CHILD HEALTH AND NUTRITIONAL STATUS OF TRIBES IN KERALA: A CASE STUDY

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By

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DECLARATION

I, ANU JOSEPH, hereby declare that this Ph.D thesis entitled, **"Child Health and Nutritional Status of Tribes in Kerala: A Case Study"** is a bonafide record of research work done by me for the fulfillment of the award of the degree of Doctor of Philosophy, under the guidance and supervision of Dr. C. KRISHNAN, Former Associate Professor, Department of Economics, Government College Kodanchery. I also declare that this thesis has not been submitted earlier for the award of any degree, diploma, fellowship or any other similar title.

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CERTIFICATE

This is to certify that the thesis entitled **"Child Health and Nutritional Status of Tribes in Kerala: A Case Study"** being submitted by **Mrs. ANU JOSEPH** for the award of the degree of Doctor of Philosophy in Economics, to Department of Economics, Government College Kodanchery, is a record of bonafide research work carried out by her under my supervision. It is also further certified that the thesis is free from plagiarism after having checked using OURIGINAL and no sentence equation, diagram, table, paragraph or section has been copied from previous work verbatim except at a very minimum level with due acknowledgement of the original sources. The contents of this thesis, in full or in part, have not been submitted to any other institute or University for the award of any degree or diploma.

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Date: Research Supervisor

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ABSTRACT

The study attempts to analyse the health status, nutritional status, determinants of nutritional status and nutritional inequality among tribal children of Attappady, the only tribal block in the state of Kerala. Extensive review of related literature showed that although many studies researched on child malnutrition and reasons thereof, the health and nutritional status, the extent of nutritional inequality among tribes and effectiveness of government interventions on Attappady tribes have a little documentary evidence. This study attempted to fill such a gap. The major objectives of the study centered on: to examine the socio economic and living conditions of Attappady tribal households; to examine the health status and its determinants of tribal children of Attappady; to understand the nutritional status and its determinants of Attappady tribal children; to ascertain the nutritional inequality among tribal children. Finally, the study aims to evaluate the awareness, accessibility and effectiveness of institutional interventions for improving the nutritional status among tribal children. Data and methodology of the study showed that the study resorted to multi-stage stratified random sampling method by randomly selecting 800 cross section units from Attappady block. The study used econometric tools such as Logistic Regression Models, Ordered Probit Regression Models, Re - Centered Influence Function (RIF) Regression Models and Semi Non-Parametric Ordered Probit Model to generate and interpret results from cross section data.

The results of the study showed that Agali recorded largest number of people having both recurring illness and diseases registered. More importantly, the adverse effect of the absence of a mother due to her employment is higher than the positive income effect of her employment on the health status of tribal children. The issue of underweight of Irular community is more dangerous than that of the other two communities and that stunting is found more among female tribal children. Similarly, the effect of nutritional inequality is higher for female in the case of variance and Gini index and this is triggered off by irregular breastfeeding and the

irregularity of mothers' food and fruits during pregnancy. As much as 85 percent of the female respondents reported some kinds of health problems at the time of delivery. Distance to health centre is also positively associated with nutritional inequality. The insufficient institutionalization of pre - natal care raises the risk of child morbidity and mortality. As much as 36 percent of those not engaged in multiseed farming reported that the Government schemes are not effective. It is also noteworthy that the respondents 'rating is higher on Government schemes if the distance to Anganwadi is less than one kilometer. The study, therefore recommends that there has to be a revamp of extant government schemes by assuring some pre-requisites like stricter and fuller implementation of Forests Rights Act which helps tribes row back their traditional right to land, opportunity to learn their language by incorporating it in the curriculum, revisit to the good old multi seed farming technique by amalgamating it with Millet Village Scheme and community farming strategy. This will enable them to have a more independent, healthier and happier life rather than waiting for free rationing.

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ABBREVIATIONS

ACFS	- Attappady Co-operative Farming Society
AHADA	- Attappady Hills Area Development Society
BMI	- Body Mass Index
CDS	- Center for Development Studies
CED	- Chronic Energy Deficiency
GOI	- Government of India
GOK	- Government of Kerala
HDI	- Human Development Index
HIV	- Human Immunodeficiency Virus
HPI	- Human Poverty Index
ICDS	- Integrated Child Development Scheme
ITDP	- Integrated Tribal Development Project
JSY	- Janani Suraksha Yojana
KILA	- Kerala Institute of Local Administration
KIRTADS	- Kerala Institute for Research Training & Development Studies
MDG	- Millennium Development Goal
MGNREGS	- Mahatma Gandhi National Rural Employment Guarantee Scheme
MSME	- Ministry of Micro, Small & Medium Enterprises
NFHS	- National Family Health Survey
NGOs	- Non-Governmental Organization
NRHM	- National Rural Health Mission
PHCs	- Primary Health Centers
PQLI	- Physical Quality of Life Index
RIF	- Re-Centeral Influence Function
SD	- Standard Deviation
SNEOP	- Semi Non Parametric Extended Ordered Probit Model
ST	- Scheduled Tribe
UNESCO	- United Nations Children's Fund
UP	- Uttar Pradesh
WHO	- World Health Organization

CHAPTER 1
INTRODUCTION

1.1 Introduction

The lives of indigenous and aboriginal tribes have been lamentable from time immemorial. Without having an organized familial set up, they have been engaging in living together traditionally so that there is no official registration of their marriage and the resultant child birth which negate them from having access to social justice schemes. According to the International Labour Organization "Indigenous and tribal peoples have their own common cultures, languages, customs, ancestors, religion, name, territory, and institutions." Indigenous and tribal peoples have their own common cultures, languages, customs, ancestors, religion, name, territory, and institutions, which distinguish them from others. They share a culture, a dialect, and a similar landscape. Spirits, magic, and witchcraft are all the varied things they believe in. They have their own set of taboos that forbid specific behaviour punished by the community, the supernatural, or the magical. They were engaged in hunting and gathering roots and fruits for veg food and grilled animals for non-veg food, woefully ignorant to the country's political and economic situation, opposing any development attempts, and having a deep hate for foreigners and the educated contemporary community. They are the social groups with an endogamous affiliation without any specialised function of a tribal officer, hereditary or otherwise united by the language or dialect, which recognises a social distance from other tribes.

1.2 Scheduled Tribes in India

Tribes are one of the most distraught groups in India. Notwithstanding many a scheme, they live in most pitiable conditions on account of a lot of reasons such as locational isolation, improper health care mechanism, unscientific beliefs and customs, alienation from development and the like. This unfavorably affected the tribal tots. An amalgam of reasons including penurious socio-economic conditions like lack of schooling, lack of access to potable water, insanitary living conditions,

poor awareness result in disastrous health conditions among them. It is conclusively proved that health is the potent determinant of tribal welfare and quality of life and is decided by socio-political, cultural, religious organisations.

India is having a total of 635 tribal communities among whom more than 120 major tribes reside in North East India. As per Census 2011, of the total population, the population of tribes is 10.43 crore, which is 8.6 percent of the total population. Of these, near 89 percent live in rural areas and 10 percent in urban areas. From census 2011, it is evident that the decadal population growth of the tribes is 23.66 percent. As a matter of fact, the tribes reside in two different regions viz the North- Eastern Area and the Central India. It was in central India that beyond 50 percent of the ST population was concentrated. i.e., mainly in Orissa, Rajasthan, Gujarat, Jharkhand, Maharashtra and Madhya Pradesh. No tribal population was noted in three states and Two Union territories viz Chandigarh, Pondicherry, Haryana, Punjab and Delhi. Out of these 635 tribes, there are about 75 tribes which are extremely in under-developed stage, and have been listed under primitive tribes in India. The tribes in India are generally considered to be the weakest sections of the population by virtue of common socio-economic, socio-demographic as well as socio-cultural factors such as poverty, illiteracy, lack of developmental facilities and lack of adequate primary health availabilities (Basu 1994). Tribal populations of our country are at different stages of social, cultural and economic development. The socio-cultural structure changes from region to region and from tribe to tribe. The tribal economy had a definite and distinctive nature. The Indian tribes are divided by the changes in their food pattern viz. Food gatherers and hunters (Example the Jarwa and the Andamanese of Andaman islands etc.); Shifting (Farm)Cultivators: (Example – Khasis, Nagas, Korwa, Muria and Maria etc.); Settled Agriculturists: (Example – Santal, Munda, Ho, Oraon etc.); Artisans: (Example – Birhor etc.); The Pastoralists and Cattle Herders: (Example – Todas, Gujar etc.); The Folk Artists: (Example – Pradhans etc.); Wage Laborers: (Example – Large number of tribes from eastern India performed in mining and industrial development, tea plantations, coal mines, brick industry etc.).

In 2011 census, total tribal population of India was 10,454, 5716 constitute 8.63% of the total size of population in India among them 52,547,215 are male and

51,998,501 are female. Other than Punjab, Chandigarh, Haryana, Delhi, Pondicherry, they are seen in all of the States and inhabit different eco-systems. Poverty is one of the major causes for illness and early death among the tribes. However, unavailability to quality foods: iron, protein and nutrition's such as iodine and vitamins, is the principle cause for the very high incidence of nutritional deficiency diseases: anemia, diarrhea, night blindness, goiter, etc. These factors connected with in accessibility to basic health care services is the main cause for the unexceptionally adverse diversity with the more developed parts of the state: maternal mortality is eight per 1000, (increasing to 25 among some tribal groups) as against four per 1000 for the state; infant mortality rate is 120-150 per 1000 compared to 72 per 1000; and while it is nine per 1000 crude death rate, with 30 per cent under-five mortality for the state, among some of the major tribal groups such as Savaras, Gadabas and Jatapus, the death rate is as high as 15-20 per 1000 with over 50 per cent of deaths of children under five.

1.3 Scheduled Tribes in Kerala

2011 census reported that ST population of Kerala was 4, 84,839 lakhs, with female being 2, 46,636 lakhs and male consisting of 2, 38,203 lakhs. The district with the highest concentration of tribal population is Wayanad being 17.43 percent. If the two districts viz Palakkad and Kasargod were taken, it would come up beyond 19 percent of ST population in the state. They were named and called differently such as *"Kattukurman", "Kattujathi'', "Adivasis", "Forest dwellers", "Vanavasi"* etc. The tribal communities from differentiated locations may be grouped into seven keeping in mind their socio-cultural relations and the locations. They are Kasargod, Wayanad, Attappady, Nilambur, Parambikulam, Idukki and Thiruvananthapuram (P.R.G.Mathur, 1977).

Scheduled Tribes in Kerala State are generally known as Adivasis which means primitive residents or indigenous people. Majority of the Tribal population of Kerala are living in the remote forest areas of mountains of Western Ghats, bordering Tamil Nadu and Karnataka. Scheduled Tribe communities in Kerala include 36 categories and the total tribal population in Kerala is estimated as 484839 and it constitutes 1.45 percentage of the total population of Kerala State. The highest

percentage of Tribal population has been recorded in Wayanad District, that is, 1, 51,443 (18.55 percentage) and in Palakkad District the Tribal population is 48,972 (Census 2011)

So far as the socio-economic status of Scheduled Tribes in Kerala are concerned, the health status, educational status and employment status are backward compared to the State level. The literacy rate of Tribes in Kerala State is estimated as 74.44 percent (Scheduled Tribes Development Department, Government of Kerala) which is lower than the State average of 93.91 percent (Census 2011). With regard to the literacy rate of tribes in Palakkad District, it was found to be 57.63 percent, the lowest among all tribes in the State. Among the total number of students in various streams, 11781 students discontinued their education due to poverty and financial problems. Majority of the Scheduled Tribal communities in Kerala are doing manual physical works including agriculture work and MGNREGS work and hence the employment status and income generation are very poor compared to other communities. Health status is also poor among Tribes in Kerala especially among the isolated tribal areas. High poverty levels, lack of food security, poor supply of nutrition, illiteracy, poor sanitation, lack of safe drinking water, unhealthy life style, beliefs and cultural practices, changes in food habits etc. aggravate the poor health status of tribes. Even though the highest percentage of Scheduled Tribes in Kerala is recorded in Wayanad District, it is spreading throughout the District that is the Tribal communities are residing almost all areas of the District and no Tribal concentration. On the other hand, Attappady, the only Tribal block in Kerala and a Block in Palakkad District has the highest density of Tribal population among all other places in Kerala. At the same time the malnutrition related health problems are very highest among Scheduled Tribes in Attappady and therefore Attappady is taken as the study area.

Attappady is the most scenic forest region of Kerala state situated at Mannarkkad Taluk of Palakkad district. The Kurumbar, the Irular and the Mudugar were the three major tribal communities residing in this region. Of the total tribal communities, the largest number of tribes belonged to Kurichians, Kanikarans Kurumans Maratis, Paniyans, and Irulars.

1.4 Child Health and Malnutrition in India

Nutritional status among children is indeed worth exploring and there are different methodologies to quantify it. Usually it is measured through three main indicators viz weight-for-age implying underweight due to insufficient intake of food, height-for-age implying stunting as a result of chronic malnutrition, weight-for-height called wasting due to starvation (WFP 2019)

For the past several years India was wrestled with only one type of malnutrition viz under nutrition. But, over the last two decades, there is a double whammy of over and under nutrition. While under nutrition can be related to the ills gripping such as poverty, and other communicable diseases, the additional challenge is in the form of over nutrition presumably arising from and associated with inequality, industrialization, urbanization and economic growth. Overweight and obesity are the inevitable by products of over nutrition, one of the most hunting and haunting second generation challenges that the country has been experiencing. It has become a severe public health problem in India. On the one hand, women in India are overburdened with low BMI and anaemia and on the other hand, there is a disturbing evidence of high obesity among men and women.

Apart from the above, there is a growing incidence of micronutrient malnutrition too on account of micronutrient deficiencies such as iodine deficiency, Vitamin A deficiency and iron deficiency resulting high disease burden, poor immunity and lower productivity. Resolving micronutrient malnutrition is a pre requisite for fulfilling rapid development (Chatterjee and Minika 2014). In the world, more than two-thirds of the world's population, especially women and children belonging to poor households are buffeted by micronutrient deficiency which manifests themselves in the forms of increased stunting, exposure to infectious diseases, cognitive impairments and premature mortality (Deaton and Dreze 2008). Stunting, wasting and underweight together spawn multiple burden of malnutrition. It is also to be borne in mind that the conundrum of malnutrition is more severe among Scheduled Tribes than Scheduled Castes at national level, in spite of the fact that there are inter –state variations as well. However, among Scheduled Tribes, all types of malnutrition and anemia are on a higher side. This is

triggered off by energy deprivation. Among social groups at the national level, stunting is highest in children who belong to Scheduled Tribes (43.6 percent), accompanied by Scheduled Castes (42.5 percent) and the OBC (38.6 percent).

1.5 Child Health and Malnutrition among Tribes in Kerala

Kerala's health care system has undergone many upheavals. In spite of the fact that the state has best indicators for social development in terms of highest life expectancy in India, highest literacy, highest quality of life and civic consciousness and lowest infant and maternal mortality rate, the trends are really disturbing so far as the conditions of tribal population are concerned. This is symptomatic of stunting, wasting and high incidence of anaemia. (NFHS-3, 2005-06). Kerala's achievements were unevenly distributed across geographical locations of the State and that marginalised communities like tribes were somehow left out of it. (Shyjan, 2000, Vimalakumari, 1991). Lack of access to sufficient food makes the child poor in health and curtails the absorption capacity of the body paving the way for fastly dissipating nutrients. Child nutrition is closely associated with and influenced by sanitation, availability of safe drinking water, literacy and urbanisation (Osmani and Bhargava, 1998). Child malnutrition has become one of the most pressing issues both at national and international level as it is having a significant bearing on well - being. In developing countries, investment in health and nutrition is an inevitable variant of investment in human capital for low income populations (Mincer, 1974; Becker, 1975; Grossman, 1972; Edwards and Grossman, 1978; Behrman, 1989; Behrman and Deolalikar, 1987). The quality of demographic divide in future largely hinges on the nature and amount of investment in child population. In most developing countries, health of child is more importantly a perennial resource allocation. Chhabra and Rokx (2004) held that out of the eight Millennium development goals (MDGs), three goals exclusively thrust upon health including lowering child mortality, sustained maternal health and fighting HIV/AIDS, malaria and other diseases). The difference between good health and bad health is such that the former curtails the medical costs of households and government whereas bad health breeds loss of income, malnutrition and hunger which tells upon especially the lower rungs of the society. So, investment in human capital focusing on child health and nutrition is long term sustainability. Kannan et al (1991) held that there

was a positive relationship between higher health status and elevated economic and social status and that the extent of morbidity among lower rungs of society were found to be beyond 40 percent. So, pattern and utilisation of health care is imperatively important so far as the preservation of child population in country is concerned. Nutrition and health are inextricably related to each other. The incidence of sickness and malnutrition are positively associated with each other and negatively correlated with life expectancy. Child hood malnutrition adversely affect growth potential and heighten risk morbidity and mortality in future. Malnourished children, in course of time become malnourished adults giving rise to higher incidence of morbidity and mortality (Haq, 1984; Roberts et al, 1986; Das Gupta, 1990). The nutritional status of an individual is decided by a host of factors such as access to food, consumption pattern, affordability of people, distribution of food, nutritional awareness, education and implementation of government schemes. There is no dispute that improved nutrition contributes to economic progress and steers the nation to a higher growth trajectory (Measham and Chatterjee, 1999).

The scenario of under nutrition is unarguably lamentable in most tribal areas (Sahu et al 2015). The case of tribes at Attappdy is no longer different. As per the report of NRHM, of the total children of 572, the conditions of 127 tribal children are doubly critical. The official survey held in June 2014 corroborated that 572 children below the age of five, still remain malnourished. It is paradoxical that such a premature death among tribal children happened when the governments both at the centre and state pumped not less than rupees 500 crore for improving the lot of tribes. The problem of anaemia among pregnant and lactating mothers is still gruesome in Attappady. The 'Right to Food India Campaign' reported that 90 per cent of tribal women at Attappady were underweight and that the average birth weight was hardly 1.6 kgs. National Institute of Nutrition in the study held in 2013 held that the infant mortality rate at Attappdy was 66 compared to other states where it was only 15. The 'mother-child tracking system' introduced by state government in 2013 proved not fruitful at all.

The study conducted by Dr. E.K.Sathyan(2013) ,the former pediatric surgeon of Medical college, Alappuzha came out with disturbing findings that, the schemes promulgated with much fanfare following the death of tribal children in 2013 were

non-operational. The hospitals and ICDS centres were not equipped with sufficient staff. When a total of 40 tribal children were examined, their weight was much below the national average. The seminal study conducted by UNICEF reported that alienation of land among tribes, abject poverty, lack of access to supplementary diet and other health care among pregnant women, malfunctioning of Anganwadis were squarely responsible for the sorry state of affairs among tribes at Attappdy. Uniform distribution of food, regardless of local preferences only helped wastage of food rather than nutritional acquisition among tribal children. The community kitchen initiative has been against the very spirit, culture and preference of tribes and could only provide temporary succour. The Nutrition Rehabilitation Centre announced in 2013 were beset with operational inefficiencies. The scheme 'Janani Janmaraksha' in 2013 for pregnant women was also a colossal failure. The Tribal Sub Plan (TSP) was implemented for tribes since the inception of Ninth Five Year Plan. The bottom line was that the schemes tailored for and targeted at the wellbeing of tribes unobjectionably transformed them from being self-independent to supplicants on settlers. Regrettably, 64percent of the agricultural land owned by tribes was pocketed by settlers from outside.

KILA survey report 2008 says that the most pertinent reasons for the malnutrition deaths at Attappady are land alienation of the tribes, loss of traditional shifting cultivation, loss of traditional food items such as ragi, chama, cholam, veraku, thina, thuvara, honey, tubes, roots, medicinal vegetables, etc., neglect of the tribes and inaction by the Departments of Tribal and Social Welfare and Health, failure of Public Distribution System and desperate ranking of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). Unlike others, neither milk nor eggs / banana were distributed among children. To top it all, the misperformance of AHADS, weakening of tribal communities, apathy of bureaucracy and intricacies in executing laws and programmes for the disadvantaged tribal groups in Attappady also turned things upside down.

1.6 Tribal Development Schemes in Kerala

At the very outset, keeping in mind the tribal welfare as the avowed mission, Government of Kerala promulgated many heroic schemes for permanent settlement

among tribes. Major tribal development projects were envisaged for the better habituation of the tribes of Kerala. It can be stated that their projects working under tribal development department experienced both gain and loss. The greatest achievement is that these projects enabled to provide housing facilities, drinking water facilities, electricity, educational, employment opportunities and other infrastructural facilities etc. In this backdrop, it is worth mentioning that the tribal projects provided much leeway to uplift the community. It is equally worth mentioning that the projects were executed to an extent sans incorporating the heterogeneity within tribal genre. A separate area as enclave was created by the settlers. As a result, the benevolent effects of tribal projects were cornered by non-tribes with the connivance and knowledge of officials. These bureaucrats, being the official decision makers implemented stereotyped projects at their whims and fancies. To top it all, they were totally ignorant of tribal economy. A host of welfare measures were executed in Kerala for the socio-economic amelioration of the tribes. Even though, a multitude of tribal welfare schemes are under implementation since the inception of Five Year Plans, much thrust was accorded to improving the nutritional status among tribes. In Kerala, there have been a plethora of schemes such as Grants-in-aid to voluntary organisations, running of health care institutions, providing medical help with the help of hospitals, financial assistance to tribal patients with medical certificate, provision of salubrious food, meeting the cost of medicines unavailable at the hospitals and providing financial assistance for post mortem. Tribes were having untold miseries owing to Sickle cell anaemia disease spawning body ache, mental agony, malnutrition etc. Monthly honorarium was provided to such tribes. As part of rejuvenating the nutritional status among tribes, a flagship scheme viz 'Janani-Janma Raksha' was implemented. The scheme is envisaged for extending timely assistance of rupees 1000 per month for 18 months beginning from third month of the pregnancy to the first birthday of the child. The case of traditional tribal healers deserves special note here. For incentivising and restoring their healing practice, an amount of rupees10000/- was being paid to them. The beneficiaries were selected with the assistance of KIRTADS. For ensuring that none of the tribe dies for want of medical negligence, mobile medical units have been set up expeditiously. Since the tribal settlements are far from health centres, available and utilizable medical amenities are beyond their reach and catch and so,

they become more susceptible to communicable diseases and malnutrition. So, Government of Kerala initiated three mega health projects viz, Attappady health project, Mananthavady health project, and Idukki health project. Apart from this, for the stupendous success of these schemes, hands - on training was imparted to tribal women in nutrition, health and hygiene. There are special schemes for the rehabilitation of such tribes' buffeted by numerous diseases. Health problems in the form of Leprosy, Tuberculosis and skin diseases as a result of insanitary, filthy and contagious conditions battered the tribes hard. Open defecation is one of the bizzare issues among tribes. This paves the way for malnutrition in tribal areas stripping of their efficiency. Health Service Department is being pressed for impeccable service delivery mechanisms among tribes everywhere in Kerala and Attappady in particular. Despite many conspicuous initiatives, conditions of tribes have been as emaciated as before.

1.7. Statement of the Problem

Malnutrition is not only caused by lack of access to nutritious food, but also by other accompanying evils such as persistent illness, insufficient care practices and inability to avail of health and other social services (Akseer 2020). The stunting and malnourishment seen among children have roots in their mothers also. This is specifically seen among tribal communities all over the world. The land of Attappady Block in Kerala where larger number of tribes with heterogeneous issues is concentrated is also not spared from it. They are beset with a multitude of socio-economic issues. Of this, the most devastating issue is pertaining to under nutrition. The UNICEF Report (2013a) held that 39 deaths happened in Attappady tribal block. The Times of India (2013) reported that malnutrition took a heavy toll of 58 deaths at Attappady. Despite having heroic tenancy reforms erstwhile and the most coveted human development eulogized as 'Kerala Model', the conditions of tribes in the state are more impecunious. Prolonged schemes tailored for and targeted at the tribes have only helped them to be more alienated and more vulnerable than before. Though pregnant women and children below the age of six are having access to nutritious meal a day under the community kitchen programme, there was no effective mechanism to address the issue of anaemia among school-going tribal children. Despite initiatives to supply nutritious meals through community kitchens, most of

the tribal children in the region are suffering from malnutrition needing urgent attention. The Ekbal Committee Report (2013) voiced concern that in the year 2013 nearly 30 children lost their lives either within a few hours or after a few days of their birth. Compared to national average, Scheduled Tribes were wrestled with high mortality rates (Subramanian 2011). There are studies on the general health issues among tribes such as high anaemia, poor hygiene, little access to health care utilisation etc. (Bharati et al 2008) and that same health issues are also compounded among tribes in Attappady in Kerala. This is accentuated by high prevalence of malnutrition among tribal children. Just like the prevalence of a yawning gap between tribes and non - tribes on their health status (Haddad 2006), there are severe child health and nutritional gap within tribal groups viz Irular, Mudugar and Kurumbar, across age and gender. The study of Mohanti (2003) lends credence to it who held that the exclusion of tribes from socio economic opportunities spawned serious health divide among tribal groups. Mohindra et al (2012) reported that existing studies on tribal health are at macro level or they dwelled on the health issues of a tribal category per se than that of disaggregating the tribal categories in a region. As part of policy response, many a scheme on uplifting the nutritional status among tribal children are already underway under the auspices of GOI and GOK and NGOs'. Notwithstanding such an institutional intervention among tribal children, there has been no significant improvement in the nutritional status among them. Hence, a pertinent attention and a serious intervention as to how to ameliorate the nutritional status of tribal children in terms of groups, age and sex is the need of the hour. So, it drives home that not only a comprehensive and empirical study on child nutrition status among tribes is lacking but also studies on inter-tribal nutritional divide is also sparse. Apart from this, even though a multitude of schemes are underway for the tribes both by the government and NGOs', an extensive knowledge on access to and utilisation of these schemes and more importantly the response of tribes on the effectiveness of programmes is still lacking. In this backdrop, the extant study attempts to evaluate the health and nutritional status, determinants of health and nutritional status and nutritional divide among tribal children of Attappady in terms of groups, age and sex. The study also examines tribal awareness, tribal accessibility and the effectiveness of the extant schemes by Government and NGOs' for improving the nutritional status among

tribal children in the Attappady block in Kerala. The specific objectives of the study are as follows.

1.8 Objectives

1. To examine the socio economic and demographic conditions of tribal households of Attappady in Kerala

2. To examine the health status and its determinants of tribal children of Attappady

3. To analyse the nutritional status and its determinants of Attappady tribal children

4. To examine nutritional inequality its determinants of Attappady tribal children

5. To evaluate the awareness, accessibility and effectiveness of institutional interventions for improving the nutritional status among tribal children.

1.9 Methodology

This study is based on randomly selected 815 cross section units (sample size rounded to 800) using Maccor Sample size formula from Attappady block of Mannarkkad Taluk of Palakkad district of Kerala state by using multi-stage stratified random sampling method. According to Census 2011, Palakkad (Dt.) is having the third highest concentration of tribal population (10.10 per cent). Above all, Attappady block in Palakkad district is the only tribal block area in Kerala state. The respondents from study area were identified from Anganwadi which is a repository of information on tribal children's' food habit and nutritional status aged up to five years. Detailed information was collected from the parents of these tribal children as it is a strenuous task to collect data directly from children. For descriptive analysis, percentage method, mean, Standard Deviation, cross tabulation and bar diagrams were used. The study used econometric tools such as Ordered Probit Model, Re - Centered Influence Function (RIF) Regression and Semi Non-parametric Extended Ordered Probit Model (SNEOP) to generate and interpret results from primary data. A meticulous explanation of methodology is separately devoted in chapter 3.

1.10 Limitations

The study is not free from limitations too. The most pressing issue was communication barrier. It was a time consuming exercise to garner information from tribes due to lack of co-operation from tribal promoters. This was accentuated by Covid-19 pandemic. The threat of wild animals was a stumbling block which paved the way for the stoppage of data collection temporarily. Identifying and measuring the height and weight of the randomly selected respondents from Anganwadis was an onerous step. A more comprehensive study on nutritional status invariably requires clinical investigations that go beyond the scope of this research work.

1.11 Chapter Scheme

The entire work is divided into a total of seven chapters. First chapter deals in introduction, preliminary information on tribes, statement of the problem, objectives of the study, hypothesis, methodology, major limitations of the study and chapter scheme. Chapter two deals in both theoretical and empirical review of related literature. Third chapter deals in detailed methodology of the study, definition of variables, data sampling, sampling unit and the like. Fourth chapter discusses an over view of the schemes of government of Kerala on perking up the health and nutrition of tribes. Fifth chapter is devoted to analyzing and interpreting the determinants of health status, and nutritional status. Chapter six focusses on nutritional inequality across tribal groups, age, sex, education, type of family etc. This chapter also discusses and evaluates the awareness and effectiveness of institutional interventions among tribal children. Chapter seven earnestly calls for conclusions and policy prescriptions to resolve the health and nutritional issues and nutritional inequality among tribal children.

CHAPTER 2
REVIEW OF LITERATURE

2.1 Introduction

As discussed in chapter 1, nonetheless the state of Kerala made rapid strides in terms of literacy, HDI and PQLI, the health and nutritional status of some echelons of the population especially the 'Adivasis' is abysmally low. Uneven access, utilisation and distribution of resources open the door for malnutrition, inequalities, ill health, social exclusion, marginalisation of the vulnerable brackets of the society etc. In this chapter, review of related literature on nutritional status, determinants of nutritional status and nutritional divide and other literature are examined. Initially, the study went through theoretical review and then proceeded with empirical review.

The theoretical underpinnings in this regard discuss Amartya Sen's (1999) capability approach, structural functionalism and social suffering approach. Amartya Sen construed utility as happiness in his capability approach. Through capability approach, Sen held that as part of assessing how people are, the study observed whether people are able to live a life for which they have a reason to value which is not based on their material wealth or well-being. In other words, the ability to live a good life is interpreted in terms of 'beings and actions.' People should be equipped with identifying such functions which are important to have a good and decent life in terms of their capacity. Freedom of the people determines high quality choices and the set of capabilities represents the freedom of the individual. A.K.Sen lamented that the poor rungs of the society are susceptible to being shunted out of health care services.

The structural functionalism approach dwells on the fact that health care and illness in a society is influenced by systemic changes in relation to social life. Just like the biology of human body, the society is also a living organism with intertwined parts, norms and values each other. The structural functionalist approach

advocates that the functioning of social institutions is to sustain and augment the well-being of individuals (Mooney et al 2000).

Kleinman (1997) and Farmer (2009) emphasized the significant impact of social suffering and structural violence on human interactions. They argued that social suffering arises from the consequences of political, economic, and institutional power on individuals, as well as the reciprocal relationship between these forms of power and the way societies respond to social problems. Kleinman (1997) defined social suffering as the result of what power does to people, while Farmer (2009) highlighted the importance of understanding how power dynamics influence the collective response to social issues. Their work sheds light on the intricate connections between power, suffering, and societal responses to these challenges.

Social suffering encompasses various situations involving moral, ethical and legal issues. It fruitfully joins together socio-political forms of human suffering. As Kleinman observed "social suffering is a kind of human problem that creates pain, distress, and other trials for people to undergo and endure….." There are "the often close connection of personal problems with societal problems which reveals, too, the interpersonal grounds of suffering: in other words suffering is a social cultural experience." He adds that "changing societal practices transform individual lives and ways of being-in-the-world".

The following literature discusses various studies related to health and nutritional status and nutritional divide at national and international context.

In their study, Satish B. Agnihotri et al. (2020) provided evidence supporting the existence of significant disparities in nutritional outcomes among diverse groups in India. They found that there were notable intra-state and inter-state inequalities, highlighting variations in nutritional status at the district level. The study revealed the presence of districts with low burden and high burden of nutritional challenges, which could be attributed to regional and geographical differences. These findings underscore the need for targeted interventions and policies to address the disparities

and inequalities in nutritional outcomes across different regions and populations within India, in order to promote equitable and improved health for all.

S. K. Singh et al (2020) elaborated that the occurrence of under nutrition among children was mainly attributed to impoverished socio-economic background and that the concentration index during the period 2005-06 to 2016-16 abated for wasting, underweight and stunting among children. The urban poor, with compared to urban non-poor bore the brunt of under nutrition at every age. The education of mother and other environmental factors played a profound role in deciding upon the chasm between the haves and have-nots, underweight, wasting and stunting.

Chithra, N. (2020) calculated the salient features of tribal economy in Thrichinapally district in Tamil Nadu. The study extensively used both primary and secondary data and primary data were collected for the year 2012-13. The cardinal objectives are to analyze the socio-economic status of tribes, their size of landholdings, and their employment status and to analyze their level of indebtedness. Lorenz curve and cost-benefit analysis are used for this study.

Sujathan (2020) conducted a study that revealed the stark inaccessibility of essential services, particularly healthcare institutions, among tribal communities, leading to premature deaths within these populations. The research also highlighted the distressing situation regarding the availability and quality of drinking water, which had reached an abysmally low level. This dire state of affairs resulted in a multitude of health problems, most notably stunting and wasting, among the tribal communities. The study shed light on the significant challenges faced by tribes in terms of accessing healthcare and clean water, emphasizing the urgent need for interventions to improve infrastructure and address these issues in order to enhance the health and well-being of tribal populations.

Chauhan B.G et al. (2019) held that maternal weaknesses such as inappropriate and unattainable maternal health care services, penurious circumstances and lack of education among mothers were causative factors for the nutritional gap among different tribal groups and region.

Singh et al. (2019) in the study on the nutritional status of children under five a Tokapal, Chhattisgarh held the view that children who were stunted constituted 41percent followed by those who were wasted (29.3 percent) and underweight being 44.3percent. The study confirmed that in spite of many several nutrition programmes, the extent of under nutrition was predominantly high in the tribal rural region. The major reason attributed to malnutrition was poor socio-economic conditions.

Senthilkumar et al. (2018), in their study among tribal children in Coimbatore stated that the overall malnutrition was unimaginably higher by 51percent. The reasons cited in the study for increased malnutrition were alcohol consumption of parents, poor nutritional status of mother, poor socio-economic status and poor educational status of parents. Aside from this, the issues such as poor sanitary and housing conditions, rickety antenatal care and hunger broke their back.

ICDS (2018) reported severe malnutrition gripping at Mananthavadi and Sulthan Bathery Block Panchayath in the Wayanad district. In a survey conducted among 231 Anganwadis of Wayanad district, it was deciphered that 839 children below five years old experienced severe stunting and among whom 130 children were.

Based on his research on the nutritional status of rural pre-school children in Kasargod district, Vipin Chandran (2018) found that these children faced a concerning trend. He observed that once they entered adolescence and adulthood, they became trapped in a cycle of undernutrition. The study also revealed the unfortunate reality of low household deprivation and poor nutritional status among the respondents. These findings highlight the persisting challenges and the need for interventions to address the intergenerational cycle of undernutrition in the rural areas of Kasargod district. Efforts should be focused on improving household conditions and enhancing nutritional support to break this cycle and promote better health outcomes among the population.

WHO (2018) made a meticulous study on the major issues among tribes and concluded that severe poverty made tribes emaciated and impoverished. This had a

backwash effect on their nutrition status. With no access to food, shelter and adequate sanitation, their life became more penurious and disastrous.

According to Kankana De (2017), a prevailing issue in rural areas was the high prevalence of sexually transmitted diseases (STDs) and reproductive tract infections (RTIs) among the population. This was exacerbated by two key factors: the lack of regular intake of medicines and insufficient knowledge about prevention and treatment. Furthermore, the practice of open defecation was identified as a contributing factor to the prevalence of anaemia in these areas. Additionally, early marriage was found to be associated with low birth weight among newborn babies. These findings underscore the urgent need for comprehensive healthcare initiatives in rural communities, including improved access to medications, increased awareness about STDs and RTIs, promotion of sanitation practices, and addressing the issue of early marriages to ensure better reproductive and child health outcomes.

Niti Aayog (2017) documented that NITI Aayog released a 'Nourishing India-National Nutrition Strategy 2017'to elevate nutrition to the centre-stage. The cardinal objectives mainly included tapering off all kinds of nutrition by 2030, strive hard to attain the targets under SDG related to health and nutrition, reducing wasting and stunting to less than 5percent, to address the double burden of malnutrition and implement efficaciously National Nutrition Mission.

Keya Chatterjee et al. (2016) in their study at Gumla district of Jharkhand observed that the prevalence of poverty was the single most disturbing factor for the increased underweight (54.3 percent) among children. The study also came out with a startling finding that child from a lower bracket of the society was 70percent more likely to be comparatively underweight. The study also took note of widespread variations within the tribal community with regard to the fulfillment of weight and height.

Meerambika et al. (2016) found that in the last decade, the maternal mortality rate in India has reduced drastically. But still Indian women are dying due to lack of access of proper medical care during delivery. In this respect, the National Rural Health Mission (NRHM) introduced the Janani Suraksha Yojana (JSY) aimed to

target the Indian women by ensuring fast and quality medical treatment. The paper suggests policy makers and experts to introduce effective strategies for the fast and effective outcome in the treatment of pregnant women.

Valsan et al. (2016) found that young individuals belonging to Scheduled Castes and Scheduled Tribes faced a higher risk of experiencing severe health issues related to wasting and stunting compared to children from other castes. This indicates a disproportionate burden of malnutrition among these marginalized groups. Furthermore, the study revealed that the health status of indigenous populations was consistently poorer compared to the general population. These findings emphasize the urgent need for targeted interventions and policies that address the specific health challenges faced by Scheduled Castes, Scheduled Tribes, and indigenous communities, aiming to improve their overall well-being and reduce health disparities in these vulnerable populations.

According to the findings of Singh et al. (2016), the nutritional status of children under five years of age in the tribal belt of Himachal Pradesh was relatively better compared to their counterparts. In fact, they were approaching the target set by the Millennium Development Goals, which aimed to reduce the proportion of underweight children below three years of age to 26 percent within a span of three years. This suggests positive progress in addressing malnutrition in the region and signifies the effectiveness of interventions and efforts focused on improving the nutritional well-being of young children in the tribal belt of Himachal Pradesh. Continued efforts and targeted strategies can further advance the achievement of the Millennium Development Goals and enhance the overall health outcomes of children in the area.

In the analysis conducted by Ghosh (2015) using the Indian District Level Household and Facility Survey, the study aimed to investigate the presence of inequalities in safe delivery across India. The findings revealed significant disparities in safe delivery based on various factors, including religion, age, education of parents, area of residence, and ownership of assets. These inequalities underscored the need for focused interventions and targeted policies to address the

barriers faced by disadvantaged populations. The study emphasized that poverty eradication could serve as a solution to mitigate these disparities, as poverty often acts as a root cause of limited access to safe delivery services. By tackling poverty, policymakers can work towards improving safe delivery outcomes and ensuring equitable access to maternal healthcare services for all.

Karthick (2015) analysed the socio-economic status of tribal in Karbi Anglong district in Assam. The study sailed through many issues that prevented in accomplishing the long cherished goals in respect of welfare and development of tribal people and various policies and administrative actions of Assam government. The study used analytical methodology for the extensive analysis of documents and reports. The study also discussed various issues with tribal development like gap in infrastructure, rural indebtedness, and modification of present ST status, insurgency problems, problem of tribal identities and ethnic conflicts. The study identified that, in spite of all development schemes adopted by central and state, the tribesmen are still in dire straits.

WHO (2015) published a report that the collective issues related to hunger, nutrition and poverty in India could be tackled through assured per capita availability and accessibility of food grains. Food production is still a predominant mainstay for a major section of agricultural labourers in India.

Bisai (2014) in an in depth study among the tribal pre - school children of West Bengal found that underweighted children were as much as 65.2 percent followed by stunting (54.2 percent and wasting (20.15 percent) . Yet another study conducted by Yadav &Singh (1999) among the tribal preschool children of Bihar validated that stunting, wasting and underweight was alarmingly high as 60percent, 34.5 percent and 55percent respectively.

Manikandan (2014) in his study on tribes in Attapadi reported that fastly rising infant mortality rate at Attappdy paved the way for culturocide, genocide and ethnocide of tribes. More than ten cases on child death were reported between 2017 -18 from Attappady. One of the NFHS studies published in the Malayala Manorama (2017) reported that it was among the under five years old tribal children that

malnourishment as much as 27 percent was mostly seen and that there were issues such as stunting and wasting.

Ramya (2014) cross checked the reason for internal migration among the underprivileged labours of tribal with particular reference to brick kilns in UP. It, therefore, drives home that a sizeable mass of the tribes are vulnerable and suffer from lack of access to food during a long part of the year.

In their study, Abalo et al. (2014) employed the Gini and concentration indices to examine the factors influencing childhood undernutrition among children aged 0 to 35 months in Togo from 1990 to 2006. The study revealed significant levels of nutritional health inequalities within the country, as well as social inequalities, pure inequalities, and regional inequalities. These findings indicate that there were moderate disparities in the nutritional health status of children in Togo during the study period. It highlights the importance of addressing these inequalities through targeted interventions and policies to ensure equitable access to nutrition and healthcare services for all children in Togo, regardless of their social background or geographic location.

In their study, Correia et al. (2014) identified several key factors contributing to malnutrition. They found that an unhygienic environment played a significant role in the prevalence of malnutrition, as poor sanitation and hygiene practices can lead to the spread of infections and diseases that hinder proper nutrition. Additionally, the lack of basic education was identified as a contributing factor, as it limits individuals' knowledge and understanding of proper nutrition and healthy practices. Insufficient dietary intake, often caused by poverty and limited access to nutritious food, was another major factor. Finally, the study highlighted the laxity in dealing with diseases, indicating that inadequate healthcare and disease management can exacerbate malnutrition. These findings emphasize the importance of addressing these underlying factors through improved hygiene practices, access to education, nutritional interventions, and effective healthcare systems to combat malnutrition effectively.

Mishra et al. (2013) estimated the Human Poverty Index (HPI), Human Development Index (HDI) and Gender Development Index (GDI) for scheduled tribes in India. The HPI and HDI for tribes are found to be around 30 per cent lower compared to all-India indices. The international comparison of deprivation and development index among the scheduled tribes of India are comparable to that of the poorer countries of sub-Saharan Africa.

Rozario (2013) confirmed that even though 92 infant deaths were reported from Attappady, no rectificatory steps were seen taken by the government. Near 50 pregnant women were severely suffered by anaemia. Rosario report (2013) came out with startling findings that as a result of grinding poverty 25 deaths were reported from Attappady in 1996 which scaled up to 32 in 1999. Apart from it, near 15 child deaths due to under nutrition were also reported.

Raju (2013) after having analyzed the district-wise details of ST population concluded that Wayanad district accommodated a tribal population of 136062, the highest among all districts. The tribal population was on the increase from 1981 onwards, even though the growth rate tapered off from 22. 75 percent in 1991 to 13.percent in 2001. Only 1.06 per cent of the families were provided with lands which are about 2.2 per cent of the identified land. The exclusion of Adivasis in India and their alienation over land is a burning reality in contemporary India. The inalienable right of the Adivasis' to productive resources is being lost. The shift from food to cash crops and from indigenous to hybrid seeds also made inroads into the livelihood of these people.

In their report, Black et al. (2013) highlighted a concerning statistic: approximately 45 percent of child mortality among children under the age of five was linked to maternal and child undernutrition. This finding underscores the critical impact of nutrition on child health and survival. However, the study also emphasized the potential for effective nutrition interventions to address these health issues. By implementing efficient and targeted interventions, many of these nutrition-related problems and associated child mortality could be significantly reduced or even prevented. The report emphasizes the importance of prioritizing nutrition

interventions as a key strategy in improving child health outcomes and reducing child mortality rates worldwide.

Kaur et al. (2013) concluded that tribal population was neck deep in trouble owing to sickle cell anaemia. The study made a strong case for the amalgamation of genetic health services with the prevailing PHCs' and medical services. Venkata Naidu, K (2015) corroborated that a spate of diseases like malaria, jaundice, viral diseases, fungal infections, leprosy, cough and cold, diarrhea, HIV were incurably prevalent among tribes in India.

Dasgupta et al. (2012) attempted to correlate the association between nutritional status of children and work of women among non-Scheduled Tribes and Scheduled Tribes among the selected States with substantial tribal population. A total of 1962 samples of tribal children and 5325 non-tribal children in between the age group 1-4 years were interviewed and it was found that the nutritional and health status of tribal children is more distressing than-tribal children.

Chakrabarty et al. (2012) in their extensive study on the nutritional status among the Shabar tribal children India held that there was a problem of serious prevalence of under-nutrition among the forest tribal children which stood that 33.87 percent with compared to their rural counterparts of 24.62percent. Jaiswal (2013) in one of his studies revealed that the prevalence of underweight among tribal of Madhya Pradesh was 58.6percent and the extent of stunting and wasting was as much as 42.2 percent and 36.2percent respectively. In a study conducted by Islam et al (2014) at Dibrugarh, Assam state on the nutritional status of children below 5 years of age, it was found that the prevalence of wasting, underweight and stunting was 21.6percent, 29percent and 30.4percent respectively.

In their study, Fotso JC et al. (2012) examined the disparity in nutritional status between the rich and the poor in urban areas of Kenya. Their findings revealed a significant gap, which they attributed to various factors. These factors included a deteriorating environment characterized by poor infrastructure and inadequate housing conditions. Additionally, the lack of access to safe drinking water and nutritious food further exacerbated the nutritional divide. Weak health

services and limited healthcare access were also identified as contributing factors. These findings highlight the complex web of social determinants that influence nutritional status in urban areas of Kenya, emphasizing the urgent need for comprehensive interventions that address these underlying factors to promote equitable access to proper nutrition and improved health outcomes for all.

Chatterjee, et al. (2011) analysed that the tribal communities in India constitute the largest percentage of tribal population in the world. The study observed the health issues and the interaction of Haemoglobinopathies and Iron deficiency which leads to anaemia in the tribal population of Eastern India. The study found out the prevalence of anaemia among females of Mishings and Sonowals observed Iron deficiency anaemia among them.

According to Nagda (2011), it was crucial to recognize and evaluate the cultural context of illness within tribal communities. The study emphasized that understanding the traditional practices and beliefs held by tribes was essential for their overall development. By recognizing and respecting the cultural context of illness, interventions and healthcare practices could be tailored to effectively meet the needs of tribal populations. This approach not only respects their cultural heritage but also promotes trust and cooperation, leading to better health outcomes. The study underscored the importance of culturally sensitive approaches in addressing the health challenges faced by tribal communities and highlighted the significance of incorporating their traditional practices and beliefs into development initiatives.

Das (2010) analyzed the malnutrition problems of Korku Tribal communities of central India mainly in the States of Maharashtra and Madhya Pradesh. Studies showed that for the last decade the malnutrition problems among Korku Tribe are acute. It is estimated that 5000 tribal children among this community were starved to death due to malnutrition problems in Melaghat, Maharashtra State in between 1992 and 1997. The same problems were still prevailing in this area. This study also tried to collect all relevant information related to the nutrition and health status of Korku Tribes in Betul District of Madhya Pradesh. The findings showed that the main reasons for malnutrition

are due to low intake of milk and milk products, low intake of pulses, fruits, sugar, jaggery, green leafy vegetables and fats and oils.

Chandraker et al. (2009) made a cross-sectional study to investigate reproductive health of pregnant women. The child and infant mortality due to malnutrition status of mother and under five children among the Tribal communities of Dhur Gond in Mahasamund district of Chhattisgarh in India also discussed by the author. For the study purpose, 174 married women and 68 children below 5 years of age were selected. Standard techniques were used to measure weight of less than five children and height and weight of mother. To analyze the nutritional status, Body Mass Index was used and the result reveals that 51.72 percent mothers had no access to ante-natal checkup, 41.38 percent to tetanus injection and 56.32 percent to iron and folic acid tablets during pregnancies.

Farahani, M. and Subramanian S.V.(2009) reported that the Millennium Development Goals (MDG) of United Nations couched as Sustainable Development Goal (2015-2030) laid much accent on child and maternal health system for the countries to develop. This was having a firm footing on the efficiency of public health system. For child care, malnutrition and premature mortality were two sides a coin demanding durable solution

Varadarajan et al. (2009) tried to focus on the health and nutritional status of Scheduled Tribes among three different areas of Andhra Pradesh State by analyzing the Body Mass Index method. In order to estimate the average calorie intake, the method of twenty four hour recall was used and it was compared with the recommended dietary allowances of Indian Council of Medical Research. The study observed conspicuous discrepancy in terms of Body Mass Index, average body height, weight among studied regions and tribes.

Sunny and Navaneetham (2008) held the view that the disease burden energy deficiency and anaemia had battered about one-fourth of rural women. There was an inverse relation between underweight and better socio-economic position (Subramanian and Smith G., 2009). Commonly found communicable diseases like malnutrition and resultant deficiency diseases, tuberculosis, measles, whooping

cough, tetanus etc. were proved to be the potent reasons for impairment (ICDS, 1984).

In Caryn Bredenkamp's study (2008) conducted in China on child nutritional status, two key areas were identified as major determinants. The first area was the one-child policy, which aimed to control population growth but did not have a direct impact on improving nutritional status. The second area was health sector reforms, which also did not show a significant relationship with improved nutritional status. Surprisingly, the model explained that factors such as quality healthcare and income did not have a direct correlation with enhanced nutritional status. These findings suggest that other factors beyond healthcare and income play a more prominent role in determining the nutritional status of children in the Chinese context. Further research is needed to explore and identify these additional factors that influence child nutritional status in China.

In their study, Harsha Aturupane et al. (2008) focused on the goal of reducing malnutrition in developing countries. The study emphasized the importance of administrators and policy makers having a deep understanding of the necessary interventions to address malnutrition effectively. It also highlighted the significance of considering the socio-political and economic determinants that contribute to malnutrition. By acknowledging these determinants and adopting a comprehensive approach, policymakers can design targeted interventions and strategies to combat malnutrition. The study underscored the need for a multidimensional understanding of the issue, emphasizing the crucial role of informed decision-making and evidence-based policies in curbing malnutrition and improving the nutritional well-being of populations in developing countries.

Mishra et al. (2008) after having studied the extent of health inequality in India stated that income inequality was positively related to health inequality. The nutritional performance of children below 5 years of age was also studied and it was concluded that rise in mean income was accompanied by rise in health inequality although income per se was not sufficient enough to study health inequality.

Despite Kerala's robust human development foundation, the nutritional profile of tribal children in the state was found to be concerning. Despite a slight decrease in the number of malnourished children, as indicated by the National Family Health Survey-3 (NFHS-3) conducted in 2005-06 and Thankappan's study in 2007, the overall situation was far from commendable. These findings highlight the persistence of nutritional challenges among tribal communities in Kerala, despite the state's overall development achievements. It suggests the need for targeted interventions and specific measures to address the unique nutritional needs and socio-economic factors affecting tribal populations in Kerala, aiming to improve their nutritional status and overall well-being (NFHS-3, 2005-06; Thankappan, 2007).

Radhakrishana et al. (2006) after having analysed the trends in malnutrition concluded that gain in nutritional status were not followed by dwindling poverty rate. They also attempted to decipher the major determinants of malnutrition in rural areas and narrated the correlation between malnutrition and poverty. Women and children were found to be more susceptible to malnutrition. Based on NFHS –II data, it was proved that 36 percent of married women aged 15-49 reported chronic energy deficiency.

In their study, Mukherjee et al. (2007) examined the key determinants of nutritional status among school children in Pune. The findings revealed that several factors significantly influenced the nutritional status of the children. One such factor was the working status of the mothers, indicating that the employment status of mothers had an impact on the nutritional well-being of their children. Additionally, parents' educational status played a crucial role, highlighting the importance of education in understanding and implementing proper nutrition practices. The general socio-economic status of the family also emerged as a significant determinant, reflecting the influence of economic conditions on access to nutritious food. Lastly, the size of the family was found to be a contributing factor, suggesting that larger families may face additional challenges in ensuring adequate nutrition for their children. These findings underline the multidimensional nature of factors affecting

the nutritional status of school children in Pune and emphasize the need for comprehensive interventions that address socio-economic disparities and promote awareness of healthy nutritional practices among parents and caregivers.

Stephan Klasen (2007), investigated the relationship between undernourishment, child mortality and poverty in developing countries. It was found that while child mortality and poverty was highest in Sub Saharan Africa, South Asia recorded highest under nutrition. The study held that childhood under nutrition and undernourishment were the most pressing concerns which demanded further policy intervention.

Kakkoth (2017) explained that, Kerala accommodated a whopping proportion of tribal communities and 36 communities were included in the ST list of the State of whom five Scheduled tribal communities, namely, Cholanaickan, Koraga, Kurumbar, Kattunayakan, and Kadar were included in the list of Primitive Tribal Groups by the GOI in 1976. This is based on their pre-agricultural technological status, nominal rate of growth, less than five per cent literacy etc. All these communities differed from each other and found themselves at divergent layers of development. The welfare initiatives of government had not percolated to these indigenous groups. Thus, this study pointed out pro- tribal initiatives with the aid of community members.

In their study, Navaneetham and Jose (2005) highlighted an interesting contrast in child health indicators between South Asia and Sub-Saharan Africa. While the incidence of child mortality was lower in South Asia compared to Sub-Saharan Africa, the prevalence of malnutrition among children was significantly higher in South Asia. This discrepancy underscores the urgent need for timely healthcare interventions in South Asia to address the high levels of malnutrition. Despite relatively lower mortality rates, the persistence of malnutrition poses a significant health challenge for children in the region. The report emphasizes the importance of prioritizing and implementing targeted health interventions to address malnutrition effectively and improve the overall well-being of children in South Asia.

Vinod and Robert (2005), in a publication featured in an NFHS (National Family Health Survey) bulletin, examined the relationship between family size, birth order, and malnutrition. The study revealed that malnutrition was more prevalent in families with three or more siblings compared to children from smaller families. Additionally, the study found that children with a lower birth order faced a lower risk of malnutrition compared to those with a higher birth order. These findings highlight the impact of family size and birth order on the nutritional status of children, suggesting that larger families and higher birth order may be associated with increased vulnerability to malnutrition. Understanding these relationships can inform targeted interventions and policies aimed at reducing malnutrition and improving child health outcomes.

Ruel and Ndiaye (2005) collated the socio-economic factors influencing nutritional status of children and mortality of 36 developing countries from three regions- South Asia, Sub Saharan Africa, Latin America and the Caribbean during 1990- 98 employing anthropometric measure. It was concluded that decision making power of mother, availability and use of toilet inside the house and education of mother had a significant bearing on the nutritional status of children.

According to the United Nations (2004) report, the nutritional status of individuals is significantly influenced by the interplay between the body's requirements for nutrients and its ability to digest and absorb them effectively. This delicate relationship between nutrient requirements and intake plays a critical role in maintaining proper nutrition. Any imbalance in this relationship can lead to both undernutrition and overnutrition. Undernutrition occurs when the body's nutritional needs are not met, resulting in deficiencies and inadequate growth. Conversely, overnutrition arises when there is an excessive intake of nutrients, leading to health issues such as obesity and related complications. Achieving and maintaining a balanced nutritional status requires a comprehensive understanding of nutrient requirements, dietary intake, and the body's capacity to utilize nutrients efficiently.

Krishnan (2004) elucidated that there were various ways of assessing the nutrition of under 5 children such as clinical signs, anthropometry, weight-for –age,

height-for –age, education of mother, environmental factors, child morbidity, birth interval of the child, birth order, breast feeding and gender. The study concluded that the most significant public health problems were found to be high underweight and stunting triggered off lower level of education and standard of living.

Sahn and Stifel (2003) remarked that socio-economic and demographic factors significantly influenced Chronic Energy Deficiency (CED) found among women and malnutrition among children. There was a study by Sahn and stifle (2003) on the assets owned by the household which were found to have strategic relation with children's stunting and height. Yet another study conducted by Bose, and Biswas, (2007) among girls found that stunting, wasting and underweight were particularly found in larger proportion compared to their counterparts.

According to Ghai (2001), the inability to purchase an adequate quantity and quality of food exacerbates poverty, leading to a deprivation of essential nutritional requirements for families. This emphasizes the critical link between poverty and malnutrition. Insufficient financial resources restrict access to nutritious food, affecting the overall well-being of individuals and families. The lack of purchasing power limits the choices and variety of food available, hindering the fulfillment of dietary needs. Consequently, this perpetuates a cycle of poverty and malnutrition, as inadequate nutrition can lead to compromised health, reduced productivity, and limited opportunities for socio-economic advancement. Recognizing the relationship between poverty and nutrition is vital for implementing effective poverty reduction strategies and ensuring access to quality food for all individuals and families.

WHO (2000) reported that nearly 30 percent humanity in the world suffered from multiple forms of malnutrition and that hunger was one of the most devastating problems. Malnutrition also resulted in 10.7 million deaths among under the age of 5 children in developing countries.

Jeyaseelan (1997) emphasized that both boys and girls were equally affected by stunted growth and being underweight, highlighting the gender-neutral nature of malnutrition. Furthermore, the study revealed a significant association between malnutrition and household economic status. This suggests that households with lower economic resources are more susceptible to malnutrition among their children.

The findings underscore the importance of addressing socio-economic disparities in combating malnutrition. The study pointed out that implementing interventions that target households with limited economic means can help alleviate the burden of malnutrition and contribute to improving the nutritional status of both boys and girls, promoting their overall health and well-being.

Basu (1993) enunciated that the perception of each and every individual exerted a profound influence on the health conditions. Hence a self-rated health status had a prime factor in making one healthy or not. The socio-cultural beliefs and circumstances also played a decisive role in making tribal women reproductively healthy having a significant bearing on the progeny. It was dolesome that most of the tribal mothers, even during the advanced stage of pregnancy, were forced to immerse themselves in collecting firewood, feeding domesticated animals, feeding the children and elderly and thereby had been a playing leading role in the care economy. This inhibited the health of the new borne baby.

According to Nath (1987), the socio-economic status of a community or household encompasses various factors that can impact the well-being of individuals, especially children. These factors include the study of family income, parental education, per capita income, parental occupation, type of neighborhood, family type and size, nutritional pattern, post-hospitalization care, type of rooms in the hospital utilized, parental access to a pediatrician, nutritional advice on child care, and attendance at school. These elements collectively contribute to understanding the socio-economic context in which individuals live and can influence their access to resources, quality of healthcare, nutritional practices, and educational opportunities. Nath's work highlights the multidimensional nature of socio-economic factors and their relevance in shaping the health and development outcomes of individuals and communities.

According to Rizvi's (1986) description, there was a significant disparity in the nutritional status of tribes in India. Particularly among women, there was a noticeable deficiency in key nutrients such as riboflavin, vitamin A, and calcium. Anemia was identified as the most prevalent health issue affecting tribal women. These findings shed light on the specific nutritional deficiencies and health

challenges faced by tribal communities, highlighting the need for targeted interventions and initiatives to address these issues.

Gupta (1986) cited that there was an invisible presence of supernatural elements entwined in tribal health practices and their traditional method of treatment. There was a notion among tribes that diseases were conjured up by 71 supernatural causes. It pointed that there was more a spiritual prevention of diseases rather than maintenance of hygiene. The socio-religious practices among tribes impeded the reproductive ability of tribal women and health conditions of the children.

2.2 Research Gap

The aforesaid review discussed both theoretical and empirical reviews of related literature. From this, it drove home that there was neither a meticulous nor an exhaustive research on the nutritional aspects of tribal children in the state. This prompted us to underscore the need for a systematic study on nutritional divide and nutritional status among tribes in Kerala. The progress in maternal health and dwindling of infant mortality rate were the two pioneering Millennium Development Goals of the United Nations. However, a cursory look reveals that most of the studies undertaken so far were more macroscopic and aggregative in nature. In Kerala context, a district level study on the nutritional status and nutritional divide among tribes is considerably patchy. The extant of study attempts to fill this lacuna with respect to the state of Kerala. It is therefore, intended to analyse and examine the extent of inequality on the attainment of nutritional status among three categories of tribes viz Irular, Mudugar and Kurumbar of Attappady, the only tribal block of Palakkad district and also to evaluate the impact of institutional interventions to accomplish the objective of 'Health for All.'

CHAPTER 3

METHODOLOGY

This chapter provides a vivid explanation of theoretical framework, data, sampling and statistical and econometric methods.

3.1 Theoretical reflections on health and nutritional status of children

Different theories have been applied in the health inequality literature. Woodward and Kawachi (2000) point out four arguments to substantiate the fact that child health inequalities are disagreeable, and must be minimised by public policy. According to them: (1) Nutritional and health inequalities are unfair mainly because poor health is correlated with inequitable distribution of social determinants of health. (2) Health and nutritional inequalities affected everyone since some forms of health inequalities cast externalities on the rest of society. (3) Health inequalities are highly associated with a slew of policy options at the disposal of public authority. So, as part of public policy agenda, all sorts of health and nutritional inequalities should be minimised. (4) Public health policies which are targeted at reducing health inequalities have to be cost-effective so as to minimise health inequalities which will diminish adverse spill-over effects on the health of the people. There is no qualm in arguing that the malady of malnutrition among children received much attention among the researchers. UNICEF (1998) introduced a comprehensive conceptual framework to elucidate the child malnutrition and its determinants. This conceptual framework divided reasons of child malnutrition into three broad categories, viz, basic, underlying, and immediate (see figure 3.1). This model explained that fundamental reasons were specific to socio-religious, cultural, political, and economic processes at a societal level which put a limit on the utilization of technological, human, and environmental resources. The fact of the matter is that the reasons such as lack of knowledge and presence of discriminatory attitudes of the people at the household level limit the access to food, water/sanitation, childcare practices, and health services which play havoc on child malnutrition. These reasons also pave the way for inadequate dietary intake and diseases, finally resulting in child malnutrition.

Figure 3.1

Causes of Child Malnutrition: - A Conceptual Framework

Outcomes → Child malnutrition

Immediate Cause → Inadequate Dietary intake | Disease

Underlying causes → Inadequate access to food | Inadequate care for mothers and children and discrimination against women | Insufficient Health Services, poor water and sanitisation

Quantity and quality of actual resources –Human, Economic and Organisational and the way they are controlled

Inadequate knowledge and discriminatory attitudes limit household access to actual resources

Basic causes at societal level

Political Resources

Socio-Economic, Political, and Demographic systems, limit the utilisation of potential resources

Source: UNICEF, 1998.

Some studies illustrate that health inequalities stem from privatisation, social inequality, job insecurity, unemployment and poverty (Laparra M et al, 2012; Bacigalupe and Pujolar, 2014). In the modern time, almost in all societies a system for allocating resources and institutional mechanisms for transforming social and individual resources into health was established in spite of the fact that health inequalities painfully exist across societies. Another theory proposed by Link and Phelan (1995) is called fundamental cause theory. According to this theory, poor socio-economic status is attributed to and identified as the fundamental cause of the health disease. It is because the socio-economic factors are the gateway to measure the extent to which diseases and their impacts prevail and how far the risk factors and their outcomes remain vulnerable in societies in general and in households in particular. Traditional thinking pin its faith on the fact that Western models of health construed sickness and disease as an inevitable outcome of individual factors such as product of individual factors such as genetic predisposition and personal behaviour. Consequently, healthcare interventions focused predominantly on fixing the individual rather than external factors.

The World Health Organization's (WHO) Social Determinants of Health (SDH) framework focus on a more holistic perspective to assure and execute interventions at multiple levels to fulfil health objectives on an equal basis. According to the WHO, well-being and health disparities are on account of variegated circumstances in which "people are born, grow, live, work, and age" (Marmot M, 2011) The WHO framework incorporates living conditions, arrangements, policies and more importantly education (Reap M, 2020). Within each society, those who are powerful own up resources which decide which social conditions and system should prevail. Typically, such unscrupulous decisions fulfil the vested interests of the power wielders leaving the dispossessed and marginalised to suffer indiscriminately. The consequence of such an injustice have ultimate impact on their health. It is therefore instructive to note that individual health is mainly influenced systemic social inequities apart from genetics and lifestyle (WHO, 2010).

3.2 Data and Sampling

The study is based on primary data of randomly selected 815 cross section units (rounded to 800) using Maccor sample size formula from Attappady block of Mannarkkad Taluk of Palakkad district of Kerala state by using multi-stage stratified random sampling method. Even though as per the appropriate sampling methodology, the total sample size is 815 having been arrived at with the help of sample size calculator of Maccor, 15 respondents were not worth considering and were, purposefully eliminated for multiple reasons such as lack of co-operation, skewed data, presence of missing values etc. and hence the sample size is finalized as 800. In the first stage, the district Palakkad was selected. According to Census 2011, Palakkad (Dt.) is having the third highest concentration of tribal population (10.10 per cent). In the second stage, block was selected. Attappady block in Palakkad district is the only tribal block area in Kerala state. In the third stage, households were identified based on the information collected from Anganwadis located in three Panchayaths viz Agali, Puthur and Sholayur. As Agali Panchayath is more populated than other two Panchayaths, more representation of the population, i.e. 50 percent is taken (400). From the other two Panchayaths, 200 each (i.e. 25 percent) is taken and thereby arriving at the sample size 800.

Figure   3.2

Multi Stage Stratified Random Sampling

Stage 1	Stage 2	stage 3
Selection of District	Selection of Block	Selection of Households through Anganwadis
Palakkad	Attappady Tribal Block	Agali-400
		Sholayur-200
		Puthur-200
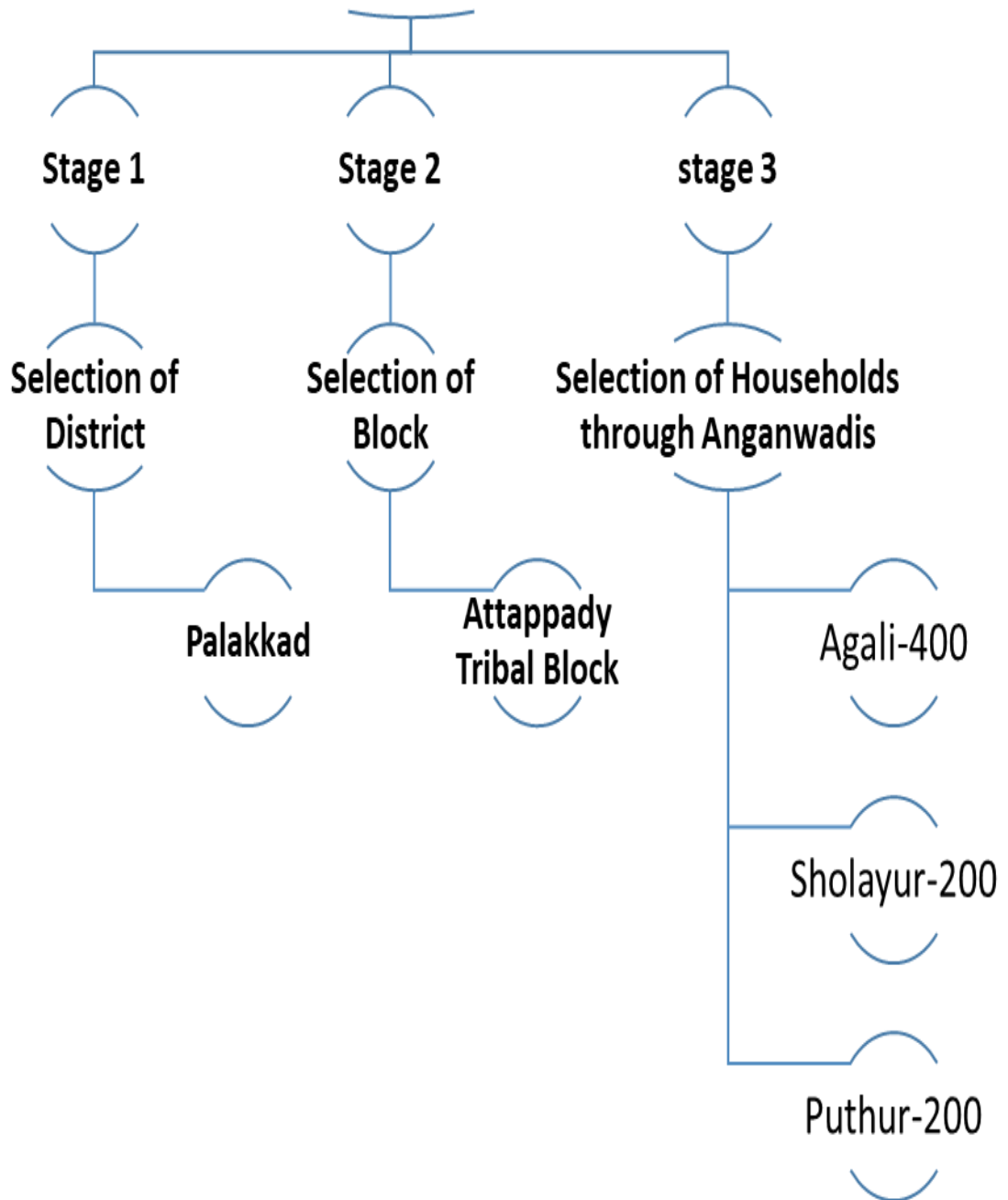
Source: Primary data

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3.3 Statistical Methods

The study has used statistical methods like descriptive statistics mean, standard deviation, percentage method, frequency distribution and bar diagram. The cross tabulation method is used to find out the differences in health and nutritional status across socio-economic and demographic variables.

3.4 Econometric Modelling

3.4.1 Logistic Regression Model

The study applied logistic regression model to find out the determinants of health status of children under the age five of Attapady tribes. In this modelling, estimated two logistic regression models by taking recurring illness and diseases of the past 2 weeks as dependent variables and that household head, type of family, source of water , toilet use, household waste dumping, use of smartphone, education of parents and employment of parents as independent variables. The functional forms of the regression is given in equation 1. Here derived odd ratios from the estimated results. The odds ratio above 1.00 indicates that estimated likelihood is more than that of comparison group and below 1.00 indicates it has a lower estimated likelihood.

Econometric model for the child health of status of Attappady can be written as follows.

$$CH_i = \alpha + \sum_{k=1}^{k} \beta_k \, Z_{ki} + U_i \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

CH is child health status of children, which is dummy dependent variable, which takes the value one if the respondent is reported as 'yes' for health-related questions and zero otherwise. Z_k is the k types of independent variables, they are household head, type of family, source of water, toilet use, household waste dumping, and use of smartphone, education of parents and employment of parents. U is the stochastic error term, which will capture all omitted variables and measurement errors.

3.4.2 Ordered Probit Regression models (S, W, and UW)

This study has used Ordered Probit model to find out the determinants of nutritional status of tribal children. And thereby estimated three different regression models separately stunting (Height for Age), wasting (weight for height) and underweight (weight for age) as dependent variables and independent variables such as gender, community, Panchayaths, household head etc. in this modelling dependent variable nutritional status measured in a prescribed integer scale (1- 5). This latent nutritional status is assumed to be a linear function of a set of explanatory variables and a random error. Indexing individuals by the subscript i, the model can be written as

$$N_i = \sum_{k=1}^{k} \beta_k \, X_{ki} + U_i \quad \dots\dots\dots\dots\dots\dots \text{(2)}$$

Where N_i is children i's latent nutritional status and the βs are the associated linear regression coefficients; X_{ki} represent k explanatory variables and U_is are mutually independent standard normal variables. The Ordered Probit model yield maximum likelihood estimates of the parameters of the latent nutritional status function given in equation (3)

N_i is related to the observable ordinal variable of y_i as follows:

$$
\begin{array}{llll}
N_i = 1 & \text{[Very Low]} & \text{if} & -\infty < N_i \, > \theta_0 \\
N_i = 2 & \text{[Low]} & \text{if} & \theta_0 < N_i \, > \theta_1 \\
N_i = 3 & \text{[Middle]} & \text{if} & \theta_0 < N_i \, > \theta_2 \\
N_i = 4 & \text{[High]} & \text{if} & \theta_0 < N_i \, > \theta_3 \\
N_i = 5 & \text{[Very High]} & \text{if} & \theta_1 < N_i \, > +\infty \\
\end{array}
$$

$$\dots\dots\dots\dots\dots \text{(3)}$$

Where θ stand for the threshold value of the ordinal variable at which the outcome variable changes and it is determined by the software.

3.4.3 Recentered Influence Function Regression (RIF Regression Model) (Nutritional inequality)

The study used statistical tools such as percentage method, mean, standard deviation, variance and graphical methods. The study have used Recentered Influence Function (RIF) regression which is introduced by Firpo et al (2007, 2018) to find out the determinant of nutritional inequality of Attapady children. In RIF regression, the level of nutritional status is substituted by the Recentered Influence Function, RIF (N; v), of the distributional parameter such as Gini and Variance coefficients. The sum of the distributional statistic v and the influence function IF (N; v) deliver RIF: RIF (N; v) = v + IF (N; v). The influence function, IF (N; v) is a generally used technique to measure the robustness of a distributional statistic to the presence of outliers, which differentiate the impact of an individual observation on that distributional statistic. RIF is considered as a linear approximation of a nonlinear function of distributional statistic such as Gini coefficient and variance. Alternatively, it helps to find out the impact of change in distribution of the explanatory variables to the change in the distributional statistic of Gini coefficient and variance. .

One basic feature of the RIF is that its expected value is equal to the distributional statistic v. According to the law of repeated expectations, the distributional statistic v can be explained in terms of the conditional expectation of the RIF on the covariates X:

$$v = [RIF \text{ (N; } v\text{)}] = [[(\text{N; } v) \mid X]]\ldots\ldots\ldots\ldots \text{ (4)}$$

The conditional expectation of RIF (N; v) can in turn, be expressed as a linear function of the covariates, obtaining the RIF regression:

$$[(\text{N; } v) \mid X] = X\gamma \text{ v } \ldots\ldots\ldots\ldots \text{ (5)}$$

Where the coefficient γ is the marginal effect of covariates X on the distributional statistic v and can be estimated with the help of Ordinary Least Squares (OLS). In this analysis RIF regression will be estimated for the variance of child nutrition also Gini coefficient as a robustness check.

3.4.4 Semi Non-parametric Extended Ordered Probit (SNEOP) (Policy effectiveness)

SNEOP model of Stewart (2004) is estimated to find out the drivers of policy effective of government interventions on Attappady. The outcome variable used by this study is the self-assessed rating elicited by the heads of the households of Attappady tribes on the effectiveness of various policies implemented by the government to uplift them. As the household heads are supposed to be aware of the institutional interventions in the form of programmes, schemes and policies of both Government of India and Kerala respectively, they are asked to mark their responses in a scale of 1 to 3 for the question: Taking all things together, would you describe your level of satisfaction with regard to governmental schemes as 1= Not Effective, 2= Fairly Effective and 3= Highly Effective.

As the dependent variable of the study is ordinal, the present study used Ordered Probit (OP) model and its extended version Semi Non-parametric Extended Ordered Probit (SNEOP) model proposed by Stewart (2004).

Indexing individuals by the subscript i, the model can be written as:

$$y_i^* = \sum_{k=1}^{k} \beta_k X_{ki} + U_i \quad \text{.......................... (6)}$$

Where y_i^* is individual i's response and the βs are the associated linear regression coefficients; X_{ki} represents k independent variables and U_is are mutually independent standard normal variables. The Ordered Probit model yields maximum likelihood estimates of the parameters of the response function given in equation (1).

y_i^* is related to the observable ordinal variable of y_i as follows:

$y_i = 1$	[Not Effective]	If	$\theta_0 = -\infty < y_i > \theta_1$
$y_i = 2$	[Fairly Effective]	If	$\theta_1 < y_i > \theta_2$
$y_i = 3$	[Highly Effective]	If	$\theta_2 < y_i \leq \theta_3 = +\infty$

Where θ stands for the threshold value of the dependent variable at which the outcome changes.

The variable y_i thus indicates in what interval y falls into. Thus, the probability of outcome j {1, 2, and 3} is

$$\mathbf{Pr}\ (y_i = j) = F\ (\gamma_{j} - x_i\ \beta) - F\ (\gamma_{j\text{-}1} - xi\ \beta),$$

$$\textit{With } F\ (\gamma_0 - x_i\ \beta) = 0 \text{ and } F\ (\gamma_2 - x_i\ \beta) = 1$$

The consistency of the estimates of β, however, depends crucially on the assumed distribution of U_is. To avoid this distributional assumption, Stewart's (2004) Semi Non-Parametric Extended Ordered Probit (SNEOP) model is used. This model has several advantages over OP. Firstly, it relaxes the distributional assumption required by OP; instead, *F(.)* is estimated by maximum likelihood from a semi-nonparametric cumulative distribution whose density function is the product of the square of an unknown polynomial multiplied by the normal density, so that:

$$F_K(z) = \int_{-\infty}^{z}\left(\sum_{k=0}^{K}\gamma_k u^k\right)^2 \emptyset(u)\,du\ \left(\int_{-\infty}^{+\infty}\left(\sum_{k=0}^{K}\gamma_k u^k\right)^2 \emptyset(u)\,du\right)^{-1} \dots\dots\dots\dots (7)$$

In Equation 7, K is the order of the unknown polynomial and ϕ (z) is the standard normal density at *z*. After choosing K based on simple likelihood-ratio tests and setting θ_1 to its ordered probit value for identification, the coefficients γ_k are estimated jointly with θ_2 and β by maximum likelihood. This flexible approach can take any distribution provided it is smooth enough and its tails are not too flat. Secondly, SNEOP nests the OP model, which corresponds to both *K=1* and *K=2*. Prior to estimating the models, the study diagnosed the multicollinearity problem and confirmed that corresponding collinearity is not too high. After estimating a standard OP model, the study tests the underlying distributional assumption by computing Stewart's (2004) likelihood ratio tests on the value of *K* in SNEOP.

3.5 Measurements of Nutritional Status

The study followed the recent WHO classification of child nutritional status. WHO malnutrition indices are categorised into 4 viz Stunting, Wasting, Overweight

and Underweight. These indices can be measured by solving the following equations. However, this study made use of Stunting, Wasting and Underweight as indicators of malnutrition as tribal children at Attappady do not suffer from overweight. These three indicators are incorporated in WHO's Global reference list of 100 significant health indicators. The definitions of these indicators are shown below.

- *"Stunting* - height-for-age Z score (HAZ)<-2 SD of the WHO *Child growth standards* median;

- *Wasting* - weight-for-height Z score (WHZ) <-2 SD of the WHO *Child growth standards* median; and

- *Underweight* - weight-for-age Z score (WAZ) <-2 standard deviations (SD) of the WHO *Child growth standards* median."

Source: WHO, Global Database on child growth and Malnutrition

By applying this formulae, we can find malnutrition status among tribal children which is classified as Very Low, Low, Medium, High and Very High. The cut off range can be seen from table 3.1.

Table 3.1

Classification of Malnutrition

Classification	Very Low	Low	Medium	High	Very High
Stunting	< 2.5 %	2.5 to <10	10 to <20	20 to <30	≥ 30%
Wasting	< 2.5 %	2.5 to <5	5 to <10	10 to<15	≥ 15%
Underweight	< 2.5 %	2.5 to <10	10 to <19	20 to <29	≥ 30%

Source: UNICEF, WHO, World Bank 2018

3.6 Measurements of Malnutrition Index

The study estimated an aggregate index of malnutrition status of tribal children of Attappady. Constructed the Child Malnutrition Index by aggregating three anthropomorphic indicators such as Stunting, Wasting and Underweight.

A composite index of malnutrition is constructed by applying the Simple Average Formula.

Child Malnutrition Index is:

$$\frac{M1+M2+M3}{N} = \frac{\sum Mi}{N}$$

Where, M1= Estimated unit level of Stunting

M2 = Estimated unit level of Wasting

M3= Estimated unit level of Underweight

N = Number of indices

To conclude the chapter discussed elaborately the statistical methods used, tools applied and econometric applications employed in the thesis. Based on this, detailed analysis was done and results were obtained with regard to health status, nutritional status, nutritional inequality and policy effectiveness in chapter 5 and 6.

CHAPTER 4

HEALTH PROFILE OF SCHEDULED TRIBES:
A KERALA SNAPSHOT

This chapter deals with the health scenario of Scheduled Tribes in Kerala with special thrust on general characteristics, malnutrition, access to health institutions, access to drinking water etc. The requisite data for this is vehemently based on the data published by Scheduled Tribes Development Department Government of Kerala, November 2013.

Table 4.1

District Wise Distribution of Scheduled Tribe Population of Kerala 2011

Sl. No	Districts	Total	Percent of ST to Total Population	Male	Female	Rural	Urban
1	Thiruvananthapuram	26759	0.81	12624	14135	20022	6737
2	Kollam	10761	0.41	5195	5566	7663	2875
3	Pathanamthitta	8108	0.68	3947	4161	2961	445
4	Alappuzha	6574	0.31	3175	3399	19698	3613
5	Kottayam	21972	1.11	10974	10998	19698	2274
6	Ernakulum	16559	0.50	8349	8210	8324	8235
7	Idukki	55815	5.04	27995	27820	55243	572
8	Thrissur	9430	0.30	4362	5068	5859	3571
9	Palakkad	48972	1.74	24314	24658	47023	1949
10	Malappuram	22990	0.56	11272	11718	18247	4743
11	Kozhikode	15228	0.49	7429	7799	9555	5673
12	Wayanad	151443	18.55	74476	76967	148215	3228
13	Kannur	41371	1.64	20141	21230	36302	5069
14	Kasargod	48857	3.74	23950	24907	46094	2763
	Kerala	**484839**	**1.45**	**238203**	**246636**	**433092**	**51747**

Source: Compiled from Census Data, 2011

The following inferences are made from table 4.1.

Firstly, the total tribal population in Kerala is 484839 and in the case of percentage of population, the total Tribal population constitutes 1.45 percentage of the total population of Kerala State.

Secondly, the percentage of population as per the 2011 Census was 1.14 and thus there has been an increase of 0.31 percentage in the proportion during 2001-2011. The highest percentage of Tribal population has been recorded in Waynad District (18.55 percentage) and the lowest in Thrissur District (0.30 percentage).

Thirdly, Tribal Population in absolute numbers has increased by 1, 20,650 and the highest number of Tribes are residing in Waynad District (1,51,443) and the lowest in Alappuzha District (6,574).

Finally, the sex composition of Scheduled Tribe population is concerned, 238203 males (213208 in rural areas and 24995 in urban areas) and 2, 46,636 females (219884 in rural areas and 26752 in urban areas) are residing in Kerala. The Sex ratio of Scheduled Tribe population in Kerala is estimated as 1035. (MSME-Development Institute, Ministry of MSME, Government of India, 2015).

4.1. Scheduled Tribe Communities in Kerala

Scheduled Tribe communities in Kerala include 36 categories and they are living on the hill areas of Western Ghat. The tribes on the Kerala hills are listed below in Table 4.2.

Table 4.2

Scheduled Tribal Communities in Kerala

Sl. No	Tribal community	Sl. No	Tribal community
1	Adiyan	19	Malai Vedan
2	Aranda	20	Malakkuravan
3	Eravallan	21	Malasar
4	Hill Pulaya	22	Malayan, Nattu Malayan
5	Irular, Irulan	23	Mavilan
6	Kadar	24	Malayarayar
7	Kanikkaran, Kanikar	25	Mannan
8	Karimpalan	26	Paniyan
9	Kattunaykan	27	Palleyan, Palliya, Palliyan,
10	Kochuvelan	28	Muthuvan, Mudugar
11	Korga	29	Ulladan, Ullatan
12	Kudiya, Melakudi	30	Uraly
13	Kurichchan	31	Mala Vettuvan
14	Kurumans	32	Ten Kurumban, Jenu Kurumban
15	Kurumbas, Kurumbar	33	Thachenadan, Moopan
16	Mahamalasar	34	Cholanaikan
17	Malai Arayan	35	Mala Panickar
18	Malai Pandaran	36	Vettakuruman

Source: Ministry of Tribal Affairs, Government of India

All these communities are diversified in terms of their beliefs, livelihood strategies, culture, developmental perspectives, and social organization. In Kerala, major tribal communities are Paniya, Kattunayakans, Kurichchya, Uralies, Kuruma, etc of Wayanad, Mudugas, Irulas and Kurumbas of Attappady, Malayarayan, Muthuvans, and Uralies of Kottayam and Idukki and Kanikkar of Thiruvananthapuram. Five major tribal communities are notified as primitive Tribes taking into account stages of their transition into modern society. They are Koragas of Kasaragod, Kattunaikans of Wayanad, Kurumbar of Attappady in Palakkad

district, Cholanaikans of Nilambur Valley in Malapuram district, and Kadars of Cochin (Suresh, 2015).

4.2 Population Profile of Scheduled Tribes in Kerala

Table 4.3

District Wise Population of Tribes in Kerala

Sl. No	Districts	Total Tribal Population (2011 census)	General Population (2011 Census)	percent of ST Population to Total	percent of ST to Total Population
1	Thiruvananthapuram	26759	3307284	5.51	0.81
2	Kollam	10761	2629703	2.21	0.41
3	Pathanamthitta	8108	1195537	1.67	0.68
4	Alappuzha	6574	2121943	1.36	0.31
5	Kottayam	21972	1979384	4.53	1.11
6	Idukki	16559	1107453	3.41	1.50
7	Ernakulum	55815	3279860	11.16	1.70
8	Thrissur	9430	3110327	1.94	0.30
9	Palakkad	48972	2810892	10.11	1.74
10	Malappuram	22990	4110956	4.74	0.56
11	Kozhikode	15228	3089543	3.14	0.49
12	Waynad	151443	816558	31.25	18.55
13	Kannur	41371	2525637	8.53	1.64
14	Kasargod	48857	1302600	10.08	3.75
State		**484839**	**33387677**	**100**	**1.45**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.3 shows that of the total state and district population, tribes in Wayanad constituted 31.25percent and 18.55percent respectively. The Tribal population in Kasargode District constitutes 3.75 percent of its population and 10.08 percentage of the total Scheduled Tribal population of the State. Palakkad District constitutes 10.11 percent of the total tribal population of the state, but only 1.74

percent of its population. The lowest portion of tribal population is in Thrissur District, it is only 0.30 percent and its contribution to the total Tribal population of the state is 1.94. Regarding the district Alappuzha, out of the total population, the proportion of tribes is 0.31percent.

Table 4.4

District Wise Number of Scheduled Tribe Families in Kerala

SL. No	Districts	Percent of families	No of families
1	Thiruvananthapuram	4.80	5183
2	Kollam	1.21	1303
3	Pathanamthitta	1.66	1791
4	Alappuzha	0.81	872
5	Kottayam	4.03	4353
6	Idukki	13.26	14315
7	Ernakulum	2.20	2370
8	Thrissur	1.37	1481
9	Palakkad	12.25	13223
10	Malappuram	3.39	3656
11	Kozhikode	2.48	2680
12	Waynad	33.47	36135
13	Kannur	8.34	9005
14	Kasaragod	10.74	11598
Total			**107965**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.4 shows that the total Scheduled Tribe families in Kerala are 107965 which are living in all the Districts of the State. Waynad District contributes 33.47 percent, that is, 36135 Scheduled Tribe families which is followed by 13.26 percent, that is, 14,315 families in Idukki, 12.25 percent, that is, 13,223 families in Palakkad and 10.74 percent, that is, 11598 families in Kasaragod. Table 4.2 also reveals that

around 78 percent. The ST families in kerala are mainly found in Wayanad, Kasargode, Palakkad, Kannur and Idukki.

Table 4.5

Trends in Tribal Population

Sl. No	Districts	Male Population	Female Population	Total population	Sex Ratio
1	Thiruvananthapuram	8040	8948	16988	1113
2	Kollam	2163	2321	4484	1073
3	Pathanamthitta	2926	3044	5970	1040
4	Alappuzha	1456	1527	2983	1049
5	Kottayam	8249	8339	16588	1011
6	Idukki	26331	26234	52565	996
7	Ernakulum	4334	4423	8757	1021
8	Thrissur	2639	2859	5498	1083
9	Palakkad	23163	23495	46658	1014
10	Malappuram	6955	7436	14391	1069
11	Kozhikode	5151	5357	10508	1040
12	Waynad	75342	77466	152808	1028
13	Kannur	18469	19173	37642	1038
14	Kasargod	23378	24225	47603	1036
Total		**208596**	**214847**	**423443**	**1030**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.5 shows the District wise details on sex ratio of Tribes in Kerala. The population of Tribes in Kerala constitutes 208596 males and 214847 females and sex ratio of the tribes is 1030. The District Thiruvananthapuram stands first in the case of sex, that is, 1113 followed by Thrissur, 1083, Kollam, 1073 etc. On the other hand, sex ratio is not favorable to female in Idukki District, that is, 996. The overall sex ratio of the state is estimated as 1030.

4.3. Access to Health Institutions

 Inaccessibility to health institutions is another crucial cause for the severe health problems of Scheduled Tribes in Kerala. The information of hamlets situated above 5 Km away from the nearest health institutions is given in Table 4.6.

Table 4.6

Access to Health Institutions

Sl. No	Health Institutions	Number of hamlets above 5 Km away from Health Institutions
1	Primary Health Centre	2139
2	Community Health Centre	3150
3	District Hospital	4604
4	Ayurveda Dispensary/Hospital	3238
5	Homeo Dispensary/Hospital	3242

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

 Table 4.6 reveals that 3150 hamlets are 5 kilometers away from the nearest community health centers and 2139 hamlets are 5 kilometers away from the nearest Primary health centers.

Table 4.7

Details of Access to Health Institutions

SL. No	Health Institutions	Within 1 Kilometer	1-2.5 Kilometer	2.5-5 Kilometer	5-10 Kilometer	10-25 Kilometer	25-50 Kilometer	50-100 Kilometer	Above 100 Kilometer	Not Specified
1	Primary Health Centre	389	554	1531	1320	702	97	19	1	149
2	Community Health Centre	191	237	695	1198	1411	441	95	5	489
3	District Hospital	18	24	77	293	862	2356	970	123	39
4	Ayurveda Dispensary/ Hospital	243	280	866	1312	1508	229	122	67	135
5	Homeo Dispensary/ Hospital	245	289	805	1242	1474	303	162	61	181

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.7 shows that 1320 hamlets are at a distance of 5 to 10 Km to the nearest Primary health centers. As far as distance to Community Health Centers is concerned, 95 hamlets have a distance between 50 to 100 Km and 123 hamlets have a distance above 100 Km to the nearest District Hospital.

4.4. Access to Sources of Drinking Water

Despite many efforts done by the Central, State, and Local Self-Governments, pure drinking water is a scarce commodity in many Tribal hamlets. Pure drinking water is available within the hamlets only for 10 percent of the hamlets. In more than half of the hamlets, potable water is not accessible easily, but away from 0.5 Km. However, the case of tribes of 114 hamlets is really embarrassing as they have to fetch water beyond a distance of 5 km.

Table 4.8 shows that only 17784 families, that is, 16.47 percent have their own source of drinking water which includes wells or tube wells. On the other hand, 35120 families, that is, 32.53 percent are depending on public wells or tube wells. About 18799 households, that is, 17.41 percent are using natural sources like river, stream and lake for collection of drinking water. The distance to drinking water source is concerned, 3449 households have to travel more than 2.5 kilometer to fetch drinking water. Another 7608 households have to travel 1 to 2.5 kilometer to fetch drinking water.

Table 4.8

Availability and Sources of Drinking Water

SL. No	Sources	Below 0.01 Kilometer	0.01 - 0.25 Kilometer	0.25 - 0.50 Kilometer	0.50 - 1.00 Kilometer	1.00 -2.5 Kilometer	Above 2.5 Kilometer	Total
1	Own Well/ Tube Well	12495	2371	614	961	652	691	17784
2	Public Well/ Tube Well	20798	7244	2677	2968	928	505	35120
3	River/Lake/ Neerchal	5403	4070	2118	3126	2923	1159	18799
4	Rain Water Harvesting	550	62	28	35	18	14	707
5	Canal	46	21	8	12	26	14	127
6	Keni/Oali/ Stream/ Surenka	3023	2600	1205	1464	1392	295	9979
7	Other Sources	5323	1507	444	625	494	363	8756
	Sub Total	47638	17857	7094	9191	6433	3041	91272
8	Depending Others for Drinking Water	6526	4258	2041	2285	1175	408	16693
	Total	**54164**	**22133**	**9135**	**11476**	**7608**	**3449**	**107965**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

4.5. Health Status of Scheduled Tribes in Kerala

Health care is a serious issue among Tribes in Kerala especially among the isolated tribal areas. High poverty levels, lack of food security, poor supply of nutrition, illiteracy, poor sanitation, lack of safe drinking water, unhealthy life style, beliefs and cultural practices, changes in food habits etc. aggravate the poor health status of tribes.

In olden days Tribes ate leaves in forest, roots, fruits, tubers and was sufficient to maintain the food requirement and nutritional status. The primitive and indigenous health care system followed by the tribal communities helped to protect the health status of them. They had a system of diagnosis of their own and followed a medicinal system based on nature by using herbs collected from nature. The nutritional and health status of tribes in Kerala, especially among women, children and adolescent girls are deficient.

4.5.1 Access to Health Care Institutions.

Despite the various health care services such as medical camps, immunization, cleaning campaigns etc. conducted by the authorities, serious health issues are prevailing among Tribes. The main reason for the same is due to lack of proper access to health care institutions. The same is evident from Table 4.9.

Table 4.9

Access to Health Care Institutions

Sl. No	Districts	Number of Settlements			
		Total	Without Health Care institutions	Services of Health Care Workers Not Available	Immunization, Cleaning etc. not Arranged, Health Camps not Organized
1	Thiruvananthapuram	226	90	36	55
2	Kollam	26	8	3	7
3	Pathanamthitta	43	27	9	18
4	Alappuzha	34	30	20	21
5	Kottayam	101	59	20	24
6	Idukki	299	156	71	106
7	Ernakulum	61	29	16	29
8	Thrissur	59	15	12	20
9	Palakkad	426	245	105	162
10	Malappuram	229	106	51	72
11	Kozhikode	126	84	44	64
12	Waynad	2167	749	235	462
13	Kannur	353	177	60	93
14	Kasargod	612	328	98	173
	Total	**4762**	**2103**	**780**	**1306**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.9 shows that out of 4762 hamlets, 2103 tribal hamlets have no health care institutions within their premises. In 780 hamlets health care workers are not available.

The situation is very worst in Palakkad, Wayanad, Idukki and Kasaragod Districts. In 1306 hamlets immunization, medical camps, cleaning etc. are not conducted.

4.5.2. The Problem of Malnutrition among Tribes in Kerala

The increasing infant mortality rate and death rates are mainly due to malnutrition. The malnutrition affected Tribal families are very high in Kerala and the District wise details of malnutrition are given in Table 4.10

Table 4.10

Malnutrition among Tribes in Kerala

Sl. No	Districts	Total Families	Malnutrition Affected Families	Percentage to Total Families
1	Thiruvananthapuram	5183	231	4.46
2	Kollam	1303	49	3.76
3	Pathanamthitta	1791	387	21.61
4	Alappuzha	872	170	19.50
5	Kottayam	4353	114	2.62
6	Idukki	14515	2002	13.99
7	Ernakulum	2370	79	3.33
8	Thrissur	1481	146	9.86
9	Palakkad	13223	2204	16.67
10	Malappuram	3656	742	20.30
11	Kozhikode	2680	414	15.45
12	Waynad	36135	5773	15.98
13	Kannur	9005	994	11.04
14	Kasargod	11598	829	7.15
	Total	**107965**	**14134**	**13.09**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Among 107965 Tribal families, 14134 families, that is, 13.09 percent are apparently affected by the problem of malnutrition. The largest numbers of malnutrition affected families are found in Wayanad District, Idukki District and Palakkad District. But proportion of malnutrition affected families are concerned, it is highest in Pathanamthitta District than Alappuzha and Malappuram. The percentage of malnutrition affected families are the highest in Pathanamthitta District. Whereas, only 2.62 families are affected by malnutrition in Kottayam District.

Table 4.11

Occurrence of Deaths

Sl. No	Age Group	No. of Persons	Percentage
1	Below 01 Year	298	2.45
2	01-03	198	1.63
3	04-05	52	0.43
4	06-14	218	1.79
5	15-29	1210	9.92
6	30-44	1921	15.76
7	45-59	2601	21.33
8	Above 60	5691	46.69
Total		**12189**	**100**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.11 depicts the age wise details of death among Tribes for the last 5 years. For the last five years, 12181 Tribal deaths registered in Kerala, and the highest Tribal death registered is the age group of above 60 years. It is quite surprising that 298 deaths occurred in the age group below 1 year and that constitute 2.45 percentage of total Tribal deaths in Kerala. A total of 548 deaths happened at the age below 5 years and that constitute 4.5 percentage of total Tribal deaths. The table also depicts that majority of deaths are due to old age.

4.5.3. Reasons of Tribal Deaths in Kerala

There are many reasons behind tribal deaths in Kerala and among them some reasons are common and some are particular to tribes. Lack of timely medical aid, consumption of liquor, accident death etc. were found to be the potent causes for the increased infant mortality among tribes for the past five years. Suicide tendency is also another particular phenomenon noted among Tribes. Details of reasons of occurrence of deaths among tribes are given below.

Table 4.12

Reasons of Tribal Deaths in Kerala

Sl. No	Age on Death	No. of Families Where Death Occurred	Poverty	Due to Lack of Proper Medical Treatment	Suicide	Infant death Due to Lack of Proper Treatment	Death Related to Delivery	Death Due to Accident	Consumption of Alcohol	Attack by Wild Animals	Normal Death	Other Reasons	Total
1	Below 1 Year	294	-	4	-	267	-	1	-	1	-	25	298
2	01-03	199	-	101	-	74	-	7	-	-	-	16	198
3	04-05	52	-	42	-	-	-	3	-	-	-	7	52
4	06-14	219	-	140	-	-	-	29	-	-	4	45	218
5	15-29	1182	-	532	334	-	46	129	30	4	5	130	1210
6	30-44	1907	6	816	348	-	24	235	129	12	15	336	1921
7	45-49	2591	2	1301	195	-	2	167	173	12	199	550	2601
8	Above 60 Years	5673	20	453	73	-	-	126	100	19	4078	822	5691
Total		12117	28	3389	950	341	72	697	432	48	4301	1931	12189

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.12 illustrates that 12189 tribal deaths happened in 12177 families and out of them 3389 Tribal deaths are due to lack of proper medical treatment, 950 suicides, 341 infant deaths, 72 maternal mortality, 432 alcohol consumption deaths

and 48 deaths due to animal attacks. The number of normal deaths during this period was 4301 and this is less than the total deaths due to all other reasons.

4.6. Sanitation Facilities of Tribal Households in Kerala

Proper sanitation facilities are the prerequisite for good socio-economic status. But quite unfortunately the sanitation facilities among Tribes in Kerala are unsatisfactory. The same problem is evident from Table 4.13 which shows the district wise details of sanitation facilities in Tribal hamlets.

Table 4.13

Sanitation Facilities of Tribal Hamlets in Kerala

Sl. No	Districts	Families				Hamlets	
		Total Families	Without Proper Latrines	Percentage of Total Families	Percentage of Latrine less Families	Without Domestic or Public Latrines	Percentage
1	Thiruvananthapuram	5183	2540	49.01	4.93	67	4.43
2	Kollam	1303	778	59.71	1.51	8	0.52
3	Pathanamthitta	1791	890	49.69	1.73	8	0.52
4	Alappuzha	872	298	34.17	0.58	11	0.71
5	Kottayam	4353	1017	23.36	1.97	16	1.04
6	Idukki	14315	7808	54.54	15.15	162	10.50
7	Ernakulum	2370	859	36.24	1.67	8	0.52
8	Thrissur	1481	568	38.35	1.10	12	0.78
9	Palakkad	13223	9096	68.79	17.64	270	17.50
10	Malappuram	3656	2217	60.64	4.30	112	7.26
11	Kozhikode	2680	994	37.09	1.93	18	1.17
12	Waynad	36135	16322	45.17	31.66	598	38.76
13	Kannur	9005	3346	37.16	6.49	88	5.70
14	Kasargod	11598	4818	41.54	9.35	165	10.69
	Total	**107965**	**51551**	**47.75**	**100**	**1543**	**100**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

Table 4.13 shows that among the total 107965 tribal families in Kerala, 51551 families, that is, 47.75 percent have no proper latrine facilities in their residence. On the other hand there are 1543 tribal hamlets without domestic or public latrines in Kerala and it constitutes 32.08 percent of the total tribal hamlets in the State. It was in Wayanad that more number of families not having toilets are found followed by Palakkad, Idukki and Kasargode.

4.7. Landless Families among Tribes in Kerala

Table 4.14 shows that among the total tribal families, those who are not having land constitute 4.78 percent of total number of families. Wayanad ranked top in accommodating largest families without land. Next to Wayanad is Palakkad with 11.86 percent. The percentage of land less families are concerned, the highest percentage is in Palakkad District (11.86 percent), followed by Ernakulum District (7.97 percent). Details are given in Table 4.14

Table 4.14

Details of Landless Families among Tribes in Kerala

Sl. No	Districts	Number of Families		
		Total Families	landless	Percentage to Total
1	Thiruvananthapuram	5183	22	0.42
2	Kollam	1303	50	3.83
3	Pathanamthitta	1791	62	3.46
4	Alappuzha	872	45	5.16
5	Kottayam	4353	148	3.40
6	Idukki	14315	252	1.76
7	Ernakulum	2370	189	7.97
8	Thrissur	1481	35	2.36
9	Palakkad	13223	1568	11.86
10	Malappuram	3656	287	7.85
11	Kozhikode	2680	52	1.94
12	Waynad	36135	1979	5.47
13	Kannur	3346	221	6.60
14	Kasargod	4818	248	5.14
	State	**107965**	**5158**	**4.78**

Source: Scheduled Tribes Development Department, Government of Kerala, November 2013

4.8. Profile of the Study Area –Attappady

Attappady is the biggest and one and only Tribal block in Kerala having an area of 745.59 square kilometers bespattered throughout three Panchayaths namely Agali, Sholayur and Pudur. Major parts of this area are dotted with dense forests infested with wild animals. Eastern part of Attappady is affected with huge deforestation and become a rain shadow region. This is mainly due to the cultivation pattern followed by the migrant farmers. Tribes in Attappady are very backward among the underprivileged groups in Kerala and India. There are 192 tribal hamlets in Attappady (ITDP Attappady 2011), populated by three tribal groups namely Irulas (82.3 percent of the total tribal population), Mudugars (9.6 percent) and Kurumbas (4.6 percent) and among them, Kurumbas are the most primitive group residing in the remote areas of Attappady, whereas Irulas are numerically dominant and mainly residing in the eastern part of Attappady. Literacy rate of Attappady is 49.55 percent, in sharp contrast to the rest of Kerala and India. It is quite surprising that 83 percent of the tribal population lives below poverty line. It was within the broad categories of Dravidians that the three tribal communities of Attappady belonged to. However, Kurumbas, being less exposed to the mainstream, suffered less as a result of the onslaught of settlers into Attappady. They occupied an agrarian economy as a result of their dependence on agriculture and subsistence life. Land mainly forests are the critical source of natural resources and have divergent uses such as shifting of cultivation including nomadic farming to sedentary agriculture.

Attappady Tribal Block is a part of the Nilgiri Bio-sphere Reserve in the southern part of India having a complex topography and is isolated from all other high range hills of India. The terrain of Attappady block is really undulating, which includes a large number of different types of hillocks of different shapes which are ranging from 450 to 2300 meters height from the sea level. A major part of the land area in Attappady is within the category of lands above 35 degree slope. In Attappady block, the rainfall differs considerably in different areas, in the western slopes it is higher, an annual average rainfall of about 3000 mm whereas it is less than 1000 mm in eastern Attappady. The rainwater on the surface of the earth has high run

off speed mainly due to deforestation, barren hills and low depth of soil, further leading to deforestation. The soil erosion in Attappady is an apprehensive issue in Kerala State. The Attappady region is blessed with two major rivers, namely, Bhavani and Siruvani. These two rivers are capable to provide adequate water for drinking and irrigation in the major part of Attappady.

The relationship between tribes with land and forest in this region underwent a serious change in the course of time. Attappady is one of the main forest areas in the Kerala state, including an area of 765 square kilometers including in Palakkad district which is a part of the old Malabar region which formed as a part of the erstwhile Madras Presidency under British India. Kurumbas, Irular and Mudugar accommodated themselves in this region up to the beginning of the second half of the 20th century.

The absentee landlords mainly known as the 'Jenmis' cornered the privileges and rights on land in Malabar before the arrival of the British and its cultivators were ruled by customs and conventions. The 'Jenmis' in general were tasked with cultivation in the land to the local chieftains who were leasing out their land to tenants, being the actual tillers of the soil. Fortunately the inhospitable forest areas of Attappady were left detached by the chieftains and their tenants. Consequently, the tribes in Attappady were enthralled by unbridled freedom and they made use of the forest lands as per their own primitive mode of cultivation, acquisition of hill products and hunting. But changes began slowly with the annexation of Malabar region towards the end of the 18th century by the Madras presidency of British India. The class and position of 'Jenmis' went through a strategic change when they were awarded the legal ownership rights over and above their lands by the British in the place of their erstwhile 'jenmom' rights found in conventions and customs.

These three tribes originally trained themselves in changing cultivation in Attappady. While Mudugars and Irulas are now practicing settled agriculture, Kurumbas still continue the shifting cultivation and remain as food gatherers. In earlier days they used the freedom to cut and burn large areas of forest land for facilitating their shifting cultivation. But currently situation changed and hence they

have to take adequate permissions from various offices mainly from the Department of Forest who apportions those pieces of cultivable land irrespective of their preference. The Forest Department distributes land known as 'kothukadu' to the Ooru Moopan, the head and he who allots the plots of each Tribal household residing in the hamlet. He is helped by Treasurer known as Bhandari, Junior Headman known as Kuruthala and a soil man who is an expert in agriculture known as Mannukkaran. The Mannukkaran's role is mainly based on rituals and customs. But soon after the emergence of settled farmers from various parts of Kerala and Tamil Nadu, they changed their agriculture habit and shifted themselves to settled agriculture. Hitherto Attappady remained as a typical tribal economy which was a self-sufficient eco system stripped off from the mainstream economy.

The Scheduled Tribes had their own unique economy, society and their own mode of production, exchange and distribution that were organized and managed by premeditated laws maintained by their customs and kinship relations which was based on their social set up. Since it is based on forest economy, the productive economic activities are mainly hinged on over utilization and exploration of natural resources including forest by means of food gathering, hunting, shifting cultivation, and fishing. Even though, the main foundation of their economy was cultivation, no relevance to the question, who owned the land so far.

Land was not at all an uncommon property among tribes and hence each family cultivated the allotted part of land by the chief among tribes based on the family size. Thus, ownership right on land was enjoyed by the tribal community and an individual tribe enjoys only the operational rights. Till the beginning of 20th century, the existence in the form of the tribal economy of Attappady continued as a closed economy. But later it broadened the relationship with traders and merchants in this area including Tamil people and Gowndans` who in the initial stage came to collect various forest products including honey, herbal plants, horns and herbs from tribes. At the same time a few sections of the tribes like Mudugars and Irulas even started products even for the purpose of trade produced by them including mats, baskets and ropes.

4.8.1 Population of Tribes in Attappady

The total tribal population in Attappady is 32646 and they are residing in 10530 families. Among the total population, 14131 are males and 14776 are females and hence the sex ratio is 1045, favorable to female (Survey Report, ITDP Attappady, 2016).

4.8.2 Occupation of Tribes in Attappady

As of now, agriculture farming is the single largest source of employment for tribes in Attappady, employing around 94 percent of the tribes of which cultivators and agricultural laborers constitute around 51percent and 43 percent respectively. Collection of forest products is another minor source of employment and engaging 1 percent of tribal population. Around 0.2 percent of the tribal population is accommodated by the private and public sectors. Reservation of employment in 25 different government services has provided only a few job opportunities to the tribes.

Figure 4.1

Map of Attappady Tribal block

4.9. Conclusion

Attappady is the only tribal block in Kerala and hence many a fund has been flowing to reign in the health issues among tribes. In this context, it is an imperative necessity to look into the health scenario, access to drinking water, ownership of land etc of tribes in Kerala. Even though Kerala state won laurels in respect of many social indicators like literacy, life expectancy etc, and the state proved to be a laggard in terms of the achievement of a robust health among tribes.

CHAPTER 5

CHILD HEALTH AND NUTRITIONAL STATUS OF TRIBES IN KERALA: EVIDENCE FROM PRIMARY DATA

This chapter brings out an empirical analysis of the child health and nutritional status of tribes in the Attappady region of Kerala. Having examined the objectives, hypothesis and research problem and this chapter comprehensively analyses the socio-economic issues of tribes apart from the health and nutritional status of children below the age 5. This chapter is divided into three sections viz section1 discusses the socio-economic and demographic profile of Attappady tribes, section 2 analyses the health status and its determinants of Attappady tribal children aged below 5, section 3 elaborates the nutritional status and its various dimensions and differences across various groups.

5. 1 Socio Economic and Demographic Profile of the Attapady Tribal Households

At the beginning, information on the household status and socio-economic issues of tribes is a compelling necessity and a pre requisite to examine, analyse and interpret the health and nutritional status of tribal children.

Table 5.1

Details of distribution of samples across Geographical Region and Community

Variables	Category	Number	Percentage
Panchayath	Agali	400	50
	Puthur	200	25
	Sholayur	200	25
Family head	Male	356	44.5
	Female	444	55.5
Community	Irular	455	56.8
	Mudugar	165	20.6
	Kurumbar	180	22.5
Number of observation	800		

Source: primary data

It can be observed from table 5.1 that Agali Panchayath constitutes largest number of respondents followed by Puthur and Sholayur which is having equal ranking. The head of the family, contrary to the general perception is female in more than 50 percent of the households. Irular community is the largest percentage inhabited in Attappady (57percent) followed by Kurumbar (23percent) and Mudugar (21percent).

Table 5.2

Details of Household Status of Attapady Tribes

Variables	Category	Number	Percentage
Type of Family	Nuclear	345	43.12
	Joint	455	56.88
Average Family Size		5.3	6.33(SD)
Type of House	Thatched	330	41.12
	Tile	270	33.75
	Concrete	200	25.13
Main Fuel for Cooking	Electricity/LPG/ Biogas	120	15
	Kerosene/Charcoal/Coal	213	26.625
	Firewood	467	58.375
Electricity Connection	Yes	601	75.125
	No	199	24.875
Major Source of Drinking Water	Surface water	304	38
	Tube well/borehole	200	25
	Piped	296	37
Distance to Fetch Drinking Water	In the residence itself	291	36.375
	< 5 minutes walking time	98	12.25
	> 15 minutes walking time	411	51.137
Purification of Drinking Water	Yes	105	13.125
	No	695	86.875
Kind of Toilet Facility	Open defecation	602	75.25
	Own toilet	170	21.25
	Common toilet	28	3.5
Possession of Land	No land	340	42.25
	Own Cultivable land	300	37.5
	Leased land	160	20
Farming Operations in Land	Yes	573	71.625
	No	227	28.375
Multi Seed Farming Technique	Yes	165	20.625
	No	635	79.375

Variables	Category	Number	Percentage
Manage Household Waste	Dumping in open space	550	68.75
	Flowing to neighbour's Premise	179	22.45
	Scientific disposal	71	8.88
Communication Amenities	TV	324	40.5
	Mobile with internet connection	250	31.25
	Others	83	10.375
	No amenities	143	17.88
Average Family Income	-	2387.32	2439.43(SD)
Sample Size	800		

Source: primary data

Table 5.2 enunciates characteristic features of tribes at Attappady. As regards types of family, it is seen that there are more joint families (57percent) than nuclear type families (43 percent). The average number of persons in a family is found to be 5. Most of the houses are thatched in nature (41percent) followed by tile (34percent) and concrete (25percent). This shows the precarious financial conditions of the tribal families. There is increased use of firewood among tribes (58percent) accompanied by kerosene (27percent) and electricity and gas (15percent). This signals the lesser affordability of tribes to have access to LPG/biogas. It is also learnt that as much as 75percent of the tribal families have access to electricity. Regarding source of water, it is seen that there is no significant difference between surface water and piped water regarding its use. More than 50percent of the tribes are forced to walk beyond 15 kms to fetch drinking water shows the gravity of the problem. Only 37 percent of the tribes do have availability of water in their residence itself. The fact that 87percent of tribes do not have access to purified water is symptomatic of chronic health issues haunting them. This finds expression in their use of toilet such that 75percent tribes are forced to defecate openly without having own toilet breeding contagious diseases.

Regarding the possession of land, it is regrettable to note that hardly 38perceent do possess cultivable land whereas rest of them is either using leased land (20percent)or are totally landless (42percent). As the traditional occupation of tribes has been farming, as much as 72percent of them are engaged in farming whereas 28percent of them desist from it. Although, tribes are aware of multi seed farming technique, hardly 21percent of them are engaged in it. This shows laxity among the tribes to get it implemented without hindrance. With regard to managing household waste, it is unfailingly seen that as much as 69percent of the tribes dump it in open space and that only 9percent dispose it scientifically. Near 23percent of the tribes are seen to have been flowing the waste to the neighbourer's area. Near 41percent of the tribes are having TV in their house followed by having a mobile with internet connectivity (31percent). Around 18percent of the tribes reported that they did not have any amenities at all. The average family income is seen to be Rs 2387/-. The details of household status are also clearly shown in the figure 5.1.

Figure: 5.1

Distance to Fetch Drinking Water
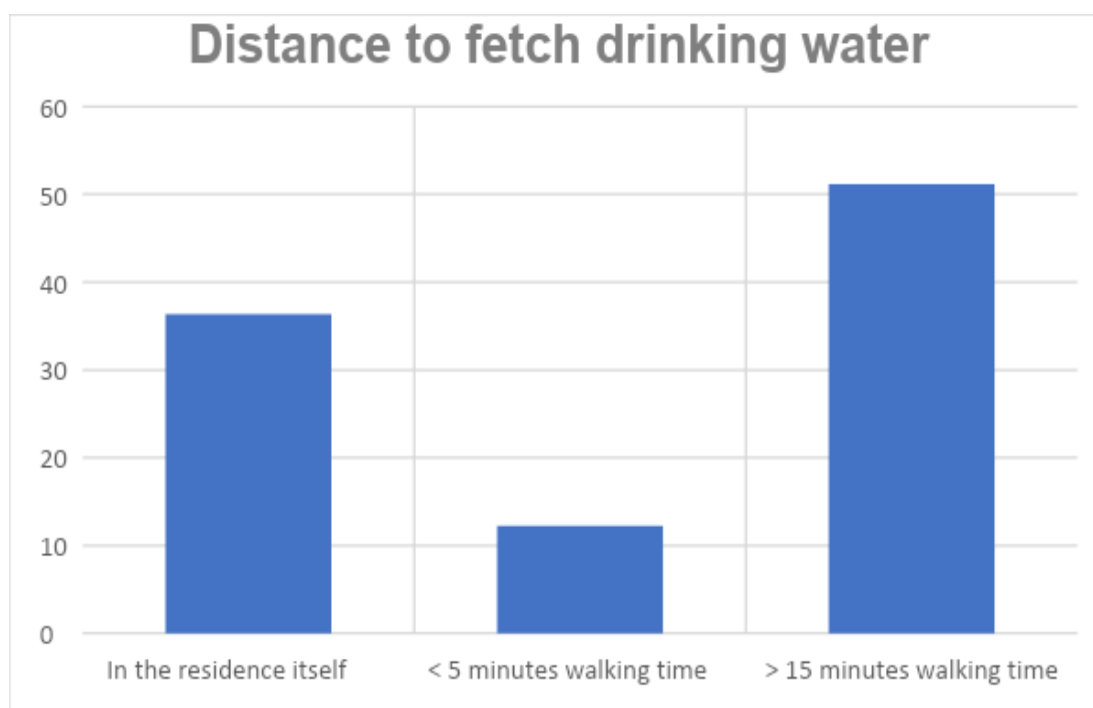
Source: primary data

Table 5.3

Details of Selected Attappady Children

Variables	Category	Number	Percentage
Child Care	Father	137	17.12
	Mother	430	53.34
	Parents in Law	233	29.13
Place of Delivery	Home	288	36
	Hospital	512	64
Birth Order	First	280	35
	Second	345	43
	Third	175	22
Previous Birth Interval	First	280	35
	< 24 months	373	46.66
	24-47 months	93	11.62
	.>48 months	54	6.72
Breast Feeding	Regularly	198	24.75
	Occasionally	280	35
	Rarely	300	37.5
	Never	22	2.75
Supplementary diet to the child other than breast milk	Regularly	156	19.5
	Occasionally	210	26.25
	Rarely	256	32
	Never	178	22.25
Incurable Illness	Yes	375	46.88
	No	425	55.34
Diseases for the Past 2 Weeks	Yes	513	64.12
	No	287	35.88
Vaccination as instructed by Health Department	Yes	345	43.12
	No	455	56.88
Sample Size	800		

Source: primary data

Table 5.3 reports the characteristics of selected children at Attappady. It is learnt that the child is cared more by mother (53percent) followed by parents in law (29 percent) and father (17 percent). The institutional delivery is seen to be more among them (64 percent). Regarding birth order, it is seen that the most of the selected children are second (43 percent) followed by first (35 percent) and the third in series is as small as 22 percent. The birth interval of tribal children is such that, the second child (47 percent) was begot just before 24 months since the first child was born. The breast feeding practice of tribal mothers does not provide a rosy picture in the sense that as much as 38 percent of the tribal mothers are engaged in breastfeeding only rarely followed by occasional feeding (35 percent) and regular feeding (25 percent). So is the case with providing supplementary diet also which vitiates against developing health of children commensurate with their age. However, 55 percent of the tribal children were not seen to be suffering from incurable illness, but near 47 percent are caught up in the grip of incurable illness is indeed a matter of awe. As much as 64 percent of the tribal children were reported to have disease for the past two weeks. The vexatious issue is that near 57 percent of tribal children remained unvaccinated.

Table 5.4

Parents' details of Attappady Tribes

Variables	Category	Number	Percentage
Age at Marriage of Mother	Mean	17.34	19.56(SD)
Antenatal Check Up	Yes	432	54
	No	368	46
Health Problem at the time of Delivery	Yes	682	85.25
	No	118	14.75
Folic Acid during the beginning state of Pregnancy	Yes	387	48.375
	No	413	51.625
Use Medicines for Iron and Calcium for Mother and Child	Yes	321	40.125
	No	479	59.875
Fruits Consumption during Pregnancy	Yes	175	21.875
	No	625	78.125
Sample Size	800		

Source: primary data

Table 5.4 reports that the average age of tribal mother at the time of marriage is 17.34 which is below the legal age of 21 years. It is only just more than half of the respondents are usually engaged in antenatal check-up which is perhaps one of the significant reasons for miscarriage among pregnant women. It is invariably shocking that as much as 85 percent of the respondents reported some kinds of health problems at the time of delivery. There is no apparent difference in the intake of folic acid at the beginning of pregnancy. The fact that near 60 percent of parents did not have iron and calcium medicines .Almost 78 percent of the parents held that they did not have access to the consumption of fruits during pregnancy.

Table 5.5

Employment Status of Parents

Variables	Category	Number	Percentage
Employment Status of Mother	Working	650	81.25
	Not Working	150	18.75
Type of Employment of Mother	Cooli	213	32.76
	Agriculture and Goat Rearing	283	43.55
	Self-Employed	150	23.08
	Government Job	4	0.61
Employment Status of Father	Working	388	48.5
	Not Working	412	51.5
Type of Employment of Father	Cooli	109	28.09
	Agriculture and Goat Rearing	256	65.98
	Self-Employed	22	5.68
	Government Job	1	0.25
Sample Size	800		

Source: primary data

Table 5.5 delineates employment status of parents. It can be discerned that largest percentage of mother (81 percent) is found to be employed. However, regarding employment of father, largest percentage (52 percent) is found to be

unemployed. Most of the employed father are engaged in agriculture and goat rearing (66 percent). The acquirement of government job, in spite of mandatory reservation is found very minimal among parents.

Figure: 5.2

Employment Status of Mother

employment status of mother(%)

Source: primary data

The figure 5.2 elucidates that largest number of mother are engaged in agriculture and goat rearing followed by going foe cooli work and then being self-employed. The percentage of tribal mother having a government job is miniscule.

Figure 5.3

Employment Status of Father

Employment status of father(%)
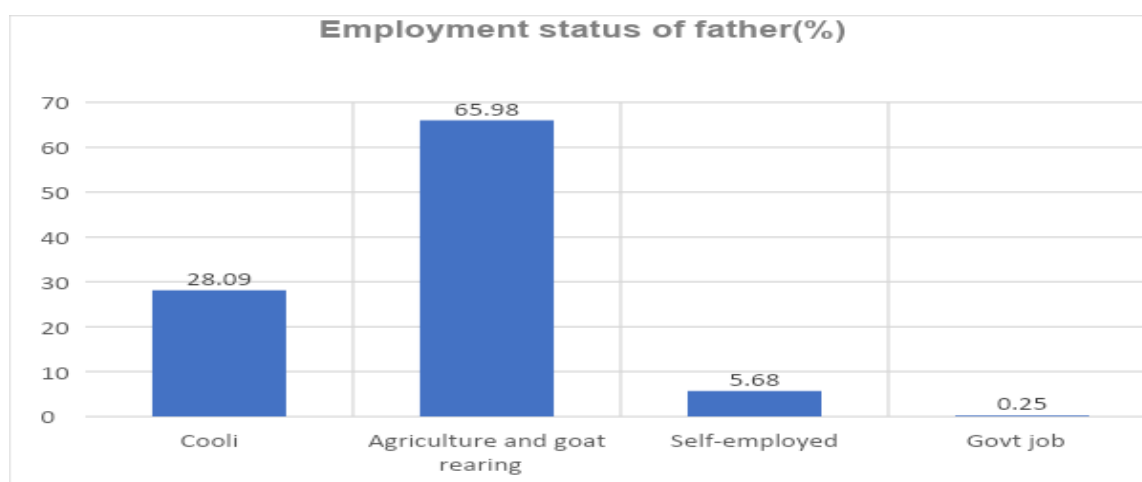
Source: primary data

It is evident from figure 5.3 that largest number of father are engaged in agriculture and goat rearing accompanied by cooli, self-employment and Government job.

Table 5.6

Personal Habits of Parents

Variables	Category	Number	Percentage
Personal Habits of Mother	Chewing Tobacco	250	31.25
	Smoking Tobacco	270	33.75
	Consuming Alcohol	280	35
	No Consumption of Drug	280	35
Personal Habits of Father	Chewing Tobacco	190	23.75
	Smoking Tobacco	269	33.625
	Consuming Alcohol	256	32
	No Consumption of Drug	85	10.625

Source: primary data

Table 5. 6 discusses personal habits of parents. There is no significant difference among parents on their bad habit of smoking tobacco. While mothers outnumber fathers regarding chewing tobacco, no noticeable difference is seen among them on consuming alcohol. Similarly, only a few numbers of father (85) are found to be abstaining from the consumption of drug, whereas there is a little improvement on the numbers of mother by averting the consumption of drug (280).

Figure: 5.4

Personal Habits Mother
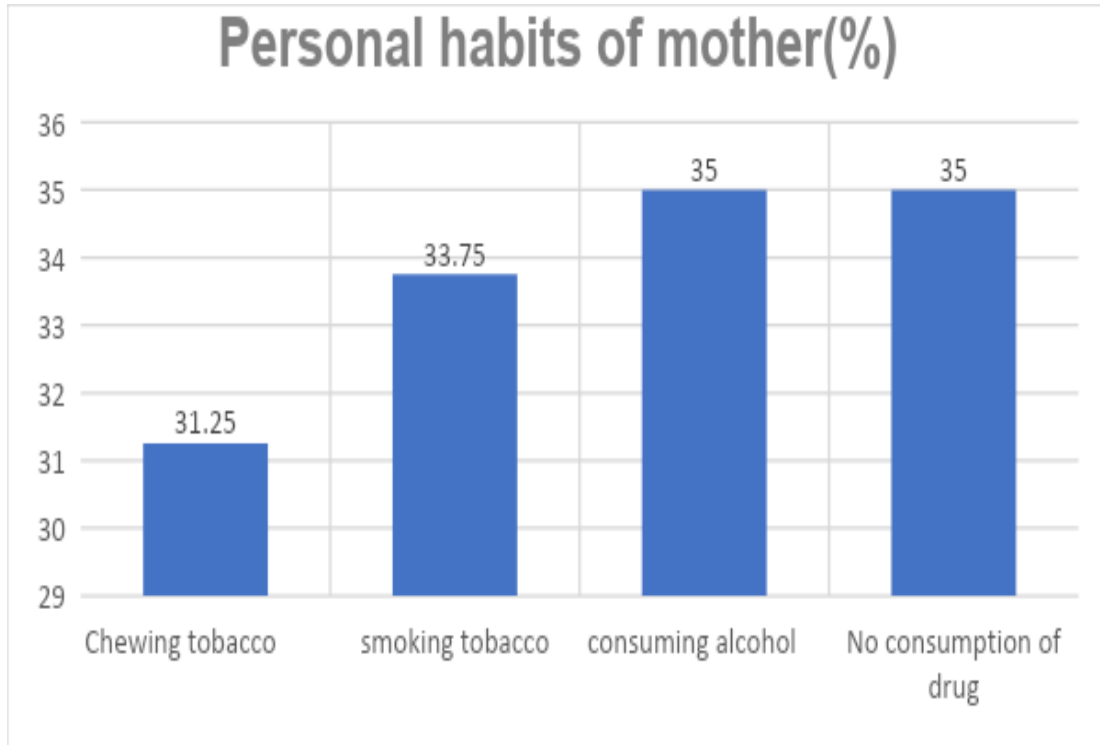
Source: primary data

Figure 5.4 clearly reveals the personal habits of mother. It is unequivocal that largest numbers of mother are engaged in consuming alcohol. Equal percentage are also not engaged in any kind of bad habits. There is no significant difference regarding chewing tobacco and smoking tobacco among the respondents.

Figure 5.5

Personal Habits of Father

personal habits of father(%)
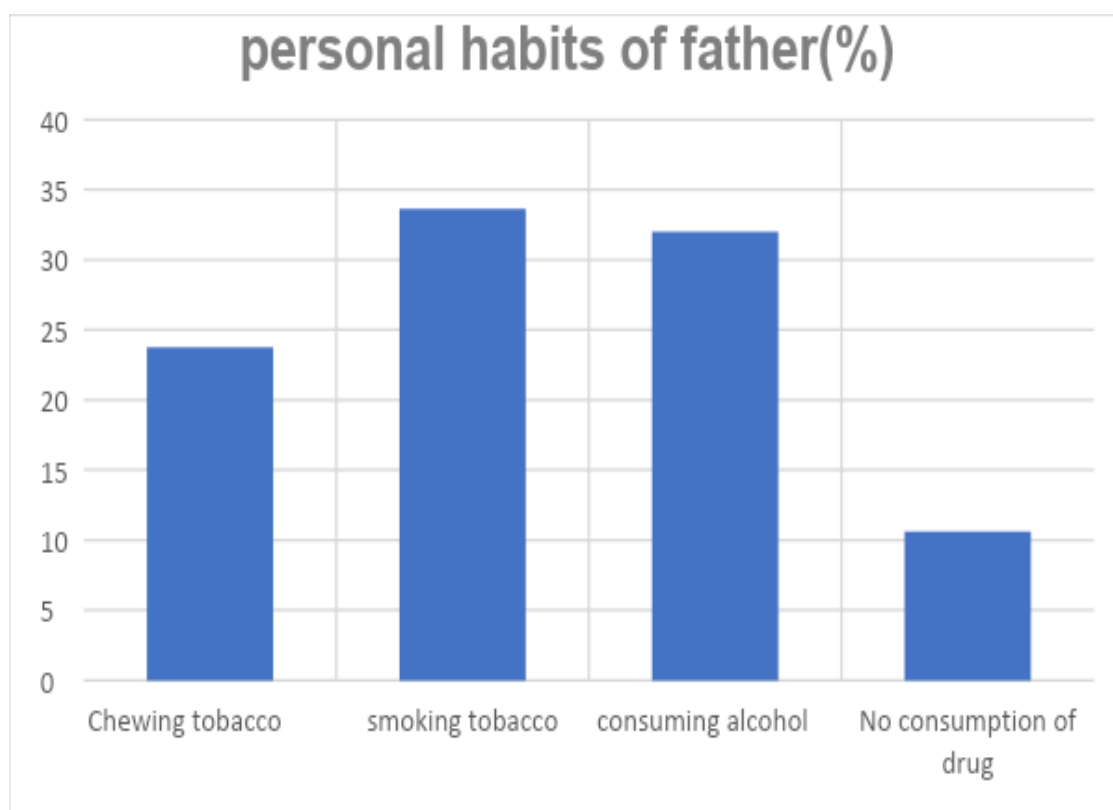
Source: primary data

Figure 5.5 shows the personal habits of father. Largest numbers of father are engaged in smoking tobacco followed by consuming alcohol, chewing tobacco. Only a small percentage are seen engaged in any bad habits.

Table 5.7

Intake of Food among Households of Tribes

Variables	Category	Number	Percentage
Number of times having Food	One Time	198	24.75
	Two Times	280	35
	Three Times	22	2.75
	Irregular	300	37.5
Type of Food	Traditional Food	432	54
	Non-Traditional Food	368	46
Source of Food	Own Cooking	395	49.38
	Community Kitchen	405	50.62
Supplementary Nutritional Food	Yes	278	34.75
	No	522	65.25
Limitations of Own Cooking	No Source to Cook	520	65
	Non Availability of Firewood	280	35
Limitations of Community Cooking	Not Functioning	276	34.5
	Not Functioning Every day	379	47.38
	Not Supplying all Food	145	18.125
Sample Size	800		

Source: primary data

Table 5.7 enunciates the variegated behaviour among tribal households concerning their intake of food. The larger quantum of traditional food (432) directly from community kitchen are seen to be taken by tribes two times a day (280). However, most of them are bereft of supplementary nutritional food (65 percent). While larger number of tribes (520) registered complaint that they were beset with no sources to cook at all, community kitchens were not seen to be functioning all days (379).

Table 5.8

Educational Status of Parents

Variables	Category	Number	Percentage
Educational Status of Mother	No Schooling	200	25
	Less than 5 years complete	238	29.75
	5-7 years complete	178	22.25
	8-9 years complete	123	15.38
	10 and above	61	7.62
Educational Status of Father	No schooling	230	28.75
	Less than 5 years complete	245	30.62
	5-7 years complete	124	15.5
	8-9 years complete	126	15.75
	10 and above	75	9.375
Member in the family pursuing Higher Education	Yes	212	26.5
	No	588	73.5
Sample Size	800		

Table 5.8 elaborates on the educational status of parents. Largest numbers of both the father and mother did have completed lesser than 5 years of schooling. However, larger numbers of father (230) had no access to school compared to that of mother (200).As much as 74 percent of the members in the family did not have the pursuit of attaining higher education which makes them regrettably self- satisfied.

Figure 5.6

Educational Status of Mother
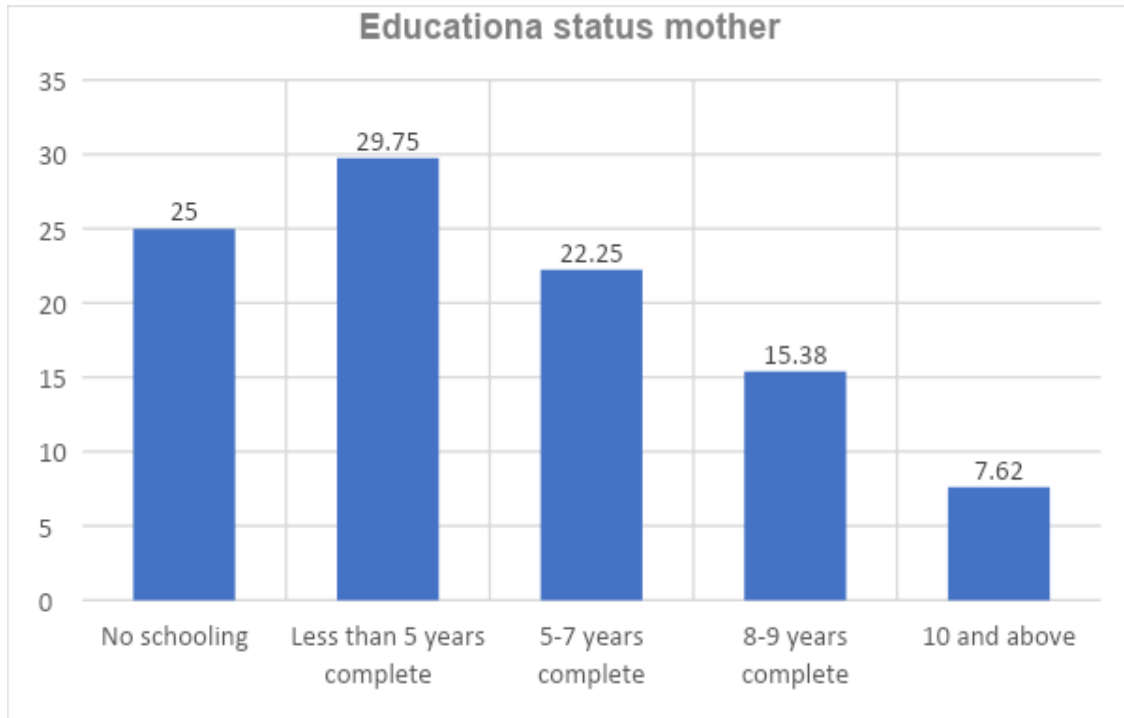
Source: primary data

Figure 5.6 conveys educational status of mother. It is informed that as much as 30 percent of them have only less than 5 years of schooling accompanied by those who never visited schools, others having 5-7 years of schooling etc.

Figure 5.7

Educational Status of Father
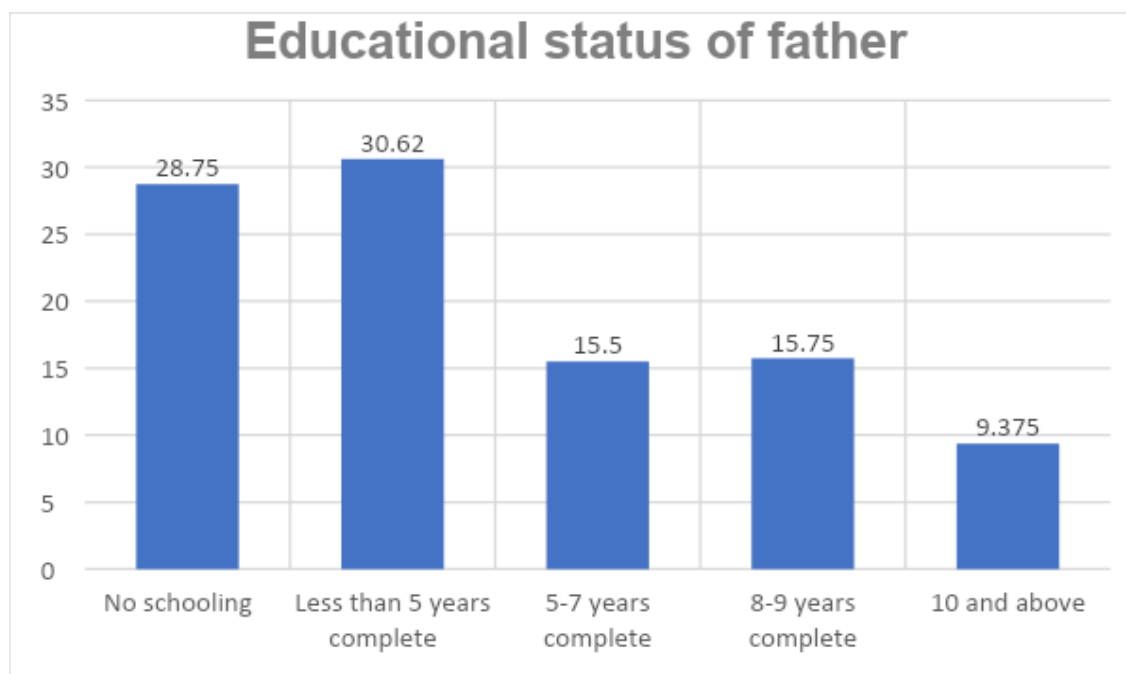
Source: primary data

Figure 5.7 explains educational status of father. It is learnt that as much as 31 percent of them do have only less than 5 years of schooling followed by those who have never had access to school, 5-7 years of schooling, 8-9 years of schooling etc.

Table 5.9

Access of Institutional facilities by Attappady Tribes

Access of Institutional facilities	MEAN	SD
Distance to near Health Facility	15KM	16.9
Distance to near Anganwadi	2.9KM	3.244
Sample size	800	

Source: primary data

Table 5.9 provides information the access of institutional facilities of tribes. It is found that the average distance to near health centre is 15 km while that of Anganwadi is near 3 km. This is a serious problem as the propensity of infant death

increases with increase in distance coupled with lesser availability of mobile health units.

Table 5.10

Awareness about Government Policies

Variables	Category	Number	Percentage
Awareness about different Government Policies and Programmes	Yes	143	17.88
	No	657	82.12
Information about the Policies and Programmes	Oorukootam	71	8.88
	Fellow members	70	8.75
	Government Officials	87	10.88
	Tribal Promoters	287	35.88
	NGOs	285	35.62
Sample Size	800		

Source: primary data

Table 5.10 conveys information on the awareness of tribes with regard to the government policies tailored for their amelioration. As much as 82 percent of the respondents admitted that they were not aware of the government Policies and Programmes. It was mainly through tribal promoters (36 percent) and NGO's (36 percent) that they could avail themselves of the information on Programmes. The contribution of Oorukoottams, fellow beings and Government officials in eliciting information are found to be negligible. The same information can be obtained from the figure 5.8.

Figure 5.8

Information about the Government Policies and Programmes
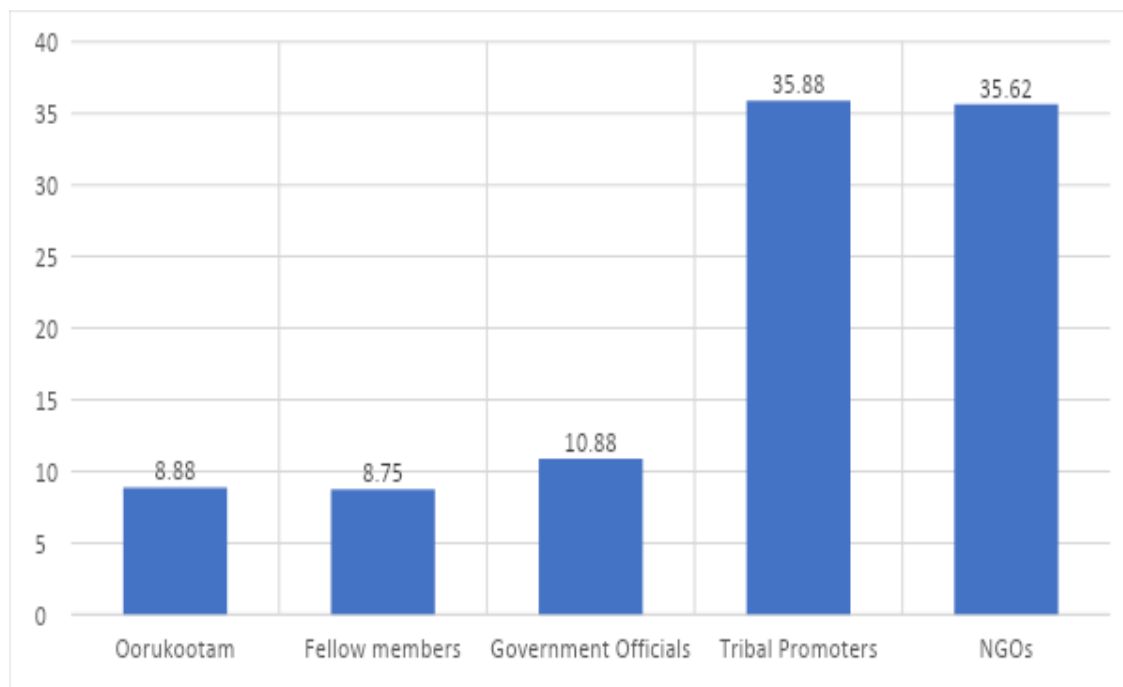
Source: primary data

Table 5.11

Eligibility and Availability to get Government Policies

Variables	Category	Number	Percentage
Eligibility	Yes	721	90.12
	No	79	9.88
Availability	Yes	483	60.38
	No	317	39.62
Sample Size 800			

Source: primary data

Table 5.11 contends that the eligible government policies are available and accessible to tribes at large in the study area. The ineligible and unavailable schemes

are less significant. However, it implies uneven allocation of available resources among tribal children.

Table 5.12

Assessment of Institutional Health and Nutritional Service Delivery Mechanisms at Attappady

Rank	ITDP	MAHILA SAMAKHYA	ACFS	KUDUMB-ASHREE
1 (100 % Satisfaction)	75 (9.38)	88 (11)	77 (9.62)	79 (9.8)
2 (80 % Satisfaction)	99 (12.38)	88 (11)	84 (10.5)	88 (11)
3(60 % Satisfaction)	134 (16.78)	120 (15)	134 (16.75)	130 (16.25)
4(40 % Satisfaction)	176 (22)	167 (20.88)	164 (20.5)	170 (21.25)
5(20 % Satisfaction)	200 (25)	220 (27.5)	210 (26.25)	199 (24.88)
6(0 % Satisfaction)	116 (14.5)	117 (14.62)	131 (16.38)	134 (16.75)
Sample Size	800			

Source: primary data

Table 5.12 conveys the level of satisfaction across the respondent from the health and nutritional service delivery mechanisms. The level of satisfaction is ranked as first, second etc. It is deciphered that the highest level of satisfaction is obtained from the service delivery of Mahlia Samakhya followed by Kudumbasree, ACFS and PO, ITDP. Regarding the second highest satisfaction of 80 percent, it is informed that ITDP is ranked top followed by Kudumbasree and Mahila Samakhya, as both enjoy second rank and by ACFS. So, goes the ranking and level of satisfaction among respondents. This is represented graphically in figure 5.9

Figure 5.9

Level of Satisfaction in Respect of different Government Schemes
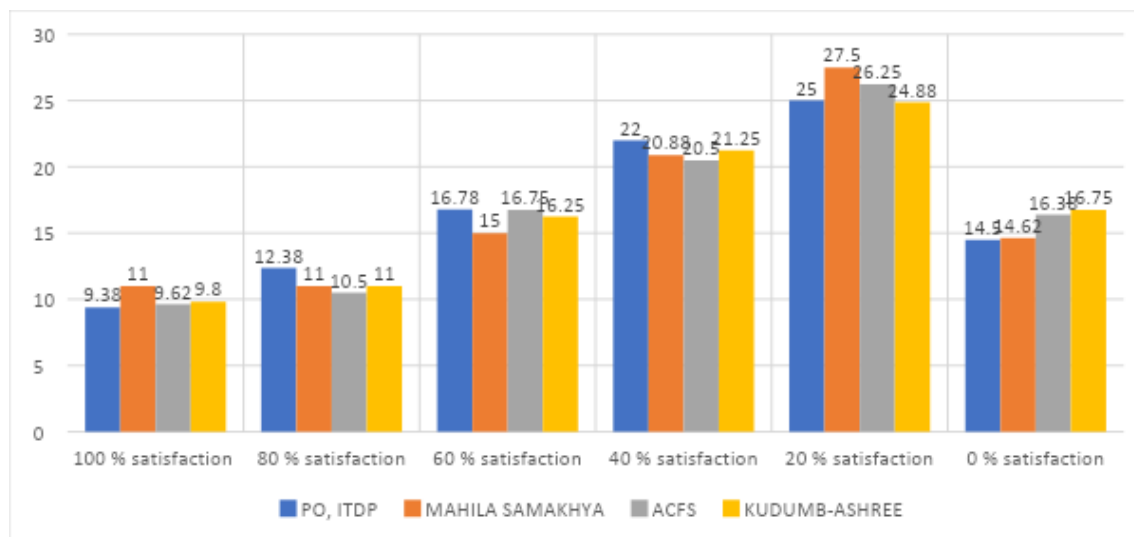
Source: primary data

5. 2 Health Status of Attapady Children

This section is devoted to the meticulous discussion of health status of tribal children and that this is as significant as nutritional status. From the discussion aforesaid, their socio-economic conditions are vulnerable and despicable. This invariably results in unprecedented erosion of nutrition and health among tribal children. Hence, this section focuses on the health status Attappady tribal children aged below 5.

Health is a strategic pre requisite of an individual. If health is lost, the very survival of the individuals is lost. This is more worrisome so far as tribal childrens' poor health are concerned. In this study, 2 important health measures are considered. One is recurring illness and the other is disease for the past two weeks. Here recurring illness means, frequently occurring diseases such as chest infection, running nose, head ache, stomach pain etc.

Table 5.13

Health status of Attappady Tribal Children

Health related variables	Category	Number	Percentage
Recurring- Illness	Yes	375	46.88
	No	425	55.34
Diseases for the Past 2 Weeks	Yes	513	64.12
	No	287	35.88
N=800			

Source: primary data

It is found that 47 percent of tribal children are suffering from recurring illness in one way or the other. Similarly, 64 percent of children are having some kinds of diseases for the past two weeks. Hence, it is concluded that the morbidity is a formidable issue opening the door for malnutrition among children.

Table 5.14

Child Health Status and Recurring Diseases across Region of Attappady

Panchayath	Recurring Illness			Diseases for the Past 2 Weeks		
	Yes	No	Total	Yes	No	Total
Agali	130 (32.5)	270 (67.5)	400 (100)	242 (60.5)	158 (39.5)	400 (100)
Puthur	120 (60)	80 (40)	200 (100)	152 (76)	48 (24)	200 (100)
Sholayur	125 (62.5)	75 (37.5)	200 (100)	119 (59.5)	81 (40.5)	200 (100)
Number			800			800

Source: primary data

Table 5.14 conveys the health status of tribal children across Panchayaths. Agali recorded largest number of children having both recurring illness and diseases

registered for the past 2 weeks. Puthur and Sholayur do not seem to have any noticeable positive difference compared to that of Agali.

Table 5.15

Child Health Status across Communities of Attappady

Communities	Recurring Illness			Diseases for the Past 2 Weeks		
	Yes	No	Total	Yes	No	Total
Irular	231 (57.75)	169 (42.25)	400 (100)	303 (75.75)	97 (24.25)	400 (100)
Mudugar	89 (44.5)	111 (55.5)	200 (100)	118 (59)	82 (41)	200 (100)
Kurumbar	55 (27.5)	145 (72.5)	200 (100)	92 (46)	108 (54)	200 (100)
Number			800			800

Source: primary data

It is discernable from table 5.15 that of the three communities, Irular found themselves atop regarding the recurrence of illness (58 percent) and the emergence of disease (76 percent) for the past 2 weeks. Followed by Irular, comes up Mudugar and Kurumbar respectively.

Table 5.16

Child Health status across gender of Attappady Tribal Children

Gender	Recurring illness			Diseases for the past 2 weeks		
	Yes	No	Total	Yes	No	Total
Male	136 (38.30)	219 (61.70)	355 (100)	215 (60.56)	140 (39.44)	355 (100)
Female	239 (53.70)	206 (46.30)	445 (100)	298 (66.96)	147 (33.04)	445 (100)

Source: primary data

It is quite manifest from table 5.16 that while the recurring illness of male is lower compared to female, the diseases for the past two weeks are woefully higher

for both male and female. This is disturbing trend as it directly influences the health condition and nutritional requirement of tribal children.

5.2.1 Determinants of Child Health Status of Attappady Tribes

From the above discussion, it drives home that the health status of tribal children differs in terms of community, sex, location and the like. Now what are the driving forces determining the health status of tribal children? Here, estimated two logistic regression models by taking recurring illness and diseases of the past 2 weeks as dependent variables and that household head, type of family, source of water , toilet use, household waste dumping, use of smartphone , education of parents and employment of parents as independent variables. The functional forms of the regressions are reported in chapter 3.   The estimated results are given in table 5.17.

Table 5.17 represent estimated odds ratio of explanatory variables and probability value within bracket. The odds ratio above 1.00 indicates that estimated likelihood is more than that of comparison group and below 1.00 indicates it has a lower estimated likelihood.

So far as household head being female is concerned, the likelihood of having 'recurring illness' among tribal children is 69 percent higher compared to male household head. Similarly, with regard to the 'diseases for the past two weeks', it is learnt that if the household head is female, the likelihood of 'tribal children to have diseases for the past weeks' is 23 percent higher compared to male household head. It is quite natural that the female head is saddled with umpteen responsibilities and hence they may not be in a position to look after the children round the clock. This naturally opens the door for the recurrence of illness.

As regards type of family, the likelihood of   'tribal children to have recurring illnesses is 49 percent higher if the type of family is joint. A similar finding is seen in the sense that 'tribal children to have diseases for the past weeks' is 35 percent higher among the joint family compared to nuclear family. This is probably on account of the fact that very little personal care to each and every child

is possible in a joint family whereas the child can enjoy the privilege of personal care and tender treatment in a nuclear family. so far as 'source of water' is concerned, the likelihood of having recurring illness and diseases for the past two weeks is lower by 68 percent and 78 percent respectively if the source of water is domestic. But the coefficient with respect to water sources is insignificant for recurring illness.

The water from other external sources may be contaminated, the use of which paves the way for the recurrence of diseases. Similar situation is found in the case of toilet use and household waste dumping. Concerning the use of toilet, it is deciphered that the probability of recurring illness and diseases for the last 2 weeks is higher by 71 percent and 81 percent respectively if the household are engaged in open defecation. Similarly, the likelihood of having recurrence of illness and diseases for the past two weeks is higher by 91 percent and 75 percent respectively among such households who are in the habit of dumping household waste in the open air. Higher the use of smart phone, lesser the likelihood of recurring illness and diseases for the past two weeks by 12 percent and 32 percent respectively. The likelihood of having recurring illness declines by 34 percent due to the increase of income by 1 rupee. Similarly, the likelihood of having disease for the past weeks declines by 25 percent if the income jacks up by 1 rupee. It is a pointer to the fact that income is a deciding factor in the disease burden among children. The likelihood of recurring illness and disease for the past two weeks is lower for the children by 83 percent and 38 percent respectively if the education of the father is above 8th standard. Very similar finding is seen in the case of the education of mother. It is pointed out that there exist an inverse relation between education of parents and diseases of children.

The likelihood of recurring illness and disease for the past two weeks is lower for the children by 1 percent and 32 percent respectively if the father is employed. Unlike a mother who is tasked with the heavy responsibility of taking care of children, father pays more attention to fetching regular income for the family as a whole. Accordingly, children of such family are unlikely to have nutritional

deficiency compared to the children of an unemployed father. However, the employment of mother provides a different and interesting scenario. The probability of recurring illness and disease for the past 2 weeks among children is higher by 91 percent and 65 percent respectively if the mother is employed compared to unemployed mother. The presence of a mother is somewhat inevitable to fulfil the nutritional requirements of the below 5 year old baby. But a working mother has a lot of limitations as she is required to give heed to her official formalities apart from caring for the baby domestically. The absence of a mother during office hours may be compensated by employing a caretaker or baby sitter or other family member who, however, may not provide affectionate treatment and health care similar to that of mother. This paves the way for the abatement of a sound health among children. In short the analysis may say that the adverse effect of the absence of a mother due to her employment is higher than the positive income effect of her employment on the health status of tribal children of Attappdy.

Table 5.17

Determinants of Child health status of Attappady Tribal Children: Results from Logistic Regression Models

Sl.No.	Explanatory variables	Recurring illness -Logit Function	Diseases for the past two weeks- Logit Function
		Odds ratio	Odds Ratio
1	Household Head (female=1, male =0)	1.686* (0.289)	1.23 (0.289)
2	Type of Family (joint=1;nuclear=0)	1.491** (0.033)	1.356** (0.024)
3	Water Source (residence itself=1; others=0)	1.68 (0.895)	1.78* (0.095)
4	Toilet (Open Defecation=1;Others=0)	1.711** (0.024)	1.811** (0.0243)
5	Household Waste (Dumped in to Open=1;Others=0)	1.910*** (0.001)	1.754*** (0.000)

Sl.No.	Explanatory variables	Recurring illness -Logit Function	Diseases for the past two weeks- Logit Function
		Odds ratio	Odds Ratio
6	Use of Smartphone (Yes=1;Others=0)	.124** (0.045)	.321** (0.035)
7	Income of the Household	.34*** (0.000)	.246*** (0.000)
8	Education of Father (8th and above=1; below 8th =0)	.831 (0.181)	.378 (0.230)
9	Education of Mother (8th and Above=1; Below 8th =0)	.21 (0.696)	.65 (0.696)
10	Employment of Father (Working=1; Not Working=0)	.01 (0.856)	.32 (0.654)
11	Employment of Mother (Working=1; Not Working=0)	1.913*** (0.004)	1.656*** (0.002)
	Constant	19.700*** (0.000)	18.660*** (0.002)
	Chi-Square	2.422*** (0.000)	1.992*** (0.000)
	No: of Observations	800	800

Source: primary data

Source: Author's estimation from survey data

Note: P value are given in parentheses

* Indicates Significance at 10 percent level.

** Indicates Significance at 5 percent level.

*** Indicates Significance at 1 percent

5.3 Nutritional Status of Attapady Tribal Children

The following section analyses in detail the nutritional status of tribal children below the age 5 which is measured in terms of stunting, underweight and wasting.

Table 5.18

Child Nutritional Status of Attappady

Scale	Indicators	Stunting	Underweight	Wasting
1	Very High	241 (30.12)	320 (40)	326 (40.75)
2	High	236 (29.5)	282 (35.25)	276 (34.5)
3	Middle	224 (28)	155 (19.38)	150 (18.75)
4	Low	78 (9.75)	35 (4.38)	30 (3.75)
5	Very Low	21 (2.63)	8 (1)	18 (2.25)
	N =800			

Source: primary data

From table 5.18, it can be surmised that 30 percent of tribal children below the age of 5 reported to have 'very high' stunting. Hardly 3 percent of children do have 'very low' stunting. Similarly, regarding underweight, 40 percent of children reported 'very high' underweight and that only 1 percent have 'very low' underweight. As regards wasting, the analysis can discern that 41 percent of children do belong to 'very high' wasting conundrum and only 4 percent and 2 percent tribal children have 'low' and 'very low' wasting issue. In short, the exploration may say that the issues of wasting, stunting and underweight are 'very high' and 'high' among tribal children in Attappady. The same is also interpreted in the figure 5.10 as shown below.

Figure: 5.10

Nutritional Status of Attapady Children: Stunting, Underweight and Wasting
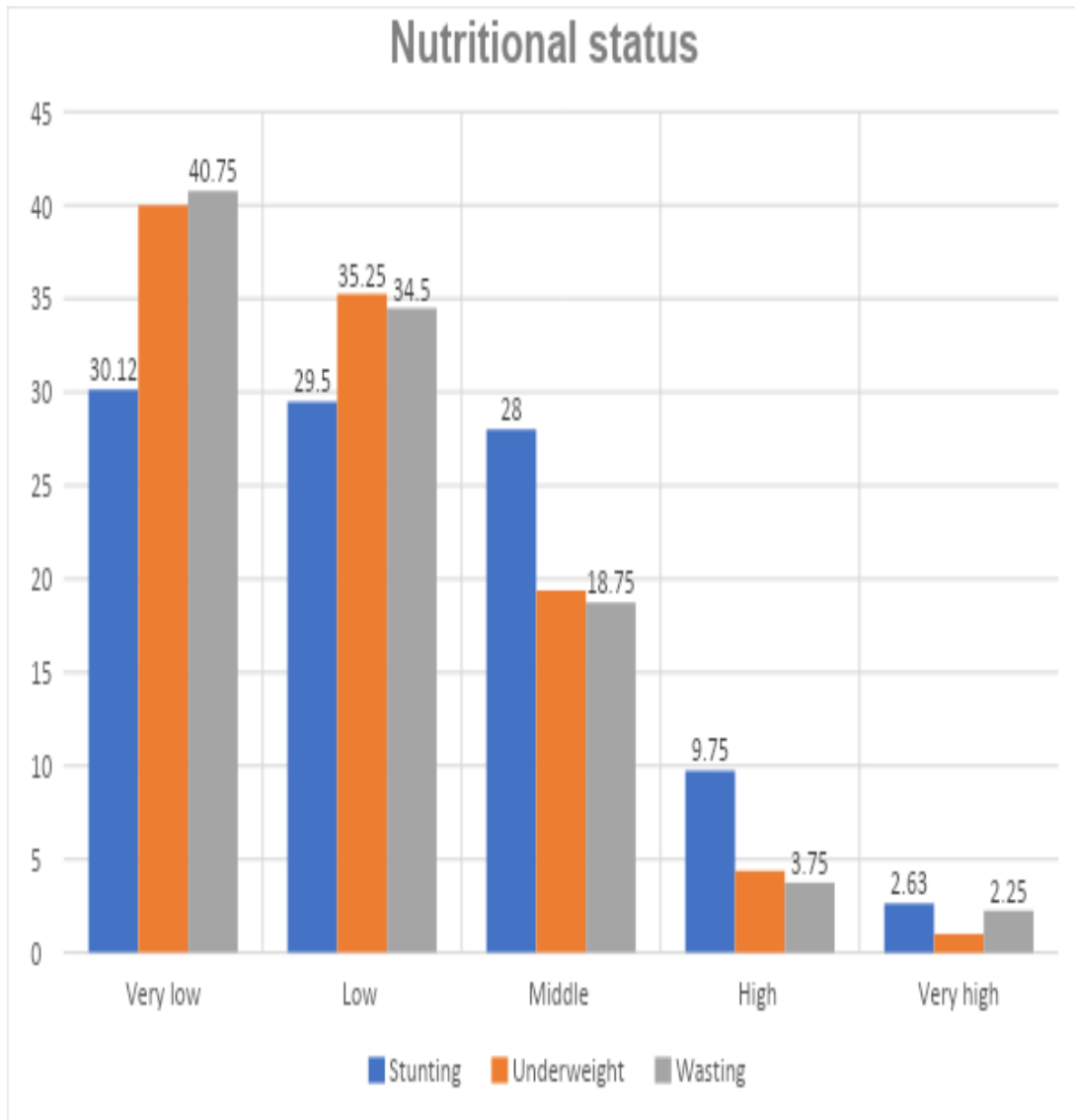
Source: primary data

Table 5.19

Gender-wise Difference in Child Nutritional Status

Scale	Indicators	Stunting		Underweight		Wasting	
		Male	Female	Male	Female	Male	Female
1	Very high	100 (28.16)	141 (31.68)	98 (27.60)	140 (31.46)	175 (49.30)	151 (33.94)
2	High	103 (29.01)	133 (29.88)	108 (30.42)	134 (30.11)	120 (33.80)	156 (35.05)
3	Middle	94 (26.48)	130 (29.22)	90 (25.35)	128 (28.77)	86 (24.22)	64 (14.38)
4	Low	45 (12.68)	33 (7.42)	49 (13.80)	35 (7.86)	17 (4.78)	13 (2.92)
5	Very Low	13 (3.66)	8 (1.77)	10 (2.8)	8 (1.79)	10 (2.82)	8 (1.78)
	No =800	355	445	355	445	355	445

Source: primary data

It is palpable from table 5.19 that 31 percent of female tribal children below the age of 5 reported to have 'very high' stunting. Nearly 2 percent of children do have 'very low' stunting. Similarly, regarding underweight, 31 percent of female children reported 'very high' underweight and that only 2 percent have 'very low' underweight. With regard to wasting, the study can discern that 49 percent of tribal male children do belong to 'very high' wasting and that 3 percent male children have 'very low' wasting issue. So, while 'very low' stunting, wasting and underweight is mainly attributed among male children, male children have 'very high' wasting compared to female children.

Table 5.20

Child Nutritional Status across Community: Stunting & Wasting

Scale	Indicators	Irular		Mudugar		Kurumbar	
		Stunting	Wasting	Stunting	Wasting	Stunting	Wasting
1	Very high	145 (60.16)	105 (30.70)	68 (28.21)	54 (21.25)	28 (11.63)	20 (9.80)
2	High	121 (51.28)	148 (43.27)	78 (33.05)	83 (32.67)	37 (15.68)	42 (20.50)
3	Middle	56 (25)	54 (15.78)	82 (36.60)	90 (35.44)	86 (38.40)	99 (48.53)
4	Low	19 (24.35)	27 (7.89)	23 (29.48)	20 (7.88)	36 (46.15)	25 (12.25)
5	Very Low	1 (4.76)	8 (2.34)	3 (14.28)	7 (2.75)	17 (80.95)	14 (6.87)
Number		342	342	254	254	204	204

Source: primary data

Table 5.20 conveys nutritional status across communities. The Irular community is having 'very high' stunting and wasting (60 and 31 percent respectively) compared to other two communities. The Kurumbar is having 'very low' stunting (81 percent) and wasting (7 percent) with compared to other two communities.

Table 5.21

Child Nutritional Status across Community: Underweight

Scale	Indicators	Underweight		
		Irular	Mudugar	Kurumbar
1	Very high	100 (29.24)	60 (23.62)	21 (10.29)
2	High	153 (44.74)	86 (33.85)	43 (21.07)
3	Middle	50 (14.61)	93 (36.61)	100 (49.02)
4	Low	32 (9.35)	21 (8.27)	24 (11.76)
5	Very Low	8 (2.34)	8 (2.75)	14 (6.87)
	Number	342	254	204

Source: primary data

The extent of underweight tribal children across three communities is depicted in table 5.21. Kurumbar and Mudugar community have better nutritional status in terms of the extent of underweight with compared to that of Irular. While Kurumbar is having 'very low' underweight (7 percent) compared to others, Irular has 'very high' (29 percent) and 'high' (24 percent) underweight. .The issue of underweight of Irular community is more precarious than that of the other two communities.

Table 5.22

Regional-Wise Difference in Child Nutritional Status: Stunting & Wasting

Scale	Indicators	Agali		Puthur		Sholayur	
		Stunting	Wasting	Stunting	Wasting	Stunting	Wasting
1	Very high	113 (28.25)	102 (25.5)	75 (37.5)	70 (35)	103 (51.5)	100 (50)
2	High	109 (27.25)	115 (28.75)	64 (32)	68 (34)	45 (22.5)	48 (24)
3	Middle	86 (21.5)	92 (23)	34 (17)	37 (18.5)	36 (18)	37 (18.5)
4	Low	79 (19.75)	81 (20.25)	23 (11.5)	24 (12)	13 (6.5)	12 (6)
5	Very Low	13 (3.25)	10 (2.5)	5 (2.5)	1 (0.5)	3 (1.5)	3 (1.5)
n Number		400	400	200	200	200	200

Source: primary data

Table 5.22 throws light on the extent of the dilemma of wasting and stunting across three Panchayaths viz Agali, Puthur and Sholaur. While 'very high' stunting and wasting is reported at Sholayur Panchayath, 'middle' and 'very low' stunting and wasting' is reported more at Agali Panchayath.

Table 5.23

Nutritional Status across Regions of Attappady: Underweight

Scale	Indicators	Underweight		
		Agali	Puthur	Sholayur
1	Very high	98 (25.5)	73 (35)	98 (49)
2	High	116 (28.75)	65 (34)	50 (25)
3	Middle	95 (23)	39 (18.5)	39 (19.5)
4	Low	83 (20.25)	22 (12)	9 (4.5)
5	Very Low	08 (2.5)	1 (0.5)	4 (2)
Number		400	200	200

Source: primary data

Table 5.23 analyses the extent of nutritional status among tribal children across three Panchayathhs. Agali and Sholayur register same record in the attainment of very low nutritional status when both have similar cases of underweight. When nutritional status is low and middle, Agali Panchayath bears the brunt more than that of Puthur and Sholayur Panchayaths. However, when nutritional status is high, Puthur and Sholayur Panchayathhs prove to be better than that of Agali.

Table 5.24

Child Nutritional Status and type of Family: Stunting and Wasting

Scale	Indicators	Nuclear		Joint	
		Stunting	Wasting	Stunting	Wasting
1	Very high	99 (28.70)	102 (29.56)	156 (34.28)	167 (36.70)
2	High	123 (35.65)	112 (32.46)	120 (26.38)	157 (34.50)
3	Middle	70 (20.28)	73 (21.15)	123 (27.04)	85 (18.68)
4	Low	40 (11.60)	46 (13.34)	45 (9.8)	25 (5.50)
5	Very Low	13 (3.76)	12 (3.48)	11 (2.42)	21 (4.62)
Number		345	345	455	455

Source: primary data

The extent of nutritional status across family mirrored in terms of stunting and wasting is elucidated in table 5.24. The problem of 'very high' and 'high' stunting and wasting is seen in Joint family compared to Nuclear family. The 'very low' stunting is seen more at Nuclear family than that of Joint family, on the other hand 'very low' wasting is seen more at Joint family than that of Nuclear family

Table 5.25

Child Nutritional Status and Type of Family: Underweight

| Scale | Indicators | Underweight | |
		Nuclear	Joint
1	Very high	90 (26.08)	168 (36.92)
2	High	118 (34.20)	156 (34.28)
3	Middle	79 (22.90)	86 (18.90)
4	Low	48 (13.91)	25 (5.49)
5	Very Low	10 (2.90)	20 (4.40)
Number		345	455

Source: primary data

The case of underweight is analysed across the type of family in table 5.25. The 'very high' underweight is seen more at Joint family compared to Nuclear family. The 'very low' underweight is a welcome sign and it is found more at Joint family than that of Nuclear family.

Table 5.26

Child Nutritional status and Household Head: stunting and wasting

Scale	Indicators	Male headed		Female headed	
		Stunting	Wasting	Stunting	Wasting
1	Very high	100 (28.24)	99 (27.96)	175 (39.42)	199 (44.82)
2	High	111 (31.35)	115 (32.48)	165 (37.16)	145 (32.65)
3	Middle	78 (22.04)	86 (24.30)	70 (15.77)	84 (18.92)
4	Low	57 (16.10)	48 (13.56)	19 (4.28)	15 (3.38)
5	Very Low	8 (2.25)	6 (1.01)	15 (3.37)	1 (0.22)
	Number	356		444	

Source: primary data

Table 5.26 dilates upon the extent of stunting and wasting across household head. The head of the household is divided into male headed and female headed. The female headed household is having 'very high' stunting and wasting than that of male headed household and vice versa. Usually, female household head is saddled with a lot of responsibilities. They have to walk more and talk more and hence to care the kith and kin more. Naturally, their nutritional status is on a lower side.

Table 5.27

Child Nutritional status and household head: Underweight

Scale	Indicators	Underweight	
		Male headed	Female headed
1	Very high	100 (28)	197 (44.36)
2	High	116 (32.58)	146 (32.88)
3	Middle	88 (24.72)	85 (19.14)
4	Low	46 (12.92)	15 (3.37)
5	Very Low	6 (1.68)	1 (0.22)
Number		356	444

Source: primary data

The case of nutritional status is analysed in terms of underweight tribal children across male headed and female headed families. The female headed households are seen to have 'very high' underweight than that of male headed households. There is no significant difference across male and female headed households on 'middle' underweight. . The male headed is having 'very low' underweight than that of female headed households.

Table 5.28

Child Nutritional status and Mother's education:
Stunting, Wasting and Underweight

Scale	Nutritional Status	No schooling	Less than 5 years complete	5-7 years complete	8-9 years complete	10 and above
		Stunting				
1	Very high	89 (44.5)	98 (41.17)	68 (38.20)	45 (36.58)	19 (31.14)
2	High	69 (34.5)	76 (31.95)	50 (28.08)	36 (29.26)	23 (37.74)
3	Middle	30 (15)	45 (18.90)	33 (18.54)	31 (25.20)	10 (16.43)
4	Low	12 (6)	15 (6.30)	20 (11.24)	8 (6.50)	7 (11.49)
5	Very low	0 (0)	4 (1.68)	7 (3.94)	3 (2.46)	2 (3.28)
	No. Observation	200	238	178	123	61
		Wasting				
1	Very high	88 (44)	96 (40.34)	65 (36.51)	44 (35.78)	15 (24.59)
2	High	70 (35)	77 (32.35)	52 (29.22)	32 (26.01)	20 (32.78)
3	Middle	29 (14.5)	44 (18.49)	32 (17.88)	37 (30.08)	15 (24.60)
4	Low	10 (5)	17 (7.14)	21 (11.79)	5 (4.06)	6 (9.84)
5	Very low	3 (1.5)	4 (1.68)	8 (4.50)	5 (4.06)	5 (8.19)
	Number	200	238	178	123	61
		Underweight				
1	Very high	86 (43)	95 (39.90)	65 (36.52)	44 (35.78)	16 (26.22)
2	High	70 (35)	78 (32.28)	52 (29.21)	30 (24.40)	20 (32.78)
3	Middle	31 (15.5)	42 (17.65)	32 (17.98)	39 (31.70)	15 (24.60)
4	Low	11 (5.5)	19 (7.99)	20 (11.24)	5 (4.06)	5 (8.20)
5	Very low	2 (1)	4 (1.68)	9 (5.05)	5 (4.06)	5 (8.20)
	Number	200	238	178	123	61

Source: primary data

Table 5.28 discusses the extent of nutritional status, the issues of stunting, wasting and underweight and mother's education. It is comprehensible that education of mother plays a decisive role in determining the nutritional status and the malnutrition issues like stunting, wasting and underweight. It is evident from the table that the malnutrition issues and very low nutritional security is associated with education of mother being less than 5 years. The "very high' stunting, wasting and underweight is associated with mother having 'no schooling.'

Table 5.29

Child Nutritional Status and Father's Education:
Stunting, Wasting and Underweight

Scale	Indicators	No schooling	Less than 5 years complete	5-7 years complete	8-9 years complete	10 and above
		Stunting				
1	Very high	76 (33.04)	90 (36.74)	40 (32.25)	37 (29.36)	07 (9.33)
2	High	77 (33.47)	85 (34.67)	37 (29.84)	27 (21.43)	16 (21.34)
3	Middle	51 (22.17)	45 (18.37)	32 (25.81)	29 (23.01)	37 (49.33)
4	Low	21 (9.14)	20 (8.16)	12 (9.68)	27 (21.44)	8 (10.66)
5	Very Low	5 (2.18)	5 (2.04)	3 (2.42)	6 (4.76)	7 (9.34)
	No observation	230	245	124	126	75
		Wasting				
1	Very high	77 (33.48)	106 (43.26)	41 (33.06)	38 (30.15)	08 (10.66)
2	High	78 (33.92)	79 (32.24)	52 (41.94)	37 (29.36)	17 (22.66)
3	Middle	52 (22.60)	57 (23.26)	15 (12.09)	28 (22.22)	35 (46.66)
4	Low	22 (9.56)	2 (0.816)	11 (8.88)	10 (7.94)	8 (10.66)

Scale	Indicators	No schooling	Less than 5 years complete	5-7 years complete	8-9 years complete	10 and above
		Stunting				
5	Very low	1 (0.43)	1 (0.40)	5 (4.04)	13 (10.32)	7 (9.33)
Number		230	245	124	126	75
		Underweight				
1	Very high	80 (34.78)	100 (40.81)	40 (32.25)	40 (31.74)	09 (12)
2	High	75 (32.26)	85 (34.70)	51 (41.12)	36 (28.57)	16 (21.34)
3	Middle	50 (21.71)	56 (22.85)	17 (13.70)	26 (20.64)	34 (45.33)
4	Low	24 (10.42)	2 (0.82)	12 (9.69)	13 (10.31)	9 (12)
5	Very low	1 (0.43)	2 (0.82)	4 (3.22)	11 (8.74)	7 (9.33)
Number		230	245	124	126	75

Source: primary data

Table 5.29 elaborates father's education, the extent of nutritional status, and the issues of stunting, wasting and underweight. It is evident that education of father plays a critical role in determining the nutritional status. It is gauged from the table that the malnutrition issues like stunting and wasting of children becomes 'very high' as and when father's education comes down. As and when father's education improves, nutritional status also progresses to be high' and 'very high'.

Table 5.30

Child Nutritional Status and Employment Status of Mother:
Stunting and Wasting

Scale	Indicators	Working		Not working	
		Stunting	Wasting	Stunting	Wasting
1	Very high	289 (44.46)	296 (45.54)	38 (25.34)	43 (28.66)
2	High	245 (37.70))	242 (37.24)	39 (26)	38 (25.34)
3	Middle	90 (13.84)	69 (10.61)	45 (30)	44 (29.34)
4	Low	21 (3.24)	41 (6.3)	14 (9.34)	15 (10)
5	Very Low	5 (0.76)	02 (0.30)	14 (9.34)	11 7.34)
N=800		650		150	

Source: primary data

Table 5.30 observes the extent of stunting and wasting interpreted in terms of the employment status of mother. The employment status of mother is divided into working and not working respectively. It is evident that 'very high' and 'high' wasting and stunting is associated with the mother of those children who are 'working.' The 'low' and 'very low' stunting and wasting of tribal children is related to that of 'not working' mother.

Table 5.31

Child Nutritional Status and Employment Status of Mother: Underweight

Scale	Indicators	Underweight	
		Working	Not working
1	Very high	301 (46.30)	40 (26.66)
2	High	230 (35.38)	41 (27.33)
3	Middle	74 (11.38)	44 (29.34)
4	Low	30 (4.61)	16 (10.66)
5	Very Low	15 (2.30)	10 (6.66)
N=800		650	150

Source: primary data

Table 5.31 enunciates the extent of underweight of tribal children vis-à-vis employment status of mother. The issue of 'very high' underweight among tribal children are associated with those mothers who are working. However, 'the not' working' mother has plenty of time to look into the nutritional requirements of their children and hence the issue of overweight disappears among such children.

Table 5.32

**Child Nutritional Status and Employment Status of
Father: Stunting and Wasting**

Scale	Indicators	Working		Not working	
		Stunting	**Wasting**	**Stunting**	**Wasting**
1	Very high	103 (26.54)	99 (25.52)	164 (39.80)	179 (43.44)
2	High	105 (27.06)	98 (25.25)	142 (34.44)	151 (36.65)
3	Middle	103 (26.54)	110 (28.35)	90 (21.84)	67 (16.26)
4	Low	64 (16.50)	70 (18.04)	12 (2.92)	10 (2.42)
5	Very Low	13 (3.35)	11 (2.84)	4 (0.98)	5 (1.22)
N=800		388		412	

Source: primary data

Table 5.32 summarises the extent of wasting and stunting of tribal children vis-à-vis employment status of father. The stunting and wasting of tribal children is seen to be 'very high' and 'high' among such father who is 'not working.' The trend becomes reversal as and when the father is 'working.'

Table 5.33

Child Nutritional status and employment status of father: Underweight

Scale	Indicators	Underweight	
		Working	Not working
1	Very high	97 (25.52)	175 (42.48)
2	High	101 (26.03)	151 (36.65)
3	Middle	111 (28.60)	71 (17.24)
4	Low	69 (17.78)	12 (2.92)
5	Very Low	11 (2.84)	3 (7.28)
Number		388	412

Source: primary data

Table 5.33 discusses the extent of underweight of tribal children vis-a-vis employment status of father. The issue of underweight of tribal children becomes 'very high' and 'high' of such a father who is 'not working.' The conundrum of 'very low' underweighted children is seen more among 'working' father.

5.3.1 Determinants of nutritional status of Children of Attappady Tribes

From the above discussion, it is inferred that nutritional status of tribal children are woefully poor as the three important indicators such as stunting, wasting and underweight. There is considerable difference in the nutritional status in terms of gender, communities, Panchayaths, social groups, type of family, nature of household head and parents' education and employment. In the forthcoming section, the study examine how these factors significantly influence on nutritional status of tribal children by applying Ordered Probit regression model. Here estimated three different regression models separately stunting, wasting and underweight as dependent variables and independent variables such as gender, community, Panchayaths, household head etc. This analysis will tell us how these

factors significantly influence on likelihood of nutritional status. Table 5.34 provides the estimated results of determinants of stunting. So far as gender is concerned, the probability of stunting is lower by.015 (1.5 percent) among female children compared to male children. Similarly, regarding community, it is seen that Irular has lower stunting by 33 percent compared to the reference category Kurumbar. Mudugar also has lower nutritional status by 23 percent compared to Kurumbar. That is to say, Kurumbar seems to be better off in terms of socio-economic conditions compared to other two groups. Regarding Panchayaths, compared to Agali, nutritional status of Puthur and Sholayur is lower by 6.9 percent and 21 percent respectively. So far as type of family is concerned, compared to nuclear family, joint family has had 3.1 percent lower nutritional status.

As regards household head, the nutritional status of children headed by females are having lower nutritional status of 65 percent compared to male household head. Mother's education also contributes nutritional status of tribal children. The nutritional status is 35 percent lower among those tribal children whose mother has education below 8th standard with compared to children whose mother has education above 8th standard. Like this, father's education is also found to be a deciding factor. The nutritional status is 33 percent lower among those tribal children whose father has education below 8th standard with compared to children whose father has education above 8th standard. The employment of parents also significantly influences the nutritional status of their children. Regarding mother's employment, it is seen that the nutritional status of children of working mother is 1.2 percent lower compared to the nutritional status of the children of unemployed mother. This is probably due the fact that working mother may not be able to take care of their children and feed them more earnestly than that of unemployed mother. But the employment status of father provides a contrasting result. The probability of nutritional status of children of working father is 1.5 (150 percent) higher compared to children whose parents are not working. This may be due the fact that the consistency and periodicity of income is more among working father who can therefore give more care and nutrition to their children. This may not be the case of unemployed father.

Table 5.34

Ordered Probit Regression Results: Stunting

	Explanatory Variables	Nutritional status: stunting		
		Coefficient	z	P>z
1	Gender of child (female=1;male=0)	-0.015[*]	2.23	0.024
2	Community: Irular	-0.33[*]	1.5	0.095
	Community: Mudugar	-0.23[***]	3.81	0.00
3	Panchayath: Puthur	-0.069**	0.35	0.01
	Panchayath: Sholayur	-0.210[***]	3.36	0.000
4	Type of family: joint=1,nuclear =0)	-0.031***	3.03	0.000
5	Household head: (female=1;male=0)	-0.650[***]	3.82	0.000
6	Mother education:(below 8th =1; 8th and above=0)	-0.353[*]	1.121	0.072
7	Father education education:(below 8th= 8th and above =0)	-0.33[***]	-3.7	0.00
8	Mother employment status(working=1; not working =0)	-0.012***	3.7	0.00
9	Father employment status (working=1; not working =0)	1.508[***]	-3.39	0.001
	Log likelihood	288.8		

Source: primary data

Reference category for community is Kurumbar.

Reference category for Panchayath is Agali.

Note: 1) *** indicates 1 percent level of significance; ** indicates 5 percent level of significance; * indicates 10 percent level of significance

2) z and P>|z| – These are the test statistics and p-value, respectively, for the null hypothesis that an individual predictor's regression coefficient is zero given that the rest of the predictors are in the model. The test statistic z is the ratio of the Coefficient to the Std. Err. of the respective predictor. The z value follows a standard normal distribution which is used to test against a two-sided alternative hypothesis that the Coefficient is not equal to zero. The probability that a particular z test statistic is as extreme as, or more so, than what has been observed under the null hypothesis is defined by P>|z|.

Source: Estimated from Sample Survey, 2021

Table: 5.35

Ordered Probit Regression Results: Wasting

	Explanatory Variable	Nutritional status: Wasting		
		Coefficient	z	P>z
1	Gender of child (female=1;male=0)	-0.035***	3.11	0.000
2	Community: Irular	-0.33*	1.6	0.095
	Community: Mudugar	-0.43***	3.87	0.00
3	Panchayath:Puthur	-0.324**	-0.45	0.01
	Panchayath: Sholayur	-0.1276***	3.36	0.000
4	Type of family: joint=1,nuclear =0)	-0.0666***	2.05	0.000
5	Household head: (female=1;male=0)	-0.500***	3.99	0.00
6	Mother education:(below 8th=1; 8th and above =0)	-0.4000*	1.21	0.072
7	Father education education:(below 8th=1; 8th and above =0)	-0.234***	-3.86	0.000
8	Mother employment status(working=1; not working =0)	-0.0322***	3.45	0.00
9	Father employment status (working=1; not working =0)	1.403***	3.48	0.001
	Log likelihood	285.00		

Source: primary data

Reference category for community is Kurumbar.

Reference category for Panchayath is Agali.

Note: 1) *** indicates 1 percent level of significance; ** indicates 5 percent level of significance; * indicates 10 percent level of significance

2) z and P>|z| – These are the test statistics and p-value, respectively, for the null hypothesis that an individual predictor's regression coefficient is zero given that the rest of the predictors are in the model. The test statistic z is the ratio of the Coefficient to the Std. Err. of the respective predictor. The z value follows a standard normal distribution which is used to test against a two-sided alternative hypothesis that the Coefficient is not equal to zero. The probability that a particular z test statistic is as extreme as, or more so, than what has been observed under the null hypothesis is defined by P>|z|.

Source: Estimated from Sample Survey, 2021

Table 5.35 provides the estimated results of determinants of wasting. So far as gender is concerned, the probability of lower nutritional status by 0.035 (3.5 percent) among female children compared to male children. Similarly, regarding community, it is seen that Irular has lower nutritional status by 33 percent compared to the reference category Kurumbar. Mudugar also has lower nutritional status by 43 percent compared to Kurumbar. That is to say, Kurumbar seems to be better off in terms of socio-economic conditions compared to other two groups. Regarding Panchayaths, compared to Agali, nutritional status of Puthur and Sholayur is lower by 32 percent and 12 percent respectively.

So far as type of family is concerned, compared to nuclear family, joint family has 6.6 percent lower nutritional status. As regards household head, the nutritional status of children headed by females is having lower nutritional status of 50 percent compared to male household head. Mother's education also contributes nutritional status of tribal children. The nutritional status is 40 percent lower among those tribal children whose mother has education below 8th standard with compared to children whose mother has education above 8th standard. Like this, father's education is also found to be a deciding factor. The nutritional status is 23 percent lower among those tribal children whose father has education below 8th standard with compared to children whose father has education above 8th standard. The employment of parents also significantly influences the nutritional status of their children. Regarding mother's employment, it is seen that the nutritional status of children of working mother is 3.2 percent lower compared to the nutritional status of the children of unemployed mother. The same reason of stunting can also be attributed here. But the employment status of father provides a different result. The probability of nutritional status of children of working father is 1.4 (140 percent) higher compared to children whose parents are not working. This may be due the fact that the regularity of income is more among working father who can therefore give nutritional care to their children. But unemployed father can only ill afford it.

Table: 5.36

Ordered Probit Regression Results: Underweight

	Explanatory Variable	Nutritional status: Underweight		
		Coefficient	z	P>z
1	Gender of child (female=1;male=0)	-0.043***	2.92	0.000
2	Community: Irular	-0.34***	2.6	0.0095
	Community: Mudugar	-0.33***	3.86	0.00
3	Panchayath:Puthur	-0.324**	-0.45	0.01
	Panchayath: Sholayur	-0.1243***	3.45	0.000
4	Type of family: joint=1,nuclear =0)	-0.044***	2.55	0.000
5	Household head: (female=1;male=0)	-0.124***	3.33	0.000
6	Mother education:(below 8th =1; 8th and above =0)	-0.0503***	2.21	0.003
7	Father education education:(below 8th =1; 8th and above =0)	-0.234***	-3.86	0.000
8	Mother employment status(working=1; not working =0)	-0.004***	3.25	0.00
9	Father employment status (working=1; not working =0)	1.345***	2.57	0.001
	Log likelihood	284.00		

Source: primary data

Reference category for community is Kurumbar.

Reference category for Panchayath is Agali.

Note: 1) *** indicates 1 percent level of significance; ** indicates 5 percent level of significance; * indicates 10 percent level of significance

2) z and P>|z| – These are the test statistics and p-value, respectively, for the null hypothesis that an individual predictor's regression coefficient is zero given that the rest of the predictors are in the model. The test statistic z is the ratio of the Coefficient to the Std. Err. of the respective predictor. The z value follows a standard normal distribution which is used to test against a two-sided alternative hypothesis that the Coefficient is not equal to zero. The probability that a particular z test statistic is as extreme as, or more so, than what has been observed under the null hypothesis is defined by P>|z|.

Source: Estimated from Sample Survey, 2021

Table 5.36 provides the estimated results of determinants of underweight. So far as gender is concerned, the probability of lower nutritional status by 0.043) among female children compared to male children. Similarly, regarding community, it is seen that Irular has lower nutritional status by 34 percent compared to the reference category Kurumbar. Mudugar also has lower nutritional status by 33 percent compared to Kurumbar. That is to say, Kurumbar seems to be better off in terms of socio-economic conditions compared to other two groups. Regarding Panchayaths, compared to Agali, nutritional status of Puthur and Sholayur is lower by 32 percent and 12 percent respectively. So far as type of family is concerned, compared to nuclear family, joint family has 4.4 percent lower nutritional status.

As regards household head, the nutritional status of children headed by females are having lower nutritional status of 12percent compared to male household head. Mother's education also contributes nutritional status of tribal children. The nutritional status is 5 percent lower among those tribal children whose mother has education below 8th standard with compared to children whose mother has education above 8th standard. Like this, father's education is also found to be a deciding factor. The nutritional status is 23 percent lower among those tribal children whose father has education below 8th standard with compared to children whose father has education above 8th standard. The employment of parents also significantly influences the nutritional status of their children. Regarding mother's employment, it is seen that the nutritional status of children of working mother is lower compared to the nutritional status of the children of unemployed mother. But the employment status of father provides a different result. The probability of nutritional status of children of working father is 1.34 units higher compared to children whose parents are not working. It is noticed that in the case of stunting and wasting, the consistency of income is more among working father who can therefore give nutritional care to their children. But unemployed father 'case is quite otherwise.

CHAPTER VI

NUTRITIONAL INEQUALITY AND EFFECTIVENESS OF INSTITUTIONAL INTERVENTIONS FOR TRIBAL CHILDREN: A STUDY OF ATTAPPADY BLOCK OF KERALA

The above chapter explained the health and nutritional status of children below the age 5 and its variation across different groups and also found out the important determinants of the both. Chapter VI examines the nutritional inequality and its determinants of Attappady tribal children and also discusses the effectiveness of government policy interventions to ameliorate a lot of tribes.

## 6.1 Determinants of Nutritional Inequality of Attapady Children

It is deciphered that unequal distribution of nutritional status among tribal children are found out from the above discussion. Hence, it is deemed desirable to analyse the inequality lurking behind child nutrition which is discussed below. For this, here constructed child nutritional index by aggregating three anthropomorphic indicators such as stunting, wasting and underweight. The details of index are discussed in the methodology chapter 3.

6.1.1 Child nutritional index

Figure 6.1 elucidates that estimated 37 percent of the tribal children are found to be belonging to *very high* malnutrition index followed by 33 percent being *high* malnutrition index, 22 percent having *middle* malnutrition index, 6 percent with *low* malnutrition index and finally a paltry 2 percent having *very low* malnutrition index.
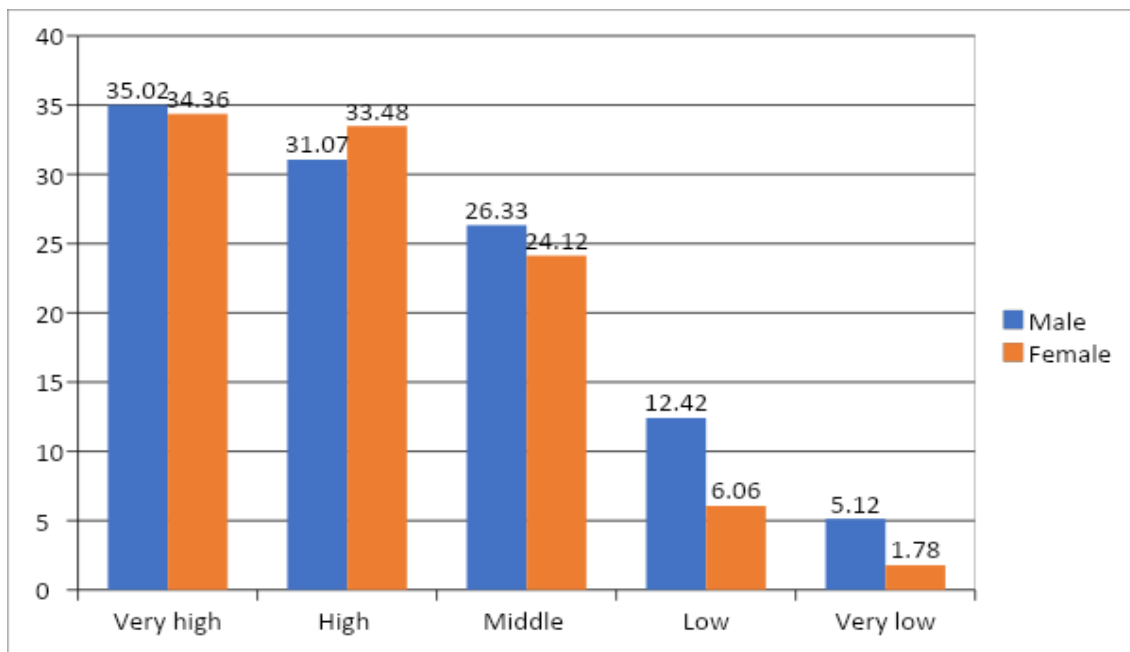
Figure: 6.1

Distribution of Child malnutrition index of Attappady
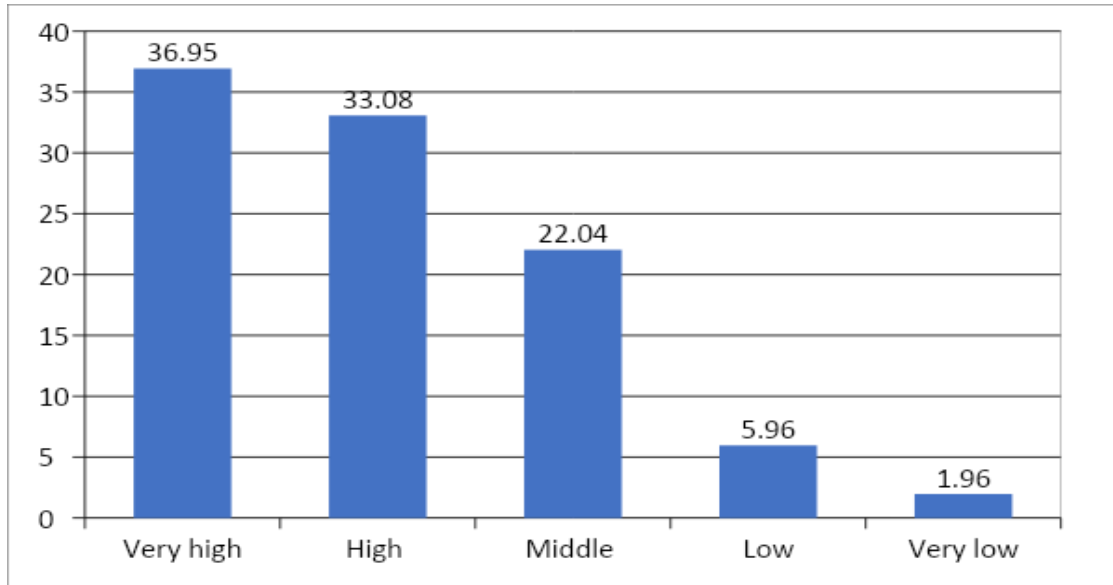
Source: primary data

Figure: 6.2

Distribution of Child Malnutrition Index between Male and Female

Source: primary data

Figure 6.2 depicts gender disparity in malnutrition index. It is seen that both male and female have *very high* malnutrition index followed by *high* malnutrition index of female compared to male and moving to *middle* malnutrition index with male a little higher, *low* malnutrition index reported more by male compared to counterparts and finally *very low* malnutrition index again reported more by male indicating that   malnutrition index, as a matter of fact is higher among female.

To find out the inequality in nutritional status, the study applied RIF regression of Firpo et.al. (2009, 2018) by taking child nutrition index as dependent variable and tribal groups, income, family size, parents' education, age at marriage, habit of narcotic drinks, water quality, birth order, recurring illness, birth interval, breast feeding, food taken, fruits during pregnancy, distance to health centre, access of Government schemes as independent variables. For measuring inequality, two RIF distributional statistics such as variance and Gini index are used. These inequality measures have been made for both male and female. The detailed discussion of the model has been elucidated in methodological chapter 3. RIF regression is one of the important modern techniques to understand the changes in the distributional statistics such as quantiles, variance a Gini index. The RIF will tell us the effect of changes in the distribution of independent variables on the unconditional distribution of the dependent variable. In other words, RIF regression estimates the partial effect of distribution of covariates on the distributional statistics (variance, Gini and quantile) of the dependent variable.

The table 6.1 is the result of RIF regression of inequality for male and female children. So far as tribal group is concerned, the result shows that if the tribal children below the age of 5 belong to Irular community compared to reference category 'Kurumbar', variance of nutritional inequality of both male and female of Irular rises. Similar pattern is seen in the case of Gini inequality. But the effect of inequality is higher for female in the case of variance. So far as Mudugar is concerned, variance of nutritional inequality of both male and female rises compared to reference category 'Kurumbar'. From this, it can be ascertained that with compared to reference category, the variance and Gini nutritional inequality is

higher for both male and female among Irular and Mudugar community. Regarding household income, it is seen that income significantly influences the nutritional inequality for both male and female children. An increase in the income of the household reduces the level of nutritional inequality in terms of variance and Gini index. The income effect is higher for male children rather than the counterpart. This is quite explicit as income perks up, more spending is made on nutritional items which dwindles the inequality.

Family size significantly influences nutritional inequality. Higher the family size, higher the level of nutritional inequality in terms of variance and Gini index and that the effect is higher for female than male. This is probably due to the prevalence of gender discrimination among tribes. Regarding the education of parents, it is seen that higher level of nutritional inequality of tribal children in terms of variance and Gini index is found among such parents who have education lesser than 8th standard. It drives home that education of parents plays an impactful role in determining the nutritional status of their children. Education enlarges mental horizon which in turn realizes the imperative necessity of having nutritional food among the children. It is equally noteworthy that higher the age at marriage of parents, higher the level of nutritional inequality in terms of variance and Gini index. This is due to the fact that the level of child health tails off as the reproductive capability of parents comes down due to increase in age at marriage. If the parents' have habit of drinking , the level of nutritional inequality in terms of variance and Gini index rises and that the effect is higher for male children than female children. Similarly, the intake of water also influences the nutritional inequality of tribal children.

The level of nutritional inequality in terms of variance and Gini index rises among children if the intake of water is contaminated and that the adverse effect is higher among female than male child. It is interesting to observe that if the birth order of children is second and above, the level of nutritional inequality in terms of variance and Gini index of such children increases considerably and it is higher among male child. It is perceived that more or less similar findings regarding the

variable 'birth interval 'are found out . Lesser the birth interval in between the children, higher the level of nutritional inequality in terms of variance and Gini index among them. It must be due to the fact that lesser spacing and higher birth order between children heightens the nutritional deficiency among children. There is no wonder that compared to those who do not have recurring disease, higher the recurring illness of children, higher the level of nutritional inequality in terms of variance and Gini index. Those tribal children who are subject to irregular breast feeding have their level of nutritional inequality in terms of variance and Gini index on higher side. And this is more among male children. Higher the irregularity of mothers' food and fruits during pregnancy, higher the level of nutritional inequality in terms of Gini index and variance for both male and female children, but it is higher among male compared to their counterpart.

Distance to health centre is also positively associated with nutritional inequality. This is the most pressing issue among tribal children at Attappady .it is sorry to say that considerable amount of pre mature death takes place when health centers are far away from their hamlets . And this is found more among such tribal family who are residing in the hinterland. During emergency situation, they are forced to go either to Coimbatore of Tamil Nadu State or to Mannarkkad of Palakkad district. With regard to the variable 'access to Government schemes', if the children do not have access to government schemes, the level of nutritional inequality in terms of variance and Gini index rises and the adverse effect is higher among male children. As per the average RIF inequality value as can be seen in the table, the level of nutritional inequality in terms of variance and Gini index is found more among female children (0.657 in the case of variance inequality index and 0.146 in the case of Gini inequality index.)

Table 6.1

Determinants of Child Nutritional Inequality-RIF Regression of Inequality measures for Male and Female

	Inequality measures	Variance		Gini	
		Male	**Female**	**Male**	**Female**
1	Group: Irular	.0223*** (.00280)	.0351*** (.0065)	.0019*** (.0003)	.00115*** (.00075)
2	Group: Mudugar	.00021*** (.00004)	.0004*** (.00008)	.000015*** (.00000)	.00001*** (.0000107)
3	Income	-.0700* (.02467)	-.0549 (.076159)	-.01049* (.032306)	-.00511 (.0101)
4	Family size	.5310** (.0647)	1.011** (.1863)	.05359** (.0068)	.0957** (.0198)
5	Father education (less than 8th std=1;above=0)	.3263** (.0535)	.4550** (.0162)	.0291** (.0556)	.0351** (.01602)
6	Mother education(less than 8th std=1;above=0)	.5424*** (.1578)	.2162* (.0595)	.05617*** (.0138)	.02603* (.00434)
7	Age at marriage	.5217 (.744828)	.1393936 (.1425864)	.0465 (.78251)	.00428 (.58204)
8	Parents' habit of narcotic/drinking(yes=1; no=0))	.717*** (.074)	.442** (.0028)	.0651*** (.0087)	.0380* (.0322)
9	Water (not purified water=1;purified=0))	.4018** (.088)	.302* (.109)	.0371*** (.0092)	.0246* (.013)
10	Birth order(second and above=1;below=0)	.854*** (.0796)	.5478*** (.0987)	.1036*** (.0077)	.0871*** (.0123)
11	Recurring Illness of children (yes=1;no=0))	.9140*** (.0673)	.6064*** (.0989)	.11362*** (.0076)	.0992*** (.01209)
12	Birth interval (below 24 months=1;above=0)	.676** (.083)	.261* (.1570)	.1391** (.009)	.1840*** (.0189)

	Inequality measures	Variance		Gini	
		Male	Female	Male	Female
13	Breast feeding (irregular=1;regular=0)	.5424** (.1578)	.2162* (.055)	.05617** (.0138)	.0260* (.0434)
14	Mother's intake of food (irregular=1;others=0)	.521*** (.074)	.1394 (.1425)	.0465*** (.0079)	.00428 (.0158)
15	Fruits during pregnancy (irregular=1;others=0)	.7175*** (.0743)	.442 (.2890)	.0651*** (.0087)	.0380 (.0322)
16	Distance to health centre	.617** (.0643)	.333* (.0345)	.0222*** (.0087)	.0343* (.0112)
17	Access of Government schemes (no =1; yes=0))	.5217*** (.0744)	.1393936 (.1425)	.0465*** (.0078)	.0042816 (.0158)
	Constant	.676* (.089)	.2619457* (.1579)	.1391*** (.0093)	.1840*** (.0189)
	Average.RIF	.54606	.65784	.10842	.14651
	Observations	355	445	355	445
	R squared	0.3087	0.3349	0.2196	0.1991
	F value	92.37	28.35	137.06	31.27

Source: Authors' calculations based on Primary survey,2021-22 (i) Bootstrap Standard errors (50 replications) in parentheses; (ii) *p<0.10; **p<0.5; ***p<0.1

6.2 Policy Effectiveness of Government Intervention for Scheduled Tribes of Attapady

So far the study have examined health status, nutritional status and various dimensions of nutritional inequality. It is, therefore, woefully seen that the tribal children are the most vulnerable and disadvantaged. The institutional interventions did not fare in assuring that the benefits were fairly spread in Attappady (Sujathan 2019). To succour the conditions of the tribal children, both Government of India and Government of Kerala have come out with a series of programmes, policies and schemes in terms of health and nutrition. Still, the child deaths among tribes are galore. Hence this has become the most intractable issue in the administrative

corridors at government level. Accordingly,   identification of durable solutions to resolve this impasse has become imperative. This section discusses on the self-assessment on the effectiveness of government intervention in regard to tribal schemes made by the heads of such households who have children below 5 years.

Figure: 6.3

Peoples' Self-assessment on Government Policies
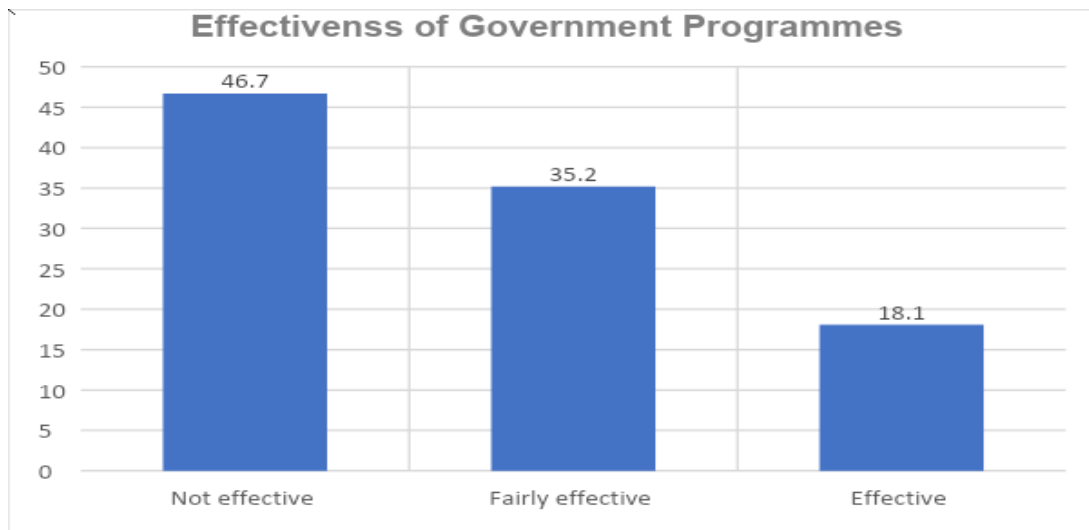
Source: primary data

The figure 6.3 sheds light on the self –assessment rating by the respondents on government policies. It is quite manifest that almost 50 percent of the respondents opined that the schemes are not at all effective followed by being fairly effective (35 percent) and effective (18 percent).

Table 6.2

Rating of effectiveness of government schemes across scale variables

Variables	Not effective	Fairly effective	Highly Effective	Total
Age of father	47.85 (9.46)	42.41 (12.86)	37.13 (12.42)	42.46 (12.02)
Income	3000.50 (8519.28)	4600.62 (5873.56)	6230.62 (7376.16)	4610.58 (7027.49)
Family size	6.08 (1.53)	5.66 (1.36)	4.45 (1.04)	5.396 (1.36)

Note: Figures in the parenthesis are standard deviations

Source: primary data

It is palpable from table 6.2 that those who have the average age of 48 reported that the implementation of government schemes is 'not effective.' Those whose age is averaged as 37 reported that the government schemes are 'Highly effective.' From this, it can be surmised that Government schemes are acknowledged more by the youngsters compared to those who are 40 plus. With regard to income, it can be opined that those who have the highest average income (6230) reported the government schemes as 'Highly effective' followed by 'fairly effective 'by those whose average income is 4600. The government schemes are categorized as 'not effective' by those whose average income is 3000, the lowest. That is to say, higher income is associated with higher effectiveness of government schemes. As regards, family size, it is learnt that those who have highest average family size rated the government schemes as 'not effective.' Such family who have the average family size 4.45 held that government schemes are 'Highly effective.' In short, it is pointed out that the higher rating of Government schemes is associated with lower family size.

Table 6.3

Rating of Effectiveness of Government Programmes across Categorical Variables

Explanatory Variables	Categories	Not effective	Fairly effective	Highly Effective	Total
Community	Irular	28.2%	49.5%	22.3%	100.0%
	Mudugar	23.4%	53.2%	23.4%	100.0%
Type of family	Nuclear	29.7%	48.6%	21.6%	100.0%
	Joined	17.9%	56.4%	25.6%	100.0%
Mobile with internet connection	Yes	16.7%	55.6%	27.8%	100.0%
	No	29.8%	49.1%	21.1%	100.0%
Education	Above primary	29.1%	51.3%	19.7%	100.0%
	Below primary	25.1%	50.3%	24.6%	100.0%
Educated member in the family	Yes	15.3%	56.0%	28.7%	100.0%
	No	38.0%	45.3%	16.7%	100.0%
Distance to Anganwadi	Less than one kilometer=1	19.1%	54.3%	26.6%	100.0%
	Above one kilometer=0	39.3%	44.6%	16.1%	100.0%
Employment status of House Hold	Employed	37.3%	40.7%	22.0%	100.0%
	Not employed	19.8%	57.1%	23.1%	100.0%
Multi-seed farming	Yes	14.2%	40.2%	45.7%	100.0%
	No	35.8%	58.4%	5.8%	100.0%

Source: primary data

Table 6.3 analyses the effectiveness of government programmes across different variables. Regarding the community wise classification, it is seen that the Mudugar community (53 percent) held the implementation of government schemes as fairly effective. As much as 50 percent of Irular community reported that government schemes are fairly effective. While 28 percent of the Irular community replied that implementation of Government schemes is not effective, it is 23 percent for the Mudugar community. Regarding the type of family, it can be seen that substantial percentage of both the Nuclear (47 percent) and Joined family (56 percent) held that Government schemes are fairly effective.

No significant difference is seen regarding rating of government schemes among those who either have or do not have mobile with internet connection. Similarly, around 50 percent of those who have above or below primary education reported that implementation of government schemes are fairly effective. The presence of an educated member in a family is a deciding factor for rating the effectiveness of government schemes tailored for improving the lot of tribal children. As much as 56 percent of the educated member and 45 percent of the non-educated member in a family held that Government schemes are fairly effective. Yet another factor deciding upon the effectiveness of government schemes is distance to Anganwadi. Higher the distance to Anganwadi, lesser the rating of government schemes. While 41 percent of the employed head of the household opined that Government schemes are fairly effective, 57 percent of the unemployed head of the household held the schemes are fairly effective. Regarding engagement in multiseed farming, it is seen that 46 percent of those who are engaged in multiseed farming opinioned that the Government schemes are effective, whereas, 58 percent of those not engaged in multiseed farming that the Government schemes are fairly effective.

6.2.1 Determinants of policy effectiveness of Government interventions

From the above discussion, it was seen how the effectiveness of Government schemes is rated by the household heads and how does it differ among type of family, family size, income, age and the like. Now, the study attempt to examine the determinants of policy effectiveness of Government interventions implemented

among tribes at Attappady. Instead of confining to the nutritional schemes per se, the overall schemes to ameliorate the socio-economic conditions of tribes are analysed. This is done keeping in mind the fact that the socio-economic issues have a direct bearing on the health and nutritional conditions of tribes as a whole. In this section, the study focuses on the determinants of governmental policy effectiveness by taking rating of effectiveness of Government interventions as dependent variable and age, income, type of family, community, family size, mobile usage with internet connection, education of the household, educated member in the family, distance to near Anganwadi, employment status of household and multiseed faming as explanatory variables. Here estimated Ordered Probit model and its extension viz Semi-Non parametric Extended Ordered Probit model to understand how the government intervention varies among different covariates and its magnitude. The estimated results of Ordered Probit model and its extension viz Semi-Non parametric Extended Ordered Probit model are analysed in the table. The validity of the estimated results depend on the function of normality of the stochastic error term in equation which is given in the methodology chapter3.

Which is rejected by likelihood ratio test of Ordered Probit model against the SNEOP model whose P value is less than 0.01all estimated models. In the second stage SNEOP model was assessed with K=4 it found to be the best OP model. The likelihood ratio test of SNEOP model with K=4 compared to Ordered Probit model confirms the rejection of Ordered Probit model. The estimated coefficients of the model and their corresponding significance are given in the table. The results show that the variables such as age, income, family size have significant impact on the likelihood of the level of effectiveness of Government policy intervention on Attappady tribes. As age increases, the levels of rating on effectiveness of Government schemes at Attappady declines as is evident from the negative sign from the table (-2.4 percent). Regarding income, the level of rating on effectiveness of Government schemes at Attappady rises with rise in income. The richer sections may be able to leverage government schemes much better than the lower rungs of the society.

As regards type of family, it is seen that compared to joint family, the level of rating on effectiveness of Government schemes at Attappady by nuclear family is on a lower side. As far as community is concerned, Irular and Mudugar have higher self-assessed rating on government intervention when compared to the reference category Kurumbar. It is therefore a pointed out to the fact that the benevolent effects of tribal schemes of government are not equally distributed among the three tribal communities of Attappady. Regarding family size, it is deciphered that tribal rating on policy effectiveness falls as family member's increases. It is but natural that each and every member in a larger family may not be considerably benefitted by the schemes. With regard to mobile with internet, policy intervention is rated high among those who are accustomed to using mobile with internet connection. It is because such tribes have much better access to information technology and they naturally become the stakeholders of the schemes compared to others who do not have a mobile with internet connection. Regarding education of the respondent, it is learnt that it has a significant positive impact on the rating of Government schemes.

Those who have primary education and above have higher level of rating on effectiveness of Government schemes at Attappady. If the household have an educated member in a family, the rating is higher. Hence it can be learnt that education plays a critical role with regard to effectiveness of schemes. The respondents 'rating is higher on Government schemes if the distance to Anganwadi is less than one kilometer. The access of Anganwadi is so significant that it is the centerpiece and nerve centre of the supplier of nutrient food to the tribes. Concerning employment status, it is seen that the employed have a low level of rating on effectiveness of Government schemes at Attappady. It must be due to the fact that those who are unemployed must be regularly having access to government schemes free of cost and it is on the go once they are used to it. Naturally they hold Government schemes in high esteem compared to the employed. But, there is every possibility that such a free rationing may make people leisure prone (Pandamangalam kalam et al 2021). Those who are engaged in multiseed farming have a higher level of rating on effectiveness of Government schemes at Attappady.

From the above, it can be concluded that younger, education, the intervention of information technology, education, access of government institutions, employment, engaging in farming process have a significant positive bearing on the implementation of government schemes.

Table 6.4

**Factors influencing the rating of effectiveness of government intervention:
Estimates of OP and SNEOP Models**

Explanatory Variables	OP Model	SNEOP Models	
	OP Estimates	SNEOP Model (K=3)	SNEOP Model (K=4)
Age	-0.0189 (0.064)	-0.029 (0.000)	-0.0244 (0.000)
Income	0.1493 (0.430)	0.1678 (0.362)	0.2113 (0.189)
Type of family (nuclear=1)	-0.434 (0.016)	-0.374 (0.018)	-0.302 (0.050)
Community: Irular	0.1493 (0.430)	0.1678 (0.362)	0.2113 (0.189)
Community: Mudugar	0.1493 (0.430)	0.1678 (0.362)	0.2113 (0.189)
Family size	-0.057 (0.813)	-0.1731 (0.422)	-0.1888 (0.328)
Mobile with internet connection (yes=1;no=0)	0.133 (0.023)	0.1256 (0.006)	0.0884 (0.038)
Education (above primary=1;below primary=0)	0.645 (0.000)	0.4719 (0.008)	0.464 (0.003)
Educated member in the family (yes=1)	0.343 (0.038)	0.4325 (0.020)	0.483 (0.037)

Explanatory Variables	OP Model	SNEOP Models	
	OP Estimates	SNEOP Model (K=3)	SNEOP Model (K=4)
Anganwadi *Less than one kilometer=1*	0.407 (0.008)	0.653 (0.000)	0.569 (0.000)
Employment status of HH (employed=1;not =0)	-2.511 (0.000)	-4.197 (0.000)	-4.223 (0.000)
Multiseed farming (yes=1;no=0)	2.877 (0.000)	4.593 (0.000)	4.608 (0.000)
Threshold 1	-1.758	-1.757	-1.757
Threshold 2	0.3567	0.307 (0.272)	0.1461 (0.678)
Polynomial 1	——	1.176 (0.131)	0.320 (0.393)
Polynomial 2	——	0.037 (0.763)	-0.611 (0.000)
Polynomial 3	——	-0.283 (0.053)	-0.076 (0.078)
Polynomial 4	——	——	0.0843 (0.000)

Notes. Number of observations = 800; OP results: Log-likelihood: -197.46; LR Chi-Square (with 12 degrees of freedom) 225.08 (0.000). SNEOP results: K=3; Log-likelihood:-188.24. Wald Chi-Square (with 12 degrees of freedom): 208.88. Likelihood ratio test of the OP model against SNEOP model: Chi-square (with 1 degrees of freedom):18.40(0.000). SNEOP results: K=4; Log-likelihood:-188.15. Wald Chi-Square (with 12 degrees of freedom): 111.82. Likelihood ratio test of the OP model against SNEOP model: Chi-square (with 1 degrees of freedom):18.65(0.000). Values in the parenthesis indicate level of significance.

Source: estimated from survey data, 2021-22

CHAPTER VII

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

In the previous chapter, the researcher, with the help of statistical techniques, comprehensively analyzed the data amenable to the objectives and hypotheses of the study. The results obtained from the analysis resulted in deducing this broad study. This chapter summarizes the major conclusion and suggestions for perking up the socio-economic and health conditions of tribal children. The extant of study related upon the health status, nutritional status, extent of nutritional inequality and policy effectiveness among the three categories of tribes at Attappady. Notwithstanding the institutional interventions among tribal children, there proved to be   no significant improvement in the nutritional status among them. Apart from this, even though a multitude of schemes are underway for the tribes both by the government and NGOs', an extensive knowledge on access to and utilisation of these schemes and more importantly the response of tribes on the effectiveness of programmes is still lacking. In this backdrop, the study attempts to evaluate the health status, nutritional status, determinants of nutritional status and nutritional divide among tribal children of Attappady.

The elaborative review of related literature showed that although plenty of studies held on child malnutrition and reasons thereof, the health and nutritional status and extent of nutritional inequality among tribes and effectiveness of government interventions on Attapady tribes have a serious paucity of evidence. This study attempted to fill such a gap. The major objectives of the study centered on: to examine the socio economic and living conditions of Attapady tribal households; to examine the health status and its determinants of tribal children of Attapady; to understand the nutritional status and its determinants of Attapady tribal children; to ascertain the nutritional inequality among tribal children. Finally, the study aims to evaluate the awareness, accessibility and effectiveness of institutional interventions for improving the nutritional status among tribal children.

Accordingly, the major research hypothesis of the study anchored around the following: The health status of tribal children is unrelated to socio economic and living conditions of households; there is no significant differences in the nutritional status of tribal children across gender of children, community, Panchayath, household status, education and employment of parent; Parents' socio-economic conditions, health access and education are not predictors of nutritional divide among tribal children and there is no significant difference in the level of perception of tribes with regard to the effectiveness of institutional interventions in uplifting the nutritional status of tribal children.

Data and methodology detailed that the study resorted to multi-stage stratified random sampling method by randomly selecting 815 cross section units (which are boiled down to 800 after deletion) from Attappady block of Mannarkkad Taluk of Palakkad district. The study used econometric tools such as Logistic Regression Models, Ordered Probit Regression Models, Re - Centered Influence Function (RIF) Regression Models and Semi Non-Parametric Ordered Probit Model to generate and interpret results from cross section data.

7. 1 Major Findings of the Study

The major findings derived out of the study by empirically analyzing the aforesaid objectives are as follows.

7.1.1 Socio-economic and Demographic characteristics

The study found that Irular community is the largest percentage inhabited in Attappady (57 percent) followed by Kurumbar (23 percent) and Mudugar (21 percent). As regards types of family, it is seen that there are more joint families (57 percent) than nuclear type families (41 percent). Most of the houses are thatched in nature (41 percent) followed by tile (34 percent) and concrete (25 percent). This shows the precarious financial conditions of the tribal families. More than 50 percent of the tribes are forced to walk beyond 15 kms to fetch drinking water shows the gravity of the problem. The fact that 87 percent of tribes do not have access to purified water is symptomatic of chronic health issues haunting them. This finds

expression in their use of toilet such that 75 percent tribes are forced to defecate openly without having own toilet breeding contagious diseases.

It is regrettable to note that hardly 38 percent do possess cultivable land whereas rest of them is either using leased land (20 percent) or are totally landless (42 percent). As much as 72 percent of them are engaged in farming whereas 28 percent of them desist from it. Although, tribes are aware of multiseed farming technique, hardly 21 percent of them are engaged in it. This shows laxity among the tribes to get it implemented without hindrance.

With regard to managing household waste, it is unfailingly seen that as much as 69 percent of the tribes dump it in open space and that only 9 percent dispose it scientifically. Near 23 percent of the tribes are seen to have been flowing the waste to the neighbourer's area. It is learnt that the child is cared more by mother (53 percent) followed by parents in law (29 percent) and father (17 percent). The institutional delivery is seen to be more among them (64 percent).

The birth interval of tribal children is such that the second child (47 percent) was begot just before 24 months since the first child was born. The breast feeding practice of tribal mothers does not provide a rosy picture in the sense that as much as 38 percent of the tribal mothers are engaged in breastfeeding only rarely followed by occasional feeding (35 percent) and regular feeding (25 percent). Near 47 percent are caught up in the grip of recurring illness is indeed a matter of awe. As much as 64 percent of the tribal children were reported to have disease for the past two weeks. Near 57 percent of tribal children remained unvaccinated. The average age of tribal mother at the time of marriage is 17.34 which is below the legal age of 21 years.

It is shocking that as much as 85 percent of the respondents reported some kinds of health problems at the time of delivery. It can be discerned that largest percentage of mother (81 percent) is found to be employed. However, regarding employment of father, largest percentage (52 percent) is found to be unemployed. Most of the employed father are engaged in agriculture and goat rearing (66 percent). The acquirement of government job, in spite of mandatory reservation is

found very minimal among parents. Only a few numbers of father (85) are found to be abstaining from the consumption of drug, whereas there is a little improvement on mothers for averting the consumption of drug (280). The larger quantum of traditional food (432) directly from community kitchen are seen to be taken by tribes two times a day (280). However, most of them are bereft of supplementary nutritional food (65 percent).

Largest numbers of both the father and mother had completed lesser than 5 years of schooling. As much as 74 percent of the members in the family did not have the pursuit of attaining higher education. It is found that the average distance to near health centre is 15 km while that to Anganwadi is near 3 km. This is a serious problem as the propensity of infant death increases with increase in distance. As much as 82 percent of the respondents admitted that they were not aware of the government policies and programmes. It was mainly through tribal promoters (36 percent) and NGO's (36 percent) that they could avail themselves of the information on programmes. It is deciphered that the highest level of satisfaction is obtained from the service delivery of Mahlia Samakhya followed by Kudumbasree, ACFS and PO, ITDP.

7.1.2 Health Status and Determinants of Attapady Tribal Children

It is found that 47 percent of tribal children are suffering from recurring illness in one way or the other. Similarly, 64 percent of children are having some kinds of diseases for the past two weeks. Agali recorded largest number of people having both recurring illness and diseases registered for the past 2 weeks. While the recurring illness of male is lower compared to female, the diseases for the past two weeks are woefully higher for both male and female.

The negative effect of the absence of a mother due to her employment is higher than the positive income effect of her employment on the health status of tribal children of Attappdy. The recurring illness and disease for the past 2 weeks among children is likely to be higher by 91 percent and 65 percent respectively if the mother is employed. Similarly, the recurring illness and diseases for the last 2 weeks is higher by 71 percent if the household are engaged in open defecation. Regarding

household debris, it is seen that having recurrence of illness and diseases for the past two weeks is higher by 91 percent among such households who are in the habit of dumping household waste in the open air. But, the recurring illness and disease for the past two weeks is lower for the children by 83 percent and 38 percent respectively if the education of the father is above 8th standard.

7.1.3 Nutritional status of Tribal Children and its Determinants

By following the recent WHO measures of nutritional measures, the study measured three nutritional indices such as wasting, stunting and underweight. The issues of wasting, stunting and underweight are 'very high' and 'high' among tribal children in Attappady. Kurumbar and Mudugar community have better nutritional status in terms of the extent of underweight with compared to that of Irular. The issue of underweight of Irular community is more precarious than that of the other two communities. While 'very high' stunting and wasting is reported at Sholayur Panchayath, 'middle' and 'very low' stunting and wasting' is reported more at Agali Panchayath. The 'very high' underweight is seen more at Joint family compared to Nuclear family. The female headed household is having 'very high' stunting and wasting than that of male headed household. The malnutrition issues and very low nutritional security is associated with education of mother being less than 5 years completed. It is evident that 'very high' and 'high' wasting and stunting is associated with the mother of those children who are 'not working. The stunting and wasting of tribal children is seen to be 'very high' and 'high' among such father who is 'not working.' The issue of underweight of tribal children becomes 'very high' and 'high' among fathers who are 'not working.

As far as determinants of nutritional status is concerned, it is found that Kurumbar seems to be better off in terms of socio-economic conditions compared to other two groups. Compared to nuclear family, joint family has had 3.1 percent lower nutritional status. The nutritional status is 35 percent lower among those tribal children whose mother has education below 8th standard with compared to children whose mother has education above 8th standard. Like this, father's education is also found to be a deciding factor. The nutritional status is 33 percent lower among those

tribal children whose father has education below 8th standard with compared to children whose father has education above 8^{th h} standard. The employment of parents also significantly influences the nutritional status of their children. The nutritional status of children of working father is 150 percent higher compared to children whose parents are not working. Regarding Panchayaths, compared to Agali, nutritional status of Puthur and Sholayur is lower by 32 percent and 12 percent respectively.

The nutritional status of children headed by females is having lower nutritional status of 50 percent compared to male household head. The nutritional status is 40% lower among those tribal children whose mother has education below 8th standard with compared to children whose mother has education above 8th standard. Regarding community, it is seen that Irular and Mudugar have lower underweight by 34 percent and 33 percent compared to the reference category Kurumbar.

7.1.4 Nutritional inequality and Determinants of Nutritional Inequality

With regard to nutritional inequality and its determinants, it is estimated that 37 percent of the tribal children are seem to be belonging to *very high* malnutrition index. As per   malnutrition index, it is seen that the issue of malnutrition among female is on a higher side compared to male. Hence, there is difference in aggregate child nutritional index between male and female children. The effect of inequality is higher for female in the case of variance and Gini index. An increase in the income of the household reduces the level of nutritional inequality in terms of variance and Gini index. The income effect is higher for male children rather than the counterpart. Higher the family size, higher the level of nutritional inequality in terms of variance and Gini index and that the effect is higher for female than male.

Regarding the education of parents, it is seen that higher level of nutritional inequality of tribal children in terms of variance and Gini index is found among such parents who have   education lesser than 8th standard. Higher the age at marriage of parents, higher the level of nutritional inequality as far as variance and Gini index are concerned. The level of nutritional inequality with regard to variance

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and Gini index rises among children if the intake of water is contaminated and that the adverse effect is higher among female than male child.

Lesser the birth interval in between the children, higher the level of nutritional inequality. If the birth order of children is second and above, the level of nutritional inequality of such children reduces considerably and it is higher among male child. Those tribal children who are subject to irregular breast feeding have their level of nutritional inequality and this is more among male children. Higher the irregularity of mothers' food and fruits during pregnancy, higher the level of nutritional inequality. Distance to health centre is also positively associated with nutritional inequality. As per the average RIF inequality value, the level of nutritional inequality with reference to variance and Gini index are found more among female children.

7.1.5 Effectiveness of Government Policy Interventions for Tribal Upliftment

Concerning, the awareness, accessibility and effectiveness of governmental schemes, it is found that higher income is associated with higher effectiveness of government schemes. With regard to income, it can be opined that those who have the highest average income (6230) reported the government schemes as 'Highly Effective'. The presence of an educated member in a family is a deciding factor for rating the effectiveness of government schemes tailored for improving the lot of tribal children. As much as 56 percent of the educated member and 45 percent of the non-educated member in a family held that Government schemes are fairly effective.

Higher the distance to Anganwadi, lesser the rating of government schemes. Geographical disadvantage naturally turns detrimental to the positive health conditions of the tribal children. The insufficient institutionalization of pre natal care raises the risk of child morbidity and mortality. As much as 36 percent of those not engaged in multiseed farming reported that the Government schemes are not effective. As age increases, the levels of rating on effectiveness of Government schemes at Attappady declines. Compared to joint family, the level of rating on effectiveness of Government schemes at Attappady by nuclear family is on a lower side. As far as community is concerned, Irular and Mudugar having a high self-

assessed rating of government intervention while compared to Kurumbar. With regard to mobile with internet, policy intervention is rated high among those who are accustomed to using mobile with internet connection. Those who have primary education and above have higher level of rating on effectiveness of Government schemes at Attappady.

The respondents 'rating is higher on Government schemes if the distance to Anganwadi is less than one kilometer. Concerning employment status, it is seen that the employed have a low level of rating on effectiveness of Government schemes at Attappady.

7.2 Recommendations of the Study

The following section deals in salutary recommendations churned out of the findings of the study.

Lack of availability of water both for domestic purposes and sanitary purposes is a bewildering issue among tribes. This perpetuates health issues among them resulting in wasting and stunting. This issue has to be resolved on war footing by executing expeditious schemes in this regard.

Lack of sufficient cultivable land among tribes poses a grim challenge to their food security. Food insecurity gradually opens the door for nutritional insecurity and thereby malnutrition and penury. So, urgent steps have to be taken for reinstating right to land among tribes for equitable distribution.

Lack of sufficient disbursal of debris often results in many kinds of communicable diseases among tribes. So, an institutional mechanism for implementing schemes like Waste to Energy, the Solid Waste Management Project etc. are to be implemented without ado.

The birth interval between tribal children is hardly 24 months. This not only impairs the health of mother, but also deprives her opportunity of providing sufficient care to the offspring. So, tribes have to be incentivized on the necessity of sufficient spacing between child births.

Only 25 percent of mother is seen engaged in regular feeding of baby is to be taken up seriously. This adversely affects the perennial health of children. Mothers' Absolute Affection Programme of Government of Assam may be replicated herewith aplomb. Breast milk is undoubtedly a balanced diet and can kick out many diseases like diarrhea and dysentery and guarantees fatty acid elements beneficial for the brain development of the infant.

Near 47 percent of tribal children are seen to have recurrence of diseases. This is symptomatic of lack of resistance among children which is very much attributed to increasing incidence of stunting and wasting. As undernourishment spawns poor human development. Target oriented programmes with the help of proper management of ICDS has to be ensured.

The fact that 64 percent of children are found to have some kinds of diseases throws light on the prevalence of considerable morbidity among them. To top it all, stunting is found more among female tribal children is not to be relegated. Balanced nourishment is necessitated for a pregnant woman from the time of conception till delivery and thereafter. But it drives home that marginalized and emaciated tribes of Attappady could not afford to this kind of nourishment. The unfailing intake of iron and folic acid tablets among pregnant mothers is an imperative necessity for having sufficient hemoglobin levels. Low birth weight is inevitably due to lack of nutrition which often results in premature death. It is regrettable that near 65 percent of them are shorn of supplementary nutritional food from community kitchen. The extant study made a shocking finding that stunting is found to be more among female tribal children rather than male children. Local self-governments can do much in this regard to resolve this imbroglio.

The average age of marriage of mother is found to be17.34 which is lesser than the legal age of 21. This makes inroads into the health of both the mother and the kid. Apart from providing proper sex education, awareness campaign has also to be promoted among tribes.

Although tribes do enjoy reservation for government jobs, very few of them are able to catch them. They have to pin their faith on the fact that a guaranteed job

is a road to well-being. Security of job provides security of life which makes them contented and healthy. Proper coaching classes and job oriented vocational training should be imparted to them timely. Around 74 percent of the members of tribal family are self-satisfied on minimum level of education does not augur well for their future.

It is unreasonable and unfortunate that on average tribes have to walk 15 km to reach the nearest health centre. This lack of institutionalization of health care stymies their life expectancy and accelerates infant mortality. Proximity of hospital is a sine qua non for the proper maintenance of health among tribes. The tribal hospital at Kottathara should be elevated to international standard with all ultra-modern equipment and sufficient number of doctors.

As most of the tribes are habituated to joint family system, individual attention with regard to each baby in the family becomes an onerous task. Hence, there is an issue of underweight among tribal children in a joint family compared to nuclear family. Although it does not pitch for disintegration of joint family, public provisioning and social security of each kid in the joint family has to be assured by the authorities concerned.

The fact that lesser is the education of parents, higher the issue of malnutrition sheds light on the strategic and sovereign significance of education in influencing the health of children in the family. So, unfailing access to education with proper enrolment in schools and colleges under the aegis of ***Oorumooppan*** should be assured.

It is an incontrovertible fact that lack of access to primitive food habit overthrows the health of tribes. They were having therapeutic food like millets, cereals etc so, they could develop immunity against contagious diseases. But, ever since there was change in staple diet due to a host of reasons, nutrition levels of tribes received setback and their food security went for a toss. This can be made solvable when the idea of community kitchen should invariably be implemented in every hamlet.

It is found that hardly 20 percent of the tribes are engaged in multiseed farming technique does not provide a rosy picture so far as their food security is concerned. This technique brings about simultaneous planting of seeds having different harvesting time so that when one plant's harvesting is over, the other one picks up and so on so that there is food security round the clock. This, however, lacks popularity which has to be taken up seriously by the local self-governments. Tribes engaging in multi seed farming technique should be given subsidy for fostering it.

It is proved that Irular and Mudugar have higher self-assessed rating on government intervention with compared to Kurumbar. It is therefore a pointed out the fact that the benevolent effects of tribal schemes of government are not equally distributed among the three tribal communities of Attappady. It also exposes the loopholes, defects and deficiencies associated with the implementation of governmental schemes. So, a plethora of many schemes will do not good at all, instead of which a handful of sound schemes tailored to and targeted at the heterogeneous behavioural preferences of tribes should be chalked out expeditiously.

The fact that those tribal household heads who have access to information technology are greatful for the government schemes that throws light on the pressing necessity of bringing the tribes to the mainstream unfailingly. As everything is becoming increasingly digitalized, tribes should not remain as marginalised and vulnerable, but the recipients of digital change in tune with changing circumstances of the time.

The variance and Gini nutritional inequality has provided a wealth of information. An increase in the income of the household reduces the level of nutritional inequality sheds light on the urgency of filling in the pockets of tribes by the government so that they are able to spend more on improving their health.

As per the average RIF inequality value, the level of nutritional inequality in terms of variance and Gini index is found more among female children. The reason is that a female tribe bears the brunt of nutritional inequality more than that of her

counterpart deserves serious deliberation. There is a possibility of gender discrimination among tribes which is evident in the case of family size. Higher the family size, higher the level of nutritional inequality and that the effect is higher for female than male. It is already noticed that the nutritional status is on a lower side for such kids whose parents have education below 8th standard. It connotes that lesser education of parents force them to discriminate among their children and the axe falls on the female compared to male. So, education is the sure shot key with which open the door of nutritional equality.

As of now, Tribal specialty hospital at Kottathara does not have advanced medical equipments and sufficient number of doctors commensurate with the daily visit of patients. Now, patients admitted are given only peripheral treatment and they are sent out to other hospitals of Coimbatore or elsewhere for better treatment. Such a comfort of irresponsibility should be done away with and the hospital should be upgraded to medical college so that the tribes do not have to hunt for anywhere for better treatment.

The study noticed that the governmental schemes are found to have higher acceptability among the unemployed tribes compared to employed tribes. This is prone to make them less working and more leisurely. So, in lieu of guaranteeing service delivery free of cost and there has to be a revamp of extant schemes by assuring some pre-requisites like stricter and fuller implementation of Forests Rights Act which helps them row back their traditional right to land. Opportunity to learn their language by incorporating it in the curriculum should be implemented and revisit to the good old multi seed farming technique by amalgamating it with Millet Village Scheme and community farming strategy which is a bellwether to food and nutritional security for them. Restoring Eco friendly Rivers like Bhavani and Siruvani rather than executing piped water as tribes have a perceived notion that only flowing water has a glowing life and the like. This will enable them to have a more independent, healthier and happier life rather than genuflecting before the government for free rationing.

7.3 Further Scope of the Study

The study has left some areas on the health literature of tribes untouched. While inter-tribal comparison has extensively been made with regard to tribal health, tribal nutrition and the resultant nutritional inequality, neither inter-district comparison nor inter-state comparison has been made on the above discussed issues. In addition, health conditions of tribes' vis-à-vis other communities like OBC, SC etc. have also been unexplored. For a comprehensive policy perspective, these studies are deemed desirable. The study have made an overall analysis on the policy effectiveness on creeping up the conditions of tribes. No scrupulous study by collating the schemes of Government of India and Government of Kerala tailored for the tribes has been done. In short, a holistic study encompassing the divergent behavioural preferences of tribes has become the need of the hour.

7.4 Contributions Made by the Researcher

Unlike other superficial studies on the macroscopic socio-economic issues of the tribes at large, this study penetrated into the health and nutritional conundrum of the tribes of Attappady, the only tribal block of the state of Kerala. The study went a step further and dwelled on the nutritional inequality lurking among the three categories of tribes of the region. While studies hitherto structured around more on studying in detail the diseases among tribes, identifying clinical signs and other anthropometric measurement like BMI, height, weight etc, an in depth study on nutritional divide and its determinants is seldom found anywhere which is construed to be a humble contribution and an addendum to the lacuna of the existing literature on the part of the researcher.

7.5 Conclusion

The extant study extensively explored the health status, nutritional status, nutritional inequality and policy effectiveness of government schemes for ameliorating a lot of tribes at Attappady. Despite a plethora of policies and programmes exclusively tailored for the tribes, very few of them can push them to the mainstream. A cursory look unravels that building up necessary social and

physical infrastructure is a pre requisite to guarantee inclusive growth among tribes. For instance, bringing bricks, cement etc. for the construction of Anganwadi is deemed desirable. But prior to having Anganwadi, necessary and motorable roads have to be properly done for transporting the above said materials to the tribal hamlets for the purpose of construction. Secondly, the issues of tribes are as variegated as their categories. What is preferred for one tribal community is not compatible with other categories. Hence, it is irrefutably true that the divergent behavioural patterns of tribes should firstly be studied before reaching out to them. That is to say, the service delivery mechanisms on the part of the government have to be rigorously restructured in accordance with the uncommon traits of tribes. This is the only way out to flush out the poor health and nutritional status and glaring nutritional inequality ominously prevailing among tribes. Apart from it, all the *Oorus* of Attappady should be brought under Forest Rights Act. If irrigation facilities are arranged in each hamlet with access to potable water, the practice of agriculture can be made a reality among tribes. This will ensure food and nutritional security for them.   Yet another heroic policy which can be executed with aplomb is that either the *Oorumooppan* or his representative should be a permanent member in the hospital management committee of the Kottathara Specialty Hospital. Such a decentralised action shall be more participatory and result oriented. It is saddening that the parents are unable to go out for work if their children are admitted at the hospital. This prevents them to be the breadwinners for the family. This is a double whammy situation because firstly, either the tribal family runs short of fund due to hospitalization and secondly, for fear of hospitalization and loss of work, the sick are not brought to the hospital. So, financial assistance to the guardian at the hospital has to be unfailingly assured. Strict conduct of medical camps at regular intervals especially in the remote hamlets should be guaranteed without ado. To conclude, the research may say that instead of a piecemeal approach, a holistic approach is the need of the hour for the sustainable development of tribes.

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Interview Schedule

"Child Health and Nutritional Status of Tribes in Kerala: A Case Study"

A.   Details of Location

1.   Name of family head:

2.   Grama Panchayath: 1.Agali   2. Puthur   3. Sholayur

3.   Gender (family head): 1.Male   2. Female

4.   Community: 1.Irular   2. Mudugar   3. Kurumbar

                                4. Others (specify)

5.   Ward No:

B.   Household Details

6.   Type of family: 1. Nuclear   2. Joint

7.   Total number of members in the family:

8.   Type of house: 1 Thached   2 Tile   3 Concrete

9.   Do you have a separate room for the purpose of cooking?

         1. Yes   2. No

10.   Main fuel for cooking in your household

         1 Electricity/LPG/ Biogas   2. Kerosene/charcoal/coal   3. Firewood

11.   Do you have electricity connection?

         1. Yes   2. No

12.   What is the major source of drinking water?

         1. Surface water   2. Tube well/borehole

         3. Piped   4. Others

13.   How long to go to fetch drinking water?

         1. In the residence itself   2. < 5 minutes walking time

         3. > 15 minutes walking time

14. Do you usually purify drinking water?

    1. Yes   2. No

15. What kind of toilet facility does your household have?

    1. Open defecation   2. Own toilet 3. Common toilet

16. How do you possess your land?

    1. No land 2.Own Cultivable land 3. Leased land

17. Do you engage in farming operations in land?

    1. Yes 2. No

18. Are you engaged in multiseed farming technique?

    1. Yes 2. No

19. How do you manage household waste?

    1. Dumping in open space 2. Flowing to neighbour's premise

    3. Scientific disposal

20. What communication amenities do you have?

    1. TV   2. Mobile with internet connection

    3. Others 4. No amenities

21. Are you engaged in animal rearing?

    1. Yes 2. No

22. What is the average family income? ----

C. **Details of the child**

23. Name of Child:

24. Gender of child: 1. Male 2. Female

25. How is the child cared? 1. Father 2. Mother 3. Parents in Law

26. Age of child in months (as mentioned by mother / respondent):

27. Weight of child (in kg):

28. Length or height of child (Length in cm): ………….

29. Mid-upper arm circumference (cm): …………

30.   Place of delivery : 1. Home   2. Hospital

31.   Birth order

     1. First   2. Second   3. Third   4. Other (specify):

32.   Previous birth interval:

     1. First   2. < 24 months   3. 24-47 months   4. >48 months

33.   Were you breastfeeding your kid?

     1 regularly   2. Occasionally   3. Rarely   4) Never

34.   Any supplementary diet being given to the child other than breast milk?

     1. Regularly   2.Occasionally   3. Rarely   4. Never

35.   Does your child have any incurable illness?

     1. Yes   2. No

36.   Any diseases does your child have for the past 2 weeks?

     1. Yes   2. No

37.   Is regular vaccination as instructed by the health department being given to your child?

     1. Yes   2.No

D. Parent's details

38.   Age at marriage of mother:

39.   Did you go for antenatal checkup:

     1. Yes   2. No

40.   Do you have any health problem at the time of delivery:

     1. Yes   2.No

41.   Do you have folic acid during the beginning state of pregnancy?

     1. Yes   2.No

42.   Do you use medicines for iron and calcium for mother and child?

     1. Yes   2.No

43. Do you consume any fruits and other salubrious items during your pregnancy time?

1. Yes   2. No

44. Is mother of the child working?

1. Yes   2. No

45. What is the type of Employment?

1. Cooli   2. Agriculture and goat rearing

3. Self-employed   4. Govt job

46. Is father of the child working?

1. Yes   2. No

47. Enumerate the personal habits of mother?

1. Chewing tobacco   2. Smoking tobacco

3. Consuming alcohol   4. No consumption of drug

48. Enumerate Personal habits of father?

1 Chewing tobacco   2 Smoking tobacco

3. Consuming alcohol   4. No consumption of drug

49. How many times do you have food a day?

1. One time   2. Two times

3. Three times   4. Irregular

50. Most of the days what is the type of food you have?

1. Traditional food   2. Non-traditional food

51. What is the source of your food?

1. Own cooking   2. Community kitchen

52. If 1, what are the limitations?

1. No source to cook   2. Non availability of firewood   3. Other reasons

53. If 2, what are the limitations?

1. Not functioning   2. Not functioning every day

3. Not supplying all food

54. Have you take any supplementary food?

    1. Yes   2. No

55. What is the educational status of father?

    1. No schooling   2. Less than 5 years complete

    3. 5-7 years complete.   4. 8-9 years complete.   5. 10 and above.

56. What is the educational status of mother?

    1. No schooling   2. Less than 5 years complete

    3. 5-7 years complete.   4. 8-9 years complete.   5. 10 and above.

57. Is any member in your family outside for pursuing higher education?

    1. Yes   2. No

E. Health and educational infrastructure

58. Which is the nearest health facility (specify)…

59. Distance of the nearest health facility from the colony?

60. Does any Anganwadi exist near your colony:

    1. Yes   2 No

61. Distance of the nearest Anganwadi from the colony? …………..

F. Awareness, Eligibility and Availability of institutional facilities

62. Are you aware about different government policies and programes?

    1. Yes   2. No

63. If yes, how you get the information about the policies and programmes?

    1. Oorukootam   2. Fellow Members   3. Government Officials

    4. Tribal Promoters   5. NGOs

64. Are you eligible for get government policies?

    1. Yes   2. No

65. If eligible, have you avail different government schemes?

    1. Yes   2. No

66. Please indicate your level of satisfaction in respect of following schemes

(1 for 100 % satisfaction; 2 for 80 % satisfaction;3. for 60 % satisfaction; 4. for 40 % satisfaction; 5. for 20 % satisfaction and 6. for 0 % satisfaction)

Institutional Health and Nutritional Service Delivery Mechanisms at Attappady

Rank	ITDP	MAHILA SAMAKHYA	ACFS	KUDUMB-ASHREE
1				
2				
3				
4				
5				
6				