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FACTORS INFLUENCING HOUSEHOLD NUTRITION STATUS IN RELATION TO INCREASING FOOD PRICES IN KANDY, SRI LANKA

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Factors influencing household nutritional status in relation to increasing food prices in Kandy, Sri Lanka

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Research Assignment

Title	**Factors influencing household nutritional status in relation to increasing food prices in Kandy, Sri Lanka**
Background of the study	The food crisis of 2008 further exacerbated the nutritional insecurity of poor people around the world. Unprecedented numbers of people do not have access to food because of insufficient economic potential. Sri Lanka is a low income food deficit country which has, until recently experienced civil war, and has high numbers of malnourished people.
Objectives of the study	- Identify factors that influence a households susceptibility to food insecurity. - Determine what type of social networks or aid households count on in times of crisis. - Determine how households behave in times of crisis by: identifying strategies households use to mitigate food price increases and assess their risk profile. - Determine the households nutrition profile in rural and urban settings. - Provide recommendations for policy improvement and poverty reduction. - Increase household resilience to food price shocks.
Research questions	- How can the nutritional status of a household be assessed? - What are the socio demographic characteristics of the households? - What strategies do households employ in time of food price increases? - What are the most relevant factors influencing nutritional status of the household? - How are coping strategies utilized by households? How are coping strategies influencing nutrition status? - Do household have better food security (in quality and quantity) if they have higher care in rural and urban areas? - How should government interventions target households? - How can knowledge of nutrition be improved?
Theory and methods	-Systems modeling, SWOT analysis - Statistical methods: regression, significance - Relationships between socio-economic variables, nutrition insecurity, and coping strategies will be analysed using the data.
Supervisor	Dr. Martijn Sonnevelt, ETH
Support(s)	Prof. Dr. Bernard Lehmann, ETH; Prof. Dr. Geir Leiblein, UMB; Dr. Joël Robin, Isara Lyon
Timetable	Start: January 2011. Finish: September 2011

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Abstract

The food crisis of 2008 exacerbated the nutritional insecurity of poor people around the world. Still today, unprecedented numbers of people do not have access to food because of insufficient economic potential. Sri Lanka is a low income food deficit country which has, until recently experienced civil war, and has high numbers of malnourished people. The objective of this thesis was to identify factors that influence a households susceptibility to food insecurity and to determine how households behave in times of crisis by: identifying strategies households use to mitigate food price increases and assess their risk profile, to determine the households nutrition profile in rural and urban settings, to provide recommendations for policy improvement and poverty reduction, and to increase household resilience to food price shocks. The ability for a household to be resilient is dependent upon its ability to respond to shocks over time and the UNICEF conceptual framework on malnutrition is used as a basis to understand the underlying causes of food insecurity in this study. The research included a field level systems analysis and qualitative data collection from stakeholders, followed by a quantitative questionnaire of 100 households, 50 in the urban area and 50 in the rural area. Results show that households that use coping strategies related to changing consumption patterns, such as, decreasing intake of protein, fruits and vegetables, eating less preferred foods, decreasing the frequency of meals, negatively affect the households nutrition status. Households that use strategies related to disposing of assets and risk taking, positively influenced the households nutrition status, however it is unclear how long households can maintain this trajectory. Results also show that nutrition knowledge in this segment of the population is quite poor and the inability to consume a quality diet, in sufficient diversity, is more prevalent than the inability to acquire sufficient quantity, in terms of energy intake.

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Abbreviations

Department of Census and Statistics (DCS)

Divisional Secretariat (DS)

Food and Agriculture Organization (FAO)

Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS)

Food and Nutrition Technical Assistance (FANTA)

Grama Niladhari (GN)

Household Dietary Diversity Score (HDDS)

Household (HH)

Household Head (HHH)

Household Income and Expenditure Survey (HIES)

International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD)

International Food Policy Research Institute (IFPRI)

International Fund for Agricultural Development (IFAD)

Non-Communicable Disease (NCD)

Recommended daily Intake (RDI)

United Nations Standing Committee on Nutrition (SCN)

World Food Program (WFP)

1. INTRODUCTION

Food security, as defined by the FAO at the 1996 World Food Summit, is when “all people have, at all times, physical and economic access to food in order to live a good and healthy life”. Increasingly, it is becoming evident that insufficient caloric intake and dietary diversity is caused by the lack of economic access to food (to be able to afford food) and not by a physical limitation of the amount of food available (Frankenberger et al., 2002). Insufficient access to food leads to malnutrition which causes poor livelihood outcomes and an increased risk of morbidity and mortality. (SCN/ACC 1999)

The international community fully supports and has committed to respecting the ability of all people to pursue a full, active and healthy life. The release of the Millennium Development Goals solidified this stance by making the first goal, the eradication of poverty, with the short term objective to halve extreme poverty and hunger by 2015. However, it is clear that malnutrition is a complex process that intersects several dimensions of human life such as: health, care, agriculture, and culture, thereby requiring a comprehensive view of the complexity of food decisions and food accessibility.

Understanding the factors that increase households’ resilience, or the households’ ability to respond to changes, will help to create policy that will build and strengthen that resilience by providing targeted social safety net programs that result in hunger alleviation (von Braun, 2008). Von Braun (2007) stated that “the fact that large numbers of people continue to live in intransigent poverty and hunger in an increasingly wealthy global economy is the major ethical, economic, and public health challenge of our time.” The continued presence of hunger and malnutrition despite significant scientific advancements in food production over the last 50 years requires serious attention by society.

In order to effectively work in this area a multi-disciplinary approach is required, because hunger and malnutrition transects the domains of agriculture, nutrition and economics.

1.1. 2008 food crisis

The 2008 food crisis highlighted the vulnerabilities that poor households face in the presence of price increases for staple foods. Poor households typically spend more of their income on food than wealthier households, and when food prices increase they are forced to make difficult choices. A direct consequence of the recent 2008 food crisis was an unprecedented 1 billion people who went hungry. By the end of 2010 this number had decreased to 925 million, this number continues to be unacceptable to the international community. (FAO, SOFI, 2010)

Famine research by Sen in the 1980's has been seminal in understanding contemporary issues of the processes involved during food crises. He realized, that food was available but not accessible to people because of the erosion in their entitlement to food (Frankenberger et al., 2002). In times of high food prices the livelihoods of the most vulnerable populations are at risk, because they are priced out of the food market. In times of increasing food prices peoples ratio of food to non-food purchases increases, health and education spending is forgone, and there is a shift to a diet that is less rich in micro-nutrients (von Braun, 2008). This undermines the ability to adequately attain nutrition, especially for children whose growth can be stunted and cognitive development impaired at critical life stages.

The food crisis of 2008 was caused by a number of factors such as, rising demand for food as a result of increased population growth, a growing middle class, climate variability, trade actions by important export countries, panic buying, speculation, and an increased demand in commodities for biofuels (von Braun et al. 2008). The price increases of key staples such as rice, wheat and corn, where the prices doubled and tripled caused poor households to be at risk for nutrition insecurity and hunger. This situation was further exacerbated by high oil prices. This resulted in unprecedented levels of malnourishment across the globe.

Figure 1 shows the dramatic increase of food prices in the period leading up to the crisis in 2008.

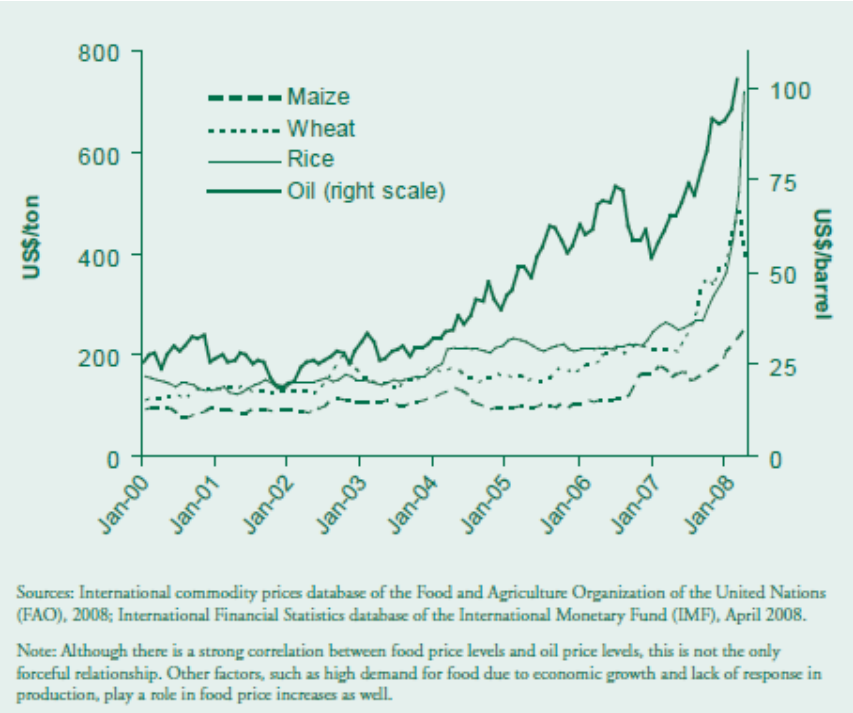

Figure 1. World commodity prices, January 2000-April 2008.

In Sri Lanka the effects of the 2008 food crisis was more tempered because of domestic production of rice. However, as a large importer of rice, the price changes had a more dramatic effect. In figure 2 the trend in prices for wheat and rice are shown, demonstrating that prices did not hit a peak in Sri Lanka in 2008, but are continuing to rise.

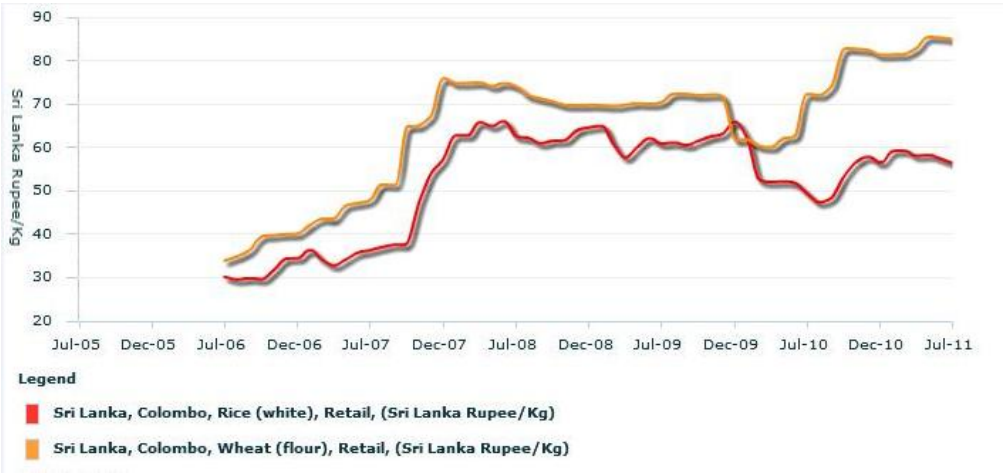

Figure 2. Trends in prices for wheat and rice in Sri Lanka (FAO GIEWS, 2011)

The poor are the most adversely affected when food prices rise. Most households switch to less nutrient rich diets with smaller amounts of, or no animal proteins. Overall

caloric intake can decrease and dietary quality, which includes micronutrient diversity, will decrease (Frakenberer and McCaston, 1998). Poorer diets mean less energy, impaired cognitive and physical development, reduced energy and fatigue, lower productivity, and increased health risks for mothers and children. Today, malnutrition is more often linked to people's inability to afford a diet that is diverse and healthy than with a lack of available food resources. (ACC/SCN 1999).

At the household level, responses to a food crisis are complex because food is only one of several competing priorities a household faces when it comes to income allocation. There are several competing interests that influence how the poor spread risk in the short and long term. Individuals may intentionally go hungry to preserve assets, especially when taking into account short and long term survival (Maxwell and Smith 1992, Frankenberger et al., 2002).

Consumers in low income countries are much more responsive to price changes than in high income countries. The demand for meat, dairy, fruits and vegetables is much more sensitive to price, than the demand for bread and cereals (von Braun, 2007) which cause the poor to have less nutritionally adequate diets resulting in long-term health care costs.

The effect of higher world food prices on individual countries depends on local conditioning factors such as the structure of imports and exports or transportation costs. Also, the effects of higher local food prices on the food security of households depends on the importance of net food purchases relative to the size of the household budget (Benson et al. 2008). For example, poor people spend 50-70% of their income on food and have little adaptive capacity due to employment that is often unskilled where they gain lower wages (von Braun 2008). The price volatility, i.e. fluctuation of prices over time, driven by changes in climatic and economic conditions, make it difficult for households to behave strategically. This in turn raises their stress levels. Government interventions can, to some extent, insulate against food price increases, for example in Sri Lanka some foods (e.g. price of rice) are subsidized, which can reduce the effects of international price volatility.

Food price volatility is worrisome because it pushes more people into poverty and moves a significant proportion of the population further away from reaching basic human development goals. There is also increasing evidence that rising food prices contribute to political instability. This is evidenced by the food riots in 2008, where more than 30 countries experienced food riots (von Braun et al., 2008). There is also evidence that the street protests and revolt in North Africa in early 2011, 'Arab Spring' was a result of growing discontentment with government inaction over rising food prices.

Joachim von Braun (2008) in responding to the recent food crisis stated that policy and investment decisions in agriculture should be geared toward exploiting new opportunities and building resilience for future challenges. The crisis highlighted the lack of investment in agriculture and the lack of credible and up-to-date data on the impact of food and nutrition insecurity, and the corresponding effects of policy responses.

Rice is the staple food item to the South Asian bread basket accounting for 40% of calories. Rice production is also especially important to food security in South Asia because 32% of all rice produced in the world comes from South Asia and all but 1% of this 32% is consumed in South Asia. Because poor households spend 30-40% of their income on rice, small changes in price can have dramatic effects. (Weerahewa, and Rajmohan, 2009)

1.2. Background of the study

Sri Lanka is a low-income, food deficit country that has had a unique development history. Progressive for decades on the health, education and literacy fronts has garnered Sri Lanka a good UN Human Development ranking, yet Sri Lanka has lagged behind other countries with similar GDP's per capita in the areas of nutrition, food security and agricultural production (WFP, 2010). This has been amplified by the civil war and natural disasters that have occurred in the recent past. According to the Department of Census and Statistics food spending took up, on average, 37.6% of households' expenditures in 2006/2007 and rose to 42.3% in 2009/10. In comparison, Americans spend 5.7% and the Swiss 10.4% of household expenditures on foods consumed at home (USDA, 2006).

Access to food by poor households has been identified as an issue in almost all Sri Lankan districts (WFP, 2010). A study from 2009 by UNICEF and the WFP found that 22% of all households in Sri Lanka were food insecure, with major disparities across regions especially in the North and North-East. The same study also found that insufficient nutrition knowledge is an underlying cause for the high prevalence of under-nutrition as well as micronutrient deficiencies.

Malnutrition continues to be a major problem in Sri Lanka, especially, protein energy malnutrition and iron, iodine and vitamin-A micro-nutrient deficiencies. (Rathnayake, Weerahewa 2002). Rathnayake and Weerahewa (2002) found that there is intra-household food distribution competition in Kandy whereby they found that there is a significant difference in the relative calorie allocation between men, women and children within households, indicating that malnutrition is more common among mothers and children.

Three socio-demographic areas of nutrition interest have been identified in Sri Lanka, which are marked by specific nutritional issues: urban areas (with poor and marginalized populations, also the nutrition transition has resulted in an increased prevalence of overweight and obese people in comparison to other areas), rural areas (marked by poor infrastructure, insufficient road access) and the estate sector (poorest nutritional group, often labour exploitation based on ethnicity). Each sector has specific and diverse constraints that compromise the nutrition security of the poorest households. (Kodithuwakku and Weerahewa, 2011)

The urban region of Kandy was chosen as the study site for this research. According to the latest UNICEF report from 2010 for the district of Kandy, 17% of population lives under the poverty line, 50% of the population is below the mean level of sufficient daily dietary intake (kcal 2030) and mean kcal consumption was 1,675, mean household income per month was 24,444 Rs. of which 8,709 Rs. were spent on food and non-alcoholic drinks.

1.3. Objective of the study and research questions

The primary objective of this study is to contribute to the body of knowledge related to how poor households become more resilient to food price changes in order to better their nutrition status. Information and analysis are required to design and implement responses to crisis (Benson et al. 2008) therefore the final objective is to provide policy makers, NGO's and other researchers with a basis for understanding food insecurity and its risks in this area. The studies aims are to determine the dietary consumption patterns of the urban poor and rural poor in the region of the Kandy Divisional Secretariat; and, using previously gathered data related to coping strategies to determine which types of coping strategies are chosen in times of high food prices. It will also consider influencing factors such as, access to basic services (e.g. medical, sanitation, water) and socio-demographic factors (income, assets, education, household size, age), nutritional knowledge and knowledge about and access to governmental aid.

The three most important household characteristics that will be looked at in depth are: care, resource base and food consumption patterns. It is postulated that these three factors will together determine the coping strategy utilized in times of high food prices. The first set of research questions are required for the explorative, observation phase in order to elaborate the further research questions and methodology.

Table 1 lists the research questions that will be addressed by this Master's thesis. The words in bold represent the category that the question falls into, which has been developed during the systems phase and is explained in detail in further sections.

The research questions fall into three categories: systems analysis for developing the problematic and questionnaire, quantitative data collection form the questionnaire, and applying the results to concrete areas for policy improvement.

Table 1. Research questions addressed by this study

Research question	Method and/or hypothesis
How can nutritional status of a household be assessed?	Literature review, systems analysis, explorative phase
What coping strategies do households employ in time of food price increases?	Literature review, systems analysis, explorative phase
What are the most relevant factors to nutrition security in Kandy?	Local literature review, systems analysis, explorative phase
What socio-economic factors affect the households' nutritional status in the rural and urban areas? **Descriptive data, resource base**	The higher the income of the household the better the nutritional status The higher the education level the better the nutritional status Households with a homegarden have a better nutrition status
Is there a difference in dietary diversity, caloric intake and consumption of macro nutrients between rural and urban households? **Food consumption**	Rural households have a diet that is more diverse than urban households Urban households consume more fats and carbohydrates Rural households consume less protein Households with a higher daily Kcal intake consume more diverse diets
Do household have better food security (in quality and quantity) if they have higher care in rural and urban areas (defined as: care for the caregiver, nutrition knowledge of the caregiver, health care of the household, water and sanitation)? **Care**	Households where the caregiver has a higher education will be more nutritionally secure Households with higher level of nutrition knowledge will consume a greater diversity of food items Households with more nutritional knowledge will consume more protein Households where the caregiver regularly accesses media will have better nutritional status In households where the caregiver is more autonomous the better the nutritional status
How are coping strategies utilized by households? How are coping strategies influencing nutrition status?	Which type of coping strategy are most utilized by households in rural vs. urban areas How is caregivers education and nutritional knowledge related to coping strategy type How is nutritional status correlated to coping strategy type How does household level income and assets affect the choice of coping strategy How do number of household members affect coping strategy chosen
How do households that have a home garden experience food security in the rural and urban areas? **resource base**	Households with a home garden consume a diet that is more diverse Household with a homegarden save money in food related expenditures
How should government interventions target households?	Systems analysis and Interpreting the statistical analysis
How can knowledge be improved?	Systems analysis and Interpreting the statistical analysis

1.4. Structure of the study

This research will be conducted using a systems and action-based research approach. In the first phase, qualitative information will be gathered about how households generally behave and treat food security. A systems approach will be utilized to create a model of the constraining factors relating to food security in that area.

During this exploration, or finding out phase, strategies that households use to mitigate food price increases will be identified by households. This will capture the qualitative aspects of food security through immersion in the community and interaction with local stakeholders.

This information will then be used to build a questionnaire, in the second phase, which asks the right questions. The questionnaire will contain questions about food consumption at the household level, using the 24-h recall method to build nutrition profiles, and socio-economic questions. In the first part, the socio-economic factors (age, gender, percentage of food spending, size of household etc.) that contribute most to nutrition insecurity (through daily Kcal consumption and diet diversity) will be identified and in the second part, the households will be asked questions about the strategies they use when food prices rise (the most common strategies will have already been identified from the work in the first phase). The data will then be quantitatively treated to determine if there are specific factors that make a household more nutrition insecure and what the distributional characteristics of these factors are. Finally, the data will help to determine if there are distributional characteristics to the strategies and common behaviours that households' most commonly employ in times of high food prices.

The proceeding sections will present the theoretical background and state of the art research in the area of food security, followed by the research design, the results, including the systems model and the data analysis, and finally the last section will be the discussion with recommendations and suggestions for improvement.

2. THEORY

Food security research cuts across several disciplines from public health to agricultural economics to sociology. The theoretical background outlined in this Master's thesis represents the most up-date knowledge regarding nutrition security and action oriented research.

2.1. Nutrition as a human right

The right to food is an emerging concept in food security literature where "the right to food imposes obligations on states to respect, protect, fulfill and promote food security (Maxwell and Smith, 1992)". This argument goes beyond the humanitarian need for people to have access to safe and nutritious food, but implores national governments, based on international law to protect and provide the fundamental right for all to have access to food.

The 1948 Universal Deceleration of Human Rights specifically regarded the right to food as a core element of an adequate standard of living (Maxwell and Smith 1992). Following this, in 1974 at the World Food Conference, the Universal Deceleration on the Eradication of Hunger and Malnutrition was adopted and stated: every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties (Maxwell and Smith 1992).

It is evident that this fundamental human right has not gained as much international attention nor the same sense of urgency that others, such as political and civil rights have gained (Eide and Kracht, 2007). Oshaug et al. (1994) stated that states have the obligation to a) respect b) protect and c) to fulfill human rights, and this includes the right to food.

The international nutrition community has adopted this rights based approach as a strategy at major food conferences and it also applies to important international bodies such as, the SCN (UN Standing Committee on Nutrition), the FAO, the WFP and IFAD. This approach obliges national governments and the international community to eradicate hunger and to ensure that everyone has equal access to a good nutrition (Eide and Kracht, 2007).

2.2. Concepts in food security

Sen's (1981) groundbreaking work from famine research in Africa, found that famine was a result of an entitlement failure rather than a food deficiency and that a "decline in food availability was neither necessary nor sufficient to create hunger." He went on to say that famine can occur in the absence of any change in production if the value of people's production and work activities decline relative to the cost of staple foods. This understanding opens the debate regarding how poor people economically access, or afford food, and how they can be priced out of the food market as a result of increasing prices.

The following theoretical review of food security attempts to present the case for the various factors that make the household and the individual more susceptible to malnutrition. This type of understanding requires information on the root causes of the observed phenomena, that involves several hierarchies as well as of a temporal time scale (important for trends, historical influences etc.). At the international level commodity markets, trade and commerce influence the transmission of prices to the national markets and the ensuing national trade actions. At the national level, the type of political climate, protection, trade environment, markets and social services the government provides influences regional markets, social programming and citizen satisfaction. At the household level how the household buys, produces and then cares for its members influences the individuals nutrition status. Finally, at the individual level, how the individual copes to changing circumstances, prioritizes their own consumption and how the body physiologically utilizes food, is the final determinant of nutrition outcomes. This involves a time dimension, where actions accumulate and have different results at different time periods. (Benson et al., 2008)

This examination at several levels requires a holistic approach to link the sources to the outcomes that contribute to food security. The following sections will outline this interaction.

2.2.1. National food security

In order to understand local outcomes of food security it is useful to begin by examining policy at the international and national levels that can be transmitted directly to the households' experience of food security, such as was seen by the rising prices of staple foods during the 2008 food crisis and in the continuing rise of prices observed today. The following will explain the conditioning factors that begin at higher levels, that are passed and transmitted to the household level.

A detailed national analysis can be a starting point to assess the source of local vulnerability which can then be used to predict future changes. Rising food prices are one outcome of international/national markets interacting directly with lower levels of the hierarchy to exacerbate food insecurity.

Table 2 outlines these conditioning factors and their outcomes on local markets (adapted from Bensen et al., 2008):

Table 2. Conditioning factors at the international and national level that can undermine household food security

Conditioning Factor	Outcome
Degree to which market prices are transmitted to local markets	When markets are volatile countries that absorb food price changes more readily will be more food secure than those that transmit them with a high degree of impact to local markets
National agricultural production capacity	Countries with low agricultural production, or an inefficient agricultural sector will usually be more food insecure than those with a high level of agricultural production with high yields
Trade balance for food (exporter or importer and relative importance of agricultural trade)	When agricultural products are of high importance to the total trade, generally the more food insecure the country.
Political stability	In countries where there is political instability riots are more probable, exacerbating national strategies and international aid from getting to those most in need
Climate variability and climate change	Countries that are unable to mitigate the effects of climate change effectively will feel the effects of a changing climate to agricultural production than others who can adapt more easily.

(adapted from Bensen et al., 2008)

The presence of one of these factors does not necessarily mean that a country will be food insecure (for example some countries are net food importers but not food insecure

e.g. Caribbean tourist destinations). However, generally the more conditioning factors present the more food insecure the country.

National levels of production are important for ensuring that local populations have sufficient access to food, but this is not sufficient. Income and the ability of people to economically access food is the most important factor in how aggregate food supplies are distributed. Poverty is increasingly emphasized as the root cause of food insecurity, even in countries where there is sufficient agricultural production (Frankenberger and Maxwell, 1992 and Smith, 1998). Therefore, household level analyses are important to identify the question of food accessibility, and what factors constrain the households' ability to purchase food through the market.

2.2.2. Household food security

Food security along with education and health are the basic determinants of an individual's ability to reach their full social and economic potential (Bensen et al. 2008). Households will have stable access to food if they can procure (purchase or produce) food that does not lead to environmental degradation – an indicator for future vulnerability (Frankenberger 1992). Food enters the household in the following ways a) home production, b) food purchased on the market, and c) in receipts of food (Cohen, 1998 in Smith 1998). How it is available is dependent on economic opportunity, political power, discrimination based on race, ethnicity, gender and age, violence and environmental factors (Smith 1998).

Household food security is predicated on three concepts: availability, access and utilization with the stability over time of these three components. Availability, is the physical availability of food through production, distribution and exchange. Access, is the affordability and cultural acceptability of food available on the market. Finally, utilization is the nutritional value, safety and the ability of the body to properly use ingested nutrients. (Ingram, 2009)

When an individual or households ability to access safe and nutritious food is compromised as a result of poverty, the consequences may be those that push the household to a longer term trajectory of poverty. This could be through the impact of a food crisis where the "household disinvests in human capital, such as withdrawing

children from school to reduce costs or to generate income from their labour, reduce expenditures on preventative health care, and changing the households diet away from protein and micro-nutrient rich foods (meat, fruits and vegetables) to less expensive staples (Bensen et al. 2008)". When a poor households begins selling assets they compromise the ability to adapt to future changes.

Analysing several key factors of household food security can shed light on the level of vulnerability a household will experience. These include (adapted from Bensen et al., 2008):

- Net amount of food expenditures in comparison to total expenditures
- Net buyer or net seller of food
- Level of income and assets
- Ability for real wages to adjust to rising commodity prices
- Level of vulnerability due to non-price factors
- Existence of government programs to protect vulnerable households
- Intra household factors

As the households' food security is the aggregation of the individuals food needs, individuals within the household might experience food security differently. Also, within the household there may be intra-household food allocation differences that should be examined. From a hierarchical perspective it is important to note that the household is also embedded within the larger social, cultural and political framework that may frame food security strategies. (Maxwell and Smith, 1992) This implies that households are 'dually specified', internally diverse organizations, embedded within and shaped by wider structures (Friedmann, 1979).

Table 3 examines the core concepts in food security that literature considers.

Table 3. Core concepts in food security studies.

Concept	Explanation
Intra-household allocation	Individuals within the household will experience different foods risks and will often follow different strategies
Household food security and nutrition	Food security is necessary but not sufficient for nutrition security, a need to also consider care and health
Household food security and livelihood	Must consider food within the greater scheme of livelihood security (people may go hungry to meet other objectives)
Sustainability, perceptions and resilience	Interventions should support the adaptability and flexibility of vulnerable livelihood systems
Perceptions and cultural acceptability	People's perceptions and risk predominate food security strategies, cultural values are important to determine the quality of food entitlements, rather than just quantity
Efficiency and cost-effectiveness	Legitimate objectives that will be pursued by the household and by the state
Household food security and human rights	The right to food poses obligations on governments

(adapted from Maxwell and Smith, 1992)

These concepts form the basis of household food security and highlight the plethora of factors that interact to provide a measure of household food security. From this broader understanding the food security concept has evolved to be a livelihood security concept. This is the relationship between poverty, malnutrition and the complex strategies that people pursue for survival. (Frakenberger and McCaston, 1998)

2.2.3. Manifestations of nutritional insecurity

At the individual level, malnutrition in childhood can lead to an increased risk of developing chronic pathologies in adulthood such as, an increased prevalence of cardio-vascular diseases, diabetes, and an increased susceptibility to infectious diseases (Perera, 2009). Undernourished children have lower resistance to infection and are more likely to die from common childhood ailments like diarrheal diseases and respiratory infections. (UNICEF, 2010)

Babies born with a birth weight of 2,000-2,499 grams are four times more vulnerable to neonatal mortality than babies with a birth weight of 2,500-2,999 grams and 10-14 times more vulnerable than newborns weighing 3,000-3,499 grams (UNICEF, 2010). Malnutrition also has effects on education, because learning capabilities are decreased and associated with lowered cognitive development, higher absenteeism, and increased rates of drop-outs. (UNICEF, 2010)

It is a double 'burden of disease' that poor households are also more vulnerable to health problems. In South Asia there exists a phenomenon called the 'South Asian Enigma' where malnutrition rates are equally as high as in sub-Saharan Africa, yet the access to food resources, and human development is greater in South Asia. This has been attributed to poor sanitation and water access, the increasing trend of urbanization seen in South Asia and poor maternal and child practices (women's nutritional status, birthing care, and breastfeeding and complementary feeding practices). (Perera, 2009)

2.2.4. UNICEF conceptual framework

The UNICEF conceptual framework of malnutrition, as seen in figure 3, maps the relationship between the various factors that contribute to the outcome of food insecurity. This model is a causative model of malnutrition where the final outcome of nutrition security relies on important conditioning factors and cannot be considered simply as the adequate aggregate consumption of food.

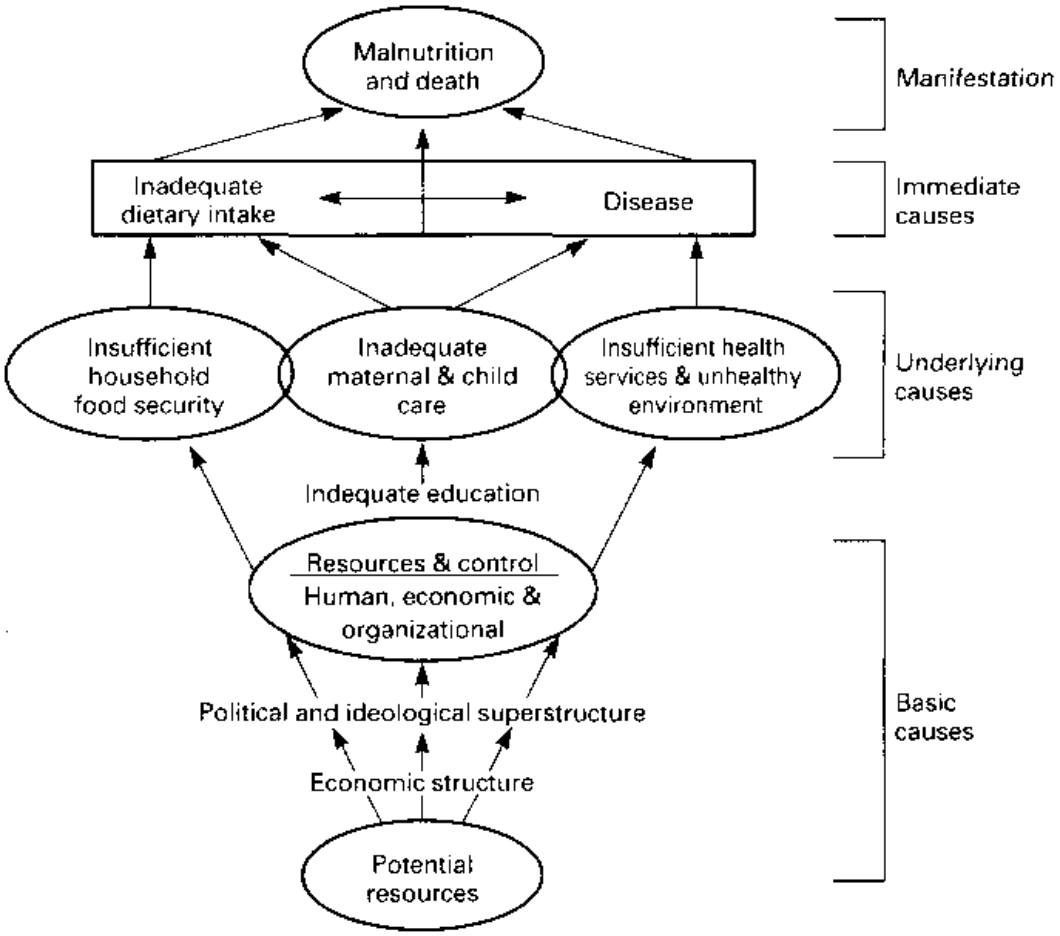

Figure 3. Conceptual framework for analyzing causes of malnutrition (UNICEF, 1997)

At the top level, the manifestation of malnutrition and/or death is caused by insufficient dietary intake and/or disease.

These two states, inadequate dietary intake and disease, are caused by three underlying causes: insufficient household food security, inadequate maternal and child care, and insufficient health services and an unhealthy environment. These three factors – food security, health and care, are each necessary but not sufficient on their own for adequate nutritional status to be achieved. The basic factors that determine to what extent the three immediate causes will be present are human, organizational, and economic which are set and defined by the political framework and ideology and the current resource base.

At this point there requires some clarification of the terms nutrition security and food security. Nutrition security and food security are not synonymous terms as household

food security is necessary but not sufficient for nutrition security (Frakenberger and McCaston, 1998).

A household must first access food (production, income or claims) and then utilize that food to contribute to nutrition through health, care, environment, culture and behavior. The UNICEF model helps clarify the terms, demonstrating the elements and their linkages that contribute to household food security (Barth Eide and Kracht, 2007). Figure 4 further clarifies the three factors that contribute to malnutrition: food insecurity, inadequate care, and health (the body's ability to use the nutrients that are ingested).

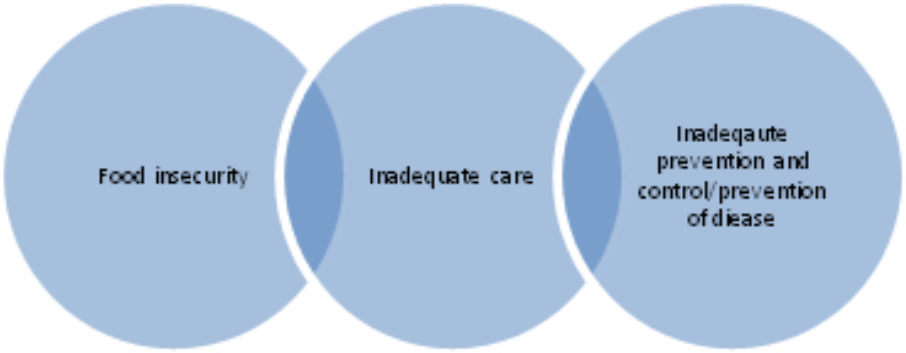

Figure 4. Sources of nutrition insecurity (adapted from UNICEF, 1997)

This concept of care becomes quite important when attempting to understand South Asia's food insecurity situation. Caregiving behaviours that underlie and create the environment within which children are raised are increasingly seen as central to child growth outcomes and policy attention to them has been recommended by the International Committee on Nutrition since 1992.

At the household level, the resource level, skills and knowledge of household members, especially the caregiver, are very important.

Care is defined as the 'provision in the household and community of time, attention and support to meet physical, mental and social needs of the growing child and other household members (International Conference on Nutrition, 1992). And the following list demonstrates 6 care activities carried out by the caregiver:

- Care for women such as providing appropriate rest time or increased feed intake during pregnancy.
- Breastfeeding and feeding of young children
- Psychosocial stimulation of child and support for their development
- Food preparation and food storage practices
- Hygiene practices
- Care for children during illness including diagnosis and adoption of health seeking practices. (Engle et al. 1996 in Pererra 2009)

The care given by the caregiver is dependent on the resources base such as education and knowledge, health of the caregiver, time, autonomy, social support and the families economic resources. This concept of care is central to the food security model, and adds other factors to understanding food insecurity.

2.3. Resilience

The most recent literature in food security points to the emerging concept of resilience and a livelihood approach to food security (EU-FAO framework). This concept forms the basis of current food-livelihood research and examines which factors, including but not limited to food, allow a household to respond to shocks over time. This approach is more holistic because it recognizes that households have competing needs that go beyond food, such as asset preservation, income generation and the need to balance present and future food supplies (Bohle et al. 2009). The resiliency concept supports the buffering capacity of households and enables households to respond to future stresses and shocks.

The EU-FAO framework for resilience is based on the idea that if the factors that make a household more resilient and therefore less vulnerable were better understood than short and long term strategies could be developed to help 'lift families out of poverty'.

Fundamental to this understanding, is that the root causes of vulnerability are what contribute to present and future vulnerability. Those root causes need to be better understood.

This concept has flexibility to include the time dimension to household food security. The ability to be resilient to food price shocks may erode over time as assets are sold. Current access to food should not influence the ability to access food in the future. This is a food systems approach and is detailed in Ericksen (2007) where an understanding of food systems requires several aspects: a) to understand the system holistically it is necessary to describe and analyze not only the component parts and actors, but the interactions among these parts and actors that produce variable outcomes b) treat food systems as multi-scale, multi-level, to facilitate the identification of critical drivers and determinant outcomes as well as allowing for the evaluation of trade-offs c) as food systems are coupled social and ecological systems, institutions play a key role in mediating between the social and ecological processes and resources d) integration across disparate literature and disciplines – ecological systems focus on critical parameters, food security focuses on root causes and food policy literature focuses on key issues for policy resolution.

A households vulnerability includes both their present experience of inadequacy and to what extent buffers (assets) have been built up over time to guard against shocks, or in opposition, have been exhausted over time. This buffering capacity relies on the frequency, intensity and duration of a previous crisis. (Maxwell and Smith 1992)

Included in this approach are the broader economic, social, and environmental dimensions that influence the outcomes of food security. Understanding food security within this framework works to identify entry points where stakeholders can act to influence desirable change.

Figure 5 illustrates these wider considerations that should be taken into account examining the factors that ultimately lead to food insecurity.

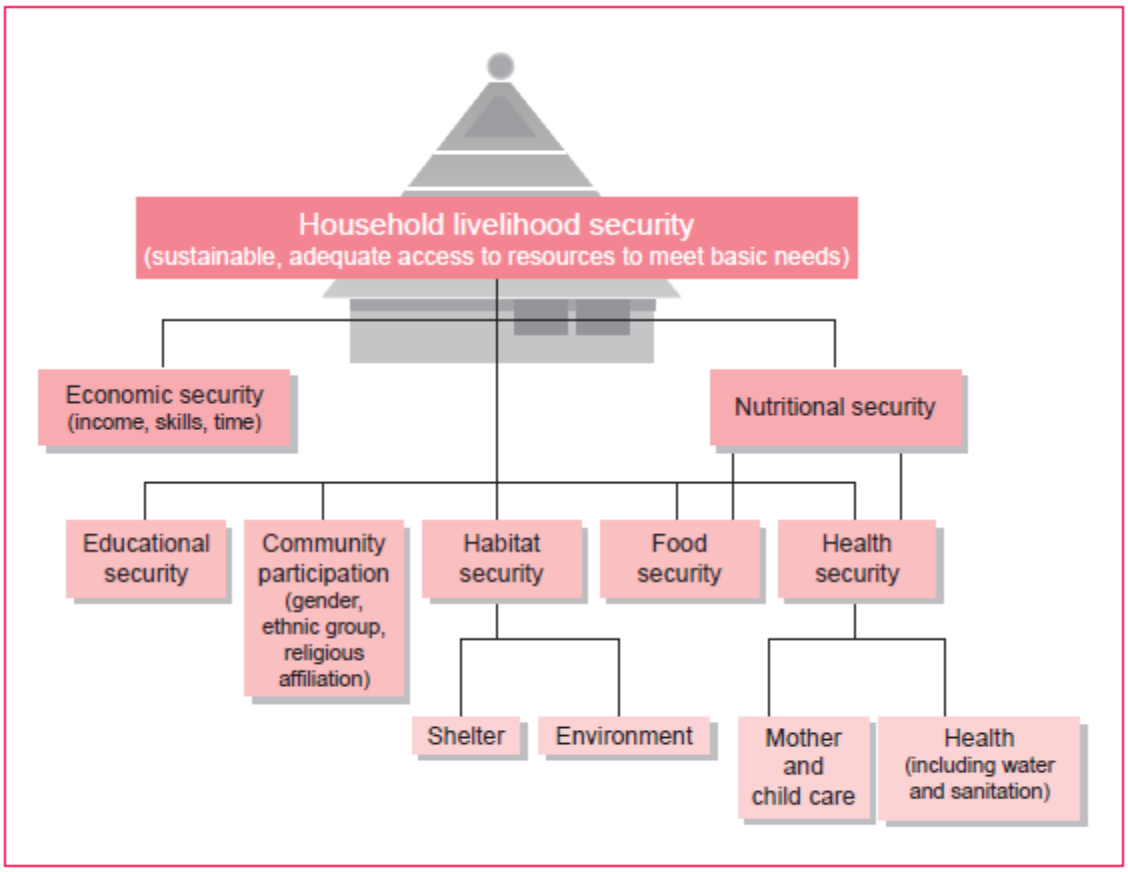

Figure 5. Components of household lilvelihood security (Frankenberger et al., 2002)

Those household which are more flexible and therefore more resilient will be those that will adapt to shocks and crisis more ably.

3. RESEARCH DESIGN

The following section describes the research design that was used to implement this project. The livelihood security framework and the UNICEF conceptual model are used as a framework for understanding the causes of nutritional insecurity and the areas where household level food security may be most vulnerable. This literature can be seen to influence the later stages of the project development. Further, the design of this project was influenced by literature that highlights the importance of qualitative and quantitative approaches to food security studies. Qualitative methods are used as a way to capture as much information as possible, whereby allowing the researcher to ensure that the right questions are being asked. Quantitative methods provide insight into the distribution and prevalence of certain risk factors and behaviours.

The rationale being that, systems methods will attempt to deal with complexity by interpreting the information and ordering it in a way that can lead to the appropriate questions in a quantitative exploration. The quantitative inquiry will attempt to determine if there is a distributional character to food security risk and if there are behaviours that are predictable in the presence of food price pressures. This can help to develop a profile for households that are vulnerable to food insecurity.

An investigative part of the project was to determine which methodologies to use undertake this study because the research requires using several data sources and types (consumption data, coping strategies, socio-economic data and care data). Therefore, in order to present the methods chosen, background will be provided, in some cases, related to the literature as to why the method was chosen. Hence, this section outlines the academic background for the methods that will be used for the field research in Kandy, Sri Lanka and the methods put in place for data collection data analysis.

3.1. Exploration phase

This first phase gathers qualitative and descriptive data. This is carried out by observing households that are similar to the study population. This process gathers information about household eating patterns, cultural habits, household food procurement strategies, existing social safety nets, strategies used to mitigate food price increases,

the extent to which food is important to overall household expenditures and to determine if households are aware of the risks involved when they make food decisions. Interviews are also carried out with organizations and people working in the health, nutrition, food security, agriculture and community support sector.

Further, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis will be carried out to better define the problematic in this area.

As Frakenberger (1992) highlights qualitative and quantitative methods are crucial to the examination of food security. Qualitative methods enable researchers to understand the local circumstances that households operate within. While quantitative methods enable researchers to examine the breadth to which observed behavioral practices, resources or problems are distributed within a population. Therefore, this study will contain aspects of both.

3.2. Systems analysis

The inquiry in the exploration phase, from interviews and observations, will provide the information needed to elaborate a systems model to assess the linkages, processes and outcomes of food insecurity in Kandy, Sri Lanka. This will allow for the conceptualization of the problematic of food insecurity in this area as well as the populations response to food price increases, how people behave in the presence of food price increases, and who they go to during times of stress (social networks, family etc.).

Systems approaches are particularity useful when the traditional methods of scientific approaches miss or are unable to consider several hierarchical levels of action because of the focus on linearity. Systems approaches are useful because they allow enable the researcher to deal with uncertainty, probability and complexity. (Wilson and Morren, 1990).

In addition, Wilson and Morren (1990) offer insight as to how systems thinking provides researchers with the tools to effectively deal with complex, value laden situations. This concept of systems thinking enables the researcher to examine how things interact, interconnect, interrelate, and in some cases, control each other. This approach is

particularly relevant to food security studies because food security has a dimension of stability which is the households access to food resources and behaviours over time.

The processes and methods used in systems thinking is visually presented below in figure 6.

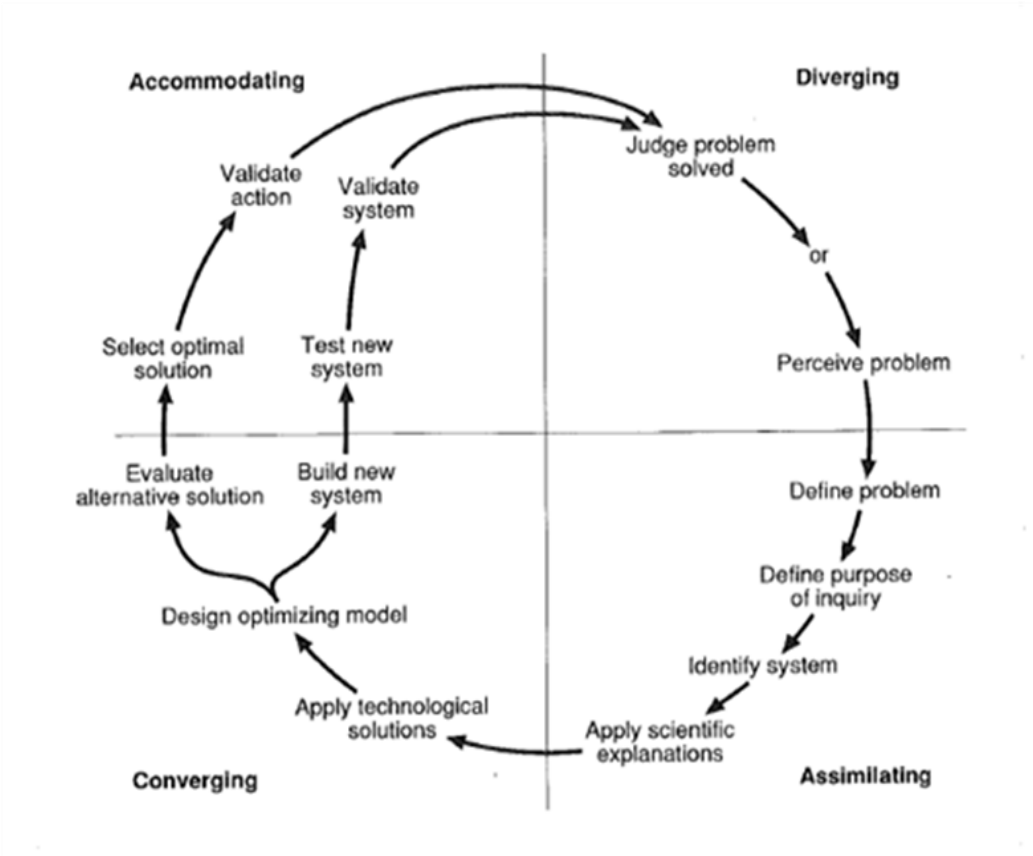

Figure 6. The process of systems inquiry (Wilson and Morren, 1990).

Figure 6 shows the four phases to systems modeling: 1) the diverging phase, where one defines and finds out about a problem situation, 2) the assimilating phase, where a model of the perceived problem situation is created 3) the converging phase where the models are used to structure debate and suggestions for improvement are made and 4) the accommodating phase where action is defined to improve the original problem situation (Checkland and Poulter 2006). This process allows the researcher to engage in the complexity of a situation and then structure it in such a way that improvements can be envisioned, through the processes that discern the root causes. (Checkland and Poulter 2006).

The models used in system thinking are most useful to: communicate complex ideas, discover new things about complex situations, and as a way to test alternative approaches to dealing with a problem (Wilson and Morren, 1990).

Specific tools are available to the researcher when engaging in action research to structure the inquiry in systems thinking. Figure 7 describes some of those tools.

Diagram type	*Purpose*	*Systems concepts employed or revealed*
Systems map	To make a snapshot of elements in a situation at a given moment	• Boundary judgements • Levels – system, sub-system, supra-system • Environment • Elements and their relationships
Influence	To explore patterns of influence in a situation; precursor to dynamic modelling	• Connectivity via influence • System dynamics
Multiple cause	Explore understandings of causality in a situation	• Worldview about causality • Positive and negative feedback
Rich pictures	Unstructured picture of a situation	• Systemic complexity • Reveals mental models and metaphors • Can reveal emotional and political elements of situation
Control model	To explore how control may operate in a situation	• Feedback • Control action • Purpose • Measures of performance

Figure 7. Types of systems diagramming for engaging in systems of complexity (Ison, 2008).

These tools are used in the assimilating phase to structure debate, determine causality and expand the field possibilities to consider factors that would otherwise be overlooked. Systems' modeling is dynamic and responds to change whereby better reflecting the complexity of human systems. This provides the researcher the tools to purposefully work in complex situations.

Of the tools described above, this study will use two: a systems map and a SWOT analysis. These tools will be used after the diverging phase is completed, and will serve to order the possibilities in the assimilating phase. This will be followed by the converging phase, where the models generated will serve to stimulate debate with other researchers and stakeholders, and will lead to the creation of a household

questionnaire. This will further enhance the scope and inclusiveness of contributing factors to the problem situation.

3.3. Household level questionnaire

After the exploration phase, where the question of food insecurity in the region of Kandy will be more precisely defined, the household level questionnaire will be created. This questionnaire will be used to interview poor rural and urban households in the region of Kandy. The responses from this questionnaire will serve to test the models that were built in the first phase. Once responses were gathered, the data was used to determine which factors were the most important to food insecurity in Kandy and what coping strategies households used in times of high food prices. An incentive to the households was provided at the end of the first interview only. The incentive given was 300 Sri Lankan rupees in the form of a gift voucher from a local store that sells household products.

The households chosen were grouped into urban and rural areas around Kandy. There were 50 interviews in the rural area and 50 in the urban area. The households were chosen if they were Samhurdi holders, which is a national level government program to alleviate poverty. Holders are poor and fall under the welfare line for Sri Lanka. There is some subjectivity as to which households are chosen to receive Samurhdi, because the guidelines are elastic, and are chosen by the Samurdhi officer in the community. There are well known problems of leakage and coverage with this program, however, it can be said with near certainty that most households are poor and can provide a good study population.

3.4. Socioeconomic data

The questionnaire was designed to gather the appropriate information about the socio-economic characteristics of the household (age, sex, education, employment, number of household members, assets). These characteristics are those that will have an impact on the level of food insecurity that the household experiences.

Questions also relate to several other aspects that have a proven affect on a households resiliency to food insecurity. These include: care (mothers knowledge,

access to media, autonomy), sanitation (water and toilet), health (access to medical services) and nutrition knowledge.

The nutrition status of the household will be correlated to the socio-economic data to statistically determine which factors are the most important to nutrition security.

3.5. Dietary Assessment

To accurately measure all of the factors contributing to food security, several methodologies needed to be considered that would account for: a) food availability, b) food access, c) food utilization and, d) stability of access. To determine the food availability component, national food balance sheets and FAO data can be used to estimate the adequacy of food availability for a given country. To measure food access household expenditure surveys and individual food intake data are required. For the utilization component an anthropometric method (eg. blood serum levels) is required. Finally for stability of access a qualitative measure of local conditions and measures of resilience is needed to project stability over time. (FIVIMS, 2011)

Dietary assessments are complex and time consuming, especially because there is no single measure that covers all of the aspects of food security, therefore the method chosen must reflect the objectives of the study. As this study was focused on the food access component at the household level, there were various methods to consider that measure individual food intake including: food frequency questionnaire, food record and the 24-hour recall. There were also rapid methods used by International Organizations, such as the Dietary Diversity Score used by the FAO, the Food and Nutrition Technical Assessment (FANTA) of the USDA, and the Food Consumption Score used by the WFP. The last two assess food security at the population level. Table 4 assesses some of the advantages and disadvantages of the various methods used for dietary assessment.

Table 4. Advantages and disadvantages of various dietary assessment methods

Method	Description	Data requirements	Questions	Advantages	Disadvantages
Food records	Respondents record food and beverages over a specified time period	Detailed data	Respondents keep a dairy	Detailed data for the reporting period More accurate portion sizes	Respondents must be literate and well trained Might change eating behavior Respondent fatigue
Food frequency questionnaire	Asks respondents to report usual frequency of consumption of food from a list Used to rank subjects according to food or nutrient intake, not for absolute levels of intake	List of foods typically eaten, may be over 100 items	Interviews ask respondent to recall past events, over one month for example	Estimates specific relevant nutrient intakes Measures intake over a longer period of time Less respondent burden	Little detail on other characteristics, caloric intake, cooking methods Difficult to get valid results, high error level
24 hour recall	Respondent are asked to report all the foods and beverages consumed on the previous day	Recall over the previous 24 hours of all foods and beverages consumed	Interviewer asks respondents to recall past events using probing questions	Interviewer records data Respondents aren't required to be literate Less potential to interfere with food habits because it is a recall	Many days needed to estimate intake accurately Foods consumed away from home difficult to quantify Relies on memory Respondents may purposefully under-report or over-report because of embarrassment
Household food insecurity access scale FANTA	Measures the households experience of food insecurity	5 qualitative questions	5 qualitative questions	Simple tool Asks one person, per household, Measures, socio-economic level of the household Used a as a proxy for food security	No quantifiable data Relies on respondents experience of food insecurity No diversity measure or calorie level measure
Household Dietary Diversity score FAO/FANTA	Measures household dietary diversity as a proxy for household food access Used as a population level indicator for dietary diversity	Qualitative free recall for all beverages and foods eaten over the past 24 hours	Food groups consumed during previous 24 hours	Can ask one person for the whole household, or individuals Used a as a proxy for food security	no quantifiable data for overall intake accuracy requires several days
Food Consumption Score WFP	Combines dietary diversity and frequency of consumption over 7 days	Each food/group has a specific weight, used to make a household score	List based recall of consumption and frequency over the last 7 days	Easier to collect data Country specific list of foods	Out of home consumption not counted No information on caloric intake
Anthropometric methods	length, height, weight, weight-for-age, and mid upper arm circumference measurements for children, BMI, percentage body fat for adults	Uses anthropometric tools to measures chronic malnutrition	Trained interviewer required to measure	Accurately captures malnutrition in children	Significant training required Time burden Shows chronic malnutrition, time lag for transitory malnutrition

Source: Thompson and Subar (2001), Swindale and Bilinsky (2006), Kennedy et al. (2009)

Attention needs to be taken when measuring nutrition security because no single measure can capture this accurately. Methods that focus solely on aggregate caloric (energy) intake, eg food intake have been criticized for discounting protein and micro-nutrient consumption. Smith (1998) is critical of the FAO's measure of undernourishment at the national level and states that "the measure reflects national food availabilities and does not adequately capture people's ability to gain access to food."

To have a sufficient indicator for nutrition security both dietary quantity and quality must be assessed. Quantity represents the total amount of calories consumed in kcals whereas quality assesses the variety of the foods consumed. Using only the measurement of aggregate energy, in kcal of food consumed, data will be lacking regarding the overall quality of the diet. The reason for including a measure of dietary quality is that a more diverse diet will provide a variety of micro-nutrients such as vitamins and minerals and have a higher nutrient density (Hoddinott and Yohannes 2002). This understanding reflects increasing evidence that micronutrient deficiencies are caused by a lack of diversity in the diet and that these deficiencies are equally as important as energy adequacy in achieving nutrition security.

This rationale reflects why the 24-hour recall is chosen to conduct the dietary assessment portion of this study. With this method it is possible to collect information on dietary quality and quantity. This is possible when the data collectors are trained to gather this information. While it can be time consuming this method provides a high quality of data and all the relevant information.

3.5.1 Measuring dietary quantity

To gather information related to dietary quantity, the 24 hour recall method is used for two separate days. This involves asking the household caregiver (usually the mother who is responsible for preparing all the household meals) what she cooked the previous day, and what was consumed (so as to account for waste). Food eaten outside of the household can be problematic, and as such, are not considered when accounting for household consumption. However, household members that are not present for a certain meal will be subtracted from the household total for the meal(s) they missed.

In Sri Lanka this effect is minimized because most people take homemade lunch packets, and this enables for a better accounting for actual consumption.

The dietary analysis will gather data from two separate days to better account for variability in diets. As such, one day will reflect a week day whereas the other will be a weekend day. The two survey days will take place no more than 14 days apart.

The questions related to food consumption in the questionnaire will be analyzed using the Nutri-Survey software. These responses will provide a nutrition profile for the household.

The Nutri-Survey software provides a breadth of nutrition information, however in this study, data will be captured only related to: energy (kcal), protein (grams), fat (grams), and carbohydrates (grams).

The percentage of fat, protein and carbohydrate contribution to overall energy will provide insight as to the quantities and ratios of macro-nutrients consumed. This allows for comparisons between groups, urban and rural, to understand the most important sources of dietary energy.

Adequacy rations will be calculated for energy and protein for each household. This will be done it two ways: using the adult equivalency ratio and using the Sri Lankan Recommended Dietary Intakes (RDI) for energy and protein.

The adult equivalent unit per household is calculated using the table below.

Table 5. Adult equivalent units per household

Age group (years)	Conversion Coefficient Male	Conversion Coefficient Female
<1	0.43	0.43
1-3	0.54	0.54
4-6	0.72	0.72
7-9	0.87	0.87
10-12	1.03	0.93
13-15	0.97	0.80
16-19	1.02	0.75
20-39	1.00	0.71
40-49	0.95	0.68
50-59	0.90	0.64
60-69	0.80	0.51
70+	0.70	0.50

Source: Nanayakkara, 2006 in Malkanthi 2010

A value for each household will be calculated according to the number, age and sex of household members. This is the adult equivalency ratio per household, which is divided by the total energy intake of the household, given by Nutri-Survey. This gives the available household energy (kcal) per equivalent adult per day.

$$\frac{total\ energy\ intake\ of\ HH\ per\ day}{Adult\ equiv\ units\ per\ HH} =$$

The next analysis is the percentage that the household is fulfilling their energy and protein requirements as per the Sri Lankan RDI. To calculate this each household's total protein and energy requirement is calculated using the table below.

Table 6. Sri Lankan Recommended Daily Intakes (RDI)

Age group (years)	Calorie* male	Calorie* female	Protein* (g) male	Protein* (g) Female
<1	820	820	28	28
1-3	1250	1250	29	29
4-6	1710	1710	33.5	33.5
7-9	2100	1810	41	41
10-12	2200	1950	53	55
13-15	2525	2125	74	70
16-19	2830	2150	88	66
20-39	Sedentary: 2475 Moderate: 2840 Active: 3350	Sedentary: 1920 Moderate: 2020 Active: 2240	53	44
40-49				
50-59				
60-69				
70+				

Source: Recommended Dietary Intakes for Sri Lankans 1998

With this information and the output from Nutri-survey the adequacy ratios for energy and protein can be calculated:

$$\frac{total\ protein\ (g) consumption\ of\ HH}{total\ protein\ \ (g) requirement\ of\ HH\ RDI} \times 100$$

$$\frac{total\ energy\ (kcal) consumption\ of\ HH}{total\ energy\ \ (gkcal) requirement\ of\ HH\ RDI} \times 100$$

3.5.2. Measuring dietary quality

The most appropriate measure for dietary quality in this context will be the Household Dietary Diversity Score (HDDS) developed by the FANTA, food and nutritional technical assistance of the USAID. This information is also gathered from the 24 hour recall and the score is a simple count of how many food groups were consumed in the previous day. The score consists of 12 food groups as shown below.

Household Dietary Diversity Score from USAID, 12 Food Groups

1. Cereals
2. Roots and tubers
3. Vegetables
4. Fruits
5. Meat, poultry
6. Eggs
7. Fish and seafood
8. Pulses/legumes/nuts
9. Milk and milk products
10. Oils/fats
11. Sugar/honey
12. Miscellaneous

This method has been used in other Sri Lankan food security studies. However, one constraint to this strategy is that it does not consider the absolute quantities of the food group consumed. For example, most Sri Lankans consume lime juice in a common dish *pol sambol* (grated coconut, chili, onion) but this is only a squeeze, yet would represent the food group fruits if it had been consumed in the previous day. Also, most Sri Lankans use powdered milk to put in their tea in the morning. This quantity would be approximately 1tablespoon per day per cup and therefore would be included under the milk and milk products group. In these cases the HDDS score might be misleading because the amount consumed would not correspond to the recommended daily intake.

Data is collected from two separate days; therefore an average of the two days will provide the HDDS. To measure the dietary quality 8 food items is considered to be the cut-off to describe a household with sufficient quality in Sri Lanka. (Malkanthi, 2010)

3.5.3 Anthropometric assessment

Anthropometric data collection is usually quite time consuming due to the requirements to weigh and measure respondents. However, as a result of the extensive network of midwives available to communities, it has been possible, for all children under 5 to be measured and weighed according to the World Health Organization's growth charts. It is mandatory for children entering school to show these growth charts. Children are taken once a month to the midwives to be weighed and measured. Therefore, by asking to see this growth chart, information can be collected related to the child's weight at birth, malnutrition over the lifetime and stunting over the lifetime.

3.6. Coping strategies and risk perception

The risk profile of individual households and communities are determined by the channels through which their access to food is normally mediated and by the assets that are available to them as buffers. The most food secure households are those that achieve adequate access to food while only using a small proportion of available resources. The most food insecure, most at risk, fail to achieve adequate access even by devoting a large proportion of available resources to food (Maxwell and Smith 1992).

Household coping strategies vary depending on local conditions but follow general patterns (Corbett 1988 in Maxwell and Smith 1992). One of the first responses is to decrease food intake, in order to preserve essential assets. Households fall into three categories – enduring households, which maintain food security over a long period of time, resilient households which suffer shocks and recover quickly and fragile households who become increasingly insecure in response to shock (Oshaug, 2006).

There are some dietary adaptations to insecure food access that lead to growth failure and usually results in an increase in specific health risks which increase mortality (Maxwell and Smith, 1992).

Behavioural responses to food price increases include trade-offs between the perceived risks. There is a consideration that is made between the current food risk and mitigating future risk vulnerabilities. Current strategies to prevent future vulnerabilities could include, children going hungry and being absent from school in order to work. In some cases households will accept decreasing food consumption to preserve assets in order to maintain an adaptation capacity for future events. As households begin to sell assets they risk becoming more vulnerable to further changes and will lose their buffering capacity. The most extreme strategy is to migrate. (Maxwell and Smith 1992)

There is a lack of knowledge about how coping strategies are successful in maintaining a balance between current food needs and longer term sustainability. In order to better understand this, the dynamics need to be tracked over a longer period of time. However, it is clear that the most resilient households will be those that have a plethora of strategies to choose from in order to spread risk.

From Maxwell et al. (2003) there are four basic types of coping strategies used to compute the Coping Strategies Index (CSI) for food insecurity. These are: dietary changes, short-term measures to increase household food availability, short term measures to decrease numbers of people to feed and rationing, or managing the shortfall. Examples within each category are displayed in table 7.

Table 7. Types of coping strategies from the Coping Index Score

1.	**Dietary change**
a)	Rely on less preferred and less expensive foods
2.	**Increase short-term household food availability**
b)	Borrow food, or rely on help from a friend or relative
c)	Purchase food on credit
d)	Gather wild food, hunt, or harvest immature crops
e)	Consume seed stick help for next season
3.	**Decrease numbers of people**
f)	Send children to eat with neighbours
g)	Send household members to beg
4.	**Rationing strategies**
h)	Limit portion size at meal time
i)	Restrict consumption by adults in order for small children to eat
j)	Feed working members of HH at the expense of non-working members
k)	Ration the money you have and buy prepared food
l)	Reduce number of meals eaten in a day
m)	Skip entire days

Source: (Maxwell et al., 2003)

In using the methodology outlined in Maxwell et al. (2003) the authors demonstrate that the use of the aforementioned coping strategies is a sign of food insecurity and therefore demonstrates an irregular behaviour. They also highlight the difference between consumption coping strategies (which are reversible and can be done quickly) and livelihood coping strategies (which are one-off adaption strategies and are often not reversible).

Maxwell et al. (2003) classified these strategies based on the long or short term effect they would have on livelihood security. Consumption related coping strategies are those which reduce food consumption, and are short-term effects which can be easily reversed. In contrast, strategies related to the diversification of the income base and disposing of assets would be related to longer-term unalterable coping strategies, also

referred to as smoothing strategies (so as to smooth consumption, to maintain normal levels).

Further, in the work by Curtis (1993) in Maxwell et al., (2003) coping strategies used in times of famine are categorized as follows: a) increasing access to extraordinary resources, b) reducing consumption, c) disposing of assets to maintain social and economic viability. The strategies are further classified into the level of risk taken by the household according to the corresponding strategy used.

Using the literature as a guide and the results of the systems analysis, a more appropriate list of Sri Lankan coping strategies to rising food prices shall be identified. These strategies will be included in the questionnaire when asking questions relating to behavior. Examples include: when food prices increase what kinds of food do households prefer, how does the household increase access to resources, does the household change eating patterns etc.

3.7. Methods to compute nutrition and coping strategy scores

Finally, the data gathered from the questionnaire will be categorized, in the case of nutrition data, coping strategies, media access and nutrition knowledge, into scores for the data analysis. The scoring follows the methodology, with some adaptations, as demonstrated in the following section, for nutrition scoring described by Malkanthi (2010)

For the dietary assessment:

- if the household is meeting less than 80% of their energy needs, from the Sri Lankan Recommended Daily Intakes, the household is assigned a score of a 1

-if the household reaches more than 80% of their energy needs, from the Sri Lankan Recommended Daily Intakes, the household is assigned a score of a 0

-if the household has a dietary diversity score of less than 8, the household is assigned a score of 1

-if the household has a dietary diversity score of greater than 8, the household is assigned a score of 0

This leaves three possibilities for the household to score, the definition of scores is as follows: 0 household is food secure (meeting both dietary diversity and household energy requirements), households are food insecure with a score of 1(household meets either the energy or dietary diversity requirement, but not both) and a score of 2 means that the household is very food insecure (neither meeting dietary energy needs or dietary quality needs).

The scores for coping strategies will be categorized into the coping strategy types that are chosen in the systems analysis and weighted according to frequency and severity.

The difference in scores, for the coping strategy types will be computed using z scores. In order to do this, z scores are determined for each household, and for each coping strategy type. Using this method it will be possible to see which coping strategy type is most often relied upon.

Nutrition knowledge and access to media will be scored by aggregating the responses for the two categories.

3.8. Sampling frame

Based upon a previous study about rising food prices and coping strategies in Kandy by Kodithuwakku and Weerahewa (2011) the Divisional Secretariat (DS) of *Gangawatakoralaya* and *Harispaththuwa* were chosen because of their respective spread of urban and rural populations. Within these DS divisions five *Grama Niladhari* (GN) divisions, which are the grassroots level of community organization, were chosen because they had the highest number of Samurdhi (poverty alleviation program, which controls for poverty and income level as determined by the government) recipients in the respective DS. The number of households per GN interviewed was determined by calculating the weight of the numbers of Samurdhi holders in the whole DS.

Upon arrival at the GN a household was randomly chosen for the first interview, then using cluster sampling methods, all the houses in that immediate area were interviewed. Generally there were two clusters per GN interviewed. The urban and rural populations were based in different municipalities. The urban population was within the city limits of Kandy, and the rural population was the neighbouring municipality to Kandy. Table 8 shows the GN communities interviewed and the number of interviewed households per

GN. The number in brackets is the number of households interviewed, based upon the number of Samurdhi holders in the GN. The total number of Samurdhi holders in the DS was divided by the number of Samhurdi holders in the GN to determine the number of households interviewed per GN. Therefore, more interviews were held in GN's with more Samhurdi holders.

Table 8. GN divisions chosen for the sample with the corresponding numbers of Samurdhi holders

Divisional Secretariat	GN level	Number of Samurdhi recipients per GN, in brackets number of households per GN interviewed
Gangawatakoralaya-(urban)	1.Poornawaththa West 2.Heerassagala 3.Udabowala 4.Ogastawaththa 5.Thannekumbura	153 (8) 190 (10) 158 (8) 164 (9) 300 (15)
Harispaththuwa(rural)	1.Yahalathenna 2.Katugasthota(Uduwa wala) 3.Hamangoda North 4.Rajapihilla 5.Kurundugolla	120 (10) 102 (8) 145 (12) 110 (9) 127 (11)

4. SYSTEMS ANALYSIS

The results presented are the culmination of the explorative, qualitative phase that gathered information about the food security situation in Kandy, Sri Lanka. This was carried out in the first four weeks of the study. The purpose of this section is to fill in the gaps of knowledge that are interdisciplinary and require a more holistic approach. This approach captures the maximum amount of information to frame the larger questions. This information comes from a mix of observations, interviews and locally available literature. In later sections this analysis will serve to frame the observations into policy recommendations for food insecurity alleviation.

During this diverging phase several interviews were held with community leaders and stakeholders, in addition to a literature review which was conducted from locally available material and research studies. Those interviewed included, agriculture, food science and economics professors at the University of Peradeniya, the Chief Medical Officer for Kandy, a clinical nutritionist at Kandy hospital, a community grassroots leader, the divisional secretariat statistics office, the Samurdhi project officer for the city, and the head of the midwives for Kandy region.

A community near Kandy was chosen to conduct interviews with households to gather information about food security in this region. Data was also collected by observing common cooking practices, ingredients and procurement strategies involved in Sri Lankan cuisine.

Using the results from these interviews and the observational analysis from time spent with communities enabled the creation of a SWOT analysis, found in Appendix 1. This SWOT analysis includes the general characteristics of food security in Kandy and is not separated into the rural and urban subtleties. The differentiation of the rural and urban divide is demonstrated in some cases by the quantitative data and could not be done in the qualitative analysis due to time constraints. However, at the most aggregate level the urban households were located near to the Kandy city center, some had access to land 1-30 perches (160 perches = 1 acres) for small homegarden production. The rural households were located further from the city in a rural municipality and most had more access to land, up to 80 perches.

Some key findings of the SWOT analysis are presented here. Strengths highlighted by the analysis are the availability of universal education and health care, the network of community midwives, the availability of home gardens and the characteristics of social interactions and solidarity. Opportunities include national level government programs for poverty alleviation, targeted nutrition supplementation programs, local production incentives and subsidies, Weaknesses include poor nutritional knowledge and poor dietary habits, diversity of cultures to be serviced by central authorities, water safety and sanitation, lack of preference for indigenous fruits, increasing urbanization and the nutrition transition, preference for short eats and street foods, and poor links to markets. Threats include external markets for key imported food commodities, high tariffs on imported goods, pressure on rice consumption, fragmentation and poor coordination of government programs, lack of a national food fortification strategy, and rising food prices.

Agricultural and nutrition policies will be examined in the following sections, as well as the coping strategies utilized by households in times of high food prices in Kandy. This information comes from both locally available literature and observations made in Kandy. Finally, a mind map will be used as the basis for the creation of a system map.

4.1. Food supply and policy responses

Trends in prices and government responses to high food prices are covered in more detail in the second part of this project due to be released in the spring of 2012. However, some general observations are made here.

Sri Lanka is nearly self-sufficient for rice production and in 2006 fulfilled 97.8% of rice requirements through domestic production. The Sri Lankan policy response to the food crisis in 2008 was to reduce the import tariffs on rice and whole milk powder. However, world market prices have not been fully transmitted to the domestic market because of agricultural and food policies of the government (Weerasooriya et al. 2010 in Marambe et al. 2009).

The agricultural sector contributes approximately 12% to the total GDP and food imports constitute 18.3% of total imports. Whereas, food exports account for 22.8%. (Marambe et al. 2009)

The role of agricultural production and self-sufficiency in Sri Lanka is clearly important, it is interesting to note however, some key staple food items are almost exclusively imported, such as, red lentils, sugar, wheat, dried milk powder and fish. Poor yields, lack of adequate infrastructure and high losses are the most important constraints to increased agricultural potential on the island. (Marambe et al. 2009)

Sri Lanka is also working to increase the central stocks of rice that could be used in the future as a reserve. For example, in 2009 the government bought, 90 million kg of paddy rice, equivalent to 4.5% of the harvest in order to build these strategic reserves. (Weerahewa and Rajmohan, 2009)

The government also has two major food supplement programs: Samurdhi and Triposha. The Samurdhi program targets households with a monthly income of less than 1500 rupees, however, this is not the only indicator. The Samurdhi officer judges several additional factors, including, the condition of the house, the number of children, the presence of unemployed people, and households where they have no permanent income. (personal communication, Kandy Divisional Secretariat 2011)

Households that receive food stamps (values range from 200-650 rupees) are also eligible for bank loans, insurance, obligatory savings, help to become self-employed, and access to social service programs. The Samurdhi values have not been adjusted to inflation for some time and therefore have limits to its usefulness when food prices are high. Nearly half of all households in Sri Lanka are covered by this program and the government spends 1% of national GDP on it. As was previously stated, there are severe problems of leakage and coverage identified within this program. (personal communication, Kandy Divisional Secretariat 2011) (Marambe et al. 2009)

The second program is a targeted food supplement program named Triposha. Pregnant and lactating mothers, infants up to 11 months as well as malnourished children who are under 5 qualify for this program. Triposha is a high energy food ration (wheat and soya) that has been fortified with micro-nutrients. Mothers and children are eligible for 800g once per month. (personal communication, Kandy Municipal Council 2011)

On the production side, the government provides some input subsidies for agricultural producers, such as fertilizers and seeds. (Marambe et al. 2009)

4.2. Nutrition and poverty indicators in Sri Lanka

Previous studies conducted in Sri Lanka indicate that dietary energy sufficiency is adequate, whereas dietary diversity is not. Only 36.5% of households reached the target level for dietary diversity in 2009. (Weerahewa and Rajmohan, 2009)

Sri Lanka is a perplexing case due to the fact that it is the best performer in terms of Human Development Indicators (HDI) in South Asia, yet when compared to countries with similar levels of income they show dismal performance. The malnutrition rate for children is three times what would be expected for a country with the same HDI (Marambe et al. 2009).

The Demographic and Health Survey of 2006 showed that 16.6% babies are born with a low birth rate, for children under 5, 21.6% are underweight, 15% are wasted, and 18% are stunted. Anemia and vitamin A deficiency is also quite high for children under 5, with 32.6% and 29.3% respectively suffering from these deficiencies. (Malkanthi, 2010)

Lack of nutritional knowledge has previously been noted as a factor contributing to high levels of malnourishment and micro-nutrient deficiencies. The predominant religion in Sri Lanka is Buddhism, and therefore the consumption of red meat is discouraged.

Food habits are also quite important in Sri Lanka. The staple food item is rice, and its consumption is encouraged, if not pushed by the government. Rice provides 53% the daily calories and 47% the protein. The government has tied economic prosperity and food security to the production of rice. (Marambe et al. 2009)

Nutritional status and growth in children generally shows a sharp decline after 6 months of age. This decline has been attributed to the lack of proper weaning practices. Most children are exclusively breast-fed until 6 months of age and then directly integrated into the family meals. There is not much knowledge about specific requirements or needs of young children. (personal communication Mrs. Priyangani, 2011)

The only clinical nutritionist for central province, who works out of the Kandy Municipal Hospital, stated that nutritional messages often do not get across, and access to nutritional information is poor. For example, a significant proportion of the population does not know about calcium and the vital role it plays in development. Cultural

attitudes also play a role whereby people do not are less inclined to change their attitudes and habits in regards to changes in diet, especially rural communities.

Mrs. Priyangani also highlighted that there is very little consumer protection and no national consumer protection agency. For example, a bread marketed in the supermarket as whole wheat is actually sugar caramelized to give the brown colour. Another example is yoghurt, it is often more jelly than milk because it is made from milk powder. There appears to be little action and protection at the national level related to nutritional promotion and protection. (personal communication Mrs. Priyangani, 2011)

High levels of malnutrition have also been linked to improper sanitation practices (clean toilets and safe drinking water). The Department of Census and Statistics released a report in 2008 showing that 89% of Sri Lankan homes had access to safe drinking water. Of this number 25% had water piped into their dwelling, 7.5% used a public tap and 46.4% used a protected well. However, all homes are under a boil-water advisory and it has been observed that most poor households do not follow this practice, which increases the risk of gastrointestinal infections and diarrhea. (Marambe et al. 2009)

Several micro-nutrient deficiencies are present in Sri Lanka on a wide scale and the World Health Organization considers the levels of iron deficiency in this population to be moderately high. A World Bank study from 2007 reported that high levels of malnutrition were associated with: a lack of food security, inadequate access to safe water, and poor maternal and child care practices (WB 2007 in Pererra 2009).

4.3 Systems tools

The knowledge gained from this diverging phase was framed by using systems tools. Figure 8 is a map mind of the food security situation in Kandy.

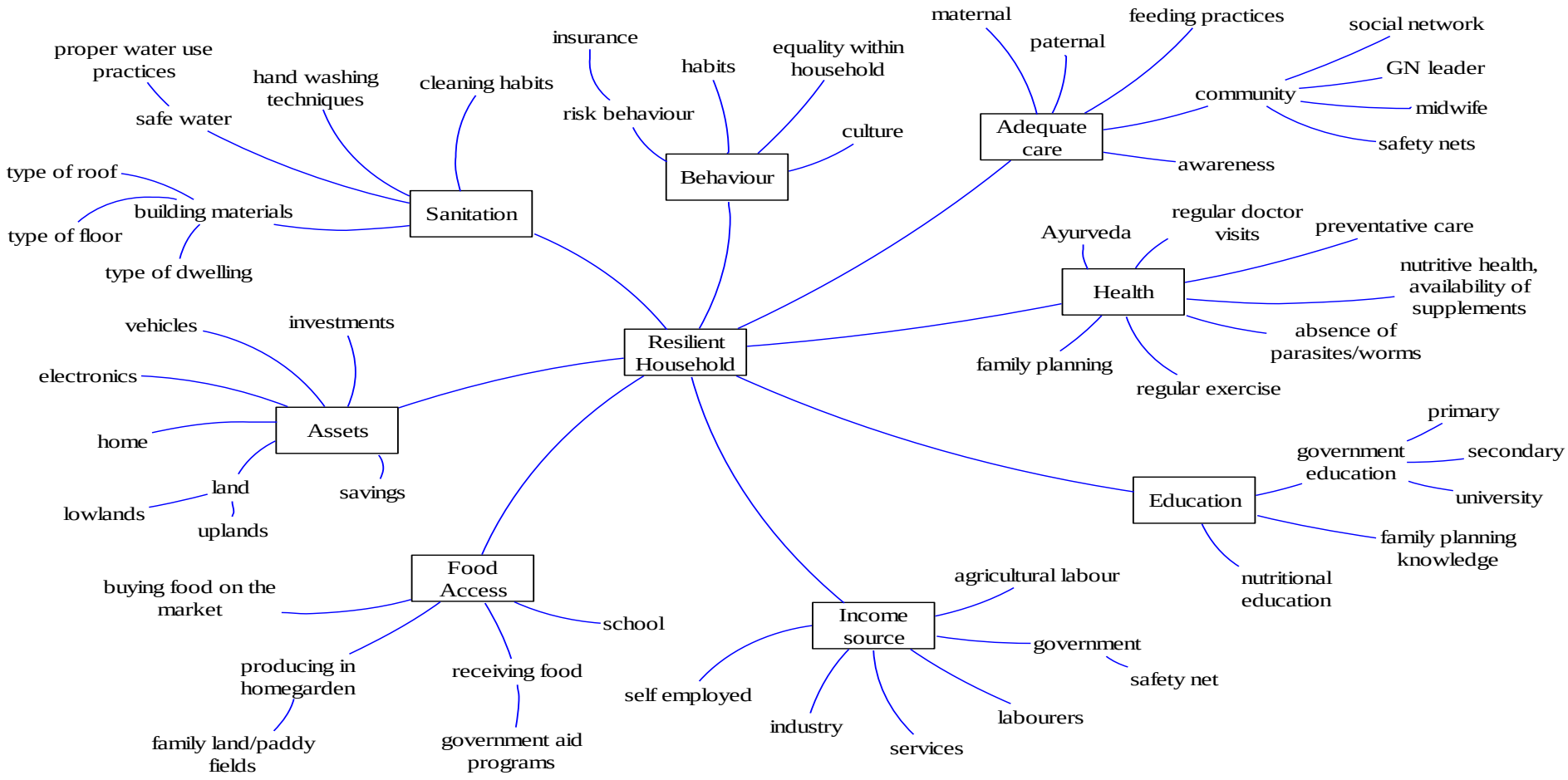

Figure 8. Mind map of food security in Sri Lanka

This map shows the basic factors that contribute to household food security resilience. Such an, accumulation of resilience allows the household to absorb shocks and respond to external changes, such as rising food prices. The most pertinent axis observed that contributed to household resilience in Kandy in the face of food prices increases were sanitation, behavior, adequate care, health, education, income source, food access, and assets.

From the mind map a systems map was developed. This map is found in figure 9 and shows the factors that are most important to food security in the Kandy region. Those factors will be the focus of the quantitative survey.

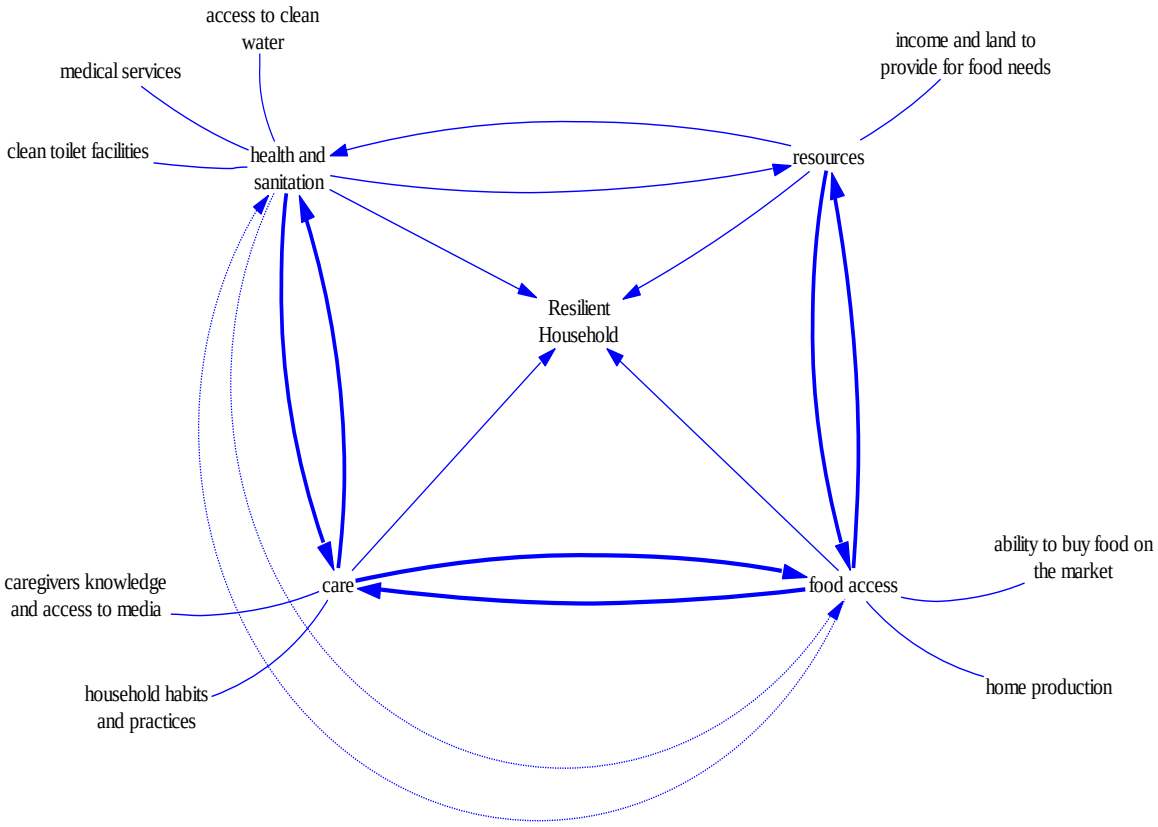

Figure 9. Systems map food security in Kandy

The systems analysis pointed to four factors that were deemed to be the most influencing factors in the system, at the household level, to resilience. These factors are, to some extent, easily quantified and could be included in a set of questions in the questionnaire. The factors were: a) health: access to clean sanitation, access to clean water and access to medical services; b) resources: income base to provide a stable

environment for households needs and/or land required to meet or supplement basic food needs; c) food access: ability to buy food on the market and the knowledge and resources to put home production in place; and d) care: knowledge related to food consumption and health care practices. Care is strongly linked to health and sanitation and food access because the decisions of the household frame the ability to meet food needs and the outcomes of the decisions related to meeting basic needs. This knowledge also relates to which coping strategies the household are willing to use based on accumulated experience and priorities. Food access is strongly linked to resources and care because the household requires the income base to buy food on the market and/or the production base to provide for food needs, as well as the food that the household can buy is framed by the knowledge that the household has related to what food to buy. Food access is also linked to sanitation, but more weakly, because of the medical aspect of food, in whether the individual members of the household are able to utilize the food resources that they are consuming (medical reasons, such as parasites or worms from improper sanitation that inhibit a positive nutritional outcome). Finally, resources are weakly linked to health and sanitation because the household's ability to receive proper health care and sanitation results in its ability to buy these services (such as a water purifier, or to install a water-sealed toilet). In most cases the most basic services are provided by the state whereas most of the requirements come from the household's ability to invest in health. This analysis and map provide the basis for the conceptual analysis that the questions in the quantitative study were developed from.

4.4. Coping strategies

The systems process narrowed down the list of coping strategies available in the literature to those that were most relevant in the Sri Lankan context. These strategies were classified into three types, which rely on separate coping mechanisms. Using this table, the most pertinent and readily available strategies are listed along with the corresponding level of risk associated with each strategy. Questions in the study will relate to the three coping strategy types and will classify households, according to their nutrition status, into coping strategy types utilized. The coping strategies chosen for this study are shown in Table 9.

Table 9. Coping strategies used in Sri Lanka classified by type

Type of strategy	Increasing access to extraordinary resources (smoothing strategy)	Reducing consumption (changing food consumption pattern)	Disposing of assets to maintain economic and social viability (smoothing + reducing consumption)
Level of risk	Minimizing risk, active strategies	Risk absorbing but nutritionally and growth risky	Taking risk
Examples of strategies	- Increasing crop - production/homegarden - Increasing food storage - Investing in valuables - Amassing capital - Diversification of income base - Increase working hours - Utilizing social networks	- Cutting down food consumption - Reducing frequency of meals - Substituting common foods - Eat less diverse meals - Eat les of preferred foods - Food staple consumption decreases - Skipping meals - Decreasing non-food expenditures - Sending children to eat elsewhere	- Selling accumulated assets or mortgaging assets - Borrowing from informal markets/searching for more credit - Migrating - Theft - Sending children to work/stopping school - Deferring payment on utility bills - Deferring health care and education spending - Depleting savings

Adapted from Maxwell et al. (1994), Curtis (1993) and Kodithuwakku and Weerahewa (2011)

4.5. Conceptual model for food security in Sri Lanka

In continuation of the assimilating phase it was determined that in order to structure and frame the quantitative survey, a conceptual model had to be developed to highlight the critical aspects that contribute to household food security. To arrive at this point, the experiences at the field level, from the literature and with the systems map were used to highlight the most important factors to food security in Kandy. The conceptual model that was developed is found in Figure 10.

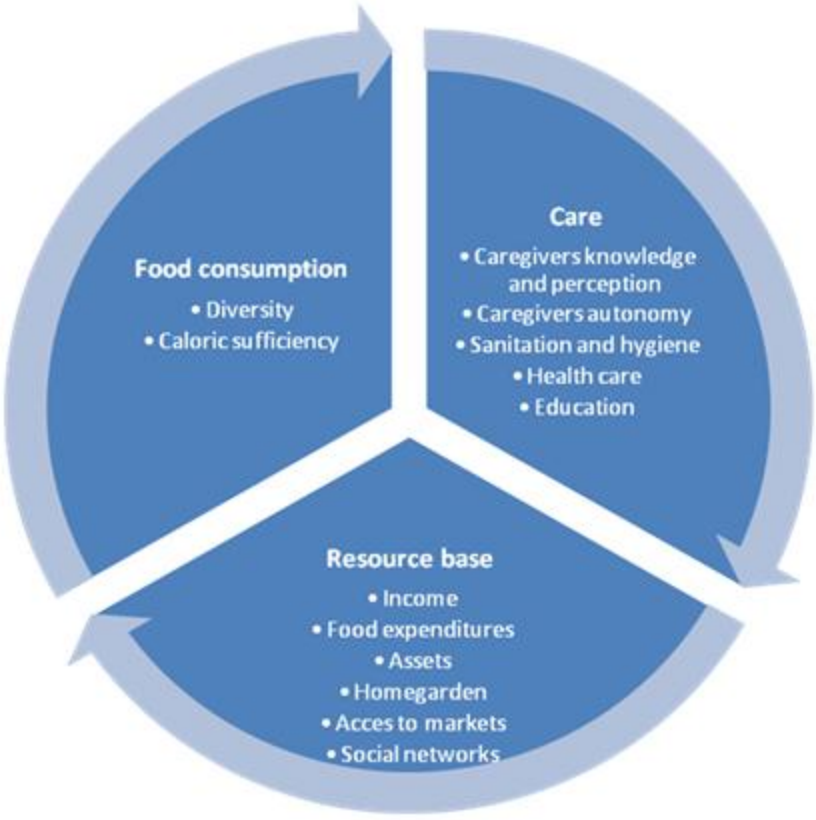

Figure 10. Conceptual model for nutritional status in relation to rising food prices in Kandy, Sri Lanka

Using this framework as a model, three critical areas that contribute to food security in Kandy emerged. These include food consumption (in quantity and quality), care (sanitation, health, knowledge, education) and the household resource base (income, assets, access to a homegarden, strength of social networks). As such, the study had to include these three key aspects in order to gather information about how relevant the various factors were in achieving food security. These same areas were used to classify the research questions into types.

4.6. Questionnaire

The questionnaire was developed after the systems analysis and included three main question types which served to develop a profile of the food security status of the household: dietary assessment, resource profile and care. The second part of the questionnaire was related to coping strategies that households use in the presence of high food price. The questions were developed from the results of the first phase. A pre-test of the questionnaire was carried out with 6 households, 3 rural and 3 urban.

The final questionnaire can be seen in appendix 2.

5. RESULTS

The results in this section correspond to responses from the questionnaire which was developed after the systems analysis. It included the three aforementioned question types. These different types served to develop a profile of the food security status of the household: dietary assessment, resource profile and care. The second part of the questionnaire was related to coping strategies that households use in the presence of high food prices. Coping strategy and health related questions were asked using either a 30 day of 3 month time scale. These time scales were chosen to construct time series data that will be correlated to price information in the second part of this study. This correlation will help to determine what the effect of price increases are on nutrition and coping strategy use. Sri Lanka is currently experiencing high food price inflation, which will most likely be greater than the price increases in 2008 (to be revealed in the second part of the study). A pre-test of the questionnaire was carried out with 6 households, from the same communities that were interviewed in the main survey. There were 3 households from the rural population and 3 from the urban population. Results from the pre-test served to adapt the questionnaire to the final form, which can be found in appendix 2.

Descriptive household level data from the study is shown in table 10.

Table 10. Descriptive data at the household level

Resource base indicator	Urban	Rural	Total
Household Ethnicity			
Sinhala	36	39	75
Muslim	14	11	25
Household Religion			
Buddhist	35	39	74
Muslim	14	11	25
Christian	1		1
Household sizes			
≤ 4 members	23	24	47
≥ 4 members	27	26	53
Total members	242	237	479
Members under 5	22	22	44
HHH/caregiver, job type			
Unemployed	1/33	0/34	1/67
Private	26/10	17/1	43/11
Government	0/1	3/0	3/1
Labourer	15/2	17/5	32/7
Self-employment	8/3	5/7	13/10
Other	0/1	8/3	8/4
HHH/caregiver income ranges			
0	0/40	0/36	0/76
1-7500	20/8	11/11	31/19
7501-12500	11/1	14/2	25/3
12501-2000	11/1	20/0	31/1
≥20000	8/0	5/1	13/1
HHH/caregiver age ranges			
20-39	17/13	12/12	29/25
40-49	20/17	9/13	29/30
50-59	9/8	16/17	25/25
60+	4/12	13/8	17/20
Education HHH/Caregiver			
No education	4/4	2/5	6/9
Up to grade 5	10/11	9/14	19/25
Up to grade 8	8/14	24/10	32/24
Up to Ordinary Level	25/15	11/18	36/33
Up to Advanced Level	3/6	4/3	7/9
Assets			
Motor bike	2	3	5
Three wheeler	3	0	3
T.V.	43	39	82
Radio	31	36	67
Sewing machine	16	9	25
Livestock	2	7	9
Water			
Protected well (public/private)	1/6	2/11	3/17
Tap line	36	21	57
Public standpipe/tube well	3/0	3/2	6/2
Other	4	11	15
Sanitation			
Water sealed	3	1	4
Pit (permanent/temporary)	43/1	43/2	86/3
Neighbours latrine	3	4	7

(in the required cases data is displayed, HHH/Caregiver) (Incomes reported in Sri Lankan rupees)

50 households were interviewed in Gangawata Koralaya, representing the urban population and 50 in Harispaththuwa, representing the rural population. The total number of household members in the study was 479. The majority of households interviewed were of Sinhalese ethnicity (75 households) and of Buddhist religion (74 households).

There were 33 households with children under 5, 15 in the urban area and 18 in the rural area, for a total of 42 children under 5 in the study population.

The Heads of the Household (HHH) work predominantly in the private sector (in 43 households) or as labourers (in 32 households). The caregiver is predominately unemployed (in 67 households) or works as a private labourer (in 11 household, this is usually making snacks and short-eats). Only in 17 cases was the caregiver employed outside of the household. 10 of which were in the urban area and 7 in the rural area. There were 16 female-headed households, 7 in the urban area, and 9 in the rural area.

The HHH was defined as the household member who had the highest salary. The average income of the HHH in the urban area was 13,538 rupees, and in the rural area was, 10,695. There was a significant difference between the rural and urban area HHH income (p value of 0.029) with the HHH in urban areas earning higher incomes. For caregivers, the average income in the urban area was 2,450, and in the rural area it was 1,228. There were no significant differences between caregiver's income and overall household income.

In the urban area the HHH was, on average between the ages of 40-49. The average age for caregivers was between 40-49. On average the rural area was an older population with the HHH between the ages of 50-59. The average age of the caregivers in the rural areas was between 40-49. There was a significant difference between the age of the HHH in the rural and urban area (p value 0.006). The HHH in the rural area was older than in the urban area. The data demonstrates that the caregiver is usually older than the HHH because the HHH often times a son, nephew or other family relation

to the older caregiver, or the matriarch, which could be the grandmother, of the household.

The majority, or 25, of the HHH's in the urban area had an education up to the Ordinary level. The others had up to grade 8, with 8 people, and up to grade 5, with 10 people. In the rural area, it was less with only 11 achieving Ordinary levels, and 24 with up to grade 8, and 9 up to grade 5.

For the caregivers in the urban area, 15 had education up to the Ordinary levels and double had completed to the Advanced levels compared to the urban HHH's.14 had up to grade 8, and 11 had up to grade 5. In the rural area 18 had up to Ordinary levels, 10 had up to grade 8 and 14 had up to grade 5. In very few cases the HHH or caregiver achieved the Advanced levels and none attended University.

Nearly all the households had a television, 86% in the urban area and 78% in the rural area. Similarly, radios were found in 62% of households in the urban area and 72% in the rural area. Most households did not have motorbikes, three-wheelers, or livestock. Additionally, nearly 100% of the households owned their own house. In very few cases, the household would pay the local temple for the use of the land where their house was located.

Most households have constant access to drinking water from a tap line, which was in 57 cases. In other cases the household has a public well, 3 cases, or a private well, in 17 cases. The remainder of the population interviewed received their drinking water from a neighbour or public stand-pipe.

For access to sanitation the majority of households have a permanent pit (in 86 cases). In very rare occasions a water sealed toilet was observed.

5.1 Food procurement strategies

The following data considers how food enters the household. This includes where the household procures food, who purchases the food, who makes decisions regarding food purchases, how much the household spends to buy food and the role the homegarden plays in consumption and food savings.

Figure 11: Households procurement source for food.

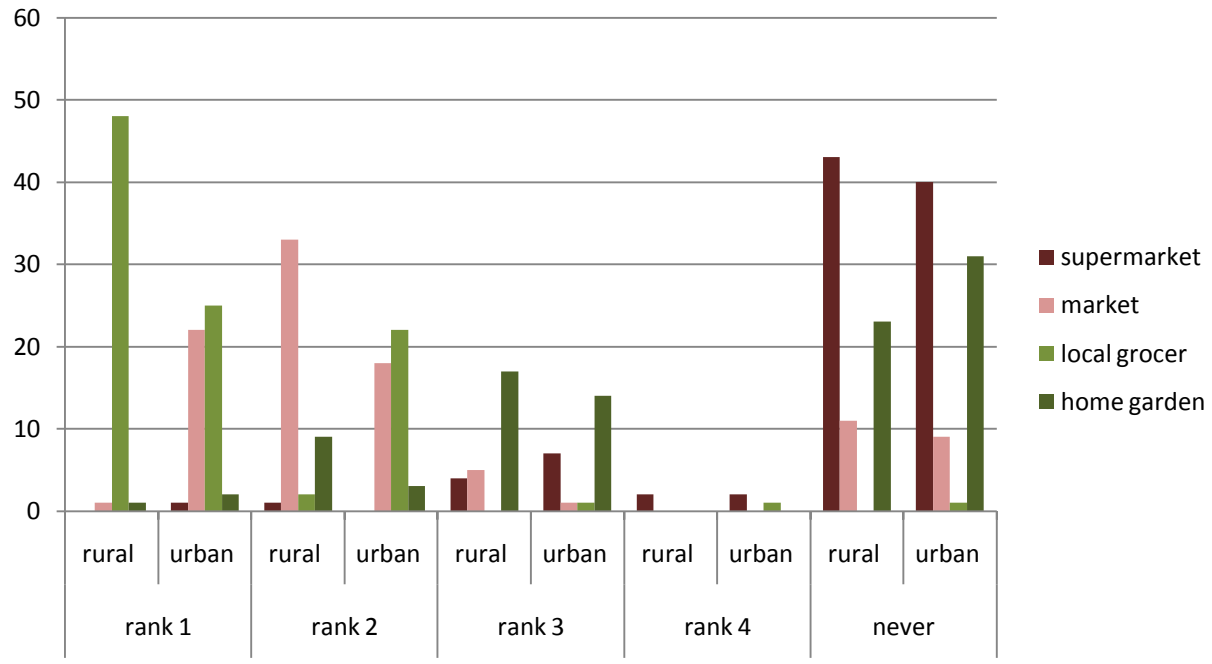

Figure 11. Food procurement ranking by source

Figure 11 shows where the household goes to buy food. A rank of 1 meant that the household most often frequented this location and a rank of 4 meant that the household rarely frequented the location to procure food.

From this figure it becomes evident that, in both the rural and urban areas, households rarely use the supermarket. In the rural area households ranked the local grocer first, 96% of the time. The urban area responses were almost equally divided between the local grocer and the market as the number one choice, representing 50% and 44%

respectively. Households rarely use their homegarden as a source for the majority of their food needs.

Figure 12 shows the decision making related to food purchases.

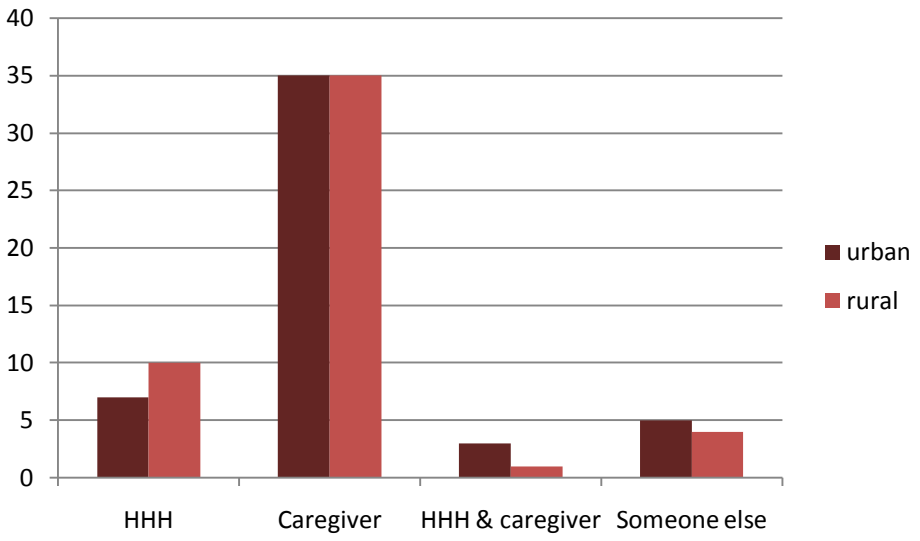

Figure 12. Food purchase decision maker

Figure 12 demonstrates that the caregiver most often makes decision regarding what food to buy. In most cases the caregiver did most of the food shopping, even more so in the rural areas. There did not appear to be any difference between perishable and non-perishable purchases, usually the person who would buy food would buy all items.

In nearly all cases the caregiver makes food purchase decisions, even if the caregiver is not directly purchasing food. This translates to the caregiver making food purchases decisions 70% of the time in both urban and rural households.

Homegardens are the areas around the household dwelling that are used to cultivate fruits, vegetables, and sometimes a host to chickens and other small livestock. Due to a lack of space in urban areas, there are a smaller number of homegardens than found in rural areas. However, urban households are sometimes not able to use their homegardens to cultivate fruits and vegetables due to problems with pests. The average size of a homegarden in the urban area is 13 perches (1 acre equals 160

perches) and in the rural area 29 perches. Rural homegardens are bigger in size and contribute to larger food expenditure savings than urban homegardens. Due to the larger size of homegardens in rural area. The average household food expenditure savings per homegarden per month in the urban area was ≤ 500 rupees and in the rural area between 500-1000 rupees. There was a significant difference between home garden food related savings in the rural area (p values of 0.042).

Food expenditures represent a large part of household expenses. In fact, 62 % of household expenditures in rural and urban areas were directed toward food purchases. This is significantly higher than the 42% national average. The average food expenditures in the urban area was 2,480 rupees per week and for the rural area, 2,401 rupees per week. Statistics quantifying significance showed that there was no statistical difference between food spending in the rural and urban areas.

When the caregivers were asked if they received money from the HHH for expenditures, 65 cases highly agreed. While in 11 cases the caregiver disagreed that she received money from the HHH. Figure 13 represents the response if the caregiver feels that she needs more money from the HHH.

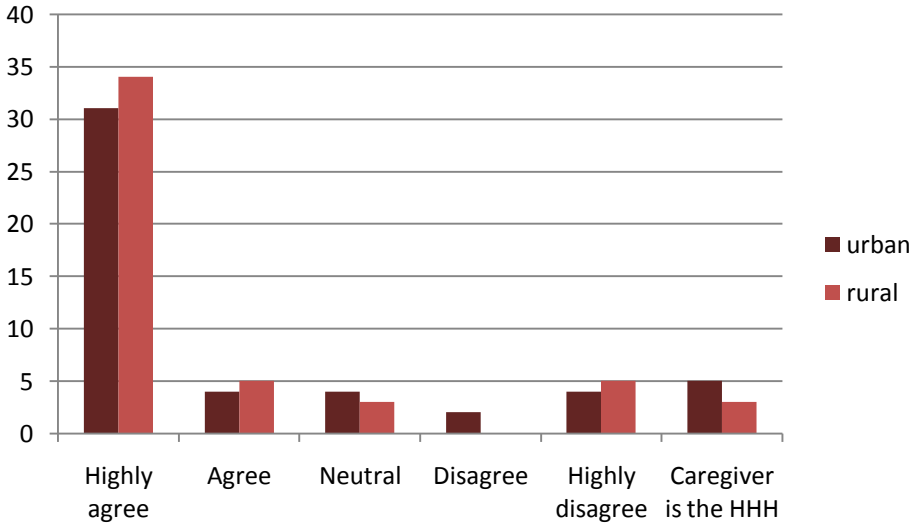

Figure 13. Does the caregiver need more money from the HHH

Figure 13 shows that in 69 of the cases in the caregiver would like more money from the HHH, in 10 cases the caregiver does not need any more money from the household head, and in 8 cases the head of the household was the caregiver.

5.2 Care

This section presents factors that contribute to care and knowledge in the household.

Figure 14 shows the caregiver responses for media access (tv, radio, newspaper) and desire to search for nutrition related information.

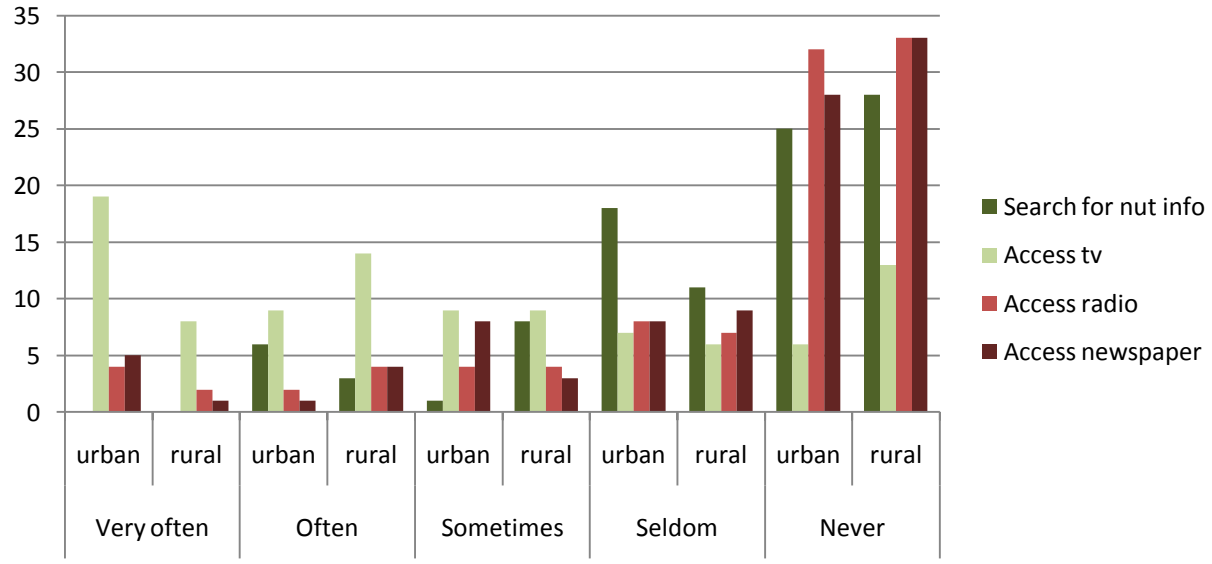

Figure 14. Access to nutrition information and to the media

According figure 14 it seems that watching television is the most common way to access media. In the urban area, 29 answered very often or often to watching the tv. In the rural area this was 22. Listening to the radio is less common, as is reading the newspaper.

Most households never, or seldom searched for nutrition information outside the home. Media access responses were calculated into a score for every household to use in later analyses. Quantification calculations demonstrating significance showed there was no significance between the urban and rural areas for total media access score,

however, there was a significant difference between the access to television for the urban area (p value 0.033).

In figure 15 the caregiver was asked 5 questions related to specific macro or micro-nutrients: calcium, iron, vitamin A, protein and vitamins. The first question asked if she knew any foods that contained the micro or macro nutrient in question. If she could answer that, the following question asked what the physiological role of that micro or macro nutrient was. Figure 15 contains the results for nutrition knowledge.

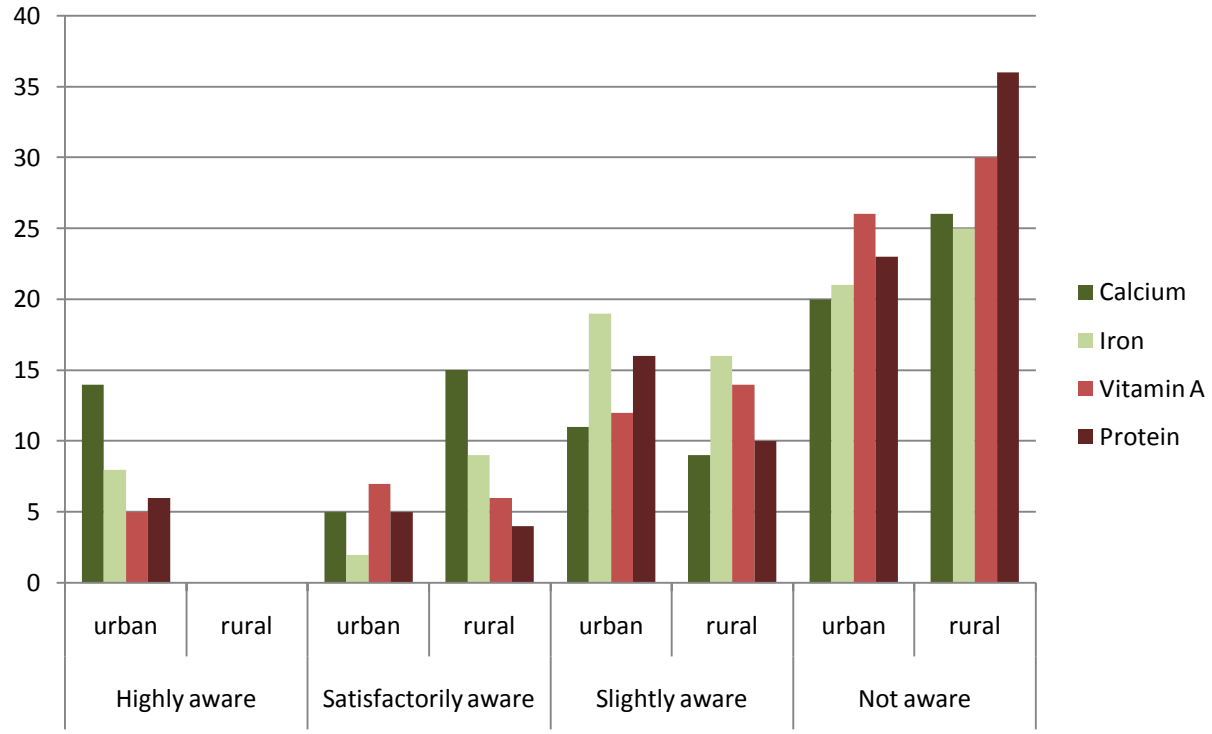

Figure 15. Nutrition awareness in the rural and the urban area

Figure 15 shows that for the urban area respondents answered not aware or slightly aware as follows: 62% calcium, 80% iron, 76% for vitamin A, 78% for protein, and 82% for vitamins.

In the rural area for the same response, interviewees responded 70% for calcium, 82% for iron, 88% for vitamin A , 92% for protein, 88%, for vitamins. In the rural area, in no cases for any micro or macro nutrient was a caregiver highly aware. The nutrition

knowledge responses were calculated into a score for every household to use in later analyses.

There was no significant difference found in terms of the nutritional knowledge score between groups. However, there was a significant difference found between the groups for protein knowledge (p value of 0.005), with the urban group scoring higher.

Care factors that were found to influence nutrition status were household income (p value 0.046) and access to media (p value 0.035). Higher income households had a better nutrition status as well as households who had better media access.

5.3 Health and Sanitation

It is well known that Sri Lankans have very good access to public health services and this study confirmed this. Table 11 shows the health statistics captured in the questionnaire.

Table 11. Health indicators and their relevance in the urban and rural areas

Health indicator	Urban	Rural	Total
Treatment for sickness in the previous 3 months			
No one sick	10	6	16
Hospital	34	33	67
Doctor	6	11	17
Reason for medical attention			
No disease	9	6	15
Respiratory infection	18	15	33
Infectious disease	7	10	17
Diarrheal	0	1	1
NCD	5	7	13
Other	10	9	19
Respiratory and infectious	1	2	3
Presence of NCD			
High blood pressure	17	16	33
High cholesterol	12	6	18
Diabetes	10	8	18
Disabled	2	4	6
Arthritis	15	11	26
Regularity of medical check-ups			
Adults – regular	2	1	3
Adults –only when sick	48	49	97
Children – regular	11	18	29
Children – only when sick	29	15	44
Water cleaning method			
No method	17	13	30
Filter	1	1	2
Boiling	8	17	25
Pouring ash	0	5	5
Both boiling and no method	24	14	38

There were 84 households that had a household member sick in the past 3 months, and all were treated by a doctor or at the hospital. 42 households, in both the rural and the urban area, had been sick in the previous 3 months.

In most cases medical attention was sought for respiratory infections, infectious diseases, and non-communicable diseases (NCD).

The caregiver was asked if any household member suffered from a non-communicable disease. 33 households had someone who had high blood pressure, 18 with high cholesterol, 18 with diabetes, 6 with disabilities and 26 with arthritis.

Most adults in Sri Lanka do not have regular medical check-ups and only seek medical attention when they are sick. On the other hand, more than half the children received regular medical check-ups (by the midwife because of the monthly visits).

Most households have access to drinking water through a protected well or a tapeline, with only 3 declaring insufficient access. Table 10 shows the household source of water and table 11 shows the method used to clean water. Most households had water pumped directly to their house or have a well. The households that did not have consistent access or responded ‘other’ usually meant that they were getting their water from a neighbour.

In Sri Lanka there is a boil water advisory and most households are expected to boil or clean their water before consuming. However, as table 11 demonstrates, in few cases are the households exclusively boiling water. Most are either not boiling or only boiling some of the time.

Most households have acceptable access to a safe source of sanitation. With 90% having either a permanent pit latrine or a water sealed toilet.

5.4 Dietary and Anthropometric

Results from the dietary assessment provided information related to dietary consumption in terms of quantity, protein adequacy, ratios of carbohydrates, protein and fats in the diet, and dietary quality. Table 12 shows these results.

Table 12. Dietary consumption indicators for the urban and rural population

	Average % protein in total energy	
urban	10.8	
rural	10.46	
	Average % fat in total energy	
urban	23.12	
rural	24.74	
	Average % carbohydrate in total energy	
urban	65.5	
rural	64.59	
	Average energy available per adult equivalent per day	
urban	2390	
rural	2470	
	avg % fulfillment of protein RDI	**HH falling below 80% RDI**
urban	99.4	16
rural	98	11
	avg % fulfillment of RDI	**HH falling below 80%**
urban	87.6	17
rural	89	12
	avg dietary diversity	**HH falling below 8**
urban	7.85	22
rural	7.96	19

There are no significant differences observed in the areas for any of the dietary indicators. However, some results should be pointed out, such as the average dietary diversity for both areas, which falls under the acceptable level of 8 food groups per day. A total of 41 households do not meet the dietary diversity requirements whereas 29 households do not meet the required energy intake levels.

The last two rows in table 12 were used to make the scores for nutrition status for later analyses (percentage energy fulfillment and dietary diversity).

Table 13 represents the anthropometric details for children that were under 5 in the study population.

Table 13. Anthropometric statistics for children under 5 and household Triposha use

Anthropometric indicator	**Urban**	**Rural**	**Total**
Number of children under 5	22	22	44
Avg weight at birth (kg)	2.87	2.86	-
Number underweight in lifetime	6	14	20
Number stunted in lifetime	5	6	11
Number with no stunting data	1	5	6
Household receives Triposha	4	2	6
Household shares Triposha portion	15	14	29

Of the 44 children in the study, 20 (44%) had been malnourished in their lifetime, 11 (25%) had been stunted, and 6 (14%) children had not been measured by the midwife. The average weight at birth for these children is low at 2.865 grams, where 2,500 grams is the cut-off for babies born underweight.

Table 13 also relates to the distribution of the Triposha food supplement program, and households that share this portion. Households qualify if there is a pregnant or lactating woman, if there is a child under 1 and if a child under 5 is underweight. It is a high protein nutrition supplement (soya and wheat) fortified with micronutrients.

There are 19 households that received Triposha and of those, 17 share the portion that they receive. Not all households with children who were underweight received this Triposha portion. There were 22 children underweight and 19 that received Triposha,

however, this 19 also represents households that had children under 5 that were not underweight (either the mother was still lactating, was pregnant, or there was a child under 1).

5.5 Coping strategies used by the study population

The following section describes the three types of coping strategies and their frequency of use by the study population. Each coping strategy type was made into a z score to facilitate comparisons across types.

Figure 16 and figure 17 show the responses for coping strategy type 1, which is the type that increases access to extraordinary resources.

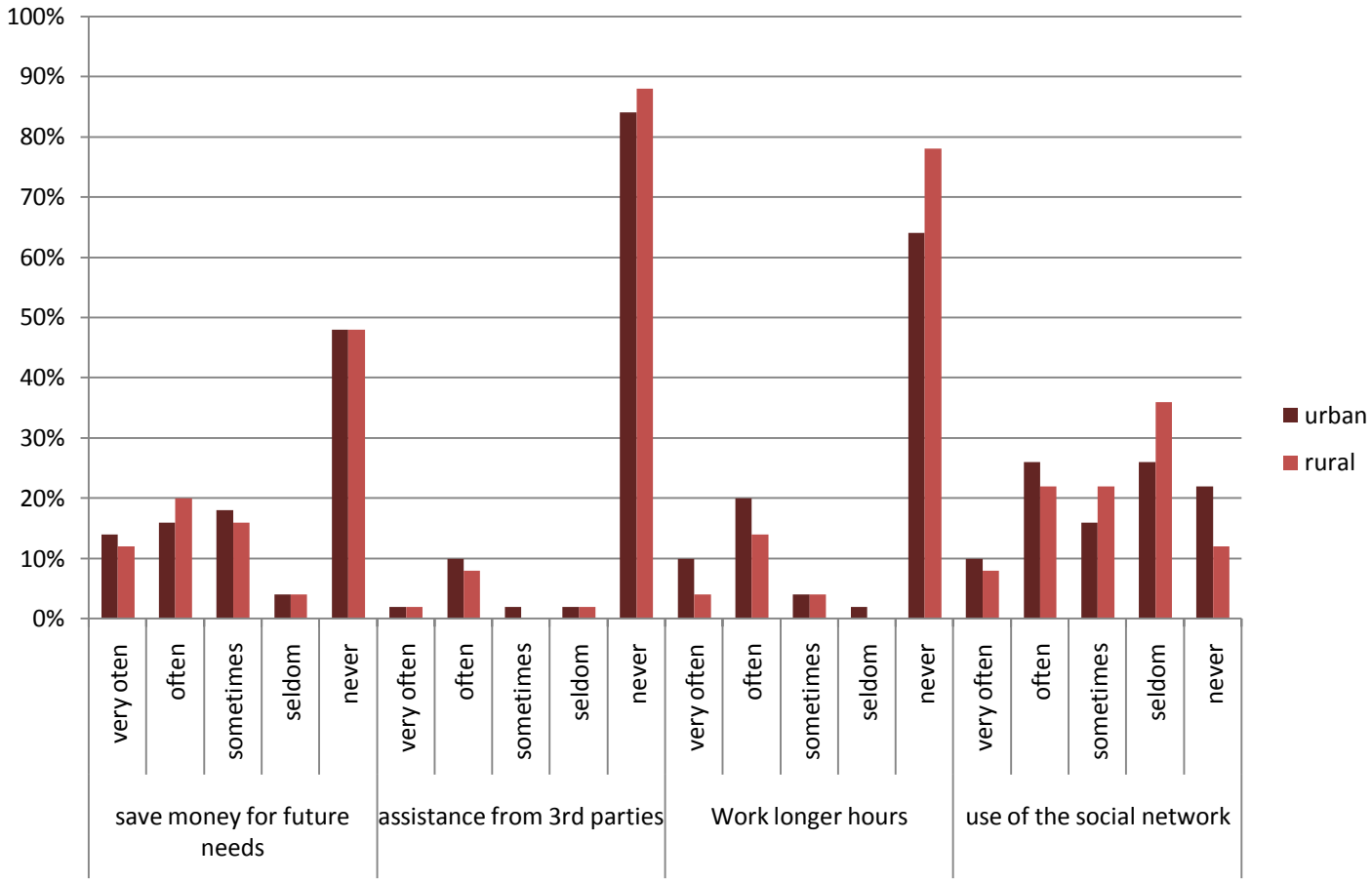

Figure 16. Coping strategy type one responses for increasing savings, assistance from 3rd parties/family and friends, and working longer hours, in the study area based on frequency

It was not common that a household would work longer hours to increase income to support the same level of consumption. The use of the social network, which is going to family and friends for food needs, was split in between those households that used the social network and those that did not use it at all.

Nearly half of the households did not save money for future needs, whereas, 36% for the urban and 30% of the rural households used their social network either often or very often. Most households did not receive assistance from third parties (such as, church organizations, NGOs etc.).

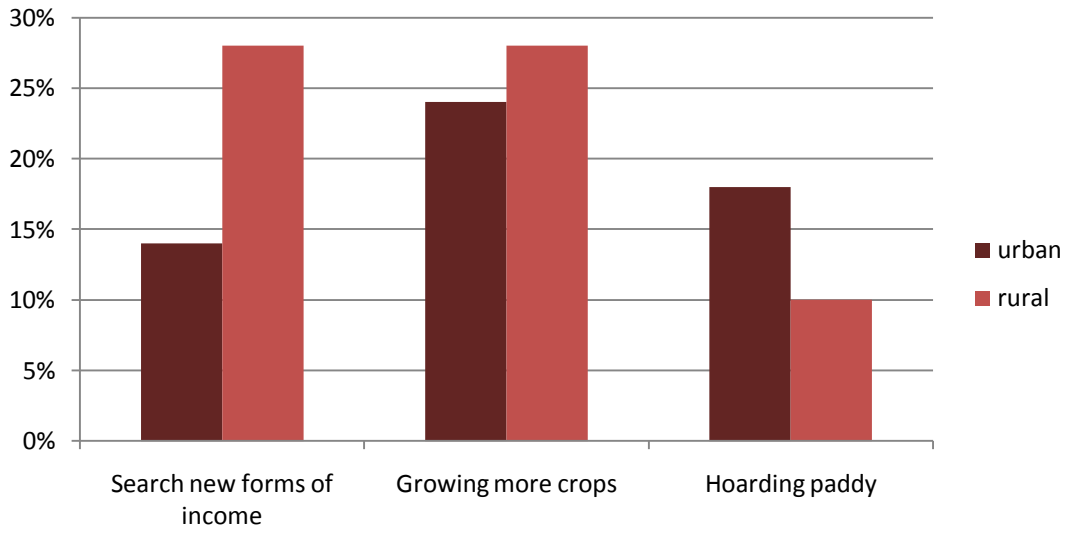

Figure 17. Household responses to coping strategy type one questions related to searching for new forms of income, growing more crops and hoarding paddy

21% of households searched for new forms of income, in the form of, small scale business, labour activities and homegardening. 26% of households expanded to grow more crops in their homegardens, such as mea, leafy cabbage, chili, bean, spinach, tomato, cassava, yams, bean, okra, winged bean, leafy vegetables and bitter gourd. In 14% of the cases, the household hoarded paddy rice, or attempted to stock pile paddy rice. Figure 18 represents coping strategy type two where the household changes consumption patterns in order to cope with the rising food prices.

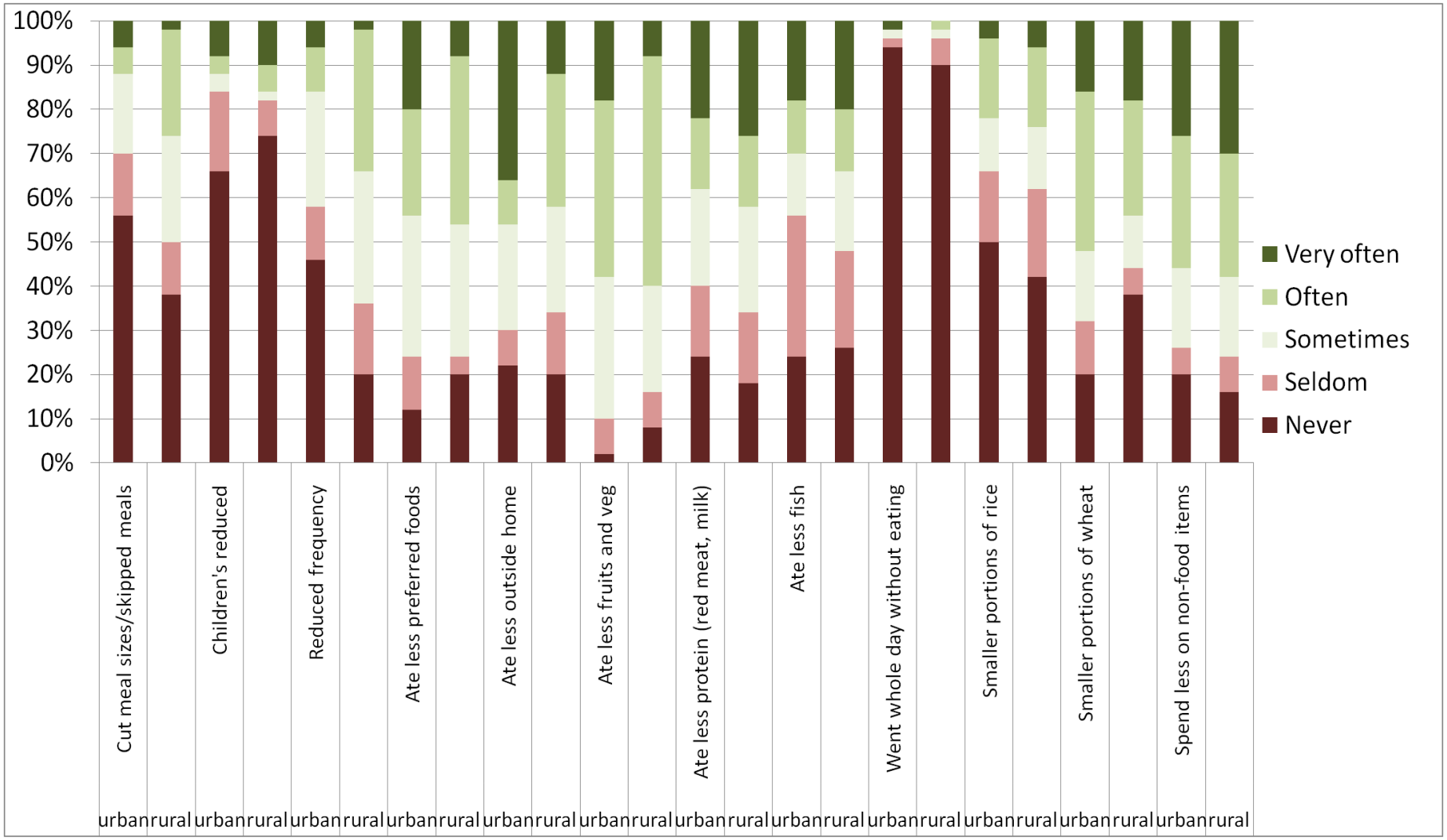

Figure 18. Coping strategy two responses for consumption patterns in the urban and rural area

The most common coping strategy type two was to consume less preferred foods, consume less outside of the home, consume less protein, consume less fruits and vegetables and eating smaller portions of wheat. The least common coping strategies were to cut meal sizes or to skip meals for adults and children, to reduce the frequency of meals and to go the whole day without eating.

There were significant differences to cut meal sizes/skip meals (p value 0.038) and to reduce the frequency of meals (p value 0.009) in the urban area.

Figure 19 shows the results of coping strategy three, where households would dispose of assets, or take risks to maintain social and economic viability.

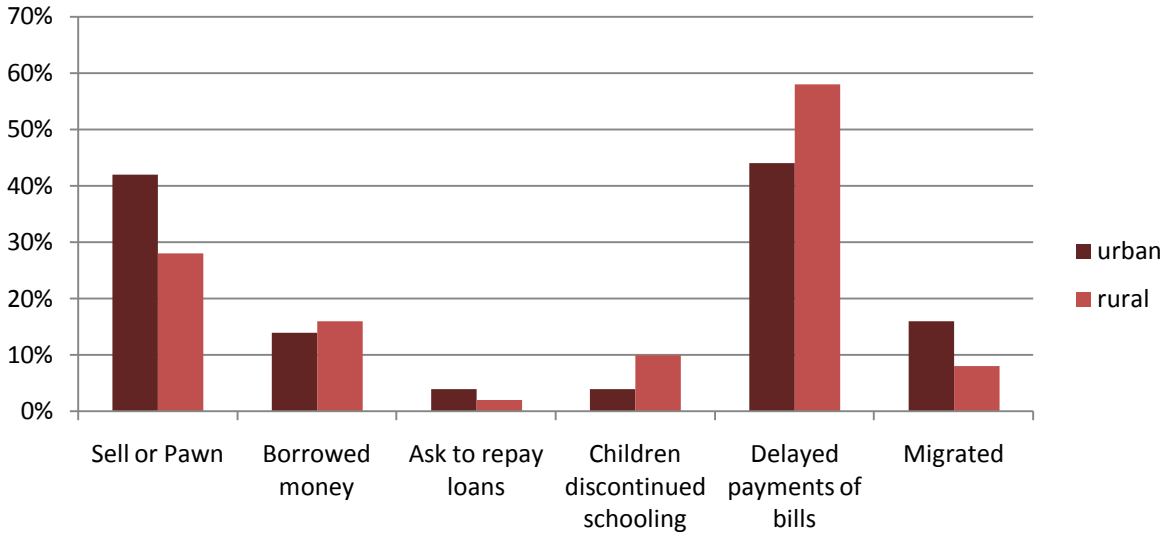

Figure 19. Coping strategy three responses

The most common coping strategy was to delay the payment of bills, which 51 households did, followed by 34 household that had pawned assets (almost always jewelry), 15 had borrowed money, and 12 had migrated. In the most extreme case were 7 households who had stopped sending children to school.

Each coping strategy type was scored independently into z scores. Using those z scores for rural vs. urban it was found that there is no statistical significance for the coping strategies utilized in the rural vs urban area. This was true for all three coping strategy types.

5.6 Regression analysis of coping strategies and food security

The regression analysis in table 14 is the analysis of coping strategy and nutrition status.

Table 14. Use of coping strategies and correlation to nutrition status

Coping strategy type	Significance	Interpretation
Coping strategy1 Increasing access to extraordinary resources	no	No influence
Coping strategy 2 Reducing consumption (changing food consumption pattern)	Yes, p value 0.000, B coefficient 0.294	High use of this coping strategy negative influences nutrition status
Coping strategy 3 Disposing of assets to maintain economic and social viability	Yes p value 0.002, B coefficient -0.216	Use of this coping strategy positively influences nutrition status

The regression analysis for coping strategy type vs. nutrition status revealed interesting results. Type 1 had no influence on nutrition status, type 2 negatively impacted nutrition, and type 3 positively impacted nutrition. The interpretation of this result will be discussed in the discussion section.

6. DISCUSSION AND RECOMMENDATIONS

The interpretation of the results rests on the basis that food security is an integrated dimension of the food system that relies on several levels of understanding. Food production provides the physical needs to meet the requirements for a good and healthy life, and how that food is obtained, processed and produced ultimately affects the composition of human bodies themselves. A report from the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) from 2009 explicitly highlighted the interconnectedness of health, nutrition and agriculture while stressing that these three things affect the ability of individuals, communities, and nations to reach sustainability goals. They go on to say that poor diets throughout the life course are a major risk factor for chronic diseases, which are the leading cause of global deaths.

In this context, this research has shed light on some of the key characteristics of the nutrition and health situation of the study population, by defining populations at risk and behavioural factors that contribute (or exacerbate) food security. The agricultural component will be dealt with in the second portion of this study due to be released in 2012.

As such, the following section is the interpretation and discussion of the results from the qualitative and quantitative sections of the study and the corresponding policy recommendations to improve the nutrition status of the population.

6.1. Discussion

For the dietary assessment it was profound to observe that 41 households were not meeting the dietary diversity requirements, in relation to 29 that did not meet daily energy requirements. Evidently, more policy attention needs to be paid to not only increasing access to food, but also increasing dietary diversity. The current system of Samurdhi food stamps focuses on rice procurement and other staples, such as oils, however, in light of these results, a much more concerted effort needs to be made in the quality aspect of the diet.

This study demonstrated it is important to use both an indicator for quality and quantity because it showed that dietary diversity in Sri Lanka is much poorer than dietary intake

for quantity. This is one of the reasons why micro-nutrient deficiencies are so prevalent, especially iron-deficiency anemia. Reduced dietary quality and diversity is a major risk factor for developing chronic pathologies, which have long-term health care costs (IAASTD, 2009).

The Dietary Guidelines for Americans recommends the following distribution for the energy nutrients: Fat: 20 - 35% of total calories (average in study was 23.93 %); Protein: 10 – 35% (average 10.6 % average in study was); and carbohydrates: 45 – 65% (average average in study was 65%). This information demonstrates that the diet of the study population is on the low end for requirements for protein and fat, and on the high end for carbohydrate consumption. The high levels of carbohydrates are due to the high consumption of rice and wheat. The percentage of protein contributing to total dietary energy is quite low.

Nutrition knowledge or awareness was very low in both the urban and rural population. In most cases the caregiver could not identify foods that contained the micro/macro nutrient in question. In this case it is difficult to determine if households are responding to the food price increases because of a lack of financial resources to be able to buy good food, or if the nutritional knowledge is so poor that they do not buy better food because of a lack of knowledge.

Clearly, it is probably a combination of these two factors. With rising incomes, people buy better quality food and a greater variety of foods. However, one serious aspect that this study shed light on, is that nutrition education is poor in Sri Lanka, that the achievement of nutrition security even with rising incomes, would not be possible without education related to healthy food choices. Nearly half of the study population had education to the o/level or the A/level, which suggests that high school nutrition education is quite poor.

This study also demonstrated that the caregiver is the conduit through which food enters the home. She either makes the decisions regarding what foods to buy or buys food for the family herself. The household generally procured food at either the local grocer or the market, which suggests that nutrition labeling might not be as effective for

this population because they rarely use supermarkets. Alternative targeting mechanisms need to be considered.

While most adults in the household did not seek regular medical access, this is not in and of itself surprising. However, it does point to the nature of the medical system, which is focused on disease management. It could be important for households, where members suffered from a non-communicable disease, to be followed and provided with specific nutrition advice.

Children under five had very good preventative access to medical services; however, the quality of the service needs to be further investigated. In cases where the child was underweight, the midwife had not measured the child, so there was no information on stunting. This may be because of a lack of knowledge of the role that nutrition plays in attaining height. Most babies were born with a low birth rate (although not at or less than 2.5 kilos, which is the cut-off point for being underweight) of 2.86 kilos, which suggests that pregnant mothers are not receiving adequate nutrition. The habit of sharing the Triposha portion is troubling, in that it loses the intended effect of being a targeted nutrition supplement when it is shared with other household members. Discussion with the head of the midwives for the region and also with mothers themselves, suggests that there is very little counseling related to nutrition and weaning, because the midwives themselves have not been adequately trained in proper nutrition practices.

The first coping strategy (increasing access to extraordinary resources to maintain consumption level) was found to have no effect on nutrition status. This strategy involved increasing access to extraordinary resources, such as: increasing work hours, search for new forms of incomes, using the social network, increasing or starting a homegarden, purchasing animals, hoarding rice, and saving money for future resources. It was not a common strategy for households to search for new forms of income or to work more. Using this strategy the household should maintain current levels of consumption even in the presence of food price increases.

The second strategy (changing consumption patterns to cope with rising prices) was significant and was found to have a negative effect on nutrition status. Therefore those

households using this strategy were contributing to decreasing their level of nutrition. This strategy included food consumption adaptations because of the inability to maintain current levels of consumption with the same resource base. Hence, when food prices rise, the household is no longer able to maintain the same level of consumption. Strategies include: adults cutting the sizes of meals or skipping meals, reducing children's meals sizes, reducing the frequency of meals throughout the day, eating less preferred foods, eating less outside the home, eating less fruits and vegetables, eating less protein (red meat, milk products), eating less protein (fish), members of the household going a whole day without eating, eating smaller portions of rice, eating smaller portions of wheat, and spending less on non-food items.

The question for strategy 2 was phrased as follows, in the last 30 days did you or anyone in your household experience the following, for example, cutting down on portions of protein? With this strategy it was sometimes difficult to determine if their response was due to rising food prices or rather, due to poverty. Especially in the case of for protein, many households stated that independent of high food prices, they simply do not consume protein or do not consume it more than once per month etc. Therefore, in order to get a more accurate response, a study such as this should determine the baseline of consumption: do they already eat less preferred foods because they are poor, do they already eat smaller meals sizes because they are poor, and do they already consume less protein because they are poor. Then ask questions related to rising food prices: in the last 30 days have you eaten less protein? Decreased meal sizes? This approach would probably give a better understanding of the change between the baseline and behviour in times of crisis and would contribute to observing the scale of differences between poverty and high food prices.

Coping strategy 3 (disposing of assets to maintain consumption levels) was found to positively affect nutrition status. This suggests that households who use this strategy have a better nutrition status. This type of strategy includes: selling accumulated assets or mortgaging assets, borrowing from informal markets/searching for more credit, migrating, stopping school for children, deferring payment on utility bills, deferring health care and education spending, depleting savings. strategy 3 involves taking the most risks, and compromises the ability of the household to adapt to future situations,

positively contributes to nutrition is perplexing. However, the use of this strategy helps the family to maintain current levels of consumption by forgoing other expenses or searching for credit and loans. This is not a long-term strategy nor is it easily reversed because once the family sells an asset or takes a loan it becomes difficult to cope to future situations. In order to see the true effect of this strategy, time series data is required, which would demonstrate how long families are able to use this type of strategy. A hypothesis could be that once the household exhausts its ability to sell assets or take loans then it switches to consumption related coping strategies. These changes might be observed in the follow-up part of this study which will provide time series data.

In addition, a common strategy in Sri Lanka, to find more disposable income, occurs when households buy jewelry in gold and pawn or sell, as the situation requires. Therefore, because it is such a widespread strategy, used as a type of savings, or preparation for future uncertainty, it may be not as accurate predictor as disposing of other assets.

Delaying payment of bills, especially for water and electricity was also a common strategy, as is migration. However, because Sri Lanka is a relatively small island, and most major cities are reachable by bus within a day, it is common to work away from home. In most cases, when there was a migration, the family member would be gone for a few days or for the week, and return on the weekend or for a certain amount of predetermined days. In very few cases was the household member migrating outside of the country. In those cases, it was to places like Kuwait.

Those who are already very poor do not have the same ability to access these assets, or even have electricity or water bills. Therefore, it may be a difficult indicator to use simply because they do not have assets, or electricity payments that they could delay.

It was also quite common that households would search for loans. Inter-family lending is quite prevalent, in very few cases was the households going to institutional sources for loans. It is probable that the very poor cannot access institutional loans and therefore a common case observed, were households participating in the Seettu program at the village level. Seettu is a type of savings program, where groups of neighbours pool their

money (either on a daily, weekly or monthly basis) and one family gets the pay-out one month per year. For example, if a family contributed 500 rupees per month, then one month of the year the family will get a payout of 6,000 rupees. This program is quite interesting because it allows families to save through this informal market, or to receive a large sum of cash once per year to take on bigger projects, mostly related to housing improvements, especially because they would probably have been unable to access this cash otherwise (because of poor knowledge of savings, inability to access institutional forms of support, etc.).

Buying food on credit was a common strategy in both populations probably because of the common use of the local grocer and the trust built up between the grocer and households.

The most troubling result of coping strategy 3, were the children who discontinued their schooling. In no cases were the children sent to work, most often the reason children discontinued schooling was due to the high cost of attending, for example the burden on the family to purchase uniforms etc. An observation from the daily interviews was also that absenteeism might be quite high in this population. It was observed that in many cases, in interviews that were carried out in the morning that the child was still at home and absent from school.

From a methodology standpoint, it was sometimes difficult to distinguish between the rural and urban communities. A more differentiated sample would have been useful. The sampling choice was done based on a previous study in the region and the two GN's where chosen based on the spread of rural and urban populations. The rural populations were sometimes, especially in one case, located very near to a bigger village, and the appearances of those houses closely mirrored what would be observed in an urban slum in Kandy. Also, the cluster sampling method also meant that in many cases the households chosen were often those located close to a road. Also, many Samhudhi households were older retired couples who received income from children and/or other family members. Generally, the observation was these households were in a improved situation than households that recieved Samurdhi which had an actively employed member. It future it may be more accurate to exclude households without a working member in the next study.

6.2. Policy recommendations

To alleviate the risk of future food insecurity, qualitative and quantitative data have been able to provide information regarding how populations react when there are increases in food prices. The process of gathering this data aims to enhance the information policy makers, NGO's and researchers have access to in order to aid and target at-risk populations to increase their ability to be resilient in times of crisis.

The following is the discussion of the policy recommendations stemming from this study:

The resilience approach to food security highlights the need for both long and short-term policy actions to achieve food security. Short-term actions are required in times of crisis, such as targeted supplement programs, income assistance, as well as longer term approaches to build system resiliency (such as education, health).

A short-term approach should act to strengthen nutrition interventions. Such as increasing the Triposha portion, and providing better coverage to populations at risk. The Samurdhi program should also increase the allocation of food stamps, and encourage or require that a set proportion be used to purchase fresh fruits and vegetables.

The existence of community midwives is a potentially powerful health resource tool for communities and would be a part of a longer term strategy. The midwives measure, weigh and follow the growth progress of pregnant mothers and children under 5. The midwives detect the earliest signs of malnutrition in children. However, the interviews conducted and the experiences that were recounted by families, prove that there is still a lot to be done to maximize this unique resource. By and large the midwives are not educated in nutrition and especially nutrition practices for proper weaning, there is no advice provided to the households that Tripohsa portions should not be shared among household members. There also appears to be a lack of knowledge pertaining to stunting, as many midwives do not measure children (stunting is a more severe case of malnourishment in children, representing a longer time frame). There is a misconception that height is a factor of ethnicity, whereby South Asians are simply shorter than their Western counterparts, and there is no awareness of the nutritional component of

attaining height, especially for young children. This is one explanation as to why some midwives neglect to measure children, and only record their weight. Further, in predominately Sinhalese towns, like Kandy, the midwives may not have sufficient training in ethnic food practices and culture (for the Muslim and Tamil minorities), and in some cases language barriers exist. More effort is required to train Tamil speaking midwives to work in communities where they are not the majority. There is also a capacity problem, whereby many of the poorer communities are either poorly serviced or not serviced at all (because they are undesirable communities to work in) and there are not enough midwives trained to spend the time needed with individual households. Therefore, more midwives should be recruited and better trained in nutrition.

Another significant problem is there exists only one clinical nutritionist in all of Kandy, and the Central province. Understandably this nutritionist is unable to work and train the midwives in nutrition. Capacity needs to be developed to train community nutritionists who work to teach preventative health and healthy eating and lifestyle practices. This is especially true in poorer communities, as there is a complete lack of awareness in the study population to simple components of nutrition. An increase in the amount of clinical dieticians and community/outreach nutritionists in Kandy could be extremely valuable especially if community nutritionists collaborated with midwives on a regular basis and assisted in visiting homes.

In nearly every interview, the first and the second, that were randomly chosen (and households were not warned ahead of time when the interview would be), the caregiver was almost always at home. It is obvious that poor women have limited options for finding reasonable work. In many cases, marital pressure and cultural taboos meant they stayed at home. It is even more difficult for female headed households to escape the traps of poverty because of limited low skilled employment opportunities. This lifestyle is very sedentary for women and there is an increasing trend of cardiovascular diseases, diabetes and over-weightness in women. High levels of hunger are associated with poor knowledge, literacy rates and gender disparity (The Global Hunger Index, 2009). Reducing gender inequality must be a priority for governments in order to reduce hunger (The Global Hunger Index, 2009).

While the caregiver is the access point to nutrition awareness and meal preparation practices, it is the HHH that currently provides the income to access the food that the caregiver requires. As such, it is vitally important that any development strategy be focused not only on increasing the caregivers' awareness but also the HHH. The ability for the caregiver to be effective is limited to what the HHH allows her to do. It could be extremely shortsighted to overly focus on women's goals and development within the household structure.

Increasing the knowledge of nutrition could influence coping behaviours during periods of crisis. When the importance of nutrition is elevated, then coping strategies that have a more benign impact on nutrition could be encouraged to be used more. Ideally, the government can reinforce coping strategies that are more economically and environmentally sustainable and increase the availability and size of targeted nutrition supplement programs to mitigate poor nutrition outcomes. (Frankenberger et al., 2002). Furthermore, there should also be an emphasis on encouraging supplementary income generating activities, especially for women, to increase adaption capacity in times of stress.

From a food security perspective it is clear that Sri Lanka needs to have a more coordinated agricultural, food and health policy response. The agricultural and price controlling policies of the government will be further investigated in the second part of this study, however, key early observation find that better infrastructure for transport and storage of agricultural products are needed, as well as investments and technological adaptations to increase agricultural yields, and government policy should focus on increasing the trade capacity and stability for food items that are imported. The over-emphasis on food security, in terms of ensuring adequate supply from within Sri Lanka, cannot be a long-term strategy because it ignores consumers' habits, preferences, and the actual production capabilities. Tamils living in the estate sector consume more wheat than their Sinhalese counterparts, therefore high tariffs on wheat disproportionately affect more Tamil's in the Estate sector than others (Kodithuwakku, and Weerahewa, 2011). This can cause undesirable nutrition outcomes.

It also must be noted that from a nutrition perspective, the government's current focus on rice production and consumption cannot be pushed any higher, the average diet in

this study was already at the upper limit for carbohydrate consumption at 65%. A more holistic approach that focuses on a variety of food items to attain nutrition security must be put in place. A diet that has more variability, as has previously been stated, can provide for a variety of micro-nutrients. Negative messages related, especially to wheat predominate, some messages have stated that eating wheat causes diabetes, and by consuming wheat Sri Lankans are supporting American farmers, are just some of the rhetoric that surrounds this complex wheat vs. rice dynamic. This is counterproductive to the nutrition conversation that policy makers should have in its place.

A surprising discovery was there is no national wheat fortification strategy. In most developed countries wheat is fortified with specific micronutrients, and/or also enriched with vitamins and minerals lost in the milling process. There are two mills in Sri Lanka that process all imported wheat. Work needs to be done to provide wheat that is of higher quality, with additional nutritional components added in order to increase the nutritional quality. Whole wheat bread and flour is very difficult to find and often times not available. Whole-wheat flour may be seen as undesirable from a cultural perspective, but even milled wheat can have enhanced nutritional qualities. Wheat is also a better candidate for fortification because it leaves vitamins and minerals in a form that is more bio-available than with rice. Therefore, instead of discouraging the consumption of products that already have a high demand, the government could consider increasing the quality and varieties available.

A consumer protection agency should be created to defend the rights of consumers and standards in food processing. This could also include better nutrition labeling on packages to uphold standard production and marketing practices.

The Samurdhi food stamp allocation has not been increased according to inflation and to developments in market prices for foodstuffs, as a consequence the impact is not as beneficial as it should be. The Samurdhi program also suffers from some well known problems of leakage and targeting. It was surprising to find some households that one would not expect to be Samurdhi holders, were in fact Samurdhi holders, whereas others who were very poor were not receiving a Samudhi allocation. The subjectivity allowed to Samurdhi community officers means that they hold the power to decide which houses receive Samudhi and which do not. National criteria should be better

enforced and monitored. Samurdhi food stamps should also focus on providing access to fresh fruits and vegetables.

There is a culture of entitlement to Samurdhi, even among middle-class households. The population should be encouraged to stop using Samurdhi once they are self-sufficient to end an on-going culture of dependence.

The other national government food program, Triposha is intended to target households not individuals. However, the strong social network and culture of sharing in Sri Lanka mean that the 800g per month ration for an individual is often shared among members of the whole household, whereby minimizing the intended effects to the individual, which is most often malnourished children and pregnant mothers. An alternative strategy that would target the whole household and increase the ration might be more effective; however a dialogue needs to be created. At present the Triposha program is not achieving its intended goals.

The most obvious area which needs immediate action is increased public health awareness by way of messages about nutrition. When a large population (at least this study applied to poor people) has very little or no awareness of basic nutrition concepts it becomes very difficult to achieve a nutritional status that is adequate to provide for a good and healthy life. When mothers are unaware of the food required for young children it becomes very difficult to combat child malnutrition. There is also a sense that if children appear healthy, regardless of the signs of malnutrition, such as low weight and height, then it is not something parents are taught to be concerned about.

This study has shown that homegarden promotion strategies by the government had not reached the poorest. Even in cases where the dwelling had land for a homegarden, knowledge or effort was lacking to maximize the production potential of the homegraden. A common problem of pests (including large animals) was the principal deterrent to utilizing the homegarden. The current government strategy focuses on providing households with seeds and fertilizer, which in this context is not effective, if the issue of disturbance by animals is not considered. Fencing and other such tools would be a further incentive to homegarden production.

Personal communication with Dr. Jeevika Weerahewa (2011) of the University of Peradeniya revealed that there are some important unutilized fruits that are native to Sri Lanka. These fruits are high in micro-nutrients and are easy to grow in the Sri Lankan climate. Their production and consumption could be better promoted by the government and agricultural and health professional.

Food policy councils have proven to be an effective tool, in developed countries, for integrating public health approaches into agricultural policy (Muller et al., 2009). A food system framework must be considered in order to maximize the efficiency of the system. Sri Lanka is an agricultural country and has a high potential to utilize an integrated approach to combate hunger.

6.3. Areas for further study

In Sri Lanka, lack of nutrition knowledge is considered to be one of the major reasons for malnutrition (Rathnayake, Weerahewa 2002). This study confirmed this statement by providing convincing data. A serious public outreach campaign needs to be started and geared to the poor in order to better educate them of the risks of nutritional insecurity. As a result of this lack of knowledge households are most likely not aware of the risks they take when choosing one coping strategy over another. In order to do this, interventions need to be considered that would target the largest possible share of the population.

Research from Wambui-Njogu 2008 showed that when agricultural projects are combined with nutrition education, significant changes in the participants' consumption behavior can occur. Further, it is known that agriculture has a much greater impact on reducing poverty and improving food security than do other sectors of the economy. (Yu et al. 2010).

The UN Standing Committee on Nutrition found that in times of economic crisis, adverse nutrition consequences could be mitigated or better managed if countries have targeted nutrition programs and social safety nets in place. More work needs to be done in Sri Lanka to determine how those programs that are already in place can be better utilized to correspond to their goals. Also, how can these same projects be more efficient to reduce administrative costs.

A further study required would involve the network of community midwives to determine to what extent nutrition education needs improvement, and in what ways can the midwives fill this gap. The midwives would need to be partners in developing a curriculum and outreach program that can better serve pregnant, lactating mothers, children, and by extension households.

Sri Lanka is a low food security country that has fertile arable land and a favourable climate (Yu et al. 2010). Studies should be performed to investigate how Sri Lanka is attracting investment in agriculture and how the government can coordinate this work.

The further part of this study, the agricultural and policy response of the government to food price increases and poverty will be invaluable to determining how health, nutrition and agriculture can become better integrated to achieve common goals.

7. CONCLUSION

The current economic climate has created a situation of hardship for millions of people around the world who struggle to meet basic nutrition requirements. The inability to meet basic food security requirements that enables one to lead a life free from hunger is the major humanitarian preoccupation of our time.

The nutrition situation of the poor in Sri Lanka is quite dismal, especially in dietary quality, which leads to several undesirable consequences: such as decreased livelihood outcomes and an increased prevalence of non-communicable diseases.

Results show that households who use coping strategies related to changing consumption patterns, by decreasing intake, frequency, protein, fruits and vegetables and eating less preferred foods, negatively affect the households nutrition status. Households who use strategies related to disposing of assets and taking risks, positively influenced the households nutrition status, however it is unclear how long households can maintain this trajectory.

Households that are in a position to absorb the effects of food price increases are more resilient in the long run. Improving the nutrition status of the poor in Sri Lanka can be achieved by rising incomes but also, arguably just as or more importantly, with an improvement in nutrition knowledge. Sri Lanka is in an excellent position to meet their Millennium Development Goals because of its extensive health, education and midwife system as well as its agricultural sector. A coordinated approach to health, nutrition and agriculture can help overcome the high levels of malnourishment.

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Appendix 1 SWOT analysis developed in Sri Lanka

STRENGTHS	**WEAKNESSES**
- Free health care - Free education - System of GN, village leaders - Community midwives - Government safety net programs (Triposha, Sarvodoya, Poshana malla) - Poverty alleviation program Samurdhi - Home gardens - Social safety nets are strong - High fruit and vegetable production - Seetu program (pooling money for loans) - Rural households are often net food sellers - Access to land especially in rural area - Availability of indigenous fruits species which are rich in micro nutrients and vitamins	- Low nutritional knowledge/awareness & poor habits - Lack of concern (even for mothers with underweight children) - Feeling of helplessness - Cultural diet rustications (esp. for red meat) - Diversity of culture and languages, messages not tailored to communities - Water safety, many households do not boil water - People have less preference for indigenous fruit species(Under Utilized) - Sanitation, hand washing techniques, proper water sealed toilet - Lack of nutrition practitioners and public health officers - Low consumption of iron rich foods - Triposha are shared within the family, quantity is not enough - Common to not stop Samurdhi once an acceptable income level is reached - Problems of leakage and coverage for Samurdhi - Preference for short eats and street food, especially for the urban - Women's autonomy within the household (relies on husband for money) - Increasing urbanization leading to the nutrition transition, high prevalence of non communicable diseases (diabetes, CVD etc.) - Negative messages of wheat being nutritionally poor, no availability of whole grain - Rice consumption is too high, fruits to low - Poor links to the market (roads, storage, distribution) - High post harvest losses ~40% - Lower yields in comparison to other South Asian countries - High alcohol consumption in poor households
OPPORTUNITIES	**THREATS**
- 'Api wawama rata nagama' – let's cultivate to build up our nation - Good climate, 2 harvests - CSR projects for multinational corporations for homegardens - 1,000,000 homegardens program - Stable situation after the war - Government restrictions to maintain paddy lands - After 2007 not allowed to use paddy lands for other purposes - Official Development Aid - Role of NGO's	- External markets for sugar, wheat, fish, whole milk powder - Rising prices - High tariffs on most imported goods - Commercial advertising for ready-made foods, esp to children - Gov social safety net programs not efficient - Political changes, may lose some programs, with change in gov - Gov: fragmentation and poor coordination of food, health and agriculture programs - Not national food fortification strategy (no wheat is currently fortified) - No consumer protection agency (nutritional messages, product integrity)

Appendix 2 Questionnaire

Visit number: 1 ☐ ☐

Household code: _____

Household Survey Questionnaire—Nutrition and Coping Strategies during the Times of Food Price Hikes

1 Date of enumeration: _____ 2 Name of enumerator: _____

3. DS division: _____ 4. GN division: _____

5. Respondent's name (if willing): _____ 6. Household address _____

1 Households characteristics

1.1 Ethnicity

1. Sinhala ☐ 2.Tamil ☐ 3.Muslim ☐ 4.Other (specify)

1.2 Religion

1. Buddhism ☐ 2. Hindu ☐ 3. Christianity ☐ 4. Islam ☐ 5.Other (specify)

1.3.1 Roof material

1. Tile ☐ 2. Corrugated asbestos ☐ 3. Cadjan ☐ 4. Corrugated metal sheets ☐ 5. Other(specify)

1.3.2 Floor

1. Earthen/cow dung ☐ 2. Cement ☐ 3. Tiled ☐ Terrasso ☐ 5. Other(specify)

1.3.3 Walls

1. Wattle & Daub ☐ 2. Plasters ☐ 3. Wooden ☐ 4.Other(specify)

1.4 Demographic Characteristics

	1.4.1 Relationship to the Head of Household (HHH also should be included)	1.4.2 Sex Female (0) Male (1)	Samurdhi holder Yes/No	1.4.3 Age 1. <1 2.1-3 3.4-6 4.7-9 5.10-12 6.13-15 7.16-19 8. 20-39 9. 40-49 10. 50-59 11. 60-69 12.70+	1.4.4 School Education (for elders) 1. No education 2. Up to grade 5 3. Up to grade 8 4. Up to O/L 5. Up to A/L 6. Diploma/degree 7. Schooling (Children if schooling) present grade? 8. Child under 5	1.4.5 Food preferences 1.Vegetarian 2.Non-Veg I (consumes milk products + eggs) 3. Non-Veg II (fish + milk products + meat)	1.4.6. Total monthly Income by type (add sources) 1.Government 2.Private 3.Labourer 4. foreign employment 5. Self employment 6. Agricultural goods 7. Government transfers/other receipts 8. Other (Specify)
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

1.4.7 Who is the head of the household (main income earner)? 1. HHH ☐ 2. Caregiver ☐ 3. Someone else ☐

1.5 Who is the primary care giver of the house hold (prepares meals)? HHH ☐ 2. Caregiver ☐ 3. Someone else ☐

1.6 Who does the shopping for staples, for perishables?

1.6.1Staples				1.6.2Perishables			
HHH		Caregiver		HHH		Caregiver	

1.6.3. Who indicates what food to buy?

HHH ☐ Caregiver ☐

1.7 Where do you most usually procure food? Rank by most important.

	Rank
1.7.1 Super market	
1.7.2 Market	
1.7.3 Local grocer	
1.7.4 Home garden	

1.8 Movable assets

1. Yes ☐ 2.No ☐

1.8.1. If yes, what are they? And, how many.

1. Motor bike ☐ 2. Three-wheeler ☐ 3. Luxury vehicle (car/van/jeep) ☐ Bus/truck ☐ ☐

6. Radio ☐ 7. Sewing machine ☐ 8 .Jewellery ☐ 9. Livestock ☐ 10. Other: .....

cows _____

chickens _____

goat _____

_____

1.9 Immovable assets

1. Yes ☐ 2.No ☐

1.9.1 If yes, what are they?

	Yes	No	Area
1.9.1.1. House			Pur
1.9.1.2 Homegarden			pur
1.9.1.3 Uplands			ha
1.9.1.4 Lowlands			ha
1.9.1.5 Other			

1.10 Weekly household expenditure in Sri Lankan Rupees

1.10.1 Food	1.10.2 Transport	1.10.3 Utility Bills	1.10.4 Education	1.10.5 Housing	1.10.6 Entertainment	1.10.7 Alcohol	1.10.8 Clothes	1.10.9 Payments for loans	1.10.10 Fuels	1.10.11 Medicine	1.10.12 cable tv	1.10.13 Other (seettu)

1.11Total weekly expenditures: _____

2 Dietary Assessment with a 24 hour recall (Assesment 1)

Breakfast foods Home or away	Specify type of ingredients	Quantities
Rice		
Bread		
Roti		
Hopppers		
String hoppers		
Other starches		
Curry		
Sambol	Coconut	
	Chilli	
	oil	
Juice/soft drink		
Tea	Tea	
	Milk	
	sugar	
Biscuits		
Other		

Were all members of the household present for this meal? If not, who was missing? .....

lunch foods home or away	Specify type of ingredients	Quantities
Rice		
Bread		
Roti		
Hopppers		
String hoppers		
Other starches		
Curry		
Sambol	Coconut	
	Chilli	
	oil	
Juice/soft drink		
Tea	Tea	
	Milk	
	sugar	
Biscuits		
Other		

Were all members of the household present for this meal? If not, who was missing? .....

dinner foods	Specify type of ingredients	Quantities

home or away		
Rice		
Bread		
Roti		
Hopppers		
String hoppers		
Other starches		
Curry		
Sambol		
	Coconut	
	Chilli	
	oil	
Juice/soft drink		
Tea	Tea	
	Milk	
	sugar	
Biscuits		
Other		

Were all members of the household present for this meal? If not, who was missing? .....

3 Coping strategies Types

Strategy type 1

3.1 Within the period of last 30 days has someone in the house had to work longer hours to make more income to be able to afford food?

very often ☐
often ☐
sometimes ☐
seldom ☐
never ☐

3.1.1 If yes, who and at what level?

Caregiver .....
Head of the household.....
Other .....

3.2 Have you (the caregiver), the head of the household or other members of the household had to search for new forms of income to keep up with existing food needs in the past 30 days?

Yes ☐ No ☐

3.2.1 If yes, what are they?

1) Home-gardening ☐
2) Small scale business development (handicrafts) ☐
3) Casual labour ☐
4) Crop diversification ☐
5) Petty trade (informal, low-earning activities) ☐
6) Extraction of natural resources (fuel wood) ☐
7) Other (specify).....

3.3 Within the period of last 30 days have you started growing more crops or rearing more livestock, so as to meet your food needs?

Yes ☐ No ☐

3.3.1 If yes, indicate the types of crops and animals?

Crops	Animals

3.4 Within the period of last 30 days have you increased your home stores of paddy/rice (hoarding behaviour)?

Yes ☐ No ☐

3.5 Did you sell/mortgage/pawn assets to meet your food needs?

Yes ☐ No ☐

If yes, what did you sell ( )/mortgage ( )/pawn ( )? _____

3.6 Have you use following to cope up with food price hikes within the period of last 30 days?

	very often	often	sometimes	seldom	never
3.6.1Social network (family, friends)					
3.6.2 Save money for future food needs					
3.6.3Assistance from external third parties					

Strategy type 2

3.7 In the last 30 days did you or anyone in your household experience the following?

	1. Never 2. seldom (once/twice) 3. Sometimes (3-10 times) 4. Often 10-20 times 5. Very often >20
3.7.1. Adult cut sizes of meals or skipped meals	
3.7.2. Children's meals sizes were reduced	
3.7.3. Reduced frequency of meals throughout the day	
3.7.4 Ate less preferred foods	
3.7.5 Ate less outside the home	
3.7.6 Ate less fruits and vegetables	
3.7.7. Ate less protein(Red meat, milk products)	
3.7.8. Ate less protein (fish)	
3.7.9 Members of the household went a whole day without eating	
3.7.10.Did you eat smaller portions of rice	
3.7.11.Did you eat smaller portions of wheat	
3.7.12 Did you spend less on non-food items	

Strategy type 3

3.8 Within last one month period have you borrowed/ requested to borrow money to meet your food needs?

Yes ☐ No ☐

3.8.1 If yes, Amount of borrowing,

Borrowing less than 1000 rupees ☐

Borrowing 1001 to 2500 rupees ☐

Borrowing 2501 to 5000 rupees ☐

Borrowing more than 5001 rupees ☐

3.8.2. If yes, what are the sources of loans utilised?

Bank loans	☐
Advanced your turn of ROSCAS (*Seettu*)	☐
Pawning	☐
Borrowed from the family (i.e. extended family support)	☐
Borrowed from friends	☐
Borrowed village money lenders	☐
Local shopkeepers	☐

3.9 In the past 30 days have you asked the people who obtained loans from you to repay those outstanding loans so as to meet your food needs?

Yes ☐ No ☐

3.10 Did you increase the amounts of food purchased on credit from the shop keeper in the last 30 days?

1. Very often ☐
2. Often ☐
3. Sometimes ☐
4. Seldom ☐
5. Never ☐

3.11 Have any one of your children discontinued schooling and started working. So as to meet your food needs over the past 3 months?

Yes ☐ No ☐

3.12 In the last 30 days have you delayed your bill (house rent ( )/electricity ( )/water ( )/telephone ( ) etc) payments so as to meet your food needs?

Yes ☐ No ☐

3.13 In the past 30 days have you cut down expenditure on agricultural inputs so as to meet your food needs?

Yes ☐ No ☐

3.13.1 If yes, for what activities? Provide your answer with respect to the crops grown.

Crop	Activity

3.14 In the past 3 months have you or any member of your family migrated to an area where there are more jobs in order to cope up with increasing family expenditure due to high food prices?

Yes ☐ ☐

3.14.1 If yes, was it

Seasonal ☐ Permanent ☐ where:_____

3.15 Have you depleted savings in order to buy food in the past 30 days? Yes ☐ ☐

Depleting less than 1000 rupees ☐
Depleting 1001 to 2500 rupees ☐
Depleting 2501 to 5000 rupees ☐
Depleting more than 5001 rupees ☐

4Household care

4.1 Variable used to compute the care index. Care for the caregiver, health care of the household, water and sanitation, child care within the household

4.1.1 Does the caregiver go outside the household to search for information related to nutrition?

1. Very often ☐
2. Often ☐
3. Sometimes ☐
4. Seldom ☐
5. Never ☐

4.1.2 Does the caregiver access media – newspapers, television, radio, on a regular basis?

	Very often	Often	Sometimes	Seldom	Never
4.1.2.1 Television					
4.1.2.2 Radio					
4.1.2.3 News paper					

4.1.3 Is the caregiver aware of the food nutrients (from a standard prepared question)? Can name foods with active ingredient and why it is important.

	Highly aware (both)	Satisfactorily aware	Slightly aware	Not aware (neither)
4.1.3.1Calcium				
4.1.3.2Iron				
4.1.3.3Vitamin A				
4.1.3.4Protein				
4.1.4.5Vitamins				

4.1.4 Is the caregiver employed outside the home?

Yes ☐ No ☐

4.1.4.1 If there are children, where do the children go while he/she is working?

Family ☐
Friends ☐
Substitute care ☐
goes along ☐

4.1.5 Caregivers autonomy within the household

	Very often	Often	Sometimes	Seldom	Never
4.1.5.1 Caregiver uses own income to buy food					
4.1.5.2 Caregiver receives money from the head of the household for food					
4.1.5.3 Caregiver receives money from head for basic needs?					
4.1.5.4 Caregiver decides what food items to buy?					
4.1.5.5 Caregiver purchases food?					
	Highly agree	Agree	Neutral	Disagree	Highly disagree
4.1.5.6 Does caregiver needs more money from household head to buy food?					

4.2 Health Care of the household

4.2.1 Was anyone in the household sick over the past three months?

Yes ☐ No ☐

4.2.2 Did they go the hospital?

Yes ☐ No ☐

How were they treated? Hospital ( ), doctor ( ) midwife ( ), ayuvedic medicine ( ), nothing ( ) other ( ) _____

4.2.2.1 Was it for? Respiratory infection ( ), infectious disease ( ), diarrheal ( ), NCD ( ), other ( )

4.2.2.2 Whether any member of the household is under medication for a Non Communicable Diseases

1. Diabetes ☐
2. Heart Diseases ☐
   i. High blood pressure ☐
   ii. Cholesterol ☐
3. Paralysis/Disabled ☐
4. Arthritis ☐
5. Other (specify)

4.2.3 Has any member of the household been to medical facilities for regular medical check-ups, or only when they are sick?

Children:

1 Regular medical check-ups ☐
2 Only when sick ☐

Other HH members:

3 Regular medical check-ups ☐
4 Only when sick ☐

4.3 Water and Sanitation

4.3.1 Do you have year round access to drinking water?

Yes ☐ No ☐

4.3.2 Where do you get your drinking water from?

Protected well (private)	☐
Protected well (public)	☐
Household tap line	☐
Public standpipe	☐
Tube well	☐
Unprotected well	☐
River/cannel/tank/pond/rain water	☐
Other (specify)	☐

4.3.3 Do you clean water before drinking in the following ways?

No method	☐
Filtering	☐
Boiling	☐
Pouring ash in and allowing settling	☐

4.3.4 What type of latrine do you have?

Water sealed	☐
Permanent pit	☐
Temporary pit	☐
Public latrine	☐
Neighbours latrine	☐
Open air	☐

4.4 Child care within the household

4.4.1 Has the child been classified as underweight at any time from birth to 5 years old?

Yes ☐ No ☐

4.4.1.1 Anthropomorphic details of children under 5

Age	Sex	Has the child been underweight in the past 6 months?	Has the child been underweight in its lifetime?	Has the child been stunted in its lifetime?	Weight at birth	Months excl breastfed?	Breastfed until what age?

4.4.1.2 Has the household received Triposha in the past 6 months? Yes ☐ No ☐

4.4.1.3 Does the household share the protions of Triposha? Yes ☐ No ☐

4.5 Home gardening

4.5.1 Do you maintain a home garden?

Yes ☐ No ☐

4.5.3 How much does home garden production save in food expenditures?

a) none ☐
b) less than 500 rps ☐
c) between 500-1000 ☐
e) 1000-2000 ☐
f) More than 2000 ☐

4.5.4 Do you have these crop species in your home harden?

Annual species		Perennial species	
Crop	Amount	Crop	Amount
		Jack	
Vegetables		Coconut	
Cassava		Bread fruit	
Leafy vegetables		Banana	

Do you have livestock? Yes ☐ No ☐

4.5.4.1 If yes, what are the livestock species?

Species	Number of animals

4.5.5 do you have a field farm in addition to the home garden?

Yes ☐ No ☐

4.5.6 What is the area? _____

4.5.7 How much income do you receive from this property? _____

Thank you for participation

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TITLE: Factors influencing household nutritional status in relation to increasing food prices in Kandy, Sri Lanka

Key-words : food security, nutrition, food prices, agricultural economics, Sri Lanka agriculture

Abstract:

The food crisis of 2008 exacerbated the nutritional insecurity of poor people around the world. Still today, unprecedented numbers of people do not have access to food because of insufficient economic potential. Sri Lanka is a low income food deficit country which has, until recently experienced civil war, and has high numbers of malnourished people. The objective of this thesis was to identify factors that influence a households susceptibility to food insecurity and to determine how households behave in times of crisis by: identifying strategies households use to mitigate food price increases and assess their risk profile, to determine the households nutrition profile in rural and urban settings, to provide recommendations for policy improvement and poverty reduction, and to increase household resilience to food price shocks. The ability for a household to be resilient is dependent upon its ability to respond to shocks over time and the UNICEF conceptual framework on malnutrition is used as a basis to understand the underlying causes of food insecurity in this study. The research included a field level systems analysis and qualitative data collection from stakeholders, followed by a quantitative questionnaire of 100 households, 50 in the urban area and 50 in the rural area. Results show that households that use coping strategies related to changing consumption patterns, such as, decreasing intake of protein, fruits and vegetables, eating less preferred foods, decreasing the frequency of meals, negatively affect the households nutrition status. Households that use strategies related to disposing of assets and risk taking, positively influenced the households nutrition status, however it is unclear how long households can maintain this trajectory. Results also show that nutrition knowledge in this segment of the population is quite poor and the inability to consume a quality diet, in sufficient diversity, is more prevalent than the inability to acquire sufficient quantity, in terms of energy intake.

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