SUMMARY & CONCLUSION

CHAPTER 5

SUMMARY AND CONCLUSIONS

Among all the tea producing states in India, Assam has the highest tea production and contributes to 52% of the total production in the country. At present there are 844 tea plantations in Assam. They are divided into three types based on their ownership:

a) British tea plantations ('British')

b) Tea Corporation plantations ('Tea Corporation')

c) Native tea plantations ('Native').

The striking feature of this organised sector of industry is that it provides the largest avenue of employment to both male and female labourers.

The tea plantation labour has been relatively ignored in the area of nutritional research. Health and nutritional status data on tea plantation workers as a whole and on those particularly in Assam is very scanty. There is great paucity of reliable nutritional/health status information on the population in Assam and there is a need to present the Management of the plantation with convincing information on the Physical Quality of Life of their workers, on which basis the Management could take enlightened action.

Nutritional status has a direct bearing on the work output of the labourers. The poor health and nutritional status of these labourers would therefore, be translated into poor

individual and national productivity and needs to be urgently addressed. The present investigation was therefore, undertaken with the general objective of comparing the nutritional and health status of plantation workers working in the 'British', the 'Tea Corpoation' and the 'Native' types of the plantations.

The specific objectives were as under:

i. To compare the socio-economic and environmental situation in three types of plantations

ii. To study the inlulence of peak and lean tea plucking seasons on the food intake, health and nutritional status of workers in the plantations.

iii. To identify those socio-economic, environmental and other factors that are most detrimental to the health and nutritioal status of these workers.

iv. To evaluate the well-being of these workers using a derived Quality of Life Index.

v. To recommend corrective measures to the tea plantation Management on the basis of the findings of the study.

Sample and experimental design:

The sample of the present study consisted of 900 male and 900 female tea plantation workers from three types of plantations in Assam.

The health and nutritional status of the workers was assessed using following parameters:

Parameters	Procedure used	Data obtained on Male (N)	Female (N)	Total (N)
1. **Socio-Economic Parameters**				
a. Education .. b. Income	Pretested Proforma	900	900	1800
2. **Environmental Parameters** ..	Pretested Proforma	900	900	1800
3. **Anthropometry** .. a. Standing Height (cm) b. Weight (kg)	Jelliffe (1966)	900	900	1800
4. **Haemoglobin**				
Cyanmethaemo-globin method	Oser (1979)	900	900	1800
5. **Stool Examination** ..	Chatterji (1981)	882	876	1758
6. **Clinical Examination** ..	Jelliffe (1966)	900	900	1800
7. **Diet Survey**				
24 hour recall method ..	Rasanen (1979)	873	870	1743
8. **Morbidity** ..	Park and Park (1977)	900	900	1800

Statistical tests employed:

a. Mean, standard deviation (SD) and standard errors (SE) were calculated for all the quantitative parameters.

b. Percentage prevalence was calculated for qualitative parameters.

c. Student's 't' test was applied while comparing the quantitative parameters.

d. Analysis of variance was used to make comparisons within groups and between groups of various quantitative parameters.

e. Chi-square test was employed to determine the relationship between the plantations for all the qualitative parameters.

f. Analysis of multiple regression was employed to predict the influencing power of socio-economic and environmental variables.

g. Analysis of Co-varience was done wherever applicable. The levels of significance selected were 5% , 1%, and 0.1%.

Results of the study:

The results of the study are presented in accordance with the objectives listed earlier into four sections.

Section A

DESCRIPTION OF THE SOCIO-ECONOMIC (SE) AND ENVIRONMENTAL FACTORS IN THE THREE TYPES OF PLANTATIONS.

Section B

INFLUENCE OF PEAK AND LEAN TEA PLUCKING SEASONS ON THE FOOD AND NUTRIENT INTAKE, AND ON THE HEALTH AND NUTRITIONAL STATUS OF THE WORKERS.

Section C

EFFECT OF SOCIO-ECONOMIC AND ENVIRONMENTAL FACTORS ON THE HEALTH AND NUTRITIONAL STATUS OF THE WORKERS.

Section D

QUALITY OF LIFE INDEX (QLI) OF WORKERS IN THE THREE TYPES OF PLANTATIONS.

Section A

Type of family: Majority of the workers (>70%) in the 'British' were living in nuclear families, while in the 'Tea Corporation' and the 'Native', the majority (>55%) of the workers were living in extended families.

Family size: The average family size in the 'British', 'Tea Corporation' and the 'Native' was 4.1, 5.1 and 5.5 respectively.

Literacy/educational status of the workers: Literacy level of the workers was higher in the 'British' in comparison to the other two types of plantations. The 'Native' showed the worst picture with illiteracy being practically universal.

Housing facilities: Majority of the workers (98%) in the 'British' lived in semi-pukka* houses while in the 'Tea Corporation', 58% lived in semi-pukka houses. On the other hand, 94% ofthe workers in the 'Native' lived in kutcha** houses.

Water supply: It was encouraging to note that almost all workers in the 'British' (99.8%) and the 'Tea Corporation' (98%) had access to safe water. However, the 'Native' presented a dismal picture where 98% workers had to use unsafe water.

Type of toilet used: Eighty two per cent of the workers in the 'British' were using sanitary toilets, while 76% of the 'Tea Corporation' and 88% of the 'Native' used non-sanitary and open air toilets, respectively.

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* Semi-pukka house is one where both roof and walls are of galvanized tin sheet, concrete or cement, floor is of plain earth.

** Kutcha house is a dwelling with thatched roof, walls made with concrete pillars and bamboo plastered with mud and the floor is of plain earth.

Per capita income: The monthly per capita income was highest in the 'British' (Rs.136) and lowest in the 'Native' (Rs.100) plantations while it was Rs.109/- in the 'Tea Corporation'.

The overall picture with respect to socio-economic and environmental parameters was better in the 'British', followed by the 'Tea Corporation' and the 'Native', in that order. All the socio-economic and environmental variables showed a significant association ($p<0.001$) with the type of plantations.

Section B:

Food and nutrient intake: Food intake data revealed that cereals formed a major component of the diet of both male and female workers. While the cereal intake was one and a half to two times the RDA, the pulse intake was just about half of the RDA.

Within the plantation type, the pattern of food intake did not change appreciably but the intake of cereals, pulses and other foods was significantly higher in both males and females in the 'British' as compared to the 'Tea Corporation' and the 'Native'.

One of the striking features of the dietary consumption of workers in all the three plantations was that some food groups like milk and milk products, fruit, sugar and jaggery were totally lacking in their diets.

The effect of seasons was observed only in the amounts of cereals consumed. During peak tea plucking season, the cereal

intake of both male and female workers in all the three plantation types was significantly lower than that in the lean tea plucking season. This was attributed to greater availability of food during the lean tea plucking season.

From the dietary findings it emerges that the diets of these plantation workers lacked variety. Another finding is that there existed a characteristic homogeneity and monotony in their dietary pattern.

A scrutiny of the nutrient intake showed that the mean energy intake of male workers fell short of RDA by 4 to 8% while, surprisingly, the energy intake of female workers met the RDA. Both male and female workers exhibited more than adequate intake of protein, thiamine and niacin in the three types of plantations but the intakes of micronutrients were indequate. The intakes of protein and energy were higher during the lean tea plucking season than the peak season. Beta-carotene was consumed more during peak tea plucking season and folic acid, calcium and iron were consumed more during lean tea plucking season. However, no seasonal variations were observed in the consumption of thiamine and vitamin C.

Anthropometric Indices: Mean values for height and weight of male and female workers of the 'British' showed relatively better ($P \leq 0.001$) anthropometric status in comparison to the 'Tea-Corporation' and the 'Native'.

The percentage of male and female workers in the normal nutritional category according to the cut off point of BMI>18.5 as proposed by Waterlow (1989) for adults of the developing world, was significantly ($P \leq 0.001$) higher in the 'British' than in the 'Tea Corporation' or the 'Native'.

Haemoglobin level: Regardless of sex or the type of plantations, haemoglobin values of the plantation workers were found to be much below the WHO norms. The mean haemoglobin levels of both male and female workers of 'British' were higher by 1 to 2 g/dl as compared to the 'Tea Corporation', and the 'Native'. The mean haemoglobin values of the male and female workers of the 'Native' were less than 8 g/dl and were significantly ($P \leq 0.001$) lower than that of the 'British' and the 'Tea Corporation.' Workers in all the three types of plantations suffered from moderate to severe type of iron deficiency anaemia, namely, less than 8 g/dl to 8 - 10 g/dl.

There was a significant association ($P<0.001$) between the haemoglobin levels of the workers and parasitic infections. The workers who were infected by parasites showed lower haemoglobin values than those who were not infected.

Clinical assessment: The signs of vitamin A and/or vitamin B deficiency were present in 65 to 66% of the male and female workers of the 'British' and was practically universal in the labourers of the 'Tea Corporation' and the 'Native'.

Morbidities: The common morbidities among the workers of these plantations were common cold and cough, diarrhoea and fever, alone or in combinations. One-fourth of the male workers of the 'British' and the 'Tea Corporation' had suffered from common cold and/or fever during the preceding two months while an equal number of the male workers of the 'Native' were sick with diarrhoea. Among the female workers, variation was not found between the plantations, but morbidities were somewhat higher in the female than the male workers in all the three plantations.

Parasitic infections: The most common protozoal infection in both the male and female workers was Giardia lamblia and among the helminthic infections, Ankylostoma duodenale infection was more common.

Among the plantation workers of the 'Native' and the 'Tea Corporation' 3 to 11% were free from infection as against 22% in the 'British'.

Section C:

Influence of literacy/educational status on the health and nuritional status of the workers: A significant association was observed between literacy/educational status and nutritional parameters of the workers. Among the illiterate workers, 40% were severely anaemic with haemoglobin levels <8 g/dl while not a single worker who was literate had severe anaemia. All the workers who had some years of schooling had haemoglobin levels

above 8 g/dl. Similarly, illiterate workers showed highest prevalence of parasitic infections (>90%), morbidities (70%), and vitamin deficiencies (30%) and were malnourished (as assessed by BMI <18.5 for the development world) as against zero prevalence of parasitic infections, morbidities, vitamin deficiencies and normal nutritional status (BMI >18.5) among the workers who had attended school.

Influence of type of housing on the nutritional status of the workers: A significant association ($P<0.001$) between the type of housing and the haemoglobin level, parasitic infections, morbidity, vitamin deficiencies and body mass index was observed. The workers who lived in huts or kutcha houses were severely anaemic with haemoglobin values of <8 g/dl, had higher occurence of parasitic infections (96-100%), higher morbidity (69-77%), higher prevalence of vitamin deficiences (59-35%) and were undernourished (35-65% had BMI<18.5). In contrast, almost all the workers living in pukka houses had haemoglobin levels above 10 g/dl, exhibited absence of parasitic infections, morbidities and vitamin deficiency signs and had better nutritional status, (100% had BMI > 18.5).

Influence of source of water on health and nutritional status: The workers who used water from open tanks and open wells were severely anaemic with haemoglobin levels <8 g/dl, while workers who had access to safe water were either mildly anaemic or non anaemic (80%). Similarly, higher prevalence of parasitic

infections, morbidities, vitamin deficiencies and poor nutritional status (BMI <18.5) were observed in workers using unsafe water as compared to those who used safe water. The source of water and health status of the workers showed a significant association (P<0.001).

Sanitation and nutritional status: The results of the present study reveal that a much higher percentage of workers who used 'Open air' for defecation had low haemoglobin levels (<8 g/dl). These workers also showed higher prevalence of parasitic infections (99%), morbidities (76%), vitamin deficienceies (37%) and poor nutritional status (45% had BMI<18.5) as compared to the workers who used non-sanitary or sanitary toilets for defecation.

Per capita income and nutritional status: The prevalence of severe anaemia (Hb<8g/dl), worm infections, morbidities, vitamin deficiencies and poor nutritional status (BMI <18.5) was universal among the workers whose monthly per capita income was less than Rs.50/-. A negative association was observed between the health and nutritional parameters and income level of the workers.

The socio-economic and environmental variables showed a positive association with health and nutritional status of the workers.

Multiple regression analysis revealed a close positive association between socio-economic and environmental factors and haemoglobin status.

Further, on controlling for **income**, the environmental factors (housing, water source, and sanitation) and literacy/educational status were found to significantly influence nutritional status, namely, hemoglobin status, anthropometric status (height and weight), and macro-nutrient intake (energy and protein).

Section D:

Quality of life index (QLI) of workers in the three types of plantations: The plantation workers in the 'British' had a QLI of "Good", whereas the bulk of the workers had a QLI of 'Fair' in the 'Tea Corporation' and the 'Native'. The mean QLI score of 19.22 in the 'British' was significantly superior to that in the 'Tea Corporation' (15.50), or the 'Native' (12.34).

A significant association ($P<0.001$) was observed between QLI and haemoglobin level, parasitic infection, vitamin deficiencies, morbidity and body mass index (BMI).

Conclusions of the study: The present study contributes valuable up-to-date information on the health and nutritional status of the plantation labourers in Assam. It is also the first of its kind to provide comparative data between different plantation types. The study fulfilled a long-standing lacuna in this area.

The study will be of practical importance for the State Department of Labour, since it provides information on the

profound influence of the type of plantation and facilities offered by the management, on the health and nutritional status of the workers. Such factual information can help to shape relevant State and National plans and policies.

The Quality of Life Index (QLI) evolved in the present study will be of practical use in assessing the QLI of any organised/unorganised agricultural/industrial labour force where mandatory facilities like housing, water supply, food etc. are provided by the management. On the basis of the Quality of Life Index (QLI), the well being of the workers can be rapidly assessed using the secondary data already available with the management.

The findings of this study will also be of great assistance to international agencies such as the International Labour Organisation or the United Nations Development Programme for instituting better policies for the overall development and productivity of the labour force in the entire third World.

Recommendations for further research, training and action:

Research:- A multi-centric study on health and nutritional status of workers not only in tea plantations but in rubber, coffee and horticultural plantations and orchards, as well as agricultural labour in general, can and should be undertaken. An indepth study on the nutritional status and its impact on productivity of workers should be focussed upon.

Training: The Quality of Life Index developed in the study can be utilized to rank tea plantations from 'very good' to 'fair'. Thus, management can be trained to easily predict the health and nutritional status of their workers and take necessary actions to improve the situation.

Action: Plantation managements at least in Assam should take immediate steps to improve the environmental conditions by providing better housing, safe drinking water and sanitary toilets for every house unit. It would be in the interest of the management to endeavour to raise the QLI of the plantations to at least 'Good' if not 'Very Good', in order to increase productivity on their plantations. Similarly, health-nutrition inputs like deinfestation and iron supplementation need to be made an integral part of the package.

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