

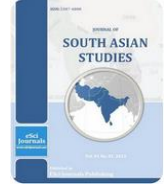


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UNDERLYING CAUSES OF CHILD AND MATERNAL MALNUTRITION IN THE ESTATE SECTOR OF SRI LANKA

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ABSTRACT

Despite overall health indicators are on track to achieve the 2015MDGs, malnutrition continues to be a serious health concern in Sri Lanka. Prevalence of child and maternal malnutrition is almost doubled in the estate sector compared to country average. Thus, this study attempts to contribute to policies on priority areas needing to be addressed in breaking the vicious cycle of malnutrition in the estate sector. The study used Demographic and Health Survey (DHS) 2006/07 of Sri Lanka as the primary source of data. The research adopted probit analysis in order to identify the determinants of child and maternal malnutrition in the estate sector. According to the findings, major aspects of estate sector child and maternal malnutrition was due to many inter-related factors, ranging from life cycle of malnutrition, food insecurity, alcoholism, poor socio-economic conditions and also lack of women's education and knowledge. It was evident that, a significant reason for child and maternal malnutrition in the estate sector was intake of the 'wrong' kind of food—consuming lack of protein rich food. Further, estate sector alcoholism significantly increased the prevalence of malnourished women. These factors coupled with the household poor socio-economic status perpetuates the vicious cycle of malnutrition in the estate sector.

Keywords: Child health, Estate sector, Malnutrition, Maternal health, Sri Lanka.

INTRODUCTION

Sri Lanka has long been recognized for decent health care outcomes such as reduced infant (per 1000 live births, 16.5 in 1995 to 9.2 in 2012) and maternal mortality rates (per 100,000 live births, 61 in 1995 to 37.7 in 2012) (Family Health Bureau-FHB, 2012). While most of the health indicators are on track to achieve the 2015 Millennium Development Goals (MDGs), malnutrition continues to be a serious health concern in Sri Lanka. Data reveals that more than 20% of children under five years are underweight, nearly 16% babies born have low birth weight, and 16% women of reproductive age (15- 49) are malnourished (see Table 1). Furthermore, certain population groups fare worse than others. For instance, the estate sector shows a higher prevalence of child and maternal malnutrition compared to the country's average figures. In the estate sector, about 30% of children below

five years are underweight, nearly one in three babies born have low birth weight, and one third of women in reproductive age are malnourished (see Table 1). According to the findings of previous research on the determinants of nutritional status in the country, being a resident of the estate sector is an important determinant of child and maternal nutritional status (Jayawardena, 2012; World Bank, 2007).

Inequalities in health arise in part, because of socio-economic inequalities in society. Improved health care alone cannot improve all health outcomes as there are deep rooted socio-economic factors affecting health. For example, a child's nutritional status as well as birth weight of babies is determined by a number of factors, such as genetics, mother's nutritional status, the environment in which a child lives, and also social circumstances where cultural habits amongst some population groups can prevent children from getting vital nutrition even when resources are available.

Estate sector people are one of the most marginalized groups in the country, in part because the majority of it

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population is descended from indentured labour brought from India in the early 1900s. In addition, large inequalities exist in access to and the utilization of, health services between the estate sector and the rest of the country. This is mainly due to the fact that estate workers are completely dependent on the estate's management for their basic needs – housing, health, and education facilities. The root cause for the

persistence of poverty in this instance is the unique organizational structure of the estates (World Bank, 2007; Samarasinghe et al., 1990). Further, plantation workers differ culturally and linguistically from the Sinhalese population, and are geographically isolated from the rest of the country. This forms a barrier when attempting to create awareness of health best practices.

Table 1. Prevalence of Child and Maternal Malnutrition by Sector.

	Underweight child	Low weight births	Maternal Malnutrition
Sri Lanka	0.21	0.16	0.16
Urban	0.17	0.13	0.10
Rural	0.21	0.16	0.16
Estate	0.30	0.31	0.33

To combat malnutrition in the country with an appropriate set of interventions, policy makers need to have a better understanding of the causes of malnutrition in severely affected populations, such as those in the estate sector. As recommended in the national malnutrition study conducted by World Bank in (2007), interventions to improve the nutritional outcomes in the estate sector need to be designed separately, in consideration of its unique socio-cultural and economic conditions. There is an urgent need to identify the factors influencing poor nutritional status in the estate sector, in order to design and implement strategies and policies to promote nutritional status in the region. Thus, this study attempts to contribute to policies on priority areas needing to be addressed in breaking the vicious cycle of malnutrition in the estate sector.

With the aim of breaking the intergenerational cycle of malnutrition in the estate sector, this study will examine the determinants of two main stages of the intergenerational cycle of malnutrition – child malnutrition and maternal malnutrition. Under this main theme there are three sub-objectives, as follows:

- Examine the factors which influence the nutritional status of under five year old children in the estate sector,
- Examine the factors which influence mothers' poor nutritional status in the estate sector, and
- Based on the above analysis, identify interventions for reducing malnutrition in the estate sector.

LITERATURE REVIEW

Research have been identified that the process of becoming malnourished often starts in utero and may

last, throughout the life cycle and also spans generations particularly for girls and women (Gillespie and Flores, 2000). Poor circumstances during pregnancy such as, deficiencies in nutrition during pregnancy, maternal stress, maternal smoking and misuse of drugs and alcohol, insufficient exercise and inadequate pre-natal care can lead to poor foetal development (WHO, 2003). Administrative Committee on Coordination – Sub Committee on Nutrition, (1992) has recognised that intergenerational vicious cycle of malnutrition has four main stages: low birth weight infants; child growth failure; malnourished stunted adolescents; and small statured, malnourished, reproductive aged women.

The causes of malnutrition are complex, multidimensional and interrelated. They range from broad factors such as political instability and slow economic growth, to immediate determinants of child nutritional status -- dietary intake (energy, protein, fat, and micro nutrients) and health status. These factors are interdependent on each other (Smith and Haddad, 2000). In turn, these conditions are closely linked to the overall standard of living of people, and whether a population can meet its basic needs such as access to food, housing, and health care.

Furthermore, there is recognition that malnutrition is frequently part of a vicious cycle that includes poverty and disease, and these three factors are interlinked. Socio-economic and political changes that improve health and nutrition can break the cycle (de Onis and Blossner, 1997). Increased income usually enables poor families to get better access to the things that enhance the nutrition: sufficient quantity and quality of food, better child feeding and hygiene practices, adequate

supplies of clean water, and access to good quality preventive and curative health care. However, if families do not spend their increased income on these factors which determine good nutrition; then malnutrition rates are unlikely to decrease (Haddad and Alderman, 2000).

In this context women are the key actors in utilising available resources for good nutrition and household food security. Women with more control over resources are also in a better position to provide care to children and achieve better birth weights. Six practices of child care are crucial for their nutritional well-being: (i) care for women, such as required rest and food intake during pregnancy; (ii) breastfeeding and feeding of young children; (iii) psycho-social stimulation of children and support for their development; (iv) food preparation and food storage practices; (v) hygiene practices; and (vi) care for children during illness -- diagnosis of illness, health seeking, and home treatment (Engle, Menon, and Haddad, 1999).

As explained in Smith et al. (2003) women's status affects the quality of care for children in a direct manner, but also indirectly through the quality of the care women themselves receive. Finally, through the women's own health and nutritional status, the care women receive influences both the quality of care for children and their birth weights. Poor women are likely to be poorly nourished, which has serious implications for the nutrition status of their yet-to-be born children, and the birth weight of newly born children.

Therefore, it is important to consider the entire life cycle when examining the causes and consequences of women's poor health. The cultural and socio-economic environment can adversely affect women's life style, and in particular result in inadequate diet. From infancy in many parts of the world women receive less and lower quality food and are treated less often when sick and then only at a more advanced stage of disease. Also when women are less educated, receive less information than men and have less control over decision making and family resources, they are also less apt to admit to health problems or to seek care. A life cycle approach to women's health takes into account both the specific and cumulative effects of poor health and nutrition. Many of the health problems that affect women of reproductive age, their newborns and older women begin in childhood and adolescence (World Bank, 1994).

The general level of underdevelopment may also pose additional health risks for women. For example poor

roads and lack of transport as well as inadequate obstetric facilities hinder women from receiving timely medical treatment for pregnancy related complications. Inadequate water supply and poor sanitation impose extra burdens on women's health status. Women's disproportionate poverty further curtails their access to health services (World Bank, 1994).

A study carried out on Sri Lankan female plantation workers to examine the determinants of maternal nutrition and health status reveals that the maternal nutrition and health status of female plantation workers is a result of the interaction of specific home related, work related, historical, social, and structural factors (Samarasinghe et al., 1990). Furthermore, lesser education, social, and cultural beliefs affect the nutrition of pregnant women. For example, pregnant women consume less food at the household level than any other female group in the plantation sector. This may be linked to the belief, prevalent among lesser educated women, that if they eat less during pregnancy, they will have smaller babies which will make it easier at child delivery.

According to the findings of the World Bank (2007), patterns of exclusive breastfeeding have a negative correlation with the prevalence of child malnutrition across sectors of the country. A study of plantation workers showed that most women do not exclusively breastfeed for longer than one month (World Bank, 2007; Sorenson *et al.*, 1998). Relative isolation of the estate sector, low levels of education, and limited access to mass media, have limited the impact of national level awareness-raising campaigns, such as on the importance of breastfeeding.

DATA AND METHODOLOGY

Sources of Data: The study used micro data from the Demographic and Health Survey (DHS) - 2006/07 conducted by the Department of Census and Statistics of Sri Lanka. The DHS collected demographic, socio-economic, and health data from married women aged 15-49 and their children less than five years. Survey has covered representative samples of 3 sectors: urban, rural, and estate sector.

DHS household survey collects information about a large number of health, nutrition and health service utilization measures, as well as data on respondents' demographic, social, and economic characteristics. This data set is especially useful for the proposed study as it provides rich information on child health and the mother's

background information (education, employment, prenatal care, health habits, as well as socio-economic background of the household –food consumption, sanitary facility, drinking watered).DHS 2006/07 survey has covered 1,791 households and 1,297 married women aged between 15-49 years, in the estate sector.

Measuring Malnutrition: Three anthropometric measures were standardized according to the international standards and z-scores were created using growth standards published by WHO in 2006. A child was classified as “stunted” if the child’s height-for-age z-score is below more than two standard deviations from the median of the reference population; “wasted” if the child’s weight for height z-score is below more than two standard deviations from the international reference population; and a child was considered as “underweight” if child’s weight for age z-score is less than two standard deviations from the international reference population, WHO (2006). A low birth weight child was defined as being of a birth weight of less than 2500g. The study considered the birth weight as recorded in the Child Health Record (CHR).

Indicator BMI< 18.5 was used to assess Chronic Energy Deficiency (CED) malnutrition in women. This indicator is the most frequently used standardized indicator of thinness to assess the progressive loss of body energy (WHO,1995). Height is a measure of past nutritional status, and reflects in part the cumulative effect of social and economic outcomes on access to nutritional foods during childhood and adolescence. Women, who are less than 145cm in height, were considered too short or stunted (ACC/SCN, 1992).

Measure of Socio-economic Status: The DHS surveys do not provide consumption or income data but has detailed information on household ownership and access to a variety of consumer goods and services. The questionnaire includes questions concerning the household’s ownership of a number of consumer items, ranging from a fan to a television and car; dwelling characteristics such as flooring material; type of sanitary facilities, drinking water source and toilet facilities used; and other characteristics that are related to household socio-economic status. Recent research suggests that the asset approach is a reasonably satisfactory proxy for consumption (Filmer and Pritchett, 1998; Wagstaff et al., 1991). Thus, an asset approach was used throughout this study as a proxy for the standard of living of a household. To construct the asset index, each household asset was

assigned a weight or factor score generated through a principal components analysis. Typically, the asset index was assumed to be the first principal component; that is, the first linear combination (Gwatkin et al., 2000).These scores were summed up for each household and the asset index, A_i , for household i was defined as follows:

$$A_i = \sum_k f_k \frac{(a_{ik} - \bar{a}_k)}{s_k}$$

Where a_{ik} is the value of asset k for household i , \bar{a}_k is the sample mean and s_k is the sample standard deviation. f_k is the weights associated with the first principal component.

Individuals were ranked according to the total score of the household in which they resided. The sample was then divided into population quintiles.

Underlying Influential Factors for Malnutrition: Probit regression analysis was carried out separately for child and maternal malnutrition to examine the influential factors. The probit model was defined as:

$$\Pr(y=1|x)=\Phi(xb)$$

Where Φ the standard cumulative normal probability distribution, xb is called the probit score or index.

Explanatory variables were employed to identify the role of all three underlying determinants (food insecurity, inadequate maternal and child care practices, and poor health environment and services), as well as the variables representing some of the basic causes, such as economic and social factors. The selection of the variables was based on the relevance to the study’s research question as well as data availability.

UNDERLINE CAUSES OF MALNUTRITION IN THE ESTATE SECTOR

Food security: In many developing countries, especially in the urban populations, there is an increase in the consumption of energy-dense nutrient poor food (high in fats and sugar but with insufficient nutrients) and a decrease in physical activity. Social and economic progress has led to the greater consumption of oil and sugar as cheap processed foods. At the same time, the consumption of fruits, vegetables and grains has also decreased. Ironically, even for low-income families these foods may be more affordable and accessible than more nutritious food such as fruits and vegetables. Health problems associated with inadequate calorie consumption and insufficient micronutrients now coexist with the growing presence of diet related chronic diseases.

Child's dietary intake is an immediate determinant of his or her nutritional status (UNICEF, 1998). Food security is achieved when a person has access to enough food to lead an active and healthy life (World Bank 1986). Dietary intake (energy, protein, fat, and micro nutrients) must be adequate in quantity and in quality, and nutrients must be

consumed in appropriate combinations for the human body to be able to absorb them. Therefore, in this section children aged between 1-3 years and their mother's food intake patterns were investigated, using dietary recall data of the type of foods consumed during the past 24 hours, as reported in DHS survey.

Child's food intake

Mother's food intake

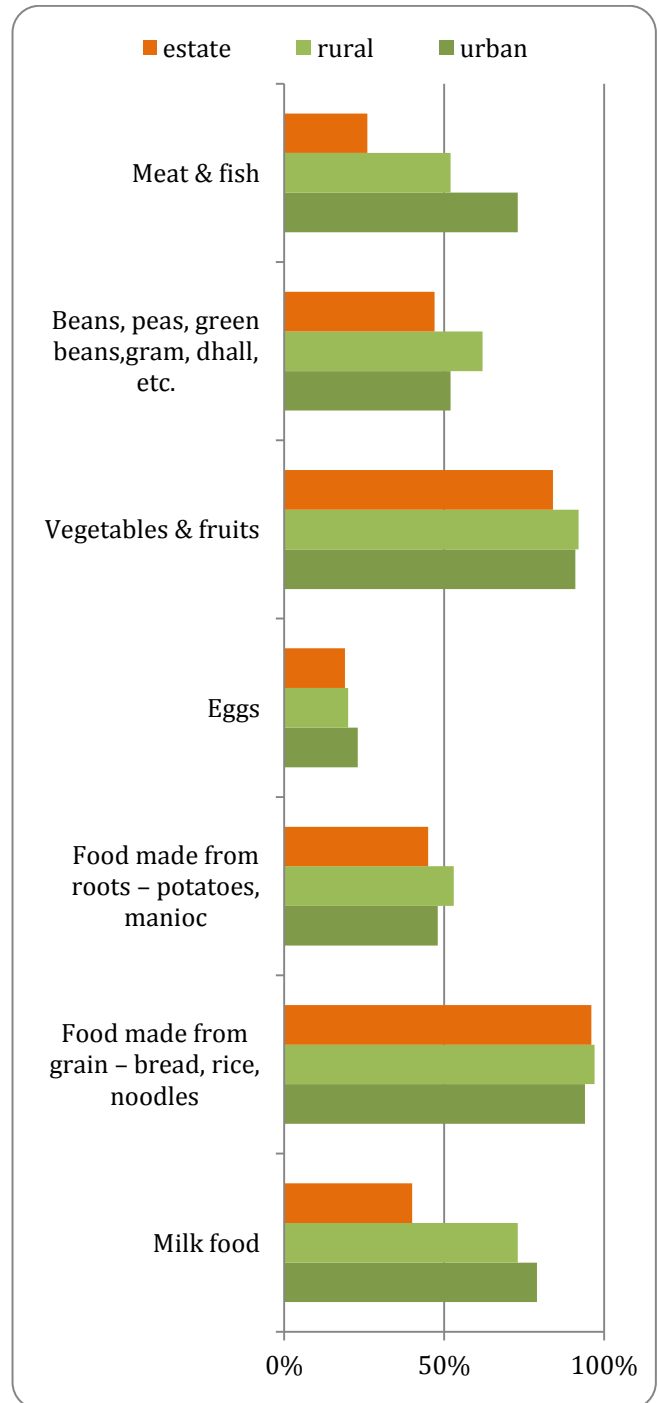
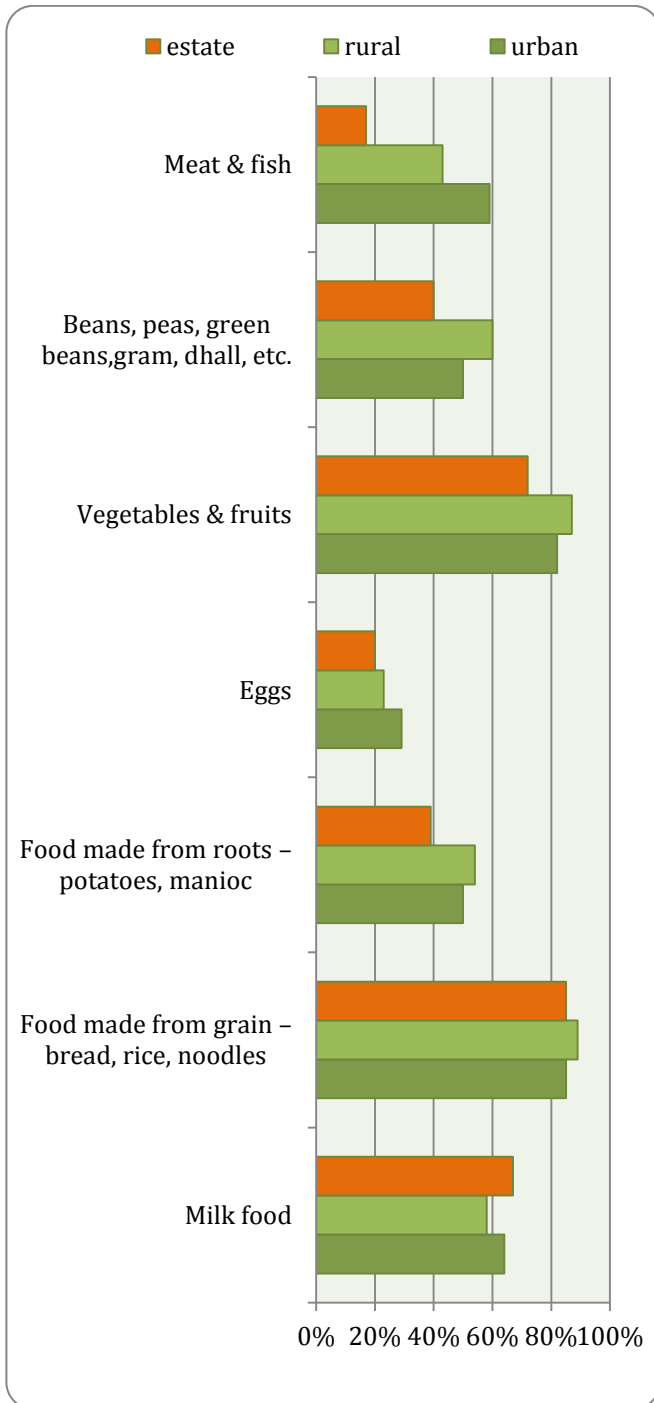


Figure 1. Food consumed by child and mother.

Source: Author's calculations using DHS 2006/07 data.

Nutritional food consumption was much lower among estate sector children and mothers: If we look at the food consumed by children aged 1-3 years, we can see that the least consumption of protein rich food (meat, fish, poultry eggs and cereals) is in the estate sector, when compared to urban and rural areas (see Figure 1). Further, consumption of other essential nutritional food items such as fruits and vegetables that are rich in vitamin A and cereals, were much lower among the estate sector children than the country average. If we look at the women's food intake we can see that women's food consumption patterns were similar to children's food consumption. Similar to Estate sector children, Protein rich foods were consumed less by mothers in the estate sector when compared to peers in the other two sectors.

Food choices vary by individual; depending on their decision on taste, nutrition, convenience, and price. These food selection choices are most intriguing in the context of childhood food consumption. Parents often contemplate food choices for their young children, and parents are generally intolerant of health risk to their children. Indeed, parents place a higher premium on nutrition than taste in that decision making model. In this context, women's education and knowledge have strong impact on decision making model. Further, it stands to reason that nutritional information may prove uniquely elucidative.

Child Care Practices: Appropriate food must be offered

to the child with correct timing and frequency. Therefore, child care is crucial for the nutritional well-being of a child. As established in Engle (1999: 132), critical areas of care for women include adequate quality and quantity of food; care to prevent and treat illness; support for sufficient fertility regulation and birth spacing; care during pregnancy and lactation; and safe prenatal and birthing care. It is well recognised that breast milk is the best for infants and nothing can duplicate its' value. Breast milk contains natural nutritional profile with perfect proportion and also it protects infants against infection. In this study child care practices were mediated through a variety of child care giving practices, such as giving the baby colostrum, and whether he/she was exclusively breastfed from 0-4 months.

Estate sector mothers were less successful in child care practices: There were wide differences in the child care routine practiced by the estate sector women. Giving the first milk (colostrum) to the newborns is promoted, as it is rich in proteins and antibodies that protect children from several infectious diseases. However, in the estate sector only 68% of babies were given colostrum, whereas on average in the rest of the country 90% of newborns were given the first milk (see Figure 2). Further, in the estate sector only 63% of babies were given 4 months of exclusive breast feeding, whereas on average in the rest of the country, around 83% of the babies were exclusively breast fed for the first 4 month.

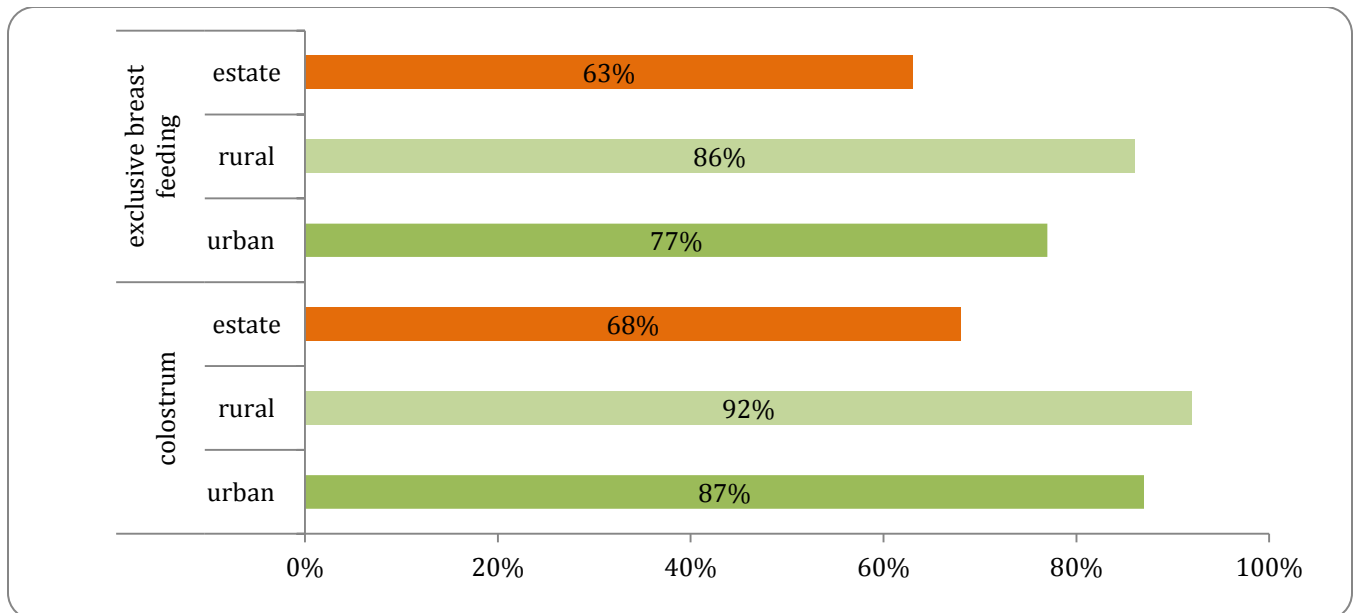


Figure 2. Child care practices

Source: Author's calculations using DHS 2006/07 data.

Nutrition of Estate Sector Women: Nutrition and physical activity are the key components of healthy and productive lives. Women’s health is central not only due to their productivity in employment, but also more importantly, due to specific reproductive outcomes and the performance of their many household tasks. To a large extent, the wellbeing of children depends on the health of their mothers. According to research findings on the determinants of child malnutrition in Sri Lanka, children of malnourished mothers are more likely to have a low birth weight, and also suffer from childhood malnutrition (Jayawardena, 2012). Also, when mothers are malnourished and sickly, their children face a higher risk of succumbing to diseases. Family members repeated submission to infectious diseases will in turn increase the health care cost and impact on household economy, as family budgets will need to be diverted towards health care.

This study used two indicators of the nutritional status of women: Body Mass Index (BMI), height, and the haemoglobin (hb) concentration in the blood. Indicator BMI<18.5 was used to assess chronic energy deficiency malnutrition of women. This indicator is the most frequently used standardized indicator of thinness (wasting), to assess the progressive loss of body energy. Height is a measure of past nutritional status.

Prevalence of malnutrition is highest among estate sector women: According to the Demographic and Health Survey (DHS) carried out in 2006-2007, one in six women of reproductive age (15-49 years) was malnourished in Sri Lanka (see Table 1). Further, there are regional differences in women’s nutritional status, with an alarming rate of malnutrition prevalent in the estate sector. According to the results, around 33% of estate sector women were undernourished, whereas this rate was about twice as high as that of the rural sector, and three times higher than in the urban sector (see Table 2).

Table 2. Nutritional status of women.

	BMI < 18.5	Stunted height<145cm)
Urban	9.7	8.6
Rural	16.3	10.6
Estate	33.3	17.3
Total	16.2	10.7

Source: Author’s calculations using DHS 2006/07 data.

Further, living in the estate sector poses a significantly higher risk in terms of long term nutritional status. Although the prevalence of stunted women was 10% on

average, in the estate sector 17% of reproductive age women were short in stature. This indicates that there is a prevalence of long term undernourished women in the estate sector, in part due to the cumulative effect of social and economic outcomes on access to nutritional foods, during childhood and adolescence.

The observed regional difference in women’s nutritional status could be an indication of low access to and use of health services in the estate sector, compared to other regions. For instance, people in the estate sector are isolated from the rest of the society, and this fact has kept this community within the estates without any social mobility due to poor infrastructure – poor roads, no transport facilities, etc. For instance, they have to travel great distances to access government hospitals. Although, Sri Lanka has good primary health care service, in the estate sector only 61% of the mothers have reported that the public health midwife visited them during their pregnancy; whereas the country average was over 83%. Further, cultural and social factors in the estate areas are less favourable for women. For example, a high percentage of plantation sector women are addicted to alcohol and go through teenage pregnancies. A combination of these factors, and others, may lead to a higher risk of poor nutritional status among women in the estate sector.

Teenage Pregnancy: Past studies, ACC/SCN (1992 : 78-79), show that adolescent girls are not physically prepared for childbirth, since linear growth is not complete until age 18, and the birth canal does not reach its mature size until two to three years later. As a result of this, and other factors, teenage mothers face a high risk of serious pregnancy related complications. Further, teenage mothers are more likely to give birth to low birth weight babies.

According to the DHS survey 2006-2007, 6.4% of adolescent women (age 15-19 years) have begun child bearing – either they were already mothers, or were pregnant with their first child (DCS, 2009). Looking across sectors, nearly 10% of adolescent girls in the estate sector have begun child bearing. According to an estate sector youth, female girls live in unsafe conditions, and often suffer sexual abuse at the hands of their own family members.ⁱⁱ Further, they explained that poor living condition – line rooms, alcoholism, lower level of education, etc. are the main reasons for the perpetuation of this pathetic situation.

Alcoholism and Smoking: Each member of the family

may be affected by alcohol differently. An alcoholic can disrupt family life and cause domestic violence, child abuse, and poverty, etc. Parental alcoholism may affect the child even before a child is born. In pregnant women, alcohol is carried to all of the mother’s organs and tissues, including the placenta.

Alcohol consumption was extensively higher among the estate sector people: According to DHS 2006/07 data, 40% of the estate sector families have been exposed to alcohol;

whereas in the other two sectors it was around 17% (see Figure 3). Further, estate sector women are also addicted to alcohol, which may have adverse effect on their health as well as the health of future generations. Estate sector people are addicted to alcohol due to many reasons such as, being engaged in labour intensive work, habit, cooler climate, and etc. Also, there are many liquor shops available in close proximity, which also acts as a motivator for people to consume alcohol.

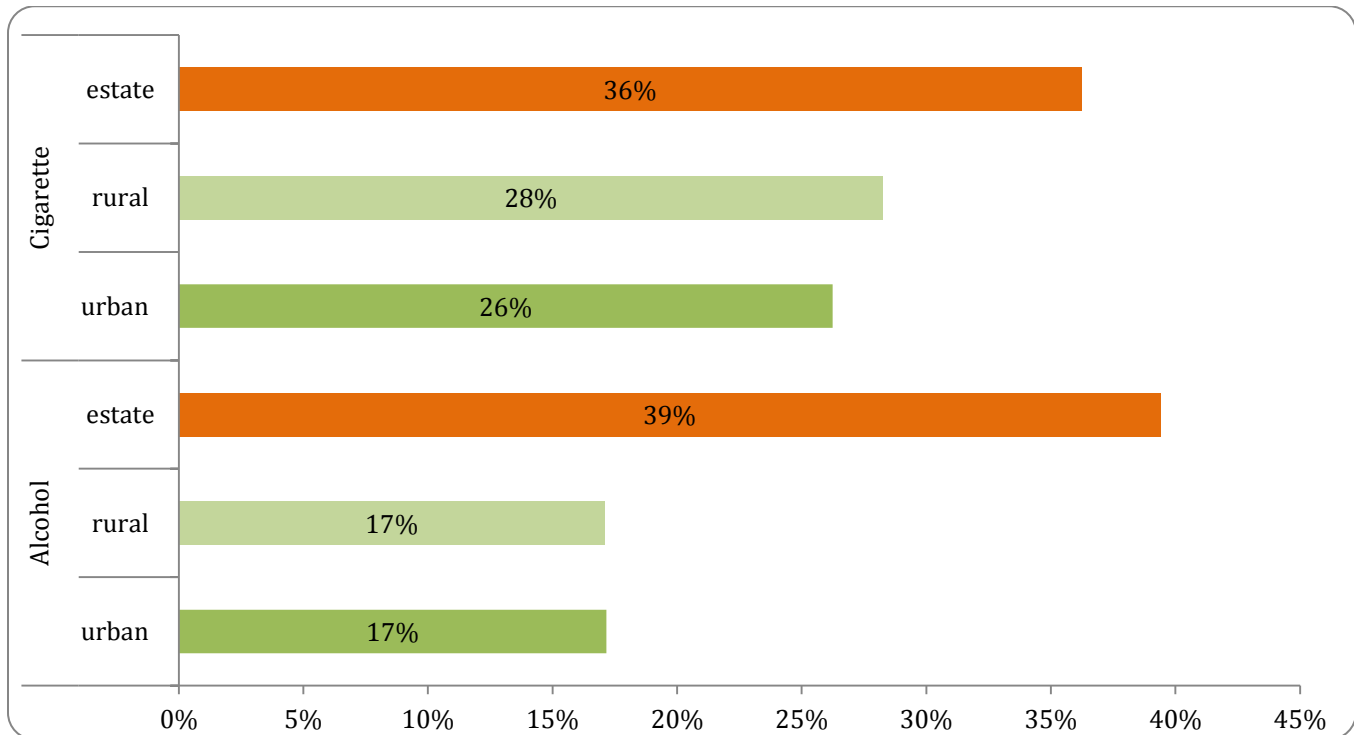


Figure 3. Household alcohol users and smokers Source: Author’s calculations using DHS 2006/07 data.

Spending on alcohol and tobacco badly affect the household’s food security: Although, estate sector has recorded for highest poverty levels (Head count ratio : national level 8.9%, estate sector 11.4%; DCS, 2011), these people spend roughly two times more than the expenditures for alcohol and tobacco incurred by the average Sri Lankan. For instance, according to the estimates based on Household Income and Expenditure Survey 2009/10 data, the estate sector average monthly expenditure for liquor, tobacco, and etc., was Rs.1216 and it made up around 9% of their monthly food expenditure whereas the average monthly expenditure of alcohol etc. of the country was Rs.665.

Utilization of Resources: Economic, cultural, and social factors affect the utilization of available resources and how they are translated into resources for food security, child and maternal care, and health environments and

services. Even where there is poverty, food insecurity, and limited access to health care, enhanced care given within the household can optimize existing resources to produce good health and nutrition in children.

Women are the key actors in generating good nutrition and household food security. Women have the greatest potential to make decisions that positively affect child health, spending of household income, the quantity and quality of food, and in health-seeking behaviours (Haddad, 1999). However, women’s position and status is formed around a series of cultural and economic factors, such as mother’s education level, knowledge, and whether mother engages in an economic activity, etc. Therefore, women’s status and household’s socio-economic status are discussed in detail in the following sections.

Estate Sector Women’s Education: *Almost half of the*

women in the estate sector have not had education beyond the primary level: In the estate sector, women’s level of education was much lower when compared to the education levels of mothers in the urban and rural areas (see Figure 4). Estate sector students get primary education in the estate schools. A majority of schools located in the estates are primary schools, and therefore, after primary education many students stop schooling due to a variety of reasons contributing to poor access to secondary schools. These include bad roads, lack of transport facilities, and poverty etc.

upward social mobility. Further, women’s low literacy level could be a major cause of the problems associated with poor nutritional status in the estate sector. Poor educational conditions affect women’s

“We have to walk around 7 kilometres to get a bus.”

Estate sector youth: these students then enter into the labour force straight after completing primary education, as there are employment opportunities for lesser educated youth in the plantation sector. According to the findings of Samarsinghe et al (1990), motivation to stay on in education is minimal among estate sector children, as they can start on wage employment at a young age. This perpetuates a vicious cycle, which keeps this community within the estates, without any ability to utilize available resources, because it makes it difficult for these women to take advantage of the awareness raising campaigns conducted by the health service on family health and hygiene practice.

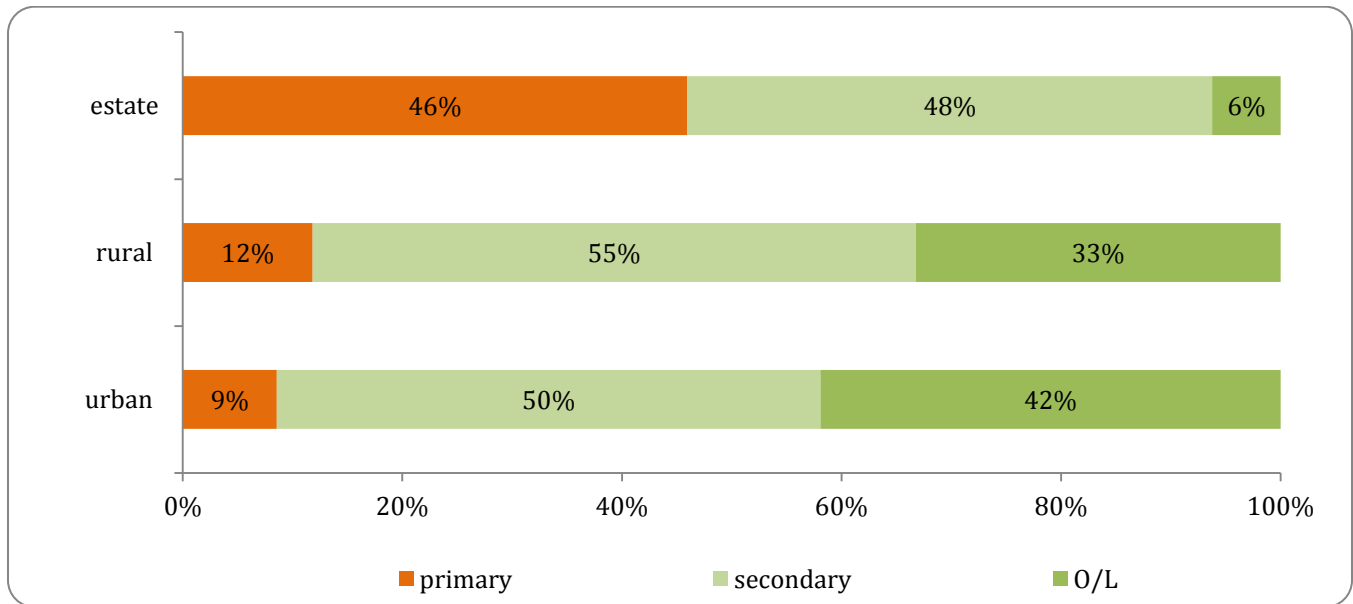


Figure 4. Women’s level of education

Health Environment and Services: Health environment and services are underlying causes of child’s and maternal nutritional status. The living environment must be cleaned to protect children from a variety of diseases. However, the availability of adequate sanitation facilities, such as safe drinking water and unshared sanitary toilet facilities varies across the residence sectors.

Estate sector housing conditions were poor: Socially, the estate sector people are inhibited, because they confined themselves to the estates where lodging facilities were provided by the estate management. As a result, these people suffer from poor housing, and unhygienic sanitary facilities, etc. As of the 2009 household survey,

Source: Author’s calculations using DHS 2006/07 data 64% of the estate sector houses consisted of line rooms houses.ⁱⁱⁱFurther, out of those line houses, 66% had one bed room. These poor living conditions are contributing factors to frequent illnesses, domestic violence, and sexual abuse among estate sector people.

Household sanitation facilities were poor in the estate sector: In the estate sector, 17% of the households did not have access to a safe drinking water facility, while 43% did not have access to a sanitary toilet or have a separate toilet facility per household; for the rest of the country, these rates were at about 9% and 20% respectively (see Figure 5). Alarming, 9% of the households in the estate sector did not have a toilet at all.

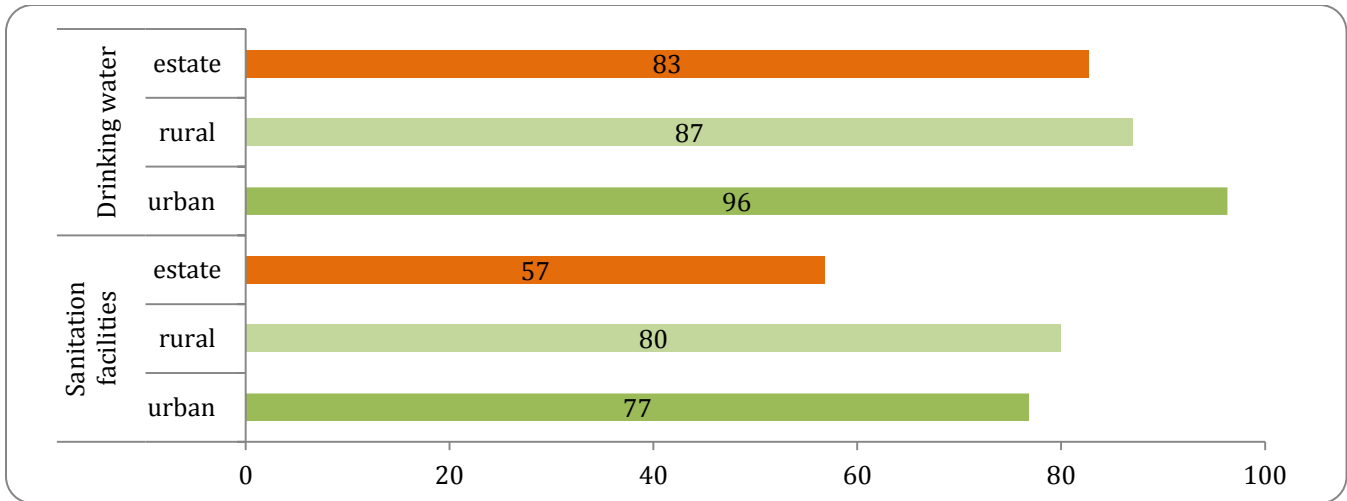


Figure 5. Household Sanitation and Drinking Water Facilities.

Source: Author's calculations using DHS 2006/07 data.

Household Socio-economic Status: A household's socio-economic conditions influence the nutrition of household members in many ways, including through the ability to satisfy the basic needs, and access to facilities which affect the health and welfare, etc. For example, a child belonging to the "poorest" socio-economic quintile is three times more likely to be underweight, than a child in the richest quintile. *In the*

estate sector 90% of households were poor: Households' socio-economic status was considerably lower in the estate sector than in the other two regions. In the estate sector almost 91% of households fall into the poor category, while in the urban and rural sectors this was at 20% and 42% respectively (see Figure 6). The poor socio-economic status of households adversely affected the health and welfare of the estate sector people.

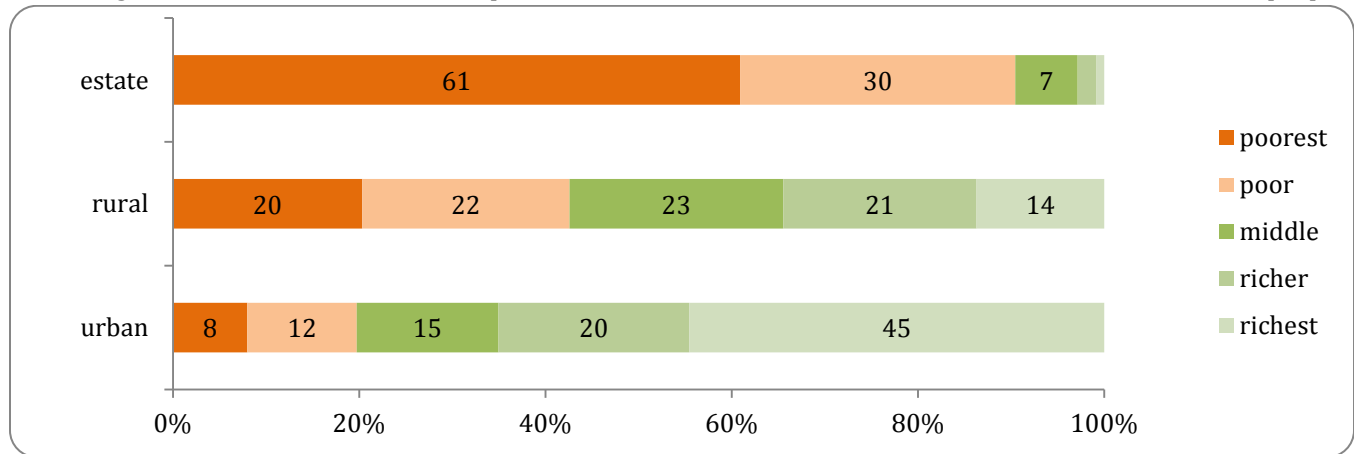


Figure 6. Household Socio-economic Status. Source:

Author's calculations using DHS 2006/07 data.

Key Underlying Determinants of the Prevalence of Childhood Malnutrition in the Estate Sector:

According to the descriptive analysis provided in the last sections, improvements in all of the hypothesized explanatory variables would lead to reductions in child malnutrition in the estate sector. However, the bi-variate relationships identified may mask the variables' confounding influences. The goal of this section is to single out the independent effect of each variable, while controlling for the others. More directly, it can be

compared to the partial effects of the regressors on the probability that a child was malnourished.

Underlying determinants of childhood malnutrition in relation to three major pathways: food insecurity, inadequate maternal and child care practices, and poor health environment and services. In this section, the practical significance of the parameter estimates of child nutritional status (underweight) was discussed with respect to the above pathways, and the possibility of significant differences were investigated. Results are shown in Table 3.

Table 3. Determinants of the Prevalence of Childhood Malnutrition in the Estate Sector

Variables	Coef.	P>z
<i>Child's characteristics</i>		
Child's age (in months)	0.00	
Male child	0.19	
Low birth weight child	0.78	***
Whether child had diarrhoea, fever, or cough in the past two weeks	0.02	
<i>Mother's characteristics</i>		
Mother's education below primary	0.34	**
Mother reads newspaper regularly	-0.08	
Mother engage in an economic activity	0.06	
Mothers height (in cm)	-0.04	**
Mother underweight (BMI)	-0.02	
Mother's age at first child's birth	-	
15-19	0.07	
20-24 (base)	-	
25-30	0.37	
<i>Household characteristics</i>		
Number of people in the household	0.03	
Number of children between 0 and 5	0.27	*
Poor (belongs to two poorest quintiles)	0.20	
Safe drinking water	0.27	
Water sealed separate toilet	0.15	
Shared toilet	0.22	
Household member use alcohol regularly	0.14	
Use iodized salt for cooking	0.19	
Child's food intake	-	
Milk food	-0.32	**
tea/coffee	-0.04	
Food made from grain – bread, rice, noodles	0.90	***
Vegetables & fruits	-0.19	
Food made from roots – potatoes, manioc	0.16	
Meat & fish	-0.35	*
Eggs	0.22	
Beans, peas, green beans, gram, dhal, etc.	0.05	
Cheese, yogurt or other milk products	0.29	
sugary food	-0.25	
Food made from oil	0.46	**
constant	2.66	
N		443
Pseudo R2		0.1731

Source: Author's calculations using DHS 2006/07 data.

Findings of this study showed that child's birth weight is strongly associated with him/her eventually becoming a malnourished child. Further, a mother's height –which represents the mother's long term nutritional status –was closely associated with the child's nutrition. As established in Smith et al., (2003), women's nutritional status influences children's nutritional status in early childhood because of poor breastfeeding practices, a care that is vitally important for a child's health and proper growth.

As in the case of a mother's nutritional status, her education and knowledge also have a stronger impact on the child's nutrition, through child care practices. A child with a mother with an education below primary level is more likely to be underweight, than a child with a mother who has had secondary level education. When considering child malnutrition by household food security and in terms of the care they receive a significantly higher risk of child growth failures can be seen in the households that have a larger number of children aged less than five years. Further, according to survey records of the 24 hour dietary recall, a child's food intake in terms of quality, showed a significant association with child nutritional status. Children, who consumed key protein food such as milk, fish, and meat, were less likely to be underweight. However, as discussed before, the consumption of protein rich food was much lower in the estate sector, compared to food consumption of urban and rural sectors. On the other hand, the consumption of more energy rich starchy and fatty foods significantly increases child malnutrition. This gives an indication that in the estate sector, a significant reason for child malnutrition was the intake of the 'wrong' kind of food. In other words, they didn't consume adequate amounts of food rich in nutrients, particularly, proteins.

MATERNAL NUTRITION

Poorly nourished mothers give birth to babies with low birth weight. As shown in the previous section, those who were born underweight are more likely to be growth retarded in childhood. Further, children of malnourished mothers were more likely to be malnourished in their childhood. Hence, finding determinants of maternal malnutrition is of vital importance to ensure that malnutrition does not become an intergenerational problem.

As established in previous research, many inter-related factors influence a mother's nutritional status, ranging from her physiological utilization of food and

nutrients during pregnancy and lactation, through to the socio-economic influences on food availability (World Bank, 1994). Bearing in mind the vital importance of a woman's nutritional status to a child's nutritional status, this section's purpose is to determine factors that influence an estate sector woman's own nutritional status. As described in methodology section, this study uses two indicators of reproductive aged (15-49 years) women's nutritional status: Body Mass Index (BMI) and stature. All the estimates in this chapter are based on DHS 2006/07 survey data. The mean height of estate sector reproductive aged women (15-49 years) was 150 centimetres, and the mean weight was 46 kilograms, whereas country averages of these measures were 152cm and 53kg, respectively.

Explanatory Analysis of the Prevalence of Maternal Malnutrition: Multivariate analysis of probit regression was performed to examine the net effect of each independent variable in the model, on maternal malnutrition among estate sector women, while controlling for other independent variables. Taking into consideration the data availability, the considered sample for above analysis, consists of reproductive aged women (15-49 years) with a child below three years of age.

Women's nutritional status varies substantially depending on differences in their level of knowledge. The mother's knowledge was measured using a proxy variable – those reading newspapers at least once a week. Women who read newspaper at least once a week were generally more aware of utilizing available resources for the improvement of themselves and their families, than those who didn't read papers regularly. Therefore, higher the level knowledge, lower the chances of a woman being malnourished.

A married woman with an absent partner is more likely to be undernourished as compared to women living with their partners. With her spouse living elsewhere, or in instances of widowhood or divorce, women are more likely to face economic insecurity, and would have to seek employment, which would in turn have both health and nutritional implications.

These results indicate that household resource allocation is associated with household food security, which is a prerequisite for access to adequate dietary intakes and improved nutritional status for all members of the household.

Table 4. Determinants of Analysis of the Prevalence of Maternal Malnutrition.

Variables	Coef.	P>z
Mothers characteristics		
Woman's age	-0.18	*
Woman's age^2	0.00	*
Live with partner	-0.81	*
Woman's education below primary	-0.04	
Woman reads newspaper regularly	-0.38	*
Woman engage in an economic activity	0.01	
Household characteristics		
Number of people in the household	-0.01	
Number of children between 0 and 5	0.11	
Poor (belongs to two poorest quintiles)	0.04	
Safe drinking water	0.01	
Water sealed separate toilet	0.18	
Make water safer to drink	-0.16	
Use iodized salt for cooking	-0.23	
Household member use alcohol daily	0.58	**
Household member use cigarette daily	0.13	
Woman decide on spending money which she earned	0.07	
Woman's food intake		
Milk food	-0.01	
tea/coffee	-0.34	
Food made from grain – bread, rice, noodles	0.54	
Vegetables & fruits	-0.24	
Food made from roots – potatoes, manioc	-0.10	
Meat & fish	0.05	
Eggs	-0.32	*
Beans, peas, green beans, gram, dhal, etc.	-0.14	
Cheese, yogurt or other milk products	0.01	
Sugary food	0.06	
Food made from oil	0.35	*
constant	2.84	
N		487
Pseudo R2		0.0818

Source: Author's calculations using DHS 2006/07 data.

CONCLUSION AND POLICY RECOMMENDATIONS

There are many recommendations have been found. The findings of this study support the argument that interrelated factors which influence the nutritional well-being of estate sector children and reproductive age women (15-49 years) range from, household food security, mother's poor education and knowledge levels, to household socio-economic characteristics, such as alcoholism. The estate sector lagged behind other communities in the country, in terms of various indicators of human development – e.g. nutrition, living conditions, etc.

Sustainable nutritional interventions should be aimed at enhancing food security, access to health care and services, and access to safe water and sanitation at the household and community levels, as well as at schools in

the estate sector. Health care services in estate areas should be strengthened with specially trained health care providers, regular nutritional check-ups, and specially designed nutritional education awareness programmes. The growth of children might be hampered by a shortage of food or the wrong kind of foods, such as those lacking protein. Therefore, nutrition education programmes should be strengthened on the importance of appropriate foods – what foods to select; how to prepare and feed children in relation to frequency, density, utilization; and the hygienic and nutrition value of food. As women may only have limited financial resources and time, while working as labourers, it is important that high quality nutrition for all women, including pregnant and lactating mothers, be available at low cost and in convenient forms for consumption.

Further, the living conditions in estate areas should be enhanced by providing better housing and increasing access to safe drinking water, and sanitation facilities.

Education and knowledge of women have a great impact on their nutritional status, as well as on the nutrition of her children. Culture and social factors, in the estate areas are less favourable for women and most of the women in the estate sector are less educated and hence, these factors adversely affect their ability to make the right nutritional choices, as well as the empowerment to adopt such decisions. Therefore, improving female education is a must for improved child and maternal nutrition. It may also be beneficial to motivate mothers to send their daughters to school, especially in the estate sector – thus increasing maternal literacy in the future. Further, special nutrition counselling programmes are necessary to improve awareness among less educated women.

As the causes of malnutrition were multi-faceted, actions to reduce malnutrition require concerted efforts at different stages of the life cycle, as well as the incorporation of nutrition considerations into all sectoral policies. Therefore, integrating nutrition with other sectoral activities, including health, agriculture, education, economic reform and rural development is necessary in order to address the multifaceted problem. Special education programmes can promote positive health behaviours and change harmful attitudes and practices such as alcoholism, and teenage pregnancies, etc. Campaigns against alcohol consumption should be carried out amongst the young people in the estates, and intervene to change the levels of alcoholism in the estates.

To develop long-term changes, the individual causes of malnutrition within the community must be recognized and removed. Therefore it is important to identify food shortages, inappropriate feeding practices, and diversities in diet that exist in these areas, for better targeting. Especially, community driven programmes would have a major role to play in improving the socio-economic development of deprived estate sector.

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ⁱThe deviation of an individual's value from the median value of a reference population divided by the standard deviation of the reference population (or transformed to normal distribution).

ⁱⁱThe information is collected through an FGD done with youth from the estate sector. The FGD was conducted by the Institute of Policy Studies, as a part of the project: Commitment of Sri Lanka in Effective and Meaningful Participation of Youth in Realizing the MDGs.

ⁱⁱⁱEstimated using Household Income and Expenditure Survey (HIES) 2009/10 data