tripura is now the second largest producer of natural rubber after Kerala. Since, 70% of the population in Tripura is Bengali population, their contribution in rubber production is also very significant. Moreover, the research done earlier were more focused on institutional production rather than individual production by small farm holders.

In addition, most of these studies are concentrated towards economic impact of rubber cultivation and very less weightage has been given to social dimension. But income generation directly cannot be taken as a substitute of social empowerment. The objective of most of these studies has also been comparison of socioeconomic impact with environmental impact and finding a fine line where boundary can be drawn. While it is very comprehensive and useful study, the socioeconomic angle often does not get enough attention and focus remains on environmental angle.

Keeping in mind the gaps in existing literature, conflicts of view amongst different studies, and the need of a new research in the context of Tripura; the idea of this thesis is to study the impact of rubber cultivation on individual farmers located in North Tripura district from both economic and social angle. In addition to economic angle of rubber cultivation, enough attention has also been given to social dimension for the research. Hopefully, the research will add some significant value to already existing literature in the context of the topic.

# Chapter 3

# Research methodology

## 3.1 Introduction:

In this chapter research approach for the thesis will be discussed. The chapter includes scope of the research, design of the research, sample design, data collection methods used and data analysis techniques used.

## 3.2 Scope of the study:

While Tripura as a whole is suitable for rubber cultivation and same is seen on ground also, the scope of this study is limited to "North Tripura" district. There are 8 blocks in North Tripura district. Total 160 farmers were selected across the district. 80 of farmers were involved in rubber cultivation while rest halves were growing other crops. The idea is comparison of socio-economic status of those who grow and those who do not grow rubber.

The data was collected spanning across 6 months from February 2023 to July 2023. The study selected only small individual farmers and did not include group cultivation in its scope. These farmers may have been member of Rubber producers' society, but data was collected by visiting each household. The study includes both tribal and Bengali population. While designing the sample same was taken care of.

## 3.3 Research design:

The thesis uses a mixed method approach, both qualitative and quantitative data collection and analysis method has been used. Further finding of the research is not confined into a single category. It is descriptive, correlational as well as explanatory in nature.

This research can broadly be categorized into cross-sectional study. Whatever data has been calculated for the population sample is in the year 2023. Although their income and social status few years back (when they started growing rubber) has also been analyzed and so it may have some element of longitudinal study.

## 3.4 Sample design:

All the farmers were selected from the "North Tripura" district. To have uniformity in the data equal number of farmers were selected from each of the 8 blocks. Also, from 20 farmers selected in each block 10 are those who grow rubber and 10 are those who are involved in cultivation of some other crops.

Moreover, attention was given to include both tribal and the Bengali population. 60% of 160 farmers i.e., 96 are Tribals and 40% of the population i.e., 64 are Bengalis. This sampling can be categorized into stratified sampling. The sampling method can also be categorized into convenience sampling method, because farmers were interviewed based on their willingness and also the availability at the time of visit. So, the sampling method is a combination of stratified and convenience sampling approach.

Due to convenience method of sampling and also tribal people's unwillingness to talk and participate there maybe biases is sampling. Few selected individuals were replaced by others when they were difficult to contact, this may have also contributed to sampling bias.

## 3.5 Data collection sources:

Both primary and secondary data have been used to analyze the topic. Secondary data includes information from Agriculture department, Rubber board, Forest department, Industry department, Tripura Forest Development Plantation Corporation Ltd. (TFDPC) and Tripura Rehabilitation Plantation Corporation Ltd. (TRPC). It provided a broad overview of condition of rubber cultivation in Tripura, good practices, government schemes and interventions and also the challenges therein.

- ✓ Statistics regarding area of cultivation, number of rubber growers, production quantity etc. was provided by regional office of rubber board.
- ✓ Industry department gave information about rubber processing and marketing avenues with its prospect and challenges.

For primary data collection visit was done to each household (160 number of farmers). Questions were asked from a pre-designed questionnaire through a structured interview (attached in annexure 1).

To get an idea of overall socioeconomic condition of farmers, rubber producers' society were the source of information. Information was collected from them through a general discussion with respect to farmers lives.

Panchayat played a big role with respect to information about farmers who were not engaged in rubber cultivation. Panchayat secretary and Pradhan arranged meetings with farmers who were engaged in growing other types of crops except rubber.

**Figure 4: Latex extraction from rubber plant**

## 3.6 Data analysis:

The data is not very complex, moreover data is not big enough that needs some sophisticated software. Microsoft excel was sufficient enough to analyze the data. To make graphs and charts Power BI was used. Method of data analysis revolved around simple percentage analysis and regression analysis. The findings and analysis of data in combination with qualitative analysis has been presented in subsequent chapters.

# Chapter 4

# Findings and analysis

## 4.1 Introduction:

From the data collected from 160 households (80 Rubber-growers and 80 non-rubber growers), we tried to deduce about their respective socio-economic conditions. Idea was to have a comparative analysis of socio-economic condition of rubber growers and non-rubber growers. Interference can be drawn from here as to if growing rubber has a significant impact on betterment of socio-economic condition of farmers.

Within rubber-growers group also we tried to establish a correlation between socio-economic condition and return from rubber cultivation. The impact of area under cultivation, better availability of fertilizers and other inputs etc. has also been discussed. The findings of these analysis will be discussed in details later in this chapter.

All the research questions that were listed in earlier chapters have been answered in this chapter. Most of these questions are under broad ambit of socio-economic status of rubber farmers, but some other periphery topic will also be touched. All the data, all the collected information's and all the accumulated knowledge will finally be put in structured and coherent manner in this chapter.

The chapter will further be divided into sub-chapters, dealing with most important socio-economic variables in great details.

## 4.2 Methodology:

Dataset of 160 odd families is not big enough to apply some sophisticated data analytics tool. Simple percentage, average, median etc. can reveal a lot of needed information. Wherever, there is a need to find correlation between variables a linear regression analysis was found to be sufficient.

Moreover, a lot of information was revealed from focused group discussion with farmers, interaction with Rubber producers' societies, interaction with individual farmers, information from publications of rubber board and industry department. In a nutshell, the analysis and findings are based on qualitative research as well as quantitative research may be 60% and 40% in that order.

Wherever, it was found that a chart or graph can better explain the findings of the research, the same has been created using PowerBI. Whether 160 is a good enough number to be a representative sample? The answer is that every care has been taken to make the samples as un-biased as possible. These 160 households are spread across the district in all the 8 blocks of the district. Moreover, attention has also been given that sample includes both Tribal and Bengali population in proportion to their respective population in the district. So, it may not be the 100% representative sample but with time and resources available this was the best possible case to have.

Every research has its own limitations and this too is no exception. Only thing is that despite its limitations, hopefully; findings of the paper present some thoughtful and reasonable points that should be focused upon.

## 4.3 Findings and analysis of research:

Before discussing the actual findings of the research, it is necessary to answer few questions to set the context right. First, **what factors have contributed in making Tripura the second largest Rubber producing state in the country?**

Rubber is known as "White gold" more so in the context of Tripura. State has become second biggest rubber producing state after Kerala. The biggest reason for this is said to be agro-climatic condition of Tripura, which is suited for Rubber cultivation. The kind of terrain of state is best suited for rubber plantation. This is the reason area under cultivation of rubber in a small state like Tripura has reached 1 lakh hectares. On top of it, government agencies have supported rubber cultivation as a livelihood opportunity (mainly for people who were earlier involved in Jhum cultivation). This too has contributed immensely in increasing the share of Tripura in Rubber production.

### 4.3.1: Agencies involved in Rubber Production:

Tripura Forest Development and Plantation Corporation (TFDPC), 1976 and Tripura Rehabilitation Plantation Corporation (TRPC), 1983 in a bid to rehabilitate Tribal people started promoting Rubber cultivation, which later developed into an alternative crop for economic empowerment.

Additionally, the Rubber Board established its regional office in Agartala in 1979, and in 1980 it started giving monetary subsidies for brand-new plantations. On August 14, 2021, the state's Chief Minister's Rubber Mission was introduced with the goal of securing 30,000 Ha of additional land for rubber cultivation within the next five years.

**Figure 5: A rubber plant nursery**

Under the auspices of a Joint Rubber Production Commissioner, the Nuclear Rubber Estate and Training Centre (NRETC) was founded in 1985 as part of the "Accelerated Development of Rubber in Tripura" plan. As soon as possible, NRETC began serving as the Zonal Office (ZO) for the state of Tripura. Despite all attempts, rubber acceptance was low until the 1980s, largely due to growers' distrust and a lack of a cohesive approach. At this point, NRETC had stepped in and had trained the key players in the rubber industry.

A nursery cum demonstration plot with a 14.32 ha area was built at Tulakona under NRETC, and it has since 1986 been propagating high yielding enhanced clones for the state.

In 1992, Block Plantation Scheme was initiated. This plan identifies a compact land (Block) where the land is primarily owned by ST households. The plantations are grown under the direct technical supervision of representatives of the Rubber Board. The beneficiaries are also given ongoing pay jobs to perform various maintenance tasks while their plantations are still in the immature stage. When the trees are tappable, they receive instruction in the tapping, processing, and marketing processes under the auspices of a Rubber Producers' Society.

Infrastructure was provided for them, including community halls, effluent treatment facilities, sheets rollers, smoking houses, and other amenities. Under the auspices of Rubber Producers' Societies (RPSs), the Rubber Board also organized the state's rubber growers.

Clearly, institutions mainly government organizations have played a very big role in making Tripura the second biggest Natural Rubber producing state.

**4.3.2: Demographic profile of Rubber growers:**

Tripura has three different categories of ownership for rubber plants. Rubber plantations totaling 7,018 acres are owned by TFDPC Ltd in deforested areas. There are four companies with a combined area of 347 ha in the estate sector: Murticherra Tea Estate (90 ha), Manu Valley Tea Estate (75 ha), Binodini Tea Estate (57 ha), and P. C. Chandra & Sons (I) Pvt. Ltd. (125 ha). The remaining land, totaling 81,899 acres, is owned by the state's small producers. 2,120 ha, 9,400 ha, and roughly 3,600 ha have been developed, respectively, by TFDPC Ltd., TRPC Ltd., TTAADC, and Tribal development departments.

**Figure 6: Rubber fields in North Tripura**

So, the balance area, which is about 66,779 ha is developed by individual rubber farmers themselves with the help of the Rubber Board's RPD/CLRPDP Schemes, which even comprise 3800 ha established under the Board's Block Plantation Project. The majority of the 1.15 lakh individual rubber farmers are from rural Tripura. According to estimates, unprivileged groups in society (ST & SC categories) possess 82% of the land that is planted with rubber. Today, local growers maintain the great bulk of Tripura's rubber plantations. A 0.75-hectare average holding size has been determined.

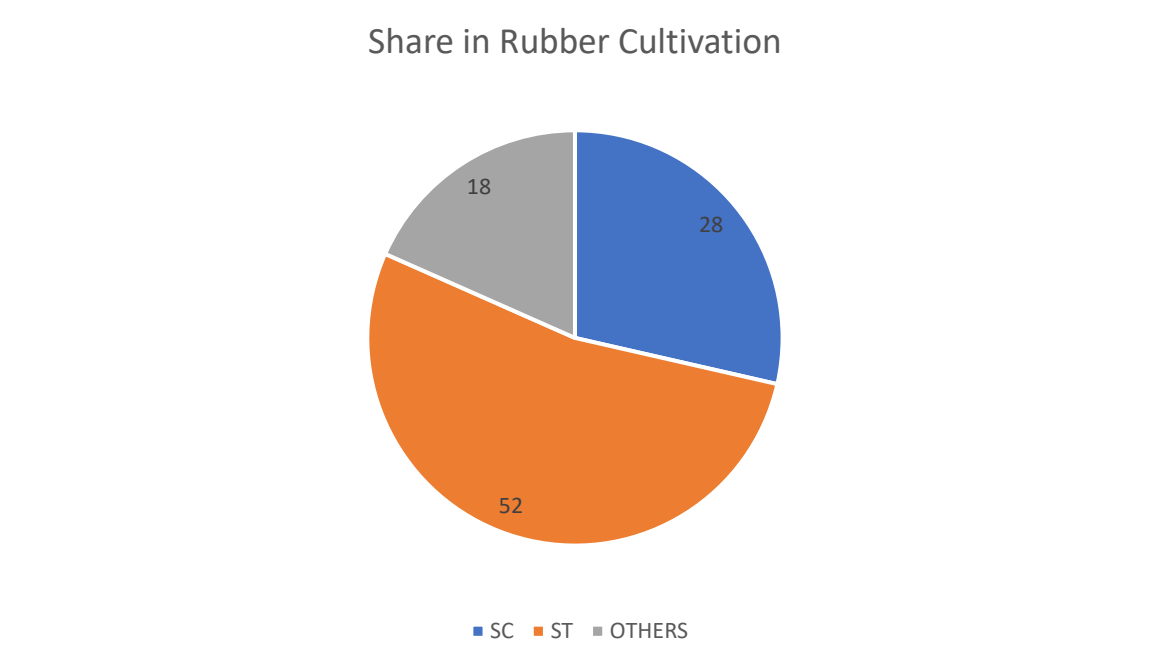


**Chart 2: Shares of different communities**

Scheduled Tribes (STs) have 52% area under Rubber cultivation, much more than population share of around 31%. Similarly Scheduled castes (SCs) have 28% share in Rubber cultivation, more than their population share of 18%. OBC/General community together have population share of around 50 percent, but they have only 18% area under cultivation of Rubber production.

**4.3.3: Socioeconomic overview:**

**4.3.3.1 Gender of respondents:**

The number of male Rubber growers/farmers easily outnumber their female counterparts. Out of 80 Rubber cultivators only 9 were female, which is about ~9% of total respondents. Same was the case with non-rubber farmers, out of 80 non-rubber farmers only 15 were female which is around ~20% of non-rubber farmers. Overall, out of 160 respondents, 24 were female, which is about 15% of the total respondents.

This disparity is prevalent in general and not specific to rubber cultivation. Female landowners are low compared to male landowners and same is reflected with respect to rubber cultivation too.

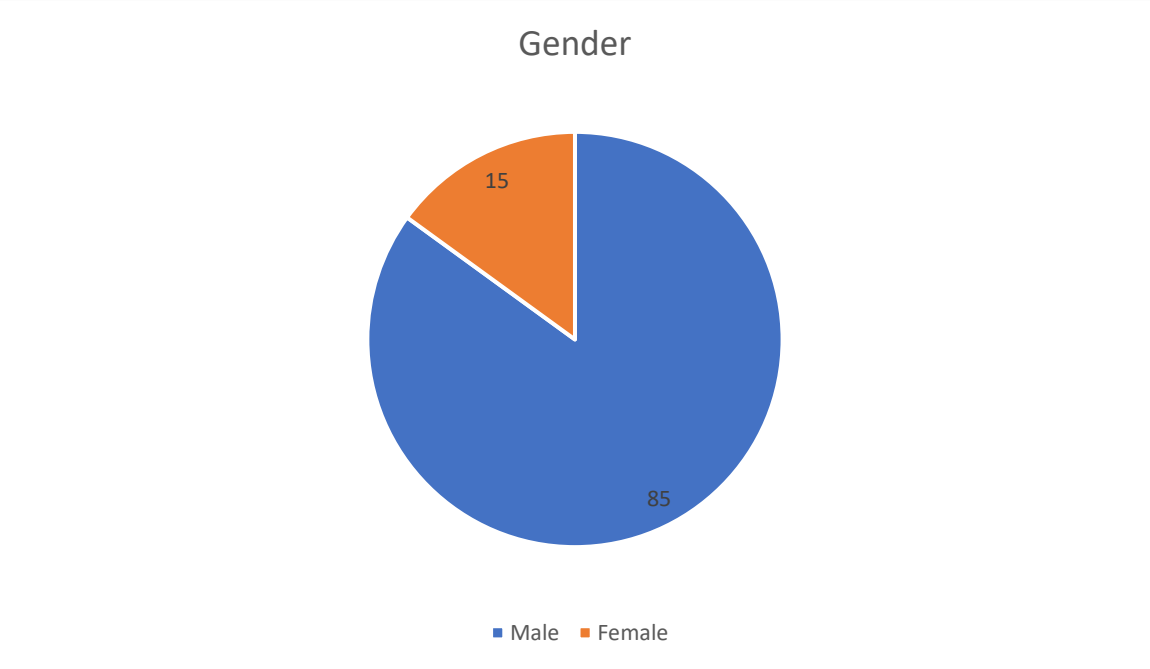


**Chart 3: Gender of respondents**

### 4.3.3.2: Age of respondents:

Most of the rubber growers are old. Around 80% of the rubber growers (respondents) were above 40 years of age. Average age of rubber growers comes to around 45 years. This can be attributed to the fact that around 15-20 years back maximum government support was provided for rubber cultivation, most of the young farmers got attracted and started rubber cultivation at that time. Now they are around 40-45 years of age.

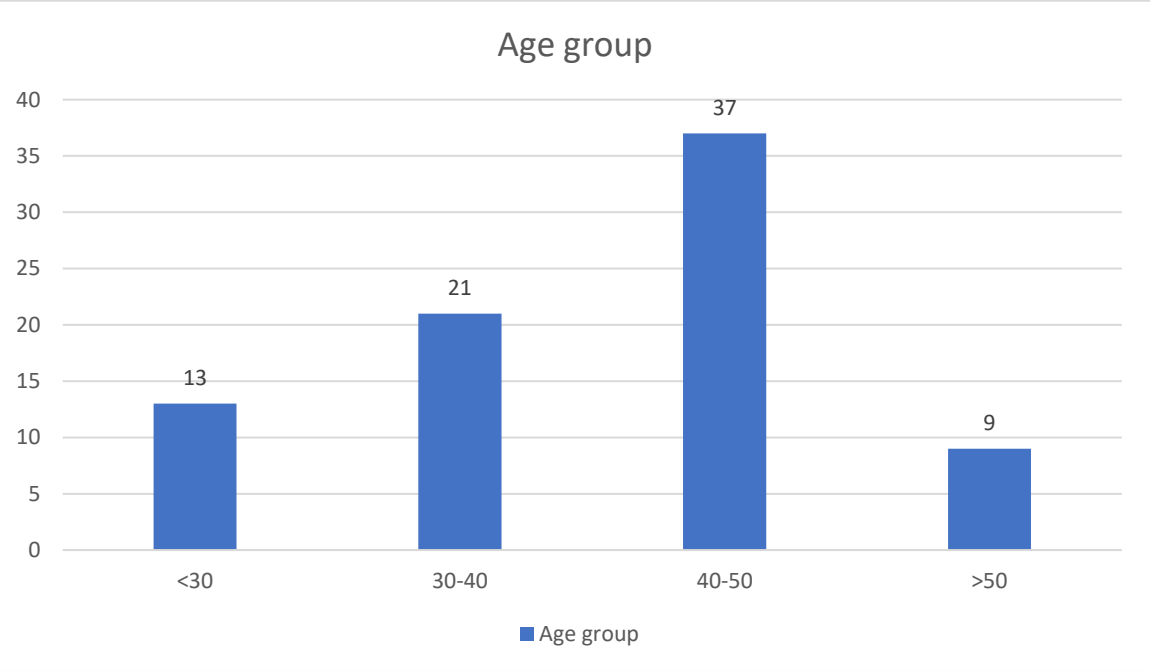


**Chart 4: Number of respondents in different age group**

### 4.3.3.3: Household size of respondents:

As of 2011, average household size in North Tripura was 4.55. Among the respondents too this did not differ much. Average household size among respondents was 4.22 for 160 participants. Average household size for rubber-growers was 4.17 and for other cultivators was 4.27.

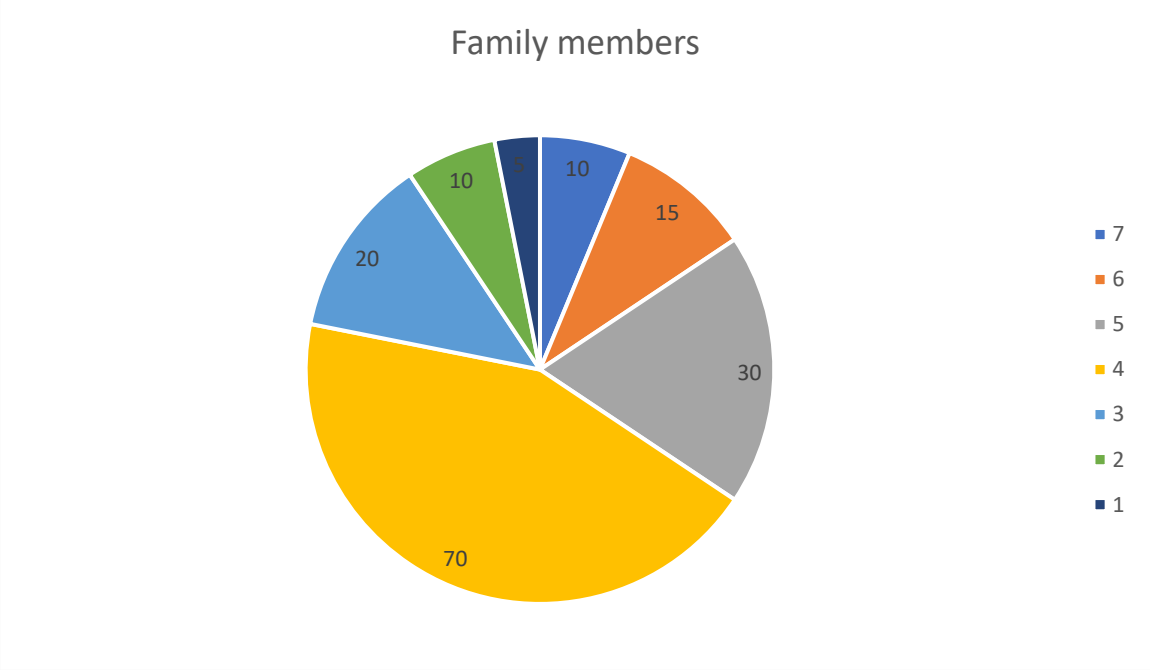


**Chart 5: Number of family-members**

### 4.3.4 Impact on Farmers' income:

There are three important findings to discuss here. First is average annual income of households those who grow rubber. For the households growing rubber average annual income was around **155000.** Average annual income of the family was also collected for the time when they started growing rubber and was projected on year 2005 with inflation adjustment. After all the calculation it was found that average annual income of these families in 2005 was around 25000. Considering inflation adjusted value, average annual income in 2005 of value 25000 comes to 84000. With this calculation it can be inferred that after families started growing rubber their income went from 84000 to 155000, which is almost double.

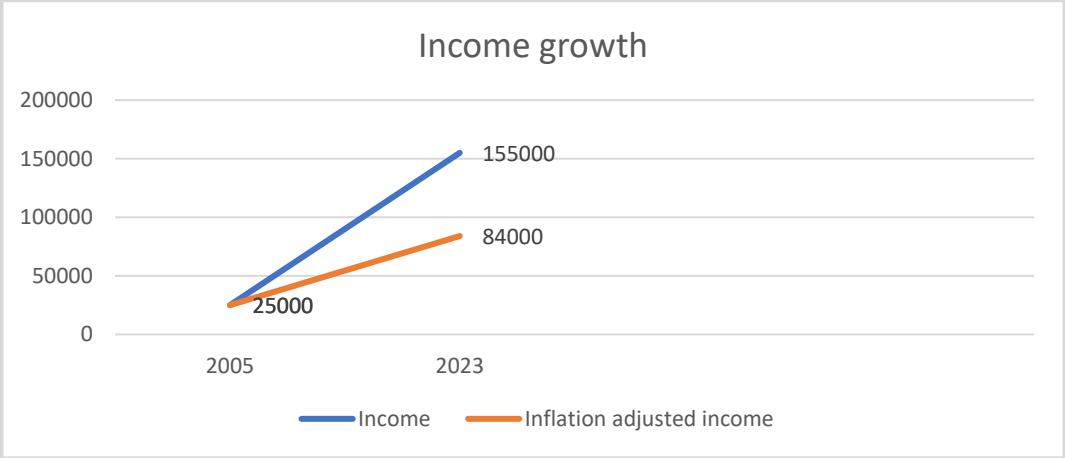


**Chart 6: Income growth of farmers**

If we compare income of farmers for those who grow rubber with those who grow other types of crops, a very interesting observation is made. Compared to average annual income of 155000 of rubber growers, average annual income of other farmers comes to 105000. The inference is that for rubber growers' average annual income is 48% higher than other farmers.

### 4.3.5 Correlation of Farmers' income with size of farm:

There is a positive correlation between Farmers' income and size of farm, both in the case of rubber and other crops. In the case of rubber, the correlation coefficient comes out to be 0.28 with statistical significance level of 1%. Similarly in the case of other crops correlation coefficient comes out to be 0.17 with statistical significance level of 1%.

It also implies that with same amount of increase in land size, farmers' income increases 9% more in case of rubber production compared to other crops. Both in the case of rubber and other crop data of only 80 farmers have been collected, land size of any farmer is not big enough to know whether this hypothesis holds true for large farm size too.

Monthly income data collected from the farmers also reveals that farmers with large farm size have not only higher income but more stable income compared to those who have small farm size.

**Figure 7: Rubber Extraction Process at household level**

### 4.3.6: Impact on Occupational structure:

Impact on occupational structure can be found by variables such as "number of earning family members", "whether there is a second job available to the farmer" and "other sources of income".

| Variables | Value | Rubber farmers | | Other Farmers | |
|---|---|---|---|---|---|
| | | Number | Percentage | Number | Percentage |
| Number of earning family members | 1 | 47 | 59 | 56 | 70 |
| | 2 | 27 | 33 | 23 | 29 |
| | 3 | 6 | 8 | 1 | 1 |
| Other sources of income | Business | 28 | 35 | 5 | 6 |
| | Salary/Wage | 5 | 6 | 19 | 24 |
| | None | 47 | 59 | 56 | 70 |
| Second job available to the farmer | Yes | 7 | 9 | 2 | 2.5 |
| | No | 73 | 91 | 78 | 97.5 |

**Chart 7: Occupational Structure**

To understand the socioeconomic status (SES) of a family, analyzing its occupational structure is a valuable approach. The occupational structure of a family refers to the distribution of different types of occupations among its members. Families with members in high-paying

professions or skilled occupations generally have higher socioeconomic status compared to families with members in lower-paying or less skilled jobs. The social prestige and recognition associated with specific occupations also impact socioeconomic status. Some occupations are highly regarded in society and offer social status and recognition, while others may be less esteemed. Families with members in well-connected professions may have easier access to valuable social networks, business opportunities, or community support.

Occupational structure in the case of Rubber farmers is not very different from occupational structure in the case of other farmers. The farmer himself is having second source of income in 7% cases in the case of rubber farmers, as compared to 2.5% in the case of other farmers.

Some other source of income is available in the family in 41% of the cases in the case of rubber farmers and 30% cases in the case of other farmers. Second source of income in the family is very different in the case of rubber farmers and other farmers. In the case of rubber farmers in 35% of the cases, second source of income is business. This may be attributed to the fact that surplus income generated by selling the rubber may have been invested into setting up some small business-like shop etc. In the case of other farmers in 24% cases the other source of income in the family is Salary/Wage. This may be due to the fact that one young member of the family is doing some daily wage work either in MGNREGA or in some private house. The difference with respect to second source of income requires a separate study.

The data was also collected with respect to number of earning family members in the families. In the case of rubber farmers, in 59% cases there is no other member who is earning, in 33% cases one more family member is earning and in only 8% cases two more members are earning. In the case of other farmers, in 70% cases no other family member is earning, in 29% cases one more family member is earning and only in 1% cases two more family members are earning. The data suggests that in both the cases main source of income remains agriculture only.

**4.3.7: Impact on debt scenario:**

Debt is a critical indicator when assessing the socioeconomic condition of a household. It provides valuable insights into financial behavior, stability, and the potential for upward mobility, while also highlighting vulnerabilities and challenges that households might face.

The data suggests that there is not much difference between debt condition of rubber farmers and other farmers in terms of outstanding debt amount. For rubber farmers average outstanding debt is ~27000, while for other farmers average outstanding debt is ~23000. Most of the debt ~90% comes from institutional sources (Banks, cooperative societies etc.).

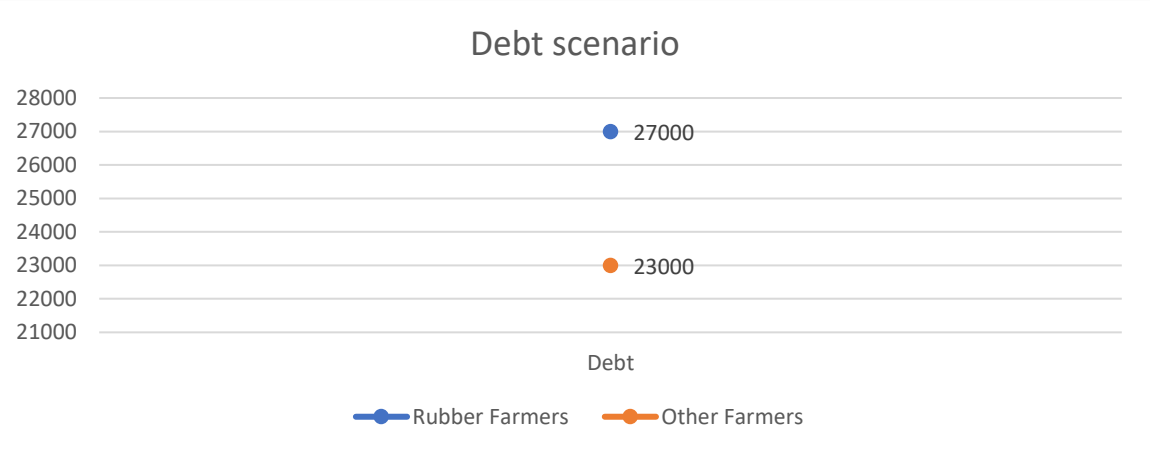


**Chart 8: Debt scenario of the households**

While interviewing farmers it was inferred that most of the times loan was taken for purpose other than agriculture like- some serious medical condition in the family, for higher education of someone in the family, for construction of house etc. There is a difference of response between rubber farmers and other farmers when question was asked about whether they will be able to repay the amount in near future. While most of the rubber farmers were sure about the repayment, there was a mixed response when it comes to other farmers.

### 4.3.8: Impact on household saving:

Impact on household saving is very distinct in the case of rubber farmers compared to other farmers. The rubber farmers saved around 1500 per month for future wise, this amount went down drastically in the case of other farmers to 900 per month. The difference in average annual income between two was 48%, while for saving the difference comes out to be 67%.

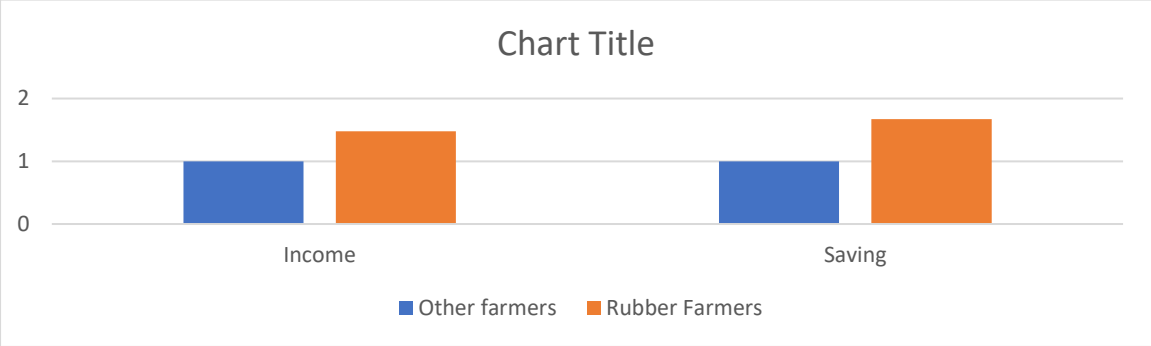


**Chart 9: Comparison of Saving and income**

### 4.3.9: Impact on household expenditure:

Consumption spending is frequently used as a gauge of a population's socioeconomic health or well-being. It offers information about the financial situation and standard of living of people and households.

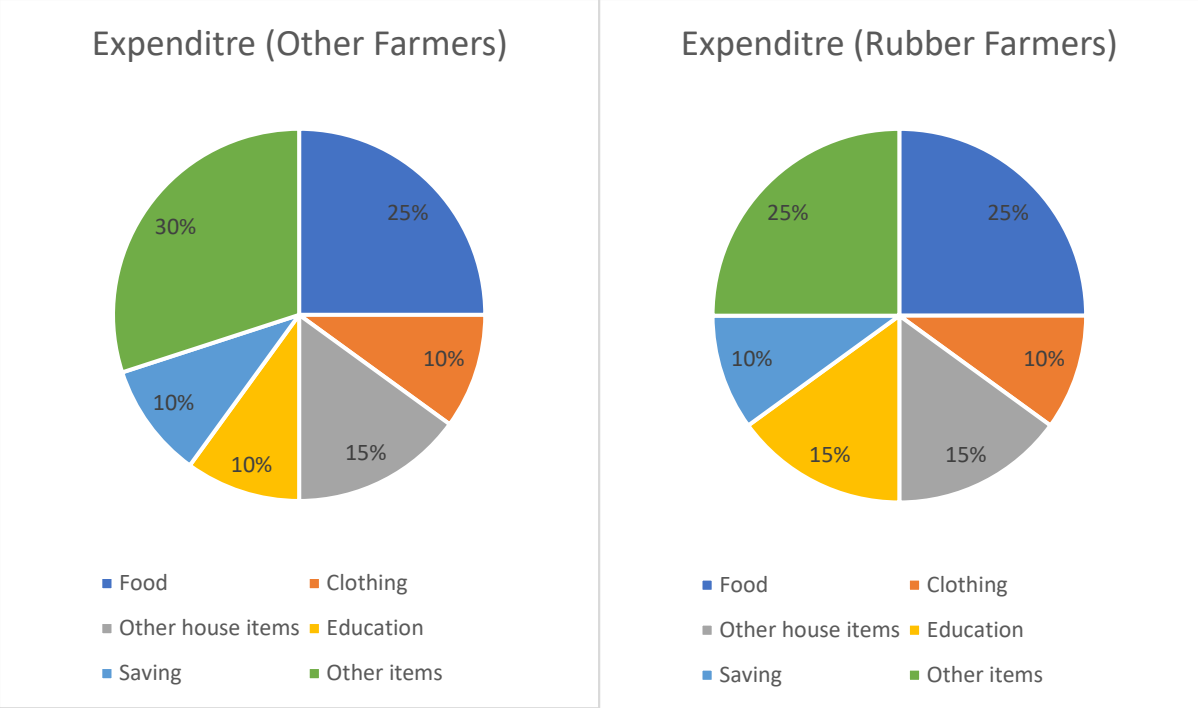


**Chart 10: Household expenditure comparison**

Expenditure baskets mainly comprises of food, clothing, day to day house necessities and education. There is not much difference between expenditure of a rubber farmer household and a normal farmer household. The only difference that can be observed from the data is expenditure on education of children. While a normal farmer expends 10% of the income on education, a rubber farmer expends on average 15% of the income on education.

The reason for this disparity cannot be explained in a single factor. The rubber farmer might want to put more money into their children's education because they want them to seek higher education or quality education in a better school, which could be a goal for them. In comparison to the typical farmer, the family of a rubber farmer may place different emphasis and values on schooling. They might give education more weight and be more inclined to devote money to it. The majority of rubber farmers have relocated to towns, where private schools are accessible but may charge greater fees.

Increasing educational spending can help a family's socioeconomic situation. A good education can lead to more lucrative careers and greater job prospects. Over their lifetimes, those with greater education typically earn more money. Social mobility can be facilitated by education, which enables people to climb the social and economic ladder. It has the power to end the cycle of poverty and open doors to a better life for next generations. Education can encourage civic engagement and involvement in local and societal issues.

### 4.3.10: Poverty level of families:

To classify households according to their socioeconomic position in India, the designations "APL" (Above Poverty Line) and "BPL" (Below Poverty Line) are employed. These classifications were primarily used to identify the recipients of various government welfare programmes and subsidies. The poverty line, a criterion for income set by the government to distinguish between households that are considered poor (BPL) and those who are not (APL),

is used to determine them. The poverty line is determined by taking into account a number of factors, such as income, consumption trends, and fundamental requirements.

According to the data collected in the case of rubber farmers 52 were in APL categories out of 80 and in the case of other farmers only 23 were in APL categories out of 80. This clearly shows a distinctive pattern of socioeconomic status of farmers involved in rubber farming compared to other farmers. In percentage terms 65% of rubber farmers are above poverty line, while this number is 29% in the case of other farmers.

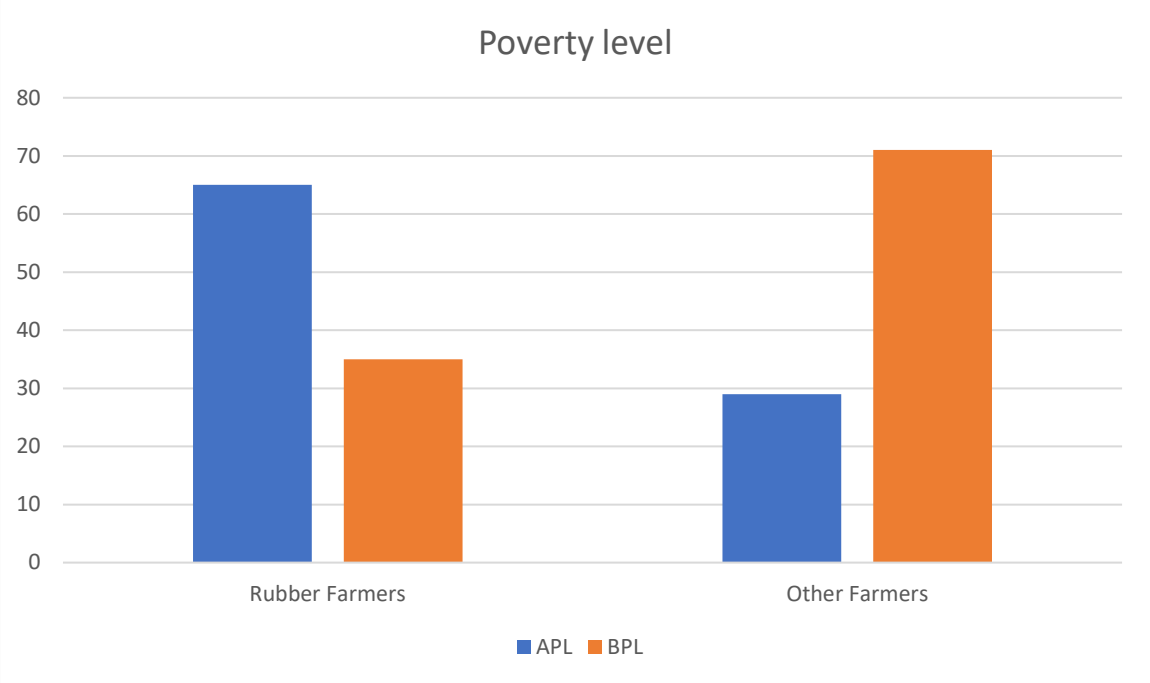


**Chart 11: Poverty level of families**

So, Rubber farmers seem to have a higher socioeconomic status compared to other farmers. This is indicated by the fact that a larger proportion of rubber farmers fall into the Above Poverty Line (APL) category compared to other farmers. The data also implies that rubber farming might be a more financially viable occupation compared to other types of farming. A higher percentage of rubber farmers are above the poverty line, indicating potentially better income and living conditions.

In conclusion, while the existing data highlights the distinct socioeconomic status between rubber farmers and other farmers, a comprehensive understanding of the driving factors requires a multifaceted research approach. Examining aspects such as market access, land ownership, education, technology, finance, social networks, government policies, and cultural influences.

### 4.3.11: Educational background of families:

Socioeconomic status is fundamentally influenced by educational attainment. Education gives people the tools they need to be more creative, innovative, and productive, which supports economic growth and entrepreneurship. Additionally, education gives people the power to participate fully in civic and political life and to influence the policies that affect socioeconomic conditions. This generational advantage of education enables parents to give their kids better

access to opportunities and resources. Education also enables individuals to adjust to changing industries, minimising vulnerability to economic shifts in an era of rapid globalisation and technological progress. In the end, education is a key driver of social mobility, the decline of poverty, and the development of more just societies.

While there is not much difference in education level of farmers themselves (rubber farmers and other farmers), there is a significant difference in education level of future generation (children and youngsters) of both the families. It seems that relatively higher socioeconomic status of rubber farmers enables them to invest more in education, affording better access to schools, learning resources, and extracurricular activities. This advantage is leading to enhanced academic outcomes, improved skill development, and increased opportunities for higher education. In contrast, children from other farming families may face limitations due to economic constraints, potentially resulting in reduced access to quality education. Thus, the socioeconomic disparities between rubber farmers and other farmers manifest in the differential educational opportunities afforded to their respective children.

To have a better idea about educational status, the number of persons below 25 years in both the families were counted and their educational status was noted. Then, they were grouped into different categories separately for rubber farmers' families and other farmers' families. Here is how the result looked like:

| Educational status | Rubber Farmers | Other Farmers |
|---|---|---|
| **Illiterate** | 0% | 5% |
| **Primary** | 20% | 30% |
| **8th** | 25% | 30% |
| **10th** | 25% | 20% |
| **12th** | 15% | 10% |
| **Graduation** | 15% | 5% |

**Chart 12: Educational status of the families**

Among family member of rubber farmers, 25% have completed education up to the 10th grade, while 20% in the case of other farmers have. This indicates a slightly higher percentage of rubber farmers' family members completing education at this level. Similarly, 15% family members of rubber farmers have finished education up to the 12th grade, while only 10% in the case of other farmers have done so. The significant difference is observed in the case of Graduation level education. Among family members of rubber farmers, 15% have graduated from college, while only 5% in the case of other farmers have done the same. This demonstrates a significant difference, with a notably higher percentage of rubber farmers having achieved a college degree compared to other farmers.

The data shows that in general, family members of rubber farmers tend to have higher educational attainment levels than family members of other farmers. In the families of rubber farmers have higher percentages of individuals who have completed higher levels of education, including 10th grade, 12th grade, and graduation.

However, a very significant facts has to be mentioned here. This data is for every individual below 25 years of age and it does not signify final level of education of those individuals. It may happen that after 3-4 years the educational bracket of those individual may change for example from class 5 to class 8 or from $12^{th}$ to graduation etc.

Factors such as personal determination, access to educational resources, financial considerations, and societal opportunities can all contribute to these fluctuations. As a result, this data provides a snapshot of the educational landscape among young individuals, offering insights into the current state of educational attainment. However, it is essential to acknowledge that educational journeys are ongoing and can lead to changes in these initial classifications, demonstrating the fluid and evolving nature of educational progression.

The educational levels of farmers engaged in rubber cultivation and those involved in growing other crops appear to be relatively similar. This parity in education could be indicative of comparable access to educational opportunities and resources for the farmers when they started growing rubber. However, with time rubber farmers had better access to educational infrastructure and resources and hence a significant difference could be observed in educational attainment of younger generation within these families.

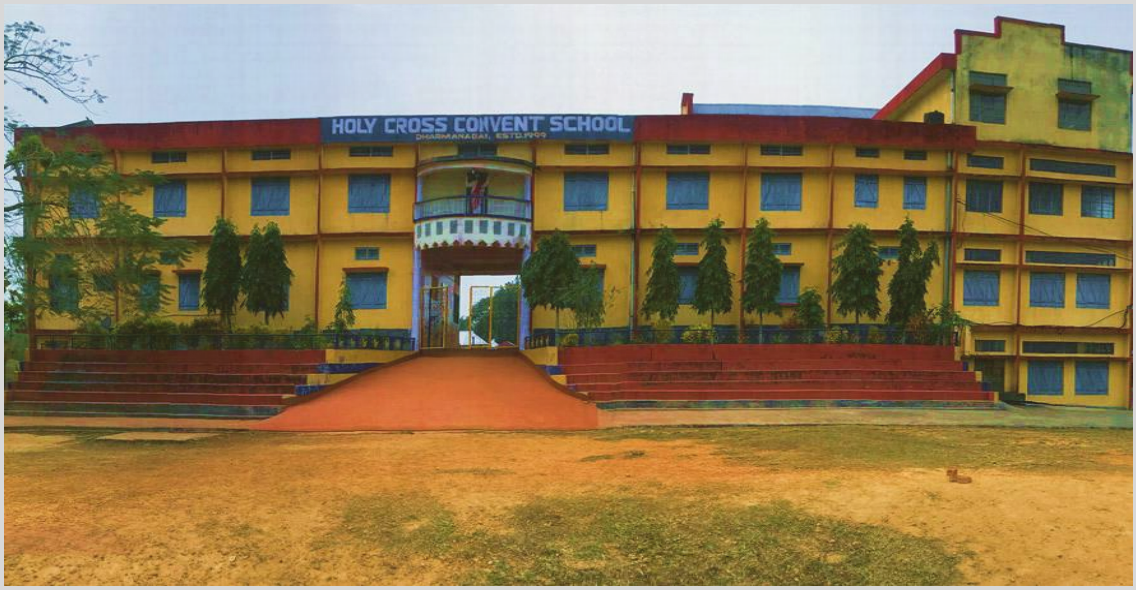


**Figure 8: A good convent school near rubber producers' society office**

Regular attendance of children is of paramount importance in education. Consistent presence in school ensures effective learning, active participation in classroom activities, and better understanding of subjects. It fosters a routine, discipline, and a sense of responsibility, which are crucial life skills. Absences can hinder academic progress, social development, and future opportunities. Therefore, prioritizing attendance contributes significantly to a child's overall educational success and holistic growth.

| Children going to School | Rubber Farmers | Other Farmers |
|---|---|---|
| **Always** | 90% | 80% |
| **Sometimes** | 8% | 16% |
| **Never** | 2% | 4% |

**Chart 13: Children attendance in schools**

Other farmers show slightly lower attendance rates overall compared to rubber farmers. While 80% always attend, a higher percentage (16%) have inconsistent attendance, and 4% never attend. The same numbers are 90%, 8% and 2% respectively in the case of rubber farmers. In summary, regular attendance is slightly higher among children going to school in the case of rubber farmers compared to other farmers.

Among rubber farmers, 20% opt for home tuition, which suggests a significant interest in supplementing their education or skills through personalized instruction. In contrast, only 10% of other farmers utilize home tuition. This data may imply that rubber farmers, due to their specific occupation or circumstances or socioeconomic status or affordability, are more inclined to seek additional educational support for their children through home tuition compared to other farmers.

### 4.3.12: Access to health services:

Access to health encompasses timely and affordable healthcare services, influenced by factors like proximity to facilities, financial capability, and cultural sensitivity. Socioeconomic status, determined by income, education, occupation, and wealth, plays a pivotal role. Higher socioeconomic status often leads to better access due to increased financial resources, education, and insurance coverage. Conversely, lower socioeconomic status can create barriers, limiting healthcare accessibility and perpetuating health disparities. In other words, better access to healthcare services in general is indicator of better socioeconomic status.

There is not much difference between rubber farmers and other farmers, when it comes to access to healthcare services. In general, the healthcare infrastructure for the farmers in Tripura remains inadequate and often inaccessible. Limited healthcare facilities, inadequate medical personnel, and a lack of specialized services are some of the major challenges faced by all the people in the region.

Few rubber farmers have moved their residence near district headquarter, which has benefitted them in terms of healthcare access marginally. Living in close proximity to a town provides the advantage of slightly better access to healthcare services. Residents of such locations enjoy reduced travel time and costs when seeking medical attention. They can easily access hospitals, clinics, and pharmacies, thereby benefiting from timely and convenient healthcare. Additionally, proximity to a town often means an improved availability of healthcare professionals and specialized treatments, contributing to enhanced overall well-being and medical outcomes for individuals and their families.

| Types of Treatment | No. of Respondents (Rubber Farmers) | Percentage (%) (Rubber Farmers) | No. of Respondents (Other Farmers) | Percentage (%) (Other Farmers) |
|---|---|---|---|---|
| Primary health centre/ Hospital | 56 | 70% | 48 | 60% |
| Kabiraj (Ayurvedic practitioners) | 16 | 20% | 20 | 25% |
| Medical Shop | 4 | 5% | 4 | 5% |
| Known person in the village | 4 | 5% | 6 | 8% |
| Own | 0 | 0% | 2 | 2% |

**Chart 14: Type of treatment used for common disease**

The provided data sheds light on the prevailing healthcare preferences among both rubber farmers and their counterparts in the agricultural community. Notably, the primary health centre and hospital emerge as the dominant choices for seeking medical attention for both groups, with a substantial 70% of rubber farmers and 60% of other farmers opting for this conventional route. This indicates a shared reliance on formal medical infrastructure and professional healthcare providers.

Interestingly, the utilization of traditional healing methods, particularly Ayurvedic practices facilitated by Kabiraj practitioners, is also noticeable. Approximately 20% of rubber farmers and 25% of other farmers favor this alternative approach, showcasing a cultural inclination towards holistic remedies. Moreover, the accessibility and convenience offered by local medical shops garner a small yet noteworthy portion of preferences – 5% for rubber farmers and 5% for other farmers – reflecting the importance of accessible medication distribution points.

Tripura has a remarkably high rate of child immunization. 99% of rubber farmers have prioritized child immunization, indicating a near-universal adherence to preventive healthcare practices. Similarly, 96% of other farmers have embraced child immunization, further underlining a widespread recognition of its vital role in preventing communicable diseases. There is not much difference between rubber farmers and other farmers.

To help those in need financially in the state of Tripura, the Tripura Health Assurance Scheme for Poor (THASP) was created. The project is open to families in the state of Tripura who make less than Rs. 1.5 lakh annually. A significant portion of Tripura's population is covered by this

programme and the government of India's "Ayushman Bharat" programme. However, it is also true that the state has an appallingly low penetration of private health insurance programmes.

It was found that among the group of rubber farmers, approximately 30% of respondents indicated that they possess health insurance coverage. This percentage, however, was notably higher for farmers engaged in other agricultural activities, with 50% of them reporting having health insurance.

Further analysis of the data revealed that a significant majority of both rubber farmers and those involved in other farming practices rely primarily on government-sponsored health insurance schemes. These findings suggest that while a considerable portion of rubber farmers are covered by health insurance, there exists a noticeable gap compared to their counterparts engaged in different agricultural pursuits.

Several farmers, particularly those primarily engaged in rubber cultivation, find themselves in a financial position where they could feasibly afford private health insurance. Despite this ability, however, it is intriguing to note that a portion of these farmers display a lack of interest in pursuing such coverage. It's plausible that these farmers might not have been adequately informed about the potential benefits, personalized coverage, or added services that private insurers can provide. Lack of information or misinformation could thus contribute to their lack of interest.

One of the prevailing addictive habits among farmers in Tripura is the consumption of pan, a preparation consisting of betel leaf wrapped around areca nut and slaked lime. This habit often becomes deeply integrated into daily routines and social interactions, offering a temporary sense of energy and alertness. Another concerning form of addiction among Tripura's farmers is the consumption of biri (hand-rolled tobacco) or cigarettes. The addictive properties of nicotine, combined with the stressors inherent in the farming lifestyle, may drive farmers to smoke as a coping mechanism. Khani, a locally brewed alcoholic beverage deeply rooted in Tripura's culture, has also become a source of addiction among farmers.

The addictive patterns observed among farmers, whether they are engaged in rubber cultivation or other forms of farming, display striking similarities that transcend the specific agricultural activities they are involved in. The prevalence of addiction to substances such as Pan, Biri/Cigarette, and Khani/Alcohol seems to cut across these distinct farming communities, indicating a shared vulnerability to addictive behaviors and highlighting the broader societal factors at play.

Common ailments among Tripura's farmers include malaria and stomach diseases, exacerbated by outdoor work conditions. Old-age issues like diabetes and high blood pressure emerge due to labor-intensive tasks. Headaches and goiter result from harsh weather and nutrient deficiencies. Back and leg pain, consequences of demanding tasks, hinder farmers' productivity and well-being. Both rubber farmers and other agricultural workers in Tripura share a common set of prevalent health issues.

### 4.3.12: Other socio-economic parameters:

#### 4.3.12.1: Sanitation:

Given their shared geographical space, rubber farmers and other farming communities lack distinct localities. This interconnected environment makes it unwise to pass judgments on the collective sanitation standards of either group. Sanitation levels depend on multifaceted factors influenced by individual behaviors, available resources, and community initiatives. Generalizations oversimplify the complex reality on the ground. To assess sanitation accurately, a comprehensive understanding of the unique circumstances within each community is essential, acknowledging the diverse practices and influences that contribute to their respective sanitation levels.

Almost all the households that were surveyed had access to toilets credit to Swachh Bharat Mission of government of India. 20% Rubber farmers segregated waste at the source, while this number is 5% for other farmers. The data reveals a significant disparity in waste segregation practices between rubber farmers and other farmers. This may be due to more awareness and also affordability of dustbins in the case of rubber farmers.

The overarching observation highlights a slight sanitation advantage among rubber farmers compared to their counterparts at the household level. This suggests a potential for shared learning and the implementation of best practices to elevate overall sanitation standards within the entire farming community.

#### 4.3.12.2: Standard of Living Parameters:

Several key parameters effectively encapsulate the socioeconomic status of a society. Factors like housing type, fuel source, and access to clean drinking water serve as robust indicators. The type of dwelling reflects living standards, while the fuel used for energy signifies economic resources. Meanwhile, the source of drinking water directly mirrors public health and well-being. Analyzing these parameters provides valuable insights into the socioeconomic landscape.

The following table will provide a broad overview of standard of living of both the farmers communities.

| **Parameter** | **Rubber Farmers (in percentage terms)** | **Other Famers (in percentage terms)** |
|---|---|---|
| **Type of house** | | |
| Kacha | 5% | 15% |
| Pakka | 25% | 15% |
| Semi-Kacha | 10% | 10% |
| Tin | 60% | 60% |
| **Type of fuel used for cooking purpose** | | |
| LPG gas | 80% | 50% |
| Kerosene oil | 0% | 0% |

| | | |
|---|---|---|
| Wood | 20% | 50% |
| **Source of lighting** | | |
| Electricity | 80% | 72% |
| Kerosene | 0% | 8% |
| Solar | 20% | 20% |
| **Drinking water source** | | |
| Tap water | 60% | 40% |
| Tube well | 20% | 30% |
| Pond/Lake | 5% | 10% |
| Well | 15% | 20% |

**Chart 15: Living standard Parameters**

Notably, a higher percentage of rubber farmers reside in pucca (permanent) houses, accounting for 25%, whereas only 15% of other farmers inhabit such dwellings. This potentially reflects relatively better economic stability or access to resources among rubber farmers.

However, in terms of kacha (temporary) houses, the scenario is reversed, with only 5% of rubber farmers residing in such structures compared to 15% of other farmers. This could suggest better living conditions for rubber farmers, who might have made improvements to their housing over time. Moreover, the equal distribution of semi-kacha houses (10%) and tin houses (60%) between both groups indicates a similar reliance on these types of accommodations. This might signify shared challenges or resource limitations experienced by both rubber farmers and other farmers.

Similarly, a significantly higher proportion of rubber farmers, accounting for 80%, rely on LPG gas for cooking, indicating a relatively improved access to cleaner and more efficient cooking technologies. In contrast, only 50% of other farmers utilize LPG gas, suggesting a potential disparity in the availability or affordability of such resources.

Notably, no rubber farmers or other farmers in the dataset reported using kerosene oil as a cooking fuel. This could indicate a positive shift towards cleaner and safer cooking alternatives in both groups.

The data also reveals that 20% of rubber farmers and 50% of other farmers still use wood for cooking, reflecting a reliance on traditional and less environmentally friendly methods. This could imply economic constraints or limited access to modern cooking fuels for a portion of both farming communities.

A notable observation is that a higher percentage of rubber farmers, constituting 80%, have access to electricity for lighting compared to 72% among other farmers. This could suggest better infrastructural development and energy distribution in the areas inhabited by rubber farmers, potentially indicative of their improved economic conditions.

Interestingly, none of the rubber farmers reported using kerosene for lighting, highlighting a positive trend away from traditional and potentially hazardous lighting methods. This number

was 8% for the other farmers, which means some of those farmers are still using hazardous lighting methods either due to unawareness or because of lack of availability.

Both rubber farmers and other farmers exhibit an equal reliance (20%) on solar energy for lighting. This shared usage underscores the popularity of solar solutions in rural areas, which often lack consistent electricity access. It could also reflect an awareness of the environmental benefits and cost-effectiveness of solar technology.

Among rubber farmers, 60% have access to tap water, indicating a relatively higher proportion with a convenient and reliable water supply. In comparison, 40% of other farmers rely on tap water, possibly indicating slightly lesser infrastructure development in their localities.

Interestingly, 20% of rubber farmers source their drinking water from tube wells, while 30% of other farmers do the same. This could reflect a shared reliance on groundwater resources, potentially indicating similar geological conditions or water availability in their respective areas.

Regarding alternative sources, 5% of rubber farmers and 10% of other farmers obtain water from ponds or lakes, while 15% of rubber farmers and 20% of other farmers use wells. These figures suggest a comparable utilization of traditional water sources within both farming communities. The data underscores the importance of clean and accessible drinking water, indicating that while tap water is the dominant source for both groups, there are variations in reliance on groundwater and alternative sources. The slight discrepancies may be attributed to geographic, infrastructural, or economic factors that influence water accessibility within these farming communities.

In summary, rubber farmers appear to hold a slightly favorable position compared to other farmers when considering indicators such as housing, cooking fuel, lighting, and drinking water sources.

**4.3.12.3: Assets:**

Assets and socioeconomic position are intertwined concepts that profoundly influence an individual's or household's economic well-being and social status. Assets encompass a range of tangible and intangible resources, from real estate and financial holdings to valuable possessions like vehicles and jewelry. These assets contribute to an individual's net worth and, over time, can significantly impact their socioeconomic position. Data was collected for very basic household assets but otherwise having it means perception of being in good socioeconomic status.

| **Assets** | **Rubber Farmers (percentage terms)** | **Other Farmers (Percentage terms)** |
|---|---|---|
| **Bicycle** | 20% | 10% |
| **Motor-cycle** | 60% | 40% |
| **Four-wheeler** | 8% | 3% |
| **TV** | 65% | 50% |
| **Air-conditioner** | 5% | 0% |

| | | |
|---|---|---|
| **Fridge** | 5% | 0% |
| **Washing-Machine** | 8% | 0% |
| **Furnishing** | 15% | 8% |
| **Furniture** | 15% | 8% |
| **Mobile phones** | 100% | 100% |
| **Smart Phones** | 70% | 60% |
| **Computer** | 5% | 3% |
| **Newspaper** | 8% | 3% |
| **Geyser** | 6% | 0% |
| **Livestock and poultry** | 30% | 45% |

**Chart 16: Movable Assets**

The distribution of assets among rubber farmers and other farmers reveals distinct patterns that shed light on their differing socioeconomic positions and lifestyles. The percentages represent the ownership rates of various assets within each category, offering insights into the contrasting realities faced by these two groups.

Rubber farmers exhibit relatively higher ownership percentages across several asset categories compared to other farmers. This disparity signifies the economic advantages and potentially greater prosperity of rubber farmers within the agricultural landscape. Notably, in terms of transportation, 20% of rubber farmers own bicycles, surpassing the 10% ownership rate among other farmers. Moreover, a striking difference is evident in motor-cycle ownership, with a significant 60% of rubber farmers possessing this mode of transport, while only 40% of other farmers do.

Moving beyond mobility, rubber farmers also outpace their counterparts in the possession of household appliances. The ownership of essential items like televisions and mobile phones stands at 65% and 100% respectively among rubber farmers, compared to 50% and 100% among other farmers. This discrepancy underscores the relatively higher living standards and access to modern conveniences that rubber farmers enjoy.

Interestingly, while ownership rates for assets like air-conditioners, refrigerators, and washing machines are low overall, a notable proportion of rubber farmers (5%) possess these amenities, reflecting a certain level of affluence that sets them apart from other farmers who report 0% ownership in these categories.

In the realm of technology, the gap between the two groups remains discernible. The ownership of smartphones is nearly universal among both rubber farmers (70%) and other farmers (60%), indicating a shared integration into the digital age. However, in the case of computers, a disparity emerges, with 5% of rubber farmers and 3% of other farmers having access to these devices.

The possession of livestock and poultry underscores an intriguing dynamic. While rubber farmers exhibit a 30% ownership rate in this category, a significantly higher 45% ownership

rate is observed among other farmers. This points to a potential diversification of income sources for the latter group and a different agricultural focus.

In conclusion, the asset ownership distribution among rubber farmers and other farmers paints a vivid picture of their varying socioeconomic positions. Rubber farmers, with their higher ownership percentages in categories ranging from transportation and household appliances to technology, signal a relatively more prosperous lifestyle. On the other hand, other farmers, despite owning a greater share of livestock and poultry, appear to lag behind in certain modern amenities. This analysis highlights the multifaceted nature of socioeconomic position and the diverse paths that agricultural communities traverse within a broader economic landscape.

**4.3.12.4: Other socio-economic parameters:**

Food habits reflect socioeconomic position. Affluent individuals often enjoy diverse, nutritious diets, while lower-income groups might have limited choices. Access to quality food, dietary preferences, and cultural factors intersect, shaping nutritional well-being and health outcomes within different socioeconomic strata.

The survey captured key aspects of food habits: egg inclusion, daily milk consumption, fruit intake, use of ghee/butter, and tea/coffee consumption. Notably, rubber farmers exhibited marginally broader food diversification than their counterparts. This disparity suggests a potentially higher socioeconomic position among rubber farmers, affording them a more varied diet. The inclusion of eggs, daily milk usage, fruit consumption, and usage of ghee/butter reflects relatively favorable dietary practices. Conversely, tea/coffee consumption might be indicative of a preference for these beverages.

Both groups, despite their distinct asset ownership, food habits and other socioeconomic disparities, demonstrate a similarity in terms of SHG membership, Panchayat Meeting/Gram-Sabha participation, and access to common property resources. This convergence suggests that these specific aspects of community engagement and resource access might be relatively equitable across the two groups, potentially contributing to a certain level of social cohesion and shared opportunities despite other disparities.

A notable distinction arises concerning the effectiveness of organizational structures for the two groups. Rubber farmers experience more favorable outcomes through rubber producers' societies, contrasting with the co-operative societies that benefit other farmers. Rubber farmers find enhanced success in negotiation, securing finances, and navigating marketing through these specialized societies. This observation underscores the tailored efficacy of such associations within the rubber farming context. In contrast, other farmers rely on more general co-operative setups. This variance highlights the critical role of targeted collective platforms in addressing the distinct needs and challenges faced by different agricultural communities, contributing to improved economic prospects and market access.

Higher socioeconomic status often provides individuals and families with greater resources, including disposable income and free time, which can make it easier to afford and plan vacations. People with higher SES may have the means to travel to desirable destinations, stay in comfortable accommodations, and engage in various activities, while those with lower SES may face more limitations in terms of travel options and experiences.

A small percentage of rubber farmers (5%) went on regular vacations outside the state, while none of the other farmers did the same.

Migration and socioeconomic status are interconnected in complex ways, as people's decisions to migrate are often influenced by their economic circumstances and aspirations, and migration itself can have significant impacts on an individual's or a family's socioeconomic status.

| **Reason of migration** | **Percentage of Rubber Farmers (of surveyed people)** | **Percentage of other Farmers (of surveyed people)** |
|---|---|---|
| **Economic Opportunity** | 20% | 24% |
| **Marriage** | 3% | 1% |
| **Education** | 9% | 6% |

**Chart 17: Reasons of Migration**

Both rubber farmers and other farmers (someone in their family) are migrating in search of better economic opportunities, with a slightly higher percentage of other farmers indicating economic reasons for migration. This suggests that the desire for improved financial prospects is a significant driver for migration across both groups.

Marriage seems to be a less common reason for migration among both rubber farmers and other farmers. The difference between the two groups is relatively small, indicating that marriage-related migration is relatively rare in this context.

Education is a significant motivation for migration in both groups, with a higher percentage of rubber farmers citing education as a reason for their migration. This suggests that access to educational opportunities is important for both rubber farmers and other farmers, though slightly more so for the former.

In the realm of land ownership, a comparative analysis between rubber farmers and other farmers reveals a noteworthy parity. Within the former, 34% of women wield ownership of land, a proportion mirroring that of their counterparts in the latter group, standing at 28%. Strikingly, across both categories, land ownership remains firmly rooted in the concept of joint ownership, with no instances of sole proprietorship identified. This underscores a shared model of control and decision-making, potentially reflecting collaborative endeavors and cooperative resource management strategies among women in both agricultural spheres.

Despite women's land ownership, a paradox emerges when familial control is scrutinized. Upon inquiry, a significant number of women indicated that their male counterparts held familial ownership. This disjuncture highlights that while women may possess land rights, such ownership doesn't invariably translate to real authority within the household. Social dynamics, norms, and power structures influence these perceptions. Land ownership may represent a formal legal aspect, but entrenched patriarchal norms can limit women's agency in decision-making and family matters. Hence, achieving equitable gender roles demands not just legal

rights, but also transforming societal perceptions and empowering women to exercise genuine control within their families.

**4.3.12.5: Conclusion:**

In a comprehensive evaluation of socioeconomic indicators, rubber farmers exhibit a marginally superior standing in comparison to their counterparts engaged in different agricultural pursuits. This nuanced advantage is discernible across several dimensions. Economically, rubber farmers demonstrate slightly higher income levels, potentially stemming from the commercial viability of rubber cultivation. Educational attainment appears favorable among rubber farmers, hinting at enhanced access to knowledge and skill development. Furthermore, a fraction of rubber farmers engaging in regular vacations outside the state signifies a certain level of disposable income and leisure opportunities. However, it's essential to recognize that these advantages are relative, and disparities may persist within both groups. Factors such as market fluctuations, landholding sizes, and regional disparities could contribute to variations in socioeconomic status. Nevertheless, this nuanced edge among rubber farmers underscores the interplay between agricultural specialization and broader economic well-being, necessitating a nuanced approach to socioeconomic development policies.

# Chapter 5

# Discussions and implications for policy

## 5.1 Contributing factors behind success of rubber cultivation in Tripura:

The Forest (Conservation) Act of 1980 led to the creation of Reserved Forests covering more than one-third of the Tripura state's land area. As a result, Tripura's lack of land for Jhum production became a significant problem. Since many refugees arrived at once and settled in hilly locations at the same time, the situation grew worse.

Low yields were the result of Jhum cycles becoming shorter due to insufficient acreage for Jhuming. The tribal people also lost access to nontimber forest products, which were crucial for their livelihood. For the Jhumias, all of these led to a crisis of subsistence. Jhumias had a significant role in the development of Tripura's insurgency. Poor Jhumias were the primary source of recruits for Tripura's covert militant organisations, claims Bhowmik (2012).

The government began to rehabilitate the Jhumias in the 1970s due to the lack of flat ground for their settlement. This was primarily done through horticulture and rubber plantation initiatives, which do not require plain land. It has been discovered that these two programmes can help the Jhumias recover. For the years 1986–2005, 9,445 Jhumia families were rehabilitated under the rubber planting scheme, according to the Tripura HDR 2007 (Government of Tripura 2007).

According to the Directorate of Welfare for Scheduled Tribes Government of Tripura's data, 26,129 Jhumia families received financial benefits from the rubber plantation scheme between 1992 and 2015, totaling 26129 hectares of land. The land used for the rehabilitation of the Jhumias under the rubber plantation scheme accounted for one-fifth of Tripura's total rubber plantation area in 2014, according to the Office of the Principal Chief Conservator of Forests, Government of Tripura.

Tripura's rubber plantations gave the shifting farmers stable employment and helped them settle in one location, which greatly facilitated the flow of institutional benefits and greatly improved the human development aspects of these households, such as education and health. **More people began growing rubber as a result of this, and the trend spread.**

Institutions have also contributed significantly to the state's continued expansion of rubber farming. Tripura's rising stature in India's rubber map is largely due to the institutional changes made during the previous 50 years. The state's agricultural sector has been successfully converted from jhum-based farming to commercial NR cultivation thanks to these efforts. The establishment of the Tripura Forest Development and Plantation Corporation (TFDPC), the Tripura Rehabilitation Plantation Corporation (TRPC), and the Block Planting Units — Rubber Producers Societies (BPU-RPS) schemes of the Rubber Board, as well as marketing interventions like the establishment of NR processing and rubber products units enabling value-addition, have highlighted the relevance of institutional innovations in the promotion of rubber production.

Preference for rubber cultivation can also be attributed to various other factors which makes it very lucrative plant to grow. Firstly, the inability of traditional crops to generate a comparable income on the same type of land, such as tilla land, is a significant motivator. Unlike conventional crops that often have limited market demand and fluctuating prices, rubber offers a stable and potentially higher income stream. This financial advantage makes rubber cultivation a viable alternative for maximizing land utility and profitability.

Secondly, the extended income potential of rubber cultivation is a key allure. While there is an initial gestation period of approximately seven years before the rubber trees reach maturity and start yielding latex, once they begin producing, the yield continues for up to 30 years. This long-term income stability provides a sense of security and reduces the need for frequent replanting or re-investment, a common concern in many other agricultural ventures.

Another compelling aspect is the frequency of rubber yield. Unlike many crops that are harvested once or twice a year, rubber trees yield latex on an alternating basis, often every other day. This frequent yield not only contributes to regular income flow but also simplifies logistical planning for harvesting and processing.

Lastly, the ease of marketing rubber sets it apart from various other crops. Rubber has a well-established and organized supply chain, which includes processing, distribution, and market access. This streamlined marketing process minimizes the challenges associated with finding buyers and negotiating prices that are often encountered when dealing with other crops.

In conclusion, the synergistic effect of factors such as the shift from traditional crops, the extended income potential of rubber, frequent yield cycles, and a well-established marketing framework has propelled Tripura to become the second-largest rubber producing state in India. The state's proactive approach, combined with its favorable agro-climatic conditions, has laid the foundation for a thriving rubber industry that not only benefits farmers but also contributes significantly to the regional and national economy.

## 5.2 Challenges faced by rubber farmers in Tripura:

India stands as the global leader in natural rubber production; however, a significant yield disparity persists between the national and state averages, consistently exceeding 40% in recent years. This discrepancy underscores existing challenges related to rubber cultivation. Despite proactive initiatives aimed at boosting productivity and ongoing upskilling endeavors, the average yield has plateaued between 1200 and 1500 kg/ha/year. While efforts to enhance productivity and scale up production have shown promise, the aging rubber plantations present a contrasting picture. As these plantations mature, their productivity wanes, leading to a steady decline in output. This trend was evident in the 2021-2022 period, where average productivity was recorded at 1252 kg/ha. Balancing the need for rejuvenation and sustainable cultivation practices remains a crucial task for Tripura's rubber industry, as it seeks to optimize its natural rubber production while mitigating the challenges posed by aging plantations.

The rubber growers of Tripura, despite their success in becoming a major rubber-producing state in India, have been grappling with a persistent challenge: the issue of poor-quality processing. This predicament has implications not only for the state's rubber industry but also for its overall economic growth and reputation in the rubber market.

One of the primary reasons for the problem of poor-quality processing is the lack of modern and technologically advanced processing facilities in Tripura. Rubber processing involves several critical stages, including latex collection, coagulation, drying, and packing. Outdated or inadequate processing equipment and techniques can lead to suboptimal results, affecting the quality of the final rubber product. Insufficient infrastructure hampers the efficient conversion of raw latex into high-quality rubber sheets, resulting in inconsistent and lower-grade products that fetch lower prices in the market.

Moreover, a shortage of skilled labor and trained technicians in rubber processing further exacerbates the issue. Proper processing requires expertise and precision to ensure that each step is executed correctly. In the absence of skilled workers, errors and inefficiencies may creep into the processing stages, leading to compromised rubber quality.

Inadequate post-harvest management practices also contribute to the problem. Improper storage and handling of rubber sheets can lead to contamination, deterioration, and loss of quality. Climate and humidity conditions prevalent in Tripura can exacerbate these challenges, making it imperative to implement effective storage and preservation techniques.

The poor quality of processing negatively impacts the state's rubber industry in multiple ways. It undermines the reputation of Tripura's rubber products in national and international markets, making it difficult to command premium prices. Buyers and manufacturers may be hesitant to procure rubber from sources known for subpar quality, affecting the demand and marketability of Tripura's rubber output.

Another major challenge is related to marketing. The absence of well-defined and organized marketing channels contributes to the weak marketing system. Without clear pathways for selling their produce, rubber growers may struggle to connect with potential buyers, negotiate fair prices, and ensure consistent sales. This lack of structure can lead to uncertainty and fluctuations in income, impacting the financial well-being of the growers.

Secondly, limited access to market information and price data further exacerbates the problem. Rubber growers may be unaware of prevailing market trends, demand patterns, and competitive prices. This lack of information puts them at a disadvantage during negotiations, making it difficult for them to obtain favorable terms for their products.

Inefficient transportation and logistics infrastructure also play a role in the weak marketing system. Poor road connectivity, inadequate storage facilities, and challenges in transporting rubber from remote plantations to processing centers can result in delays, quality degradation, and increased operational costs.

Furthermore, a lack of branding and promotional efforts for Tripura's rubber products hampers their recognition and marketability. Establishing a distinct identity and promoting the unique qualities of Tripura's rubber could help attract buyers and create a niche market, allowing growers to command higher prices.

## 5.3 Where government can intervene:

Productivity-enhancing measures such as proper manuring, soil-water conservation, and rain-guarding techniques are currently underutilized in the rubber cultivation practices of Tripura. To address this issue and optimize rubber production, it is essential for the government to take a proactive role in promoting these practices through existing agricultural institutions.

By leveraging established institutions dedicated to rubber production, such as agricultural extension services, research centers, and farmer cooperatives, the government can effectively disseminate knowledge and provide training on modern cultivation techniques. Manuring, for instance, helps replenish soil nutrients, leading to healthier rubber trees and increased latex yield. Soil-water conservation methods mitigate the effects of water scarcity, enhancing plant growth and resilience. Rain-guarding protects rubber trees from adverse weather conditions, ensuring consistent productivity.

Promoting these practices through existing institutions ensures wider outreach, facilitating knowledge transfer to a larger number of rubber growers. Additionally, the government's involvement underscores its commitment to sustainable rubber cultivation, encouraging farmers to adopt these techniques for long-term benefits. Through collaborative efforts between the government and established rubber-related institutions, the adoption of productivity-enhancing measures can significantly boost rubber yields, improve farmer livelihoods, and contribute to the growth of Tripura's rubber industry.

The existing smoke houses used for rubber processing in Tripura exhibit subpar quality standards, compromising the final product. To rectify this issue, it is imperative for the government to take a proactive stance by constructing improved smoke houses. These upgraded facilities would ensure consistent and controlled smoke curing, a critical step in rubber processing. By investing in modern and well-designed smoke houses, the government can enhance rubber quality, prevent contamination, and bolster the reputation of Tripura's rubber products in the market, ultimately benefiting both the growers and the state's rubber industry as a whole.

Intercropping should also be promoted by government agencies. Inter-cropping, the practice of growing different crops together in the same field, offers a promising approach to mitigate potential adverse impacts associated with monoculture plantation crops. This strategy not only addresses ecological concerns but also brings about socioeconomic benefits, particularly when combined with rubber cultivation in Tripura.

Research studies have highlighted drawbacks of monoculture plantations, such as increased vulnerability to pests, diseases, and soil degradation. Introducing diverse crops, including fruit crops like bananas or pineapples, tea, coffee, and medicinal plants, can create a more resilient agroecosystem. The presence of multiple crops reduces the risk of disease outbreaks and pest infestations, as different plants can have varying susceptibility. Additionally, inter-cropping improves soil health through enhanced nutrient cycling and reduced erosion, contributing to sustainable land management.

The economic advantages of inter-cropping are equally compelling. Farmers gain multiple income streams from the same land, reducing financial risks associated with relying solely on rubber. Fruit crops, tea, coffee, and medicinal plants can be sold locally or in broader markets,

diversifying revenue sources and improving overall income stability. This diversification can mitigate the impact of fluctuating rubber prices and market demand.

Furthermore, inter-cropping promotes efficient land use. Rubber trees provide shade and support to understory crops, optimizing sunlight utilization and fostering a balanced microclimate. Such synergy results in increased yields and resource use efficiency.

Encouraging the establishment of rubber article industries within Tripura can yield significant economic and agricultural benefits. By fostering local production of rubber goods, the state government can create a value-added supply chain that not only boosts the economy but also uplifts farmers and enhances their income.

When rubber articles are manufactured within the state, it reduces dependence on external suppliers, leading to cost savings and job creation. This, in turn, stimulates economic growth, generating revenue through both production and exports. The state's economy becomes more diversified and resilient, reducing vulnerabilities associated with relying solely on raw rubber exports. Furthermore, the presence of local rubber article industries ensures a stable market for rubber growers, offering them a direct avenue to sell their produce. This eliminates intermediaries and allows farmers to command higher prices for their rubber, improving their income and overall standard of living.

The strategy promotes a sustainable and integrated rubber ecosystem, where the growth of downstream industries complements rubber cultivation. It encourages skill development, innovation, and technology adoption, contributing to long-term agricultural and economic development.

In essence, fostering rubber article industries within Tripura aligns economic growth with agricultural prosperity, creating a win-win situation that enriches the lives of both farmers and the wider community, while fortifying the state's economic foundation.

In conclusion, Tripura government can boost rubber cultivation by offering targeted incentives, providing technical training, and facilitating access to modern processing facilities. Developing robust marketing channels, promoting inter-cropping, and establishing research collaborations can enhance productivity. By prioritizing infrastructure development, offering financial support, and implementing sustainable farming practices, the government can encourage more farmers to engage in rubber cultivation, ensuring economic growth and agricultural sustainability.

# Chapter 6

# Conclusion

## 6.1 Putting everything together: Summary of findings and analysis:

The comprehensive analysis of data and responses collected from rubber farmers has illuminated a noteworthy trend: rubber farmers enjoy a relatively improved socioeconomic status when compared to their counterparts engaged in various other agricultural activities. This advantageous position becomes evident across multiple dimensions, including earnings, asset ownership, health, education, and other critical socioeconomic indicators. While this phenomenon can be attributed to a multitude of factors, a significant driver is the higher income derived from rubber cultivation in comparison to alternative agricultural pursuits.

The data underscores the vital role that rubber cultivation plays in bolstering the economic well-being of farmers. The higher income generated by rubber cultivation serves as a foundational pillar for these farmers' improved socioeconomic conditions. This financial upliftment enables them to invest in better education for themselves and their families, access quality healthcare, and accumulate assets that contribute to long-term prosperity.

In the context of Tripura, rubber cultivation has transcended the realm of mere agricultural practice; it has catalyzed a transformative shift in the socio-economic landscape. Far beyond being a conventional crop, rubber has emerged as a beacon of socio-economic progress, redefining the state's identity and priorities. This shift is not limited to commercial success; it encompasses a deep-rooted social acceptance, rendering rubber the most viable and embraced plantation crop. The impact of rubber cultivation reaches beyond economic prosperity, intertwining with rural development and social upliftment. Its significance extends to initiatives aimed at rehabilitating shifting cultivators, ushering in a new era of sustainable land use and agricultural practices. Rubber cultivation has not only bolstered the financial well-being of local communities but has also served as a cornerstone of their rejuvenation and growth.

Crucially, rubber cultivation's role in fostering socio-economic stability has been underscored by its contribution to reducing insurgency within the state. By offering a sustainable source of livelihood and promoting community welfare, rubber cultivation has acted as a catalyst for harmony and cohesion, thereby positively influencing the state's security environment. The profound transformation brought about by rubber cultivation in Tripura echoes far beyond economic gains. It signifies a remarkable synergy between commercial viability, social progress, and rural development. The thriving rubber industry has carved a path towards inclusive growth, offering a lifeline to marginalized communities, empowering them to participate actively in the state's evolution.

In essence, rubber cultivation has transcended its role as a mere agricultural endeavor, evolving into a symbol of progress and transformation in Tripura. Its impact resonates through socio-economic realms, driving rural development, supporting shifting cultivator rehabilitation, and contributing to the mitigation of conflict. As rubber continues to flourish, it exemplifies the potential of a single crop to not only drive economic prosperity but also to catalyze a holistic and sustainable development journey for the state and its people.

## 6.2 Research limitations:

The study has some methodological and structural flaws that could have impacted the findings.

- **Small sample size:** The research's sample size comprised 160 farmers, evenly split between rubber and non-rubber categories, from a single district. Expanding the sample size could have bolstered research reliability by capturing a more comprehensive representation of diverse contexts, yielding results with broader applicability and reducing potential biases.
- **Convenience sampling:** The selection of farmers was based on convenience and influenced by the preferences of public representatives or officials. This approach introduces limitations, particularly in terms of generalizability and the ability to draw inferences for the entire population. The resulting sample may not fully represent the diversity of the population, potentially affecting the broader applicability of the study's findings.
- **Respondent bias** was observed, with some farmers providing inaccurate information, particularly regarding income and assets. This reluctance stemmed from fears that accurate income reporting could attract attention from the income tax department, leading to potential repercussions. Such concerns influenced the reliability of income-related data and underscore the need for measures to ensure respondent anonymity and build trust for more accurate and comprehensive research outcomes.
- The study faced constraints in terms of **limited time and resources**. These limitations impacted the depth and scope of data collection and analysis, potentially leading to a less comprehensive exploration of the research topic. A more extensive timeframe and additional resources could have facilitated a more thorough investigation and a more nuanced understanding of the subject under study.
- **Literature Gap:** The depth and scope of the study may have been hampered by the paucity of primary materials or the lack of sufficient extant literature.
- **Data analysis** encountered limitations due to the staggered initiation of rubber cultivation among diverse farmers. The varying starting points introduced complexities in comparing outcomes, potentially confounding the analysis. This temporal misalignment hindered the establishment of direct cause-and-effect relationships and required cautious interpretation of results. Acknowledging this challenge is crucial for ensuring the accurate interpretation of findings and recognizing the constraints posed by the uneven timing of rubber cultivation adoption.
- **Language limitations** posed a significant challenge during the study, as a subset of tribal participants exclusively spoke the Kokborok language. Although the presence of an interpreter helped bridge the linguistic gap, inherent difficulties in translating idiomatic expressions, cultural nuances, and subtle meanings could have led to the inadvertent omission or distortion of certain viewpoints. This potential loss of depth in communication raises concerns about the complete and accurate representation of these individuals' perspectives within the research. Despite the interpreter's efforts, the intricate interplay between language and cultural context underscores the need for cautious interpretation and highlights a noteworthy limitation in the study's ability to capture the richness of these interactions.

## 6.3 Future research aspects:

The inclusion of future research aspects within this thesis is vital to provide a comprehensive foundation for forthcoming investigations. By delineating potential avenues for exploration, we lay the groundwork for researchers to delve deeper into unresolved complexities. These suggestions encourage the evolution of this field of study, fostering a continuous scholarly dialogue. Furthermore, they underscore the dynamic nature of research, ensuring that our collective understanding advances through ongoing inquiry and discovery.

### 6.3.1: Environmental vs socioeconomic impact:

In our pursuit of understanding the intricacies of rubber cultivation, our focus has predominantly centered on unraveling the socioeconomic facets that underpin this practice. This exploration has undeniably shed light on critical aspects such as livelihoods, income generation, and local economies, providing valuable insights into the human dimensions of rubber cultivation. However, it is equally imperative to acknowledge the burgeoning body of research that has diligently examined the potential environmental ramifications associated with rubber cultivation.

A substantial corpus of literature has emerged, delving into the ecological implications of rubber farming, including issues related to deforestation, biodiversity loss, soil degradation, water pollution, and carbon emissions. These environmental considerations have rightfully garnered attention due to their far-reaching consequences on ecosystems and sustainability. Yet, a discernible gap persists – the convergence of socioeconomic and environmental dimensions in a holistic evaluation, culminating in a comprehensive cost-benefit analysis.

A compelling avenue for future research beckons: an integrated study that amalgamates the socioeconomic and environmental aspects of rubber cultivation through a robust cost-benefit analysis framework. This approach would present a novel and well-rounded perspective, transcending the conventional boundaries of research silos. By quantifying the socioeconomically derived benefits against the environmental costs, we can unearth a nuanced understanding of the true implications of rubber cultivation.

Such an integrated analysis holds paramount importance for the formulation of informed and effective policy recommendations. Policy decisions concerning rubber cultivation should be underpinned by a meticulous assessment that considers not only the economic gains but also the environmental toll. A comprehensive cost-benefit analysis would serve as a pragmatic tool, aiding policymakers in striking a delicate balance between economic development and environmental conservation.

In essence, while our exploration has unfurled the socioeconomic tapestry of rubber cultivation, it is clear that a more comprehensive inquiry is imperative. By harmoniously melding the socioeconomic and environmental narratives through a rigorous cost-benefit analysis, we have the potential to offer holistic insights that resonate with policymakers, stakeholders, and the larger global community. This approach transcends disciplinary confines, offering a multidimensional perspective that is indispensable in shaping sustainable and equitable policies for rubber cultivation.

### 6.3.2: Comparison with other crops (Bamboo, Agar, Areca nut):

Tripura's agriculture has been transformed with Bamboo, Areca nut, and Agar alongside rubber, boosting the economy and aligning with its agro-climate. Studying their socioeconomic and environmental effects, and comparing them, promises groundbreaking insights for informed agricultural policies and sustainable growth in the state.

Bamboo, once regarded as a mere forest resource, has transformed into a versatile crop in Tripura. Its utilization in construction, handicrafts, furniture, and paper-making has generated significant employment opportunities, especially in rural areas. The socioeconomic impact assessment of bamboo cultivation would delve into income generation, employment creation, and skill development. Furthermore, understanding its environmental implications, such as carbon sequestration and soil erosion prevention, would shed light on its role in sustainable land management.

Areca nut cultivation has also gained prominence, capitalizing on Tripura's favorable climate. The socioeconomic study of Areca nut would examine aspects such as farmer incomes, market integration, and livelihood improvement. Additionally, evaluating the environmental effects, including water usage and soil health, would provide a comprehensive perspective on its sustainability. Agar, renowned for its aromatic resin, has established itself as a lucrative crop choice for farmers. The socioeconomic assessment of Agar cultivation would encompass income diversification, employment opportunities, and value chain development. Exploring its environmental impacts, such as land use change and potential habitat disruption, would contribute to informed decision-making.

A comparative analysis of these four agricultural commodities would be of paramount importance. Such a study would enable policymakers to make informed choices based on their socioeconomic and environmental merits. The research could uncover which crop offers the highest returns to farmers, which contributes most significantly to employment generation, and which has the least ecological footprint. Such insights would not only aid in optimizing agricultural strategies but also facilitate resource allocation, ultimately bolstering Tripura's agricultural sector.

Moreover, considering the broader implications, a comparative analysis could foster synergy between these commodities. For instance, the study could explore potential intercropping or agroforestry models that integrate rubber, bamboo, Areca nut, and Agar, maximizing land use efficiency while promoting sustainability. This approach aligns with the global trend towards integrated farming systems that harness the benefits of diverse crops for improved resilience and productivity.

In conclusion, the emergence of Bamboo, Areca nut, and Agar alongside rubber has presented an opportune moment to conduct a comprehensive research project in Tripura. Assessing the socioeconomic and environmental impacts of these commodities, followed by a comparative analysis, holds the potential to revolutionize policy-making in the state's agricultural sector. Such a study would not only empower policymakers with data-driven insights but also contribute to the overall prosperity and sustainability of Tripura's agricultural landscape. As the region strives to secure its agricultural future, this research project could serve as a guiding beacon, illuminating the path towards a resilient, inclusive, and thriving agro-based economy.

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# Appendix A

# Questionnaire

| Personal information | |
|---|---|
| Name of the Farmer | |
| Name of gram panchayat | |
| Name of Block | |
| Name of the district | |
| Contact Number | |
| Age | |
| Gender | |
| Education level | |
| Family size | |
| Caste | |
| Religion | |
| **Land related information** | |
| Size of total land (in Kani) | |
| Size of land used for Agriculture (in Kani) | |
| Size of land used for rubber cultivation (in Kani) | |
| Soil type | |
| **Rubber production** | |
| Rubber production each year (kg) | |
| Rubber variety | |
| Tapping system | |
| Number of labours involved | |
| Cost of production (per Kani) (in rs.) | |
| Irrigation available (Yes/No) | |
| Source of irrigation | 1. Canal |
| | 2. Tank |
| | 3. Tube-well |
| | 4. Other |
| Where do you sell the product? (Local/Outside) | |
| Price of rubber-produce (per kg) | |
| **Economic status** | |
| Total monthly income when started growing rubber | |
| Total current monthly income | |
| Monthly income from rubber production | |
| Monthly income from other crops' production | |
| Do you have bank account (Yes/No) | |
| Do you have debt in your name (amount in rs.) | |
| Source of credit | ▪ Moneylender |
| | ▪ Bank |
| | ▪ Other |
| Income tax | (Yes (amount) /No) |
| Property tax | (Yes (amount) /No) |
| Monthly saving (in rs.) | |

| | |
|---|---|
| Monthly expenditure (in rs.) | • Food (in rs.)<br>• Clothing (in rs.)<br>• Other house items (in rs.)<br>• Education (in rs.)<br>• Savings (in rs.)<br>• Other items (in rs.) |
| Other sources of income (in words) | |
| **Living standard** | |
| Type of ration card | ▪ APL |
| | ▪ BPL |
| | ▪ AAY |
| | ▪ Other |
| Type of house (Kacha/Pakka/Semi-Kacha/Tin) | |
| Number of rooms | |
| Source of lighting | |
| Drinking water facility (Yes/No) | 1. Bore-well |
| | 2. Tap water (Public) |
| | 3. Piped water supply |
| | 4. Hand-Pump |
| Fuel/energy used for cooking food | 1. LPG Gas |
| | 2. Kerosene oil |
| | 3. Wood |
| Employment status of the family (Adult members only) (in numbers) | ✓ Employed |
| | ✓ Non-employed |
| SHG membership | (Yes/No) |
| Panchayat Meeting / Gram-Sabha | (Yes/No) |
| Access to common property resources | (Yes/No) |
| Access to co-operatives | (Yes/No) |
| Access to electricity | (Yes/No) |
| **Education** | |
| Number of schools going children | |
| Education Status of the family members (in numbers) | • Illiterate |
| | • Primary |
| | • 8th |
| | • 10th |
| | • 12th |
| | • Graduation |
| Children going to school | • Regularly |
| | • Sometimes |
| | • Rarely |
| | • Never |
| Home tuition available to children | • Yes |
| | • No |
| **Health and Sanitation** | |
| Mortality condition in family (Last person died at the age of?) | |
| Reason of death | |
| Medical related monthly expenditure (in rs.) | |
| Where do they go for health-related facility? | 1. Government hospital |

| | |
|---|---|
| | 2. Private Hospital |
| | 3. Kabiraj |
| | 4. Medical shop |
| | 5. Known person in the village |
| | 6. Own |
| All the children in the family vaccinated? | |
| Any person in the family has critical illness? | |
| Any person with disability in the house (Yes/No) | |
| Health Insurance | Yes/No |
| Access of toilet (Yes/No) | |
| Addiction of goods | 1. Pan |
| | 2. Biri/Cigarette |
| | 3. Khani/Alcohol |
| | 4. None |
| Most common disease in the family | 1. Malaria/ Stomach Disease |
| | 2. Old age disease/ Diabetes and B.P. |
| | 3. Headache/ Goiter |
| | 4. Back pain/ Leg pain |
| | 5. Other |
| Segregation of waste products at home | 1. Yes |
| | 2. No |
| **Assets (Yes/No)** | |
| Bicycle | |
| Motor-cycle | |
| Four-wheeler | |
| TV | |
| Air-conditioner | |
| Fridge | |
| Washing-Machine | |
| Furnishing | |
| Furniture | |
| Number of mobile phones | |
| Computer | |
| Newspaper | |
| Geyser | |
| **Food-habit** | |
| Egg included (Yes/No) | |
| Daily use of milk (Yes/No) | |
| Fruits (Yes/No) | |
| Ghee/Butter (Yes/No) | |
| Tea/Coffee (Yes/No) | |
| Monthly food consumption (in rs.) | |
| **Livestock and poultry (Number)** | |
| Cow | |
| Buffalo | |
| Goat | |
| Ducks | |
| Others | |
| **Other questions about socio-economic status** | |

| | |
|---|---|
| Number of people migrated outside from the family | |
| Reason of migration | |
| Vacation with the family | |
| Location of the Vacation | |
| Location of the house (Near main road/Away from the main road) | |
| Do women own land in the Family | |
| Are you invited in community programs? | |
| Do women have a say in household decisions (Yes/No)? – Ask to a woman in the family | |

**Subjective questions**

1. Do you believe that rubber-crop provides more income than mainstream crops?
2. Do you believe your living standard has improved after you have started growing Rubber?
3. What changes have been there in your life before and after you have started Rubber-plantation?
4. Are you satisfied with government-support in this regard?
5. Do you believe you are better-off than fellow farmers who are not growing Rubber?
6. Will you advise other farmers to grow Rubber?
7. What are the challenges faced by you in Rubber Cultivation?
8. What can government do in this regard?
9. Are you satisfied with the price you are getting for your Rubber-Produce?
10. Which other major cash crops are grown here?
11. Are you willing to shift to other cash-crops or main-stream crops?
12. Any other thing you would like to share as a rubber-planter?
13. Do they get respect in the society (Their perception)?

# Appendix B

# Case Studies

**Case study 1:**

In the heart of Tripura's lush landscapes, where emerald fields stretch as far as the eye can see, a tale of resilience and renewal unfolds. It is a story that encapsulates the very spirit of human determination, as well as the profound impact that the cultivation of rubber has had on the lives of those it touched. At the center of this narrative stands Parbati Sarkar, a woman of unwavering strength, who turned adversity into opportunity and transformed a life of loss into one of triumph.

The year was 1995, a time marked by the echoes of tribal conflict that resonated through the hills of West Tripura. It was in this tumultuous backdrop that tragedy struck Parbati's world. Her husband, a pillar of her existence, was tragically taken from her by the hands of tribal guerrillas. The sense of loss was immeasurable, and yet Parbati's spirit remained unbroken. As she sought to pick up the pieces of her shattered life, fate guided her towards a new beginning.

Forced from her ancestral home in Dewanbari, Parbati and her four children embarked on a journey of hope and survival. Their path led them to the embrace of Rangmala village, a haven nestled near the sprawling expanse of a rubber plantation. It was here that Parbati's resilience would find a fertile ground to take root.

Drawn by the stories of fellow villagers who had ventured into the realm of rubber cultivation, Parbati's curiosity grew. With determination blazing in her eyes, she made a daring decision – to carve out a future for her family by tending to the very earth that cradled her dreams. Armed with courage and a fierce will to succeed, she set out to purchase a parcel of land that would become her canvas for transformation.

The journey ahead was not without its challenges. Nature, as if testing her commitment, presented obstacles in the form of laborious tasks and unpredictable weather. The art of cultivating rubber demanded patience, care, and an intimate understanding of the land. Parbati's hands bore witness to countless hours of toil as she nurtured the rubber plants, each one a testament to her indomitable spirit.

Seasons turned, and with them, Parbati's labor began to yield its fruits. Her rubber garden, once a canvas of dirt and sweat, now flourished with vibrant life. As the rubber trees matured, they seemed to mirror Parbati's own journey – from a place of hardship to one of stability and growth. The first signs of rubber tapping marked not only the birth of a new livelihood but also a rekindling of hope that had been dimmed by the shadows of the past.

Parbati's perseverance did not go unnoticed. Her story resonated through the village, inspiring others to take their own steps towards change. The community, once divided by trials, found a common thread in their shared pursuit of progress. Through workshops and mutual support, Parbati and her fellow rubber cultivators transformed Rangmala into a tapestry of empowerment, resilience, and newfound prosperity.

Today, as the sun sets over the rolling hills of Tripura, a sense of serenity envelopes Rangmala village. Parbati Sarkar's rubber garden stands not merely as a testament to her labor, but as a living embodiment of the transformative power that lies within the human spirit. Her journey, one of tragedy turned triumph, serves as a beacon of hope for all who dare to dream amidst adversity.

In the annals of time, Parbati's story will forever be etched as a reminder that from the ashes of despair, a phoenix of strength can emerge. Her tale echoes through the windswept fields, carrying with it the promise that even in the face of adversity, the human heart has the capacity to bloom and flourish, much like the rubber trees that now sway in the gentle breeze – a symphony of resilience, growth, and the unyielding spirit of a woman who chose to rise.

**Case study 2:**

In the rugged terrains of Tripura, where echoes of a tumultuous past still whispered through the hills, a story of transformation unfolded. Alindra Debbarma, once a shadow in the world of militancy, emerged as a beacon of change, illuminating a path to progress through the unlikely avenue of rubber cultivation.

In the not-so-distant past, Alindra's life had been entwined with a different narrative – one of conflict and uncertainty. A former militant, his days were once marked by the echoes of gunfire and the heavy burden of a cause that had gradually lost its way. But life has a remarkable way of offering second chances, and Alindra seized his with both hands.

Drawn by the whispers of change carried by the winds, Alindra embarked on a journey that would rewrite the trajectory of his existence. He embraced a new vision – to cultivate rubber, a crop that promised not just sustenance, but a future brimming with possibilities.

The transition from a life entrenched in strife to one immersed in nurturing rubber saplings was not without its challenges. The very soil he now tended bore witness to a transformation as profound as his own. The days were marked by sweat-drenched toil, hands that once held weapons now cradling the delicate promise of rubber trees.

As the rubber plantation flourished under Alindra's care, so did his own sense of purpose. A steady rhythm began to replace the chaos of his past, and with each passing day, the land seemed to mirror the growth within his heart. The rubber trees, once tender saplings, reached towards the sky, a testament to the resilience that Alindra had come to embody.

The impact of Alindra's choice rippled beyond his own life. His journey inspired others in the community, offering a glimpse of what could be achieved through perseverance and determination. The story of a former militant turned rubber cultivator ignited hope and unity, transforming a once-fractured community into a tapestry of shared dreams and aspirations.

Today, as the sun sets over the verdant hills, Alindra Debbarma's rubber plantation stands as a testament to the power of reinvention. What was once a life ensnared by conflict has blossomed into a livelihood that not only sustains but uplifts. Alindra's monthly earnings of Rs 10,000-12,000 stand in stark contrast to the meager Rs 1500-2000 earned by the antiquated Jhum cultivation of yesteryears.

In this tale of Alindra's journey, the hills of Tripura bear witness to a remarkable metamorphosis – a reminder that even in the face of adversity, the human spirit has the capacity

to rewrite its own story. Alindra's footsteps have left an indelible mark, guiding others towards a future where the promise of rubber trees extends far beyond their branches – a future defined by growth, prosperity, and the unwavering courage to embrace change.

**Case study 3:**

In the heart of Tripura's North Tripura district, where time moves like a gentle river winding through the hills, a tale of transformation unfolds against the backdrop of a warm February afternoon. Sambananda Kalai, a figure etched by the sun's embrace, gazes out onto the horizon with a slight smile, reminiscing about a journey that has spanned over a decade.

Not long ago, Sambananda's story was intertwined with the age-old practice of jhumia – a laborious method of slash-and-burn farming that had been the rhythm of life in many corners of the North East. With a nostalgic gleam in his eyes, he recalls the days when his earnings hovered around Rs 2,000-3,000, a modest sum harvested from the toil of cultivating rice on his two-acre plot.

But the winds of change swept across Sambananda's world in 2005, whispering the promise of a different path. He took a daring step, embracing a new endeavor that would redefine his existence. The decision was bold – a transition from traditional rice farming to the uncharted territory of rubber cultivation.

With the tenacity of a dreamer, Sambananda nurtured his rubber saplings, coaxing life from the earth beneath his feet. As the rubber trees matured under his watchful care, so did his fortunes. The fields that were once tilled for rice now bore witness to a new harvest, one that yielded not just latex but also the fruits of his unwavering dedication.

The transformation in Sambananda's life was remarkable. His monthly earnings soared to heights previously unfathomed, reaching Rs 20,000, and at times even touching Rs 30,000. The rubber plantation had not only become a source of sustenance but a wellspring of prosperity that flowed through the seasons.

In this tale of reinvention, the central government's Rubber Board played a crucial role. During the initial year of his rubber venture, Sambananda found support in the form of subsidies worth Rs 20,000. The assistance provided by this organization became the nurturing rain that allowed his aspirations to take root and flourish.

As the sun begins to dip below the horizon, casting a warm glow over the village, Sambananda Kalai's journey stands as a testament to the power of change and resilience. His fields, once scorched by the flames of the past, now thrive with the vibrant green of rubber trees. Sambananda's story is a melody of hope, a reminder that even in the quiet corners of rural life, transformation is possible – a testament to the fact that, with determination and a touch of support, a single decision can ripple into a symphony of progress, painting the landscape of lives in hues of vibrant change.