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Health, Nutrition and Social Well-Being of Tea Garden Workers in Assam: Challenges, Determinants and Policy Responses

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ABSTRACT: *Tea garden workers constitute an important section of Assam's rural working population and play a central role in the state's tea economy. Despite their economic contribution, tea garden communities continue to experience a range of health, nutritional and socio-economic disadvantages. These problems are interconnected with poverty, occupational conditions, inadequate housing and sanitation, limited dietary diversity, gender inequality and barriers to healthcare. Earlier research among tea garden populations in Dibrugarh documented substantial levels of undernutrition, anemia, infectious diseases and emerging non-communicable diseases. More recent studies have highlighted the social determinants of health among women workers, including inadequate food and rations, poor housing and sanitation, difficult working conditions and deficiencies in healthcare services. Recent scholarship has further examined gendered health inequalities and the relationship between diet, wages and working conditions in Assam's tea plantations. This paper examines the major health and nutrition challenges faced by tea garden workers, identifies their structural and socio-economic determinants and discusses possible policy interventions. It argues that improving the health of tea garden workers requires an integrated approach combining nutrition security, occupational safety, primary healthcare, women's empowerment, improved living conditions and stronger accountability within the plantation system.*

Keywords: *Tea garden workers, Assam, health, nutrition, anemia, occupational health, women workers, social determinants of health.*

1. INTRODUCTION

Assam is one of India's major tea-producing regions and the tea industry has historically been an important source of employment and livelihood in the state. Tea garden workers perform physically demanding tasks that are essential to tea production, particularly plucking and field maintenance. However, the economic importance of the tea industry does not automatically translate into adequate health and nutritional conditions for workers and their families. The health situation of tea garden communities needs to be examined within the broader social and economic structure of plantation life. Workers may depend on tea estates not only for employment but also for housing, basic services and healthcare. Consequently, deficiencies in any one of these areas can affect several dimensions of household well-being simultaneously. A community-based study of 4,016 people in eight tea gardens in Dibrugarh district found substantial health and nutritional problems. The study reported that 59.9% of children in its sample were underweight and 69.9% of adults were thin. Anemia was widespread, while worm infections, skin problems, respiratory infections, tuberculosis and filariasis were also reported. The study further identified emerging non-communicable diseases such as hypertension and stroke. These findings demonstrate that the health challenges of tea garden communities involve both traditional public-health problems and newer chronic diseases.

Objectives of the Study:

- To examine the major nutritional problems affecting tea garden workers and their families.
- To analyses the health problems experienced by women and children in tea garden communities.
- To identify the social determinants contributing to poor health outcomes.
- To examine barriers to healthcare access.
- To suggest practical policy measures for improving the health and nutritional well-being of tea garden workers.

2. RESEARCH METHODOLOGY

This paper follows a secondary-data and literature-review approach. It draws upon peer-reviewed research concerning tea garden workers in Assam, including epidemiological studies, qualitative research, ethnographic research and recent studies of nutrition and women's health. Particular attention is given to studies conducted in Assam rather than relying exclusively on evidence from tea plantations elsewhere in India. This is important because health conditions, plantation structures, demographic characteristics and access to services may differ considerably between regions. The literature includes

community-based studies, qualitative studies involving women workers, studies of anemia and hemoglobin disorders, research on occupational health inequalities and recent intervention research addressing dietary diversity.

Socio-Economic Conditions of Tea Garden Workers: The socio-economic conditions of tea garden workers are closely associated with their health and nutritional status. Tea plantation communities in Assam have historically developed around the plantation system, where employment, housing and certain welfare facilities are often connected with the tea estate. This creates a distinctive form of economic dependence. Workers may depend on the plantation not only for wages but also for accommodation, healthcare and other basic services. Consequently, weaknesses in one area can affect several other aspects of their lives. Poverty is one of the most important factors influencing the health of tea garden workers. When household income is limited, families often have to priorities essential expenditure and may not be able to regularly purchase nutritious foods such as fruits, vegetables, milk, eggs, meat and other protein-rich foods. A qualitative study involving women workers in three tea plantations in Jorhat found that poverty, low wages and poor labor conditions were important determinants of women's health. The women also described inadequate food and rations, poor housing and sanitation and difficulties in accessing health services. Socio-economic disadvantage also affects educational opportunities. Children from economically vulnerable households may face pressure to leave school early and contribute to household income. This can reproduce poverty across generations. Therefore, improving the health of tea garden communities requires more than medical treatment; it requires improvement in income security, education, housing, food access and social protection.

Nutritional Status of Tea Garden Workers: Nutrition is a central component of the health of tea garden workers because tea plantation labor involves considerable physical activity. Workers require sufficient energy, protein, iron, vitamins and minerals to maintain their health and work capacity. However, economic difficulties and limited dietary diversity can make it difficult for families to meet these nutritional requirements. An important community-based study by Mehdi et al. examined 4,016 people in eight randomly selected tea gardens in Dibrugarh district. The study reported that 59.9% of children in the study population were underweight and 69.9% of adults were classified as thin. It also found widespread anemia and several infectious diseases. These figures should be interpreted carefully because the study was conducted in selected tea gardens in Dibrugarh rather than throughout Assam. Nevertheless, the findings provide important evidence of nutritional vulnerability among tea garden populations. Poor nutritional status can reduce physical capacity, increase susceptibility to disease and affect children's growth and development. The nutritional situation is also influenced by the fact that women frequently combine physically demanding plantation work with domestic responsibilities. They may therefore have high nutritional requirements but insufficient time, money or food to meet those requirements.

Food Insecurity and Dietary Diversity: Food insecurity is not simply the absence of food. A household may have enough calories to avoid hunger but still have an inadequate diet because the food consumed lacks sufficient variety and micronutrients. Dietary diversity is therefore an important indicator of nutritional well-being. Women tea workers may consume staple foods such as rice and potatoes regularly while consuming relatively smaller quantities of fruits, vegetables, pulses, eggs, fish, meat and dairy products. The qualitative study of women workers in Assam found that many women understood the importance of nutritious food but reported that they could not regularly afford foods such as fruits and meat. Some women also reported skipping meals when food was insufficient for the whole household. Recent intervention research provides evidence that this situation can be improved. A study involving tea workers in Assam examined a market- and Behaviour-based intervention designed to improve diet quality among female workers. The programmer combined nutrition education with strategies intended to improve access to nutritious foods and reported improvements in dietary diversity. Effective nutrition policy must combine education with improvements in food availability, affordability and household purchasing power.

Anemia Among Tea Garden Women: Anemia is a major health concern among women in tea garden communities. Women of reproductive age have higher nutritional requirements because of menstruation, pregnancy and breastfeeding. If dietary iron intake is inadequate, or if women experience infections or other medical conditions, anemia can become severe. A community-based study of women of reproductive age belonging to the tea garden community of Assam investigated anemia using laboratory measurements and reported a substantial burden of anemia. The study demonstrates that anemia among women in these communities is an important public-health issue. Anemia has direct consequences for tea workers because tea plantation labor is physically demanding. A woman suffering from anemia may experience weakness, tiredness, dizziness and reduced physical capacity. When she continues working despite these symptoms, her health may deteriorate further. The problem also has implications for maternal and child health. Anemia during pregnancy can create additional risks for both mother and child. Consequently, regular screening, appropriate treatment, nutritional improvement and antenatal care are important components of tea garden health programmers.

Hemoglobin Disorders: It is important not to assume that every case of anemia among tea garden workers is caused by inadequate dietary iron. Some individuals may have inherited hemoglobin disorders. Research among tribal populations working in tea gardens in Assam has identified conditions such as β-thalassemia, sickle-cell disorders and He. Such conditions require appropriate diagnosis and clinical management rather than simply treating every low hemoglobin result as nutritional iron deficiency. This distinction is important for public-health planning. If anemia programmers rely exclusively on iron supplementation without investigating other causes where indicated, some affected individuals may remain undiagnosed. Therefore, a comprehensive anemia-control strategy should combine nutrition improvement, iron deficiency prevention, laboratory diagnosis, appropriate clinical care and screening for hemoglobin disorders when warranted.

Women's Health: Women's health is particularly important because women constitute a major part of the tea plantation workforce and often perform both paid and unpaid labor. Women tea workers may spend several hours each day plucking tea leaves and then return home to perform cooking, cleaning, childcare and other household responsibilities. Research in Jorhat found that women workers described extremely long working days, beginning with household work early in the morning and continuing with plantation work and domestic responsibilities until night. This creates a double burden of labor. Women may have insufficient time for adequate meals, rest, medical care and personal health. Women's health is also affected by reproductive responsibilities, menstrual health, pregnancy and childcare. Therefore, health services in tea gardens should provide specific attention to women's nutritional, reproductive, occupational and mental-health needs.

Maternal and Child Nutrition: Maternal and child nutrition is closely connected. A mother's nutritional status influences pregnancy, childbirth and breastfeeding, while household food availability influences children's complementary feeding. Children in tea garden communities can be vulnerable to undernutrition because of household poverty, inadequate dietary diversity and recurrent illness. The earlier Dibrugarh study found a high prevalence of underweight among children in the study population. Maternal nutrition is equally important. Women who are undernourished or anemic may enter pregnancy with inadequate nutritional reserves. This can affect maternal well-being and potentially influence birth outcomes. Improving maternal and child nutrition therefore requires a life-cycle approach. It should begin with adolescent girls and continue through pregnancy, breastfeeding and early childhood. Nutrition counselling, antenatal services, breastfeeding support, appropriate complementary feeding and regular child-growth monitoring should all be strengthened.

Occupational Health: Tea plantation work is physically demanding and involves exposure to outdoor environmental conditions. Tea workers may spend long periods standing, walking, bending and carrying loads while repeatedly performing the same movements. Research involving women tea plantation workers in Assam found several occupational difficulties. Women described working during rain, slippery conditions, insect bites and injuries. They also reported exposure to agricultural substances without adequate protective equipment. Occupational health problems can therefore include injuries, body pain, fatigue, musculoskeletal problems and exposure-related health risks. Occupational health should not be viewed simply as treatment after an accident. Prevention is equally important. Workers require safe working environments, appropriate protective equipment, adequate rest, access to drinking water, first aid and timely medical treatment.

Housing Conditions: Housing is an important social determinant of health. Tea garden workers often live in settlements associated with plantations and the quality of these houses and surrounding infrastructure can influence health. Research in Assam found that women workers reported problems involving housing, water supply, sanitation, electricity and maintenance. Some workers described old housing structures and inadequate facilities. Poor housing can increase exposure to dampness, overcrowding, insects and unsafe water. It may also affect privacy and psychological well-being. Housing improvement should therefore form part of worker-health policy. Houses should have safe construction, adequate ventilation, reliable electricity where possible, clean water and sanitation facilities.

Water, Sanitation and Hygiene: Water, sanitation and hygiene are directly connected to infectious diseases and nutritional status. If workers lack access to safe drinking water and sanitation facilities, they may face greater exposure to gastrointestinal infections and parasitic diseases. Repeated infections can further worsen nutritional status, particularly among children. Women workers in the Assam study reported inadequate sanitation facilities at workplaces and difficulties related to water and handwashing. Some also reported the absence of suitable facilities for changing menstrual absorbents while working. These conditions demonstrate that sanitation is not simply an infrastructure issue. It is also a gender and occupational-health issue. Improving toilets, drinking water, handwashing facilities, waste disposal and menstrual hygiene facilities can significantly improve the everyday health and dignity of workers.

Infectious Disease: Infectious diseases remain an important health concern in tea garden communities. The Dibrugarh study identified worm infections, skin problems, respiratory infections including tuberculosis and filariasis among the population studied. Worm infection was particularly common among those examined. Infectious diseases can create a cycle of poor health. For example, recurrent intestinal infections may contribute to poor nutritional absorption, while undernutrition can make individuals more vulnerable to infection. Therefore, disease control and nutrition programmers should not operate separately. Improvements in sanitation, hygiene, clean water, vaccination, early diagnosis and treatment can contribute to better nutritional outcomes as well.

Non-Communicable Diseases: An important change in the health profile of tea garden communities is the emergence of non-communicable diseases alongside traditional infectious diseases and undernutrition. The Dibrugarh study identified hypertension and stroke as emerging health problems and associated them with modifiable behavioral risk factors such as alcohol and tobacco consumption. This produces what public-health researchers often describe as a double burden of disease. A community can simultaneously experience undernutrition and anemia while also experiencing hypertension and other chronic diseases. Healthcare programmers must therefore address both. Regular blood-pressure measurement, diabetes screening, health education, tobacco cessation and dietary counselling should be integrated into primary healthcare.

Mental and Psychosocial Health: Mental health is often less visible than physical illness but is an important part of worker well-being. Women workers in Assam have described considerable stress resulting from poverty, heavy workloads, family responsibilities and fear of losing wages. Some women reported working despite illness because taking leave could result in loss of income. This creates a situation in which workers may continue working even when their bodies require rest or medical treatment. Social support can provide some protection. Interestingly, the same study found that women valued the

relationships they formed with fellow workers and described the workplace as an important space for sharing problems and supporting one another. Health programmers should therefore include mental-health awareness, counselling and community support mechanisms.

Gender Inequality and Health: Gender inequality is an important underlying factor in the health of women tea workers. Women may contribute substantially to household income but have limited control over household decisions. Research in Assam found that women reported restrictions on decision-making within households and limited influence within community and workplace structures. Gender inequality affects health because women may have less control over household food allocation, healthcare decisions, employment choices and expenditure. Women's empowerment should therefore be considered a health intervention. Greater participation in worker unions, community organizations and decision-making structures can potentially improve women's ability to advocate for their health and working conditions.

Relationship Between Wages, Food and Health: Wages have a direct relationship with nutrition. When income is inadequate, households must make difficult choices about how to distribute limited resources. Women in the Assam study explained that they wanted nutritious foods but often could not afford them. Some reported prioritizing children's food over their own. This illustrates why nutritional deficiency cannot always be solved through education. A woman may know that fruits, vegetables, eggs or meat are nutritious but still be unable to purchase them regularly. Income therefore functions as an important health determinant. Better and more secure earnings can improve the ability of households to purchase food, access healthcare, support education and improve living conditions.

Government and Institutional Interventions: Government intervention is essential because many of the determinants of tea garden health extend beyond individual households. Government agencies can contribute through primary healthcare, nutrition programmers, sanitation, maternal and child health services, education, social protection and labor regulation. At the same time, tea-estate management has responsibilities concerning workplace safety, housing and worker welfare. The social-determinants research argues that the responsibilities of government and plantation management need to be strengthened rather than leaving workers dependent on fragmented systems. Effective intervention should therefore involve government departments, plantation management, health workers, local communities, worker organizations and civil-society organizations.

Nutrition-Based Solutions: Nutrition programmers should address both the immediate causes and underlying determinants of malnutrition. First, workers need access to a diverse diet. Programmed can promote vegetables, fruits, pulses, eggs and other locally accessible nutrient-rich foods. Second, nutrition education should teach workers how to prepare affordable and nutritious meals. Third, interventions should address household purchasing power and food availability. Recent research in Assam provides evidence that market-based interventions combined with Behaviour-change activities can improve women's dietary diversity. Nutrition programmers should also priorities vulnerable groups such as pregnant women, breastfeeding mothers, adolescent girls and young children. Anemia screening and appropriate treatment should form part of these programmers.

Occupational Health Solutions: Improving occupational health requires prevention, protection and treatment. Workers should receive appropriate protective equipment when exposed to pesticides, insects or other hazards. Drinking water should be available during working hours and workers should have access to toilets and handwashing facilities. Working conditions during extreme weather also require attention. Workers should have safe arrangements during heavy rain, thunderstorms and excessive heat rather than being forced to choose between safety and wages. Medical facilities should provide prompt treatment for occupational injuries, while health education can teach workers about injury prevention, safe handling of agricultural chemicals and recognition of occupational illnesses.

Recommendations

- Improve household economic security: Improving wages and ensuring that workers receive legally and contractually applicable benefits can have indirect health benefits by increasing the ability of families to purchase nutritious food and access healthcare.
- Strengthen nutrition programmers: Regular nutrition screening should be conducted, especially for children, adolescent girls, women of reproductive age and pregnant women. Programmed should focus on dietary diversity rather than calories alone.
- Strengthen anemia control: Women should receive regular screening and appropriate management of anemia. Where clinically appropriate, healthcare providers should investigate causes other than nutritional iron deficiency.
- Improve water and sanitation: Tea estates should ensure access to safe drinking water, toilets, handwashing facilities and appropriate menstrual-hygiene infrastructure.
- Improve occupational safety: Workers should receive appropriate protective equipment and training, particularly when exposed to agricultural chemicals or environmental hazards.
- Strengthen healthcare services: Plantation health facilities should provide accessible primary healthcare, essential medicines, maternal and child services and screening for hypertension and other chronic diseases.
- Improve women's empowerment: Women should have greater participation in workplace decision-making, worker

organizations and community institutions.

- Strengthen childcare facilities: Functional childcare facilities can help women workers balance employment and childcare and may improve children's nutrition and safety.
- Promote community participation: Workers should participate in designing, implementing and monitoring health programmers. Their experiences provide important information about problems that may not be visible through administrative data alone.

3. CONCLUSION

The health and nutrition of tea garden workers in Assam should be understood as a multidimensional social and public-health issue. The available research demonstrates that nutritional problems, occupational risks, infectious diseases, chronic diseases, inadequate sanitation, poor housing, gender inequality and barriers to healthcare are interconnected. The evidence from Dibrugarh demonstrates substantial nutritional and disease burdens in the tea garden population studied, including childhood underweight, adult thinness, anemia, worm infection and respiratory diseases. Research focusing specifically on women shows that poverty, low wages, demanding work, inadequate food, housing and sanitation problems and limitations in healthcare can operate together to produce poor health outcomes. At the same time, recent nutrition research suggests that improvement is possible. Interventions that combine nutrition education with better access to nutritious foods have demonstrated improvements in dietary diversity among female tea workers. Therefore, the solution should not be limited to treating diseases after they occur. A long-term strategy should address the social determinants of health: adequate income, food security, safe working conditions, housing, sanitation, healthcare, education and women's empowerment. In other words, healthy tea garden workers require not only better medical care but also better social, economic and working conditions. This integrated approach is essential for improving the quality of life of tea garden communities and for creating a more sustainable and equitable tea industry in Assam.

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