National Planning Commission
Central Bureau of Statistics

In collaboration with:
World Food Program
World Bank
AusAID
UNICEF

Nepal Thematic Report on Food Security and Nutrition
2013

Table of Contents

Foreword

The Government of Nepal has given high priority to food and nutrition security for all its citizens. Over the past years, the government has prepared and implemented plans, policies and programs to improve Nepal's food security and nutrition situation.

This Report presents a situational analysis of food security and nutrition based on the results of the Nepal Living Standards Survey 2010-11 (NLSS-III), carried out by the Central Bureau of Statistics.

This Report describes the long-term trends of food security and nutrition outcomes in Nepal over the past fifteen years and analyzes various factors affecting the outcomes, offering comprehensive descriptions about the complex and imminent issue of food security and nutrition in Nepal.

The data, analysis and recommendations provided in this Report will help the government in evidence-based decision-making and in implementing coordinated multi-sectoral efforts to reduce hunger and malnutrition in Nepal.

This Report was prepared jointly by the World Food Program, the World Bank, UNICEF, and the Central Bureau of Statistics, Nepal, with contributions from Nepalese and international experts.

We are grateful to all the contributors for this crucial study and greatly appreciate the Central Bureau of Statistics for coordinating this effort and for providing critical data to the contributors to complete their analysis.

Deependra Bahadur Kshetry
Vice-Chairman
National Planning Commission

March, 2013

Preface and Acknowledgements

Executive Summary

The *Nepal Thematic Report on Food Security and Nutrition 2013*, updates the status of food security and nutrition in Nepal, and analyzes key food security trends over the past 15 years. This report is based primarily on the findings of the Nepal Living Standards Survey (NLSS) 2010/11, which covered 5,988 households and included anthropometric data collected from approximately 2,500 preschool children under 60 months of age. The 2010/11 NLSS is the third of its kind in Nepal (following surveys undertaken in 1995/96 and 2003/04) and represents a comprehensive and reliable source of information on the status of national and regional food security and the nutritional status of the population.

Findings from the NLSS highlight significant socioeconomic changes that are altering Nepal's national food security and nutrition landscape. These changes include:

(i)   urbanization and remittance income have become drivers of poverty reduction and improved nutrition and food security;

(ii)   households are now less dependent on self-production and more dependent on purchased food to meet their consumption needs than they have been previously;

(iii)   the proportion of female-headed households has almost doubled since 1995/96, and women are spending more time engaged in agricultural work, while young people are shifting their time use towards education and income generating activities;

(iv)   population growth and changing consumption patterns are increasing demand for food at a time when agricultural growth has stagnated and urbanization is increasing;

(v)   food prices have increased significantly in recent years despite improvements in rural road infrastructure and reduced transportation costs to some rural areas;

(vi)   there have been improvements in chronic undernutrition (stunting), although the prevalence is still quite high, with over half of all children stunted by the time that they reach two years of age; and

(vii)   acute undernutrition (wasting) has remained practically unchanged at a critical level of almost 15 percent, which is a concern.

Over the past 15 years, Nepal has made significant gains in poverty reduction, from a rate of 40 percent in 1995/96 to 25 percent in 2010/11. This has been matched by a corresponding reduction in the proportion of the population experiencing hunger and chronic undernutrition. In spite of the progress made, some households are falling behind, and amongst some of the poorest households, there is evidence that vulnerability may have increased in recent years.

Key report findings

- Over the past 15 years, there has been an overall decline in food insecurity and chronic undernutrition. Nevertheless, a proportion of households remain trapped in a cycle of poverty and hunger. Twenty-five percent of households are considered food poor, i.e., the total value of their food consumption is insufficient to ensure a basic diet. Nearly half of children under five years of age suffer from chronic undernutrition. Acute undernutrition is at a critical level, affecting 15 percent of children under five years of age.

- The diet of the average household has changed significantly over the past decade. Household vegetable consumption has almost tripled as compared to 2003/04[1] (from 470g per month to 1,309g), and more than twice the amount of meat and fish is consumed (from 402g per month to 847g).

- Poverty is the most important determinant of food insecurity and poor nutrition. Almost all households living in the bottom wealth quintile are food insecure and the vast majority of the food insecure are poor. The prevalence of chronic undernutrition among children from the poorest households is almost twice as high as compared with children from the wealthiest households.

- Populations living in certain geographical areas and/ or identifying with certain caste/ethnic groups are particularly vulnerable to hunger and undernutrition, and disparities are not closing.

- The magnitude of undernutrition remains high in the country. An estimated 1.6 million children under five years of age (out of an estimated total population of 3.5 million) are suffering from chronic undernutrition and its long-term consequences. While over 500,000 children are suffering from acute undernutrition, or wasting. The high prevalence of chronic undernutrition among infants under six months of age, and the fact that more than fifty percent of children are stunted by the time they reach two years of age, highlights the importance of targeting interventions during the "first 1,000 days," from the prenatal period through pregnancy and the first two years of life.

- Seasonal food insecurity is most prevalent in Mountain areas. Most households living in the Hills or Terai are able to smooth their consumption throughout the year. During 2010/11, informal and formal assistance provided to Mountain households was important for smoothing household consumption but only when provided at the right time. When assistance was not available when needed, average household consumption levels dipped below the minimum threshold level.

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[1] Quantity consumed is based on household estimates of the total weight of consumed food items in a one-month period. Potatoes for the purpose of this analysis are considered separately.

Measuring Food Security and Nutrition

Food security

Food security defines a situation in which all people at all times have physical and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (FAO, 1996).

Food security depends upon three main factors:

Availability of food: Food availability is the physical presence of food through all forms of domestic production, commercial imports, and food aid. Estimates of food availability might be aggregated at the regional, national, district or community level.

Access to food: Food access concerns a household's ability to acquire adequate amounts of food through its own home production and stocks, direct purchases, barter, gifts, borrowing, and food aid.

Utilization of Food: Refers to the ability of members of a household to make use of the food to which they have access. This includes an individual's ability to absorb and metabolize the nutrients, the ways in which food is stored, processed and prepared, how water and cooking fuel are used, as well as hygiene conditions. Utilization can be impaired by illness or poor caring practices.

Nutrition

Nutrition is the intake of food, considered in relation to the body's dietary needs. It includes deficiencies in protein-energy as well as vitamin and mineral intake (micronutrient deficiencies). Women who are pregnant or breastfeeding, infants, young children, and teenagers are among the most nutritionally vulnerable population groups, as they require additional nutrients for optimum growth and development. Good nutrition – an adequate, well-balanced and safe diet, combined with regular physical activity – is a cornerstone of optimal health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity. According to the UNICEF 1990 conceptual framework, undernutrition is the outcome of two immediate factors – including insufficient food intake, and infectious diseases. The underlying factors include food insecurity, poor caring practices, and poor access to environmental and health services. While the basic causes include political and economic resources, cultural beliefs, and physical infrastructure.

The conceptual framework below shows that causes of undernutrition are multifaceted, embracing food, health, and caring practices. They are also classified as immediate, underlying, and basic; whereby factors at one level influence other levels. The framework serves as a guide in assessing and analyzing the causes of the nutrition problem and helps in identifying the most appropriate mixture of actions. It is utilized in the *Nepal Multi-Sectorial Nutrition Planning (MSNP) Framework for Accelerating the Reduction of Maternal and Child Undernutrition.* It was adopted for use in Nepal during the consultative process to understand the key determinants of undernutrition, and in turn to identify what

intervention(s) will lead to long-term and sustainable improvements in nutrition. The consultative process was led by the National Planning Commission (NPC) and involved the five key ministries: the Ministries of Health and Population (MoHP), Education (MoE), Agriculture Development (MoAD), Physical Planning, Works and Transport Management (MoPPWTM), and Federal Affairs and Local Development (MoFALD).

The NLSS survey employed robust indicators on food availability and food access, but did not include information on some of the other key factors that affect food utilization, such as the burden of infection and critical behaviors and caring practices. As a result, the full range of determinants of nutritional status is not represented in this report.

Figure 1. Nepal Government Conceptual Framework of the Determinants of Chronic Undernutrition[2]
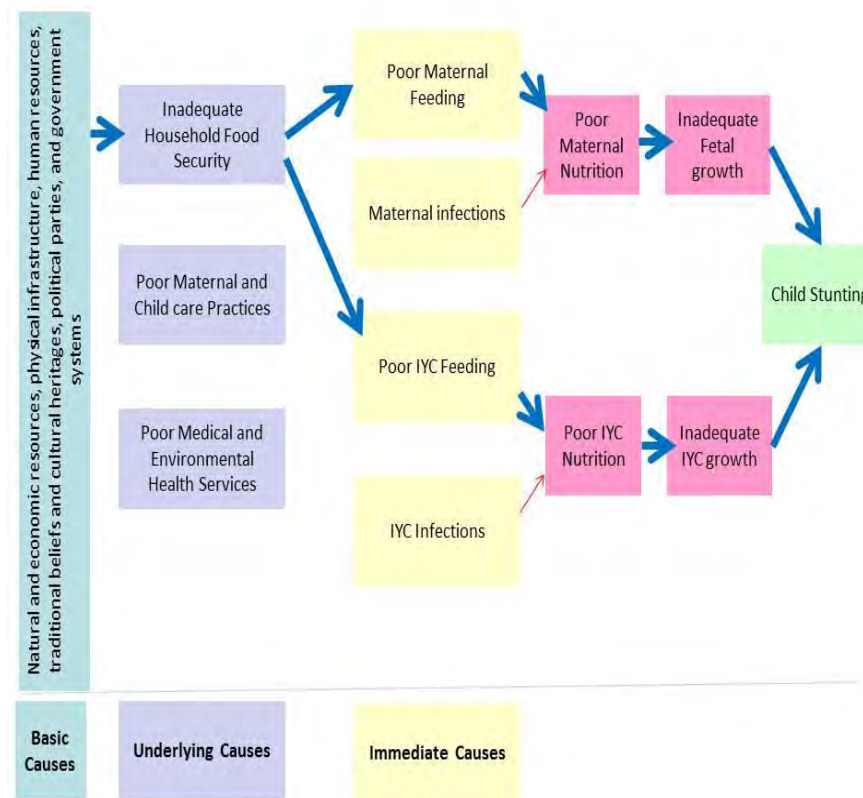
[2] Shrimpton, R. 2011.In: Nepal Multi-Sectorial Nutrition Planning Framework for Accelerating the Reduction of Maternal and Child Undernutrition.. Based on the 1990 UNICEF Conceptual Framework on the Determinants of Undernutrition.

Measuring food security and nutrition

There is no single measure to judge a nation's food security and nutritional status; rather a variety of indicators and measurement techniques are required. This report utilizes findings from the 2010/11 NLSS with the aim of producing a meaningful food security and nutrition profile for Nepal.

The 2010/11 NLSS is the third of its kind in Nepal. The initial survey was undertaken in 1995/96, and a second round was conducted in 2003/04. The NLSS represents a comprehensive and reliable source of information for tracking the status of food security and nutrition. It is based on methodology developed by the World Bank and included the enumeration of 5,988 households. Anthropometric data were collected from approximately 2,500 preschool children under 60 months of age from all regions of the country.

The key measures utilized in this report are outlined below. Where possible, this report provides available trend analysis to identify progress towards the achievement of food security and nutrition between 1995/96, 2003/04, and 2010/11. Further analysis of issues relating to national food security also was undertaken.

- **Measuring the quantity of food that household members consume.** Average daily calorie consumption below the threshold required for a healthy active life is a strong indicator of food insecurity. If the consumption of an individual or household falls significantly short of meeting prescribed physiological dietary energy requirements, this indicates a state of "hunger." Dietary energy consumption per capita is calculated by dividing each household's average daily consumption of all food items (based on a seven-day recall) by the number of household members. To provide the most accurate estimates of dietary deprivation, this report uses the age and sex specific recommended daily allowances used by the Central Bureau of Statistics as the threshold limits for calculating energy deprivation. Households that consume low dietary energy are also most likely to have poor micronutrient intake.

- **Measuring the quality/diversity of food that household members consume.** If the diet of a household or individual is insufficiently diverse, it is likely that a household will have inadequate micronutrient intake. Food insecure households spend a larger share, if not all, of their food budget on staples, such as rice and wheat, which provide inexpensive sources of calories. In doing so, they forfeit more nutritious items and their diet lacks adequate proteins and micronutrients. Dietary diversity can be captured by two simple and complementary measures: i) the number of food groups (out of eight) that a household consumes over a reference period of seven days, and ii) the share of calorie consumption derived from staples.

- **Measuring the adequacy of food consumption.** The *Food Consumption Score (FCS)* combines the elements of "quantity" and "quality" of food as listed above. The FCS measures food diversity (the types of food consumed), food frequency (the number of days each food group is consumed), and the relative nutritional importance of different food groups. The FCS uses standardized and calibrated thresholds that divide households into three groups: "poor" food consumption, "borderline" food consumption, and "acceptable" food consumption. An alternative measure of adequacy of food consumption is the *Food Poverty* indicator. The "food poor" are those who spend less on food than is required to consume the minimum level of calories for a healthy and active life (based on the types of

foods purchased and consumed by the poor, calculated at local costs). Prices are based on the local market. This measure provides a more robust picture of food insecurity in urban areas, compared to other measures, as it separates the population who may consume a diet below recommended levels from those who cannot afford to consume adequate Kcals.

- **Measuring the nutritional status of children aged 0-59 months through anthropometry.** _Stunting_ or low height-for-age is defined as having a height at least two standard deviations below the median height for a given age as compared to an international reference population. Stunting is regarded as evidence of chronic undernutrition. _Wasting_ is based on standardized weight-for-height, and is a measure of acute undernutrition. _Underweight_ or low weight-for-age is similarly defined and is a composite indicator of both chronic and acute undernutrition. The new growth standards employed in the classification of nutritional status in the NLSS is that recommended for international use by the World Health Organization and UNICEF, and was recently revised.[3] Implicit in the use of a single international growth standard is the assumption that variations in height and weight for children below five years are caused largely by environmental rather than genetic factors. More information relating to nutrition measurement can be found in the Appendix.

Methodology used for calculating consumption is generally in-line with standards outlined in IFRPI (2007).

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[3] Garza, C. and de Onis, M. 1999. A new international growth reference for young children. _American Journal of Clinical Nutrition._ 70 (1 Part 2):169S-72S.

Food Security Outcomes

Diet quantity

According to the 2010/11 NLSS, the national *average* dietary energy (Kcal) intake is 2,536 Kcal per capita per day; a level that is higher than the minimum average adequate requirement of 2,220 Kcal set by the Government of Nepal.[4]

There is no significant difference in *average* dietary energy intake between urban and rural areas. In urban areas, 43 percent of the population consume less than the national minimum caloric threshold compared to 37 percent in rural areas. However, when interpreting this result, it is important to consider that national thresholds set by the government of Nepal are based on "light activity" and the energy demands for a healthy active life in rural areas typically exceed those in urban areas due to increased activity. As such, the data may underestimate the real magnitude of energy deficiency in rural areas.

Food energy intake varies significantly between Nepal's geographic regions. The greatest per capita intake of calories is in the Rural Terai - Central (2,762 Kcal per day), compared to the lowest per capita intake in the Rural Hills - Mid and Far Western (2,331 Kcal per day).

Table 1. Diet quantity 2010/2011

Population	Average kilocalories consumed per capita per day	% of the population food energy deficient
Nepal	**2536**	**38**
Urban	2525	43
Rural	2539	37
Regions		
Mountains	2403	45
Urban - Kathmandu	2481	53
Urban - Hill	2524	42
Urban -Terai	2553	38
Rural Hills - Eastern	2542	43
Rural Hills - Central	2422	45
Rural Hills - Western	2452	42
Rural Hills – Mid and Far Western	2331	49
Rural Terai - Eastern	2640	28
Rural Terai - Central	2762	23
Rural Terai - Western	2590	34
Rural Terai – Mid and Far Western	2515	37

Interpretation of average Kcal intake[5]

>3000	high	**2050 - 2500**	low
2500-3000	medium	**<2050**	very low

[5]IFPRI 2007.

[4] Poverty in Nepal, CBS, 2011.

Areas that have higher than average kilocalorie consumption generally also have a lower portion of the population consuming fewer than the minimum caloric threshold for a healthy active life.

Diet quality

Poor diet diversity is a serious problem across much of Nepal. While the average Nepalese consumes sufficient calories, staple food items constitute 72 percent of the average household diet, which is considered to be high (see Table 2). This share of staples is relatively consistent with other low-income developing countries (averages are typically around 70 percent), compared to industrialized countries where the average share of staples in the diet is around 30 percent (FAO 1996a). Among developing countries, populations with relatively good dietary quality receive around 55–70 percent of their energy from staples (Bouis and Hunt 1999).

The *Diet Diversity Score* measures how many food groups (out of 8) are consumed during a week reporting period. The average household in Nepal consumes food from 6.5 food groups. The score for urban households is slightly above rural households (7.0 vs. 6.4 respectively), and there is relative consistency across analytical regions ranging from 6.0 to 7.2.

This report considers households that consume more than 60 percent of their total calories from staples to have a *High Staple Diet* and households that consume more than 75 percent of their total calories from staples to have a *Very High Staple Diet.*[6] At the household level, it is measured as

the percentage of dietary energy available from food staples (for example, rice, maize, and wheat) in the total dietary energy available. A higher value indicates lower diet quality, because energy-dense starchy staples have small amounts of bioavailable protein and micronutrients, leaving those consuming large amounts of them compared to other foods vulnerable to protein and micronutrient deficiencies. 87 percent of households in rural areas have a *High Staple Diet,* and more than half (52 percent) have a *Very High Staple Diet.*

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[6] In line with IFPRI (2007) methodology. Based on food supply data, in low-income developing countries, the percentage of food energy derived from staples averages around 70 percent; while

that of industrialized developed countries averages around 30 percent (FAO 1996a). Among developing countries, a set classified by Bouis and Hunt (1999) as having relatively good dietary quality receives 55–70 percent of their energy from staples. The IFPRI guideline is 75+: very high (very poor diet quality); 60–75: high; 40–60: medium; and <40: low.

Table 2. Diet diversity and % of calories from staples 2010/11

Population	Average % of calories from staples	Household Dietary Diversity Score*
Nepal	**72**	**6.49**
Urban	66	7.01
Rural	74	6.35
Regions		
Mountains	77	6.03
Urban - Kathmandu	62	7.24
Urban - Hill	65	7.03
Urban -Terai	69	6.84
Rural Hills - Eastern	72	6.25
Rural Hills - Central	73	6.19
Rural Hills - Western	70	6.42
Rural Hills - Mid and Far Western	76	6.07
Rural Terai - Eastern	75	6.52
Rural Terai - Central	76	6.57
Rural Terai - Western	72	6.63
Rural Terai - Mid and Far Western	76	6.30

*Excluded small quantities (less than 15 grams)

Almost 70 percent of the urban population has a High Staple Diet; however, only 24 percent of the urban population has a Very High Staple Diet (see Figure 2).

This report classifies households that have consumed food from fewer than four food groups (out of 8) within a seven-day reporting period as having a Low Diet Diversity.[7] In 2010/11, this accounted for 9 percent of Nepalese households, representing 5 percent of the urban population and 10 percent of the rural (see Figure 2). Populations in some regions of Nepal are particularly prone to poor dietary diversity. Underlying causes of differences in regional dietary diversity are discussed further throughout this report. In Mountain areas, 60 percent of the population derive a very high share of their energy from staple food, and over 10 percent of the population in varying Hill and Terai regions consumed less than four food groups within the reporting period.

Figure 2. Poor diet quality in 2010/11, urban and rural comparison

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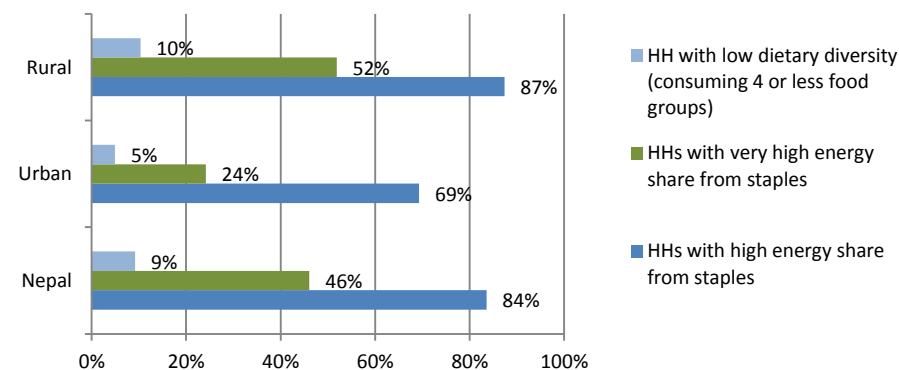
[7] In line with IFPRI (2007) methodology.

Figure 3. Poor diet quality in 2010/11, regional comparison

Legend:
- HH with low dietary diversity (consuming 4 or less food groups)
- HHs with very high energy share from staples
- HHs with high energy share from staples

Chart data:

Region	Low dietary diversity	Very high energy share from staples	High energy share from staples
Rural Terai - Mid & Far	12%	56%	90%
Rural Terai - Western	6%	44%	82%
Rural Terai - Central	10%	59%	93%
Rural Terai - Eastern	6%	58%	90%
Rural Hills - Mid & Far	15%	57%	93%
Rural Hills - Western	8%	37%	78%
Rural Hills - Central	15%	46%	85%
Rural Hills - Eastern	10%	48%	82%
Urban - Terai	8%	35%	76%
Urban - Hill	5%	20%	69%
Urban - Kathmandu	2%	13%	60%
Mountains	12%	60%	91%

Trends in diet quantity and quality

Compared to previous years, the Nepalese population is consuming more food per capita per day and a more diverse diet in both urban and rural areas. At a national level, people are consuming on average 12 percent more calories than in 2003/04 and 21 percent more than in 1995/96.

The proportion of the population consuming below the minimum caloric threshold for a healthy active life is also decreasing. At a national level, 38 percent of the population is food energy deficient as compared to 59 percent in 2003/04 and 60 percent in 1995/96.

Between 2003/04 and 2010/11, the increase in average caloric consumption and decline in the proportion of the population, which is food energy deficient, was slightly greater in rural areas (see Figure 4).

The share of staples in the average Nepalese diet has decreased from 83 percent in 1995/96 and 81 percent in 2003/04 to 72 percent in 2010/11. There have also been significant decreases in the proportion of rural and urban households with *Very High Staple Diets*, from 83 percent in 1995/96 and 74 percent in 2003/04 to 46 percent in 2010/11 (see Figure 5). Improvement has been greatest in rural areas.

At a national level, the average *Dietary Diversity Score* has improved marginally, from 6.3 in 2003/04 to 6.5 in 2010/11. The percentage of the population consuming less than four food groups has marginally improved, from 10 percent in 2003/04 to 9 percent in 2010/11. A more detailed review of changing consumption patterns is included later in this report.

Figure 4. Rural and urban energy intake, 1995/96 – 2010/11

Urban kcals per capita per day
Rural kcals per capita per day
Urban % of population energy deficient
Rural % of population energy deficient
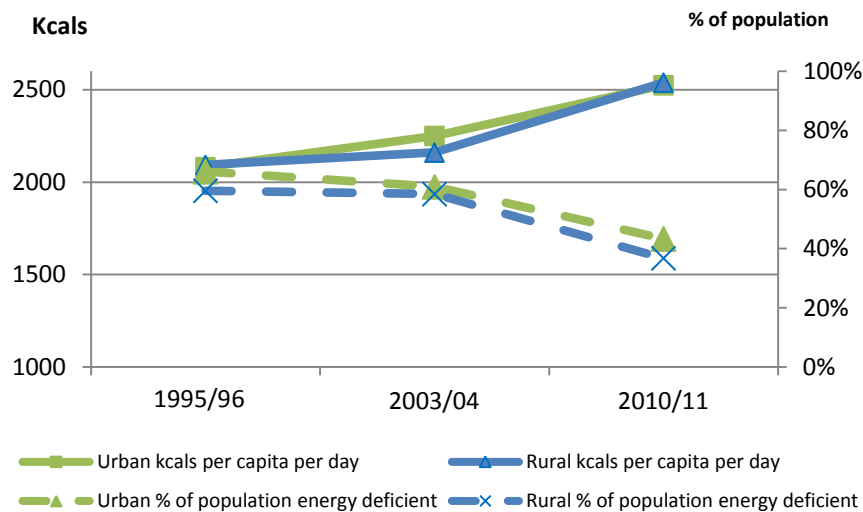
Figure 5. Percentage of households with poor diet quality, 1995/96 – 2010/11

Urban - HHs with very high share of energy from staples

Rural - HHs with very high share of energy from staples

Urban - HHs with low dietary diversity (consuming 4 or less food groups)

Rural - HHs with low dietary diversity (consuming 4 or less food groups)
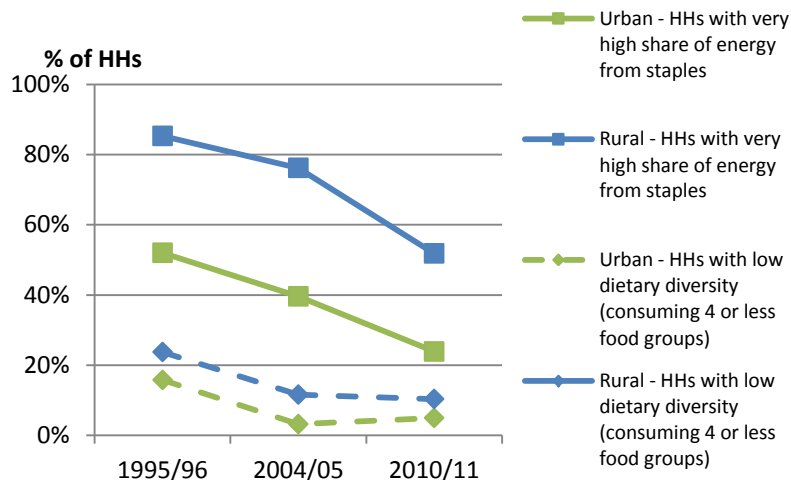
Adequacy of overall food consumption

Two measures are employed to determine the overall adequacy of a household's food consumption: The *Food Consumption Score* (FCS) and the *Food Poverty* measure. The FCS assesses the frequency of consumption of various food groups within the reporting period but does not consider the quantity of the servings. The *Food Poverty measure,* or more specifically, the indicator, *Food Poor,* reflects those who consume a diet with a value below the cost of a basic adequate diet (regardless of the source of food). The basic diet is based on the average diet makeup of poor households at a quantity that would provide sufficient kilocalories (based on the government set threshold). The cost is determined by local food prices. Both measures include elements of diet "quantity" and "quality." However, the FCS is focused more heavily on diversity; whereas the Food Poverty measure is focused on the overall quantity of consumption because it is based on the overall expenditure on food compared to the price of the basic food purchased by the poor (see Section 1 for more information on the calculation of both indicators). The measures are complimentary and should be analyzed together to ensure the most accurate understanding of overall consumption and food security.

Based on the FCS, the average household's food consumption in both rural and urban areas of Nepal is considered adequate (above the threshold of 42, which corresponds to the global standard criteria for "acceptable" food consumption). However, there is still a relatively high proportion of the population, 20 percent, with an *inadequate Food Consumption Score* (FCS below 42), and 8 percent of the population are considered to consume a *poor diet* (a FCS below 28).

Figure 6. Rural and urban food consumption, 2010/2011
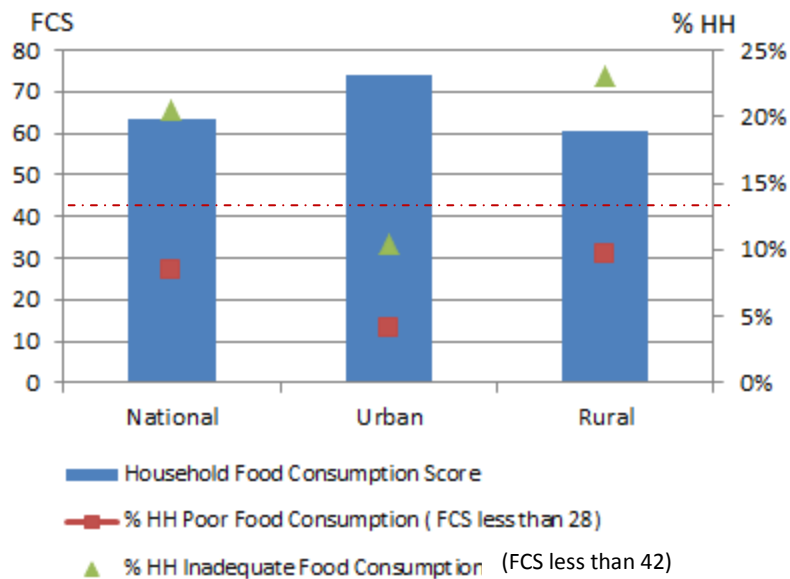
At the national level, 24 percent of the population are classified as *food poor*.

The average FCS in urban areas is 74, compared to an average FCS of 60 in rural areas. The likelihood of being either *food poor* or having an inadequate FCS is more than twice as high in rural areas than in urban areas. In rural areas, 23 percent of the population consume an *inadequate diet* and 26 percent are considered *food poor*, compared to 10 percent with an *inadequate diet* in urban areas and 13 percent *food poor*.

While the FCS and food poverty measure show relatively consistent differences between rural and urban areas, at a regional level there are some substantial differences in how areas rank under the two measures.

Areas that have high levels of both inadequate FCS and food poverty include the Mountains, Rural Hills - Central, Eastern and Mid Western, and Rural Terai – Mid Western. Section 2.4 includes more information on regional food insecurity including self-perceptions of food insecurity.

Figure 7. Regional average food consumption scores and percentage of households with inadequate consumption, 2010/2011

- ■ Food Consumption Score
- ■ % HH Poor Food Consumption (FCS less than 28)
- ▲ % HH Inadequate Food Consumption   (FCS less than 42)
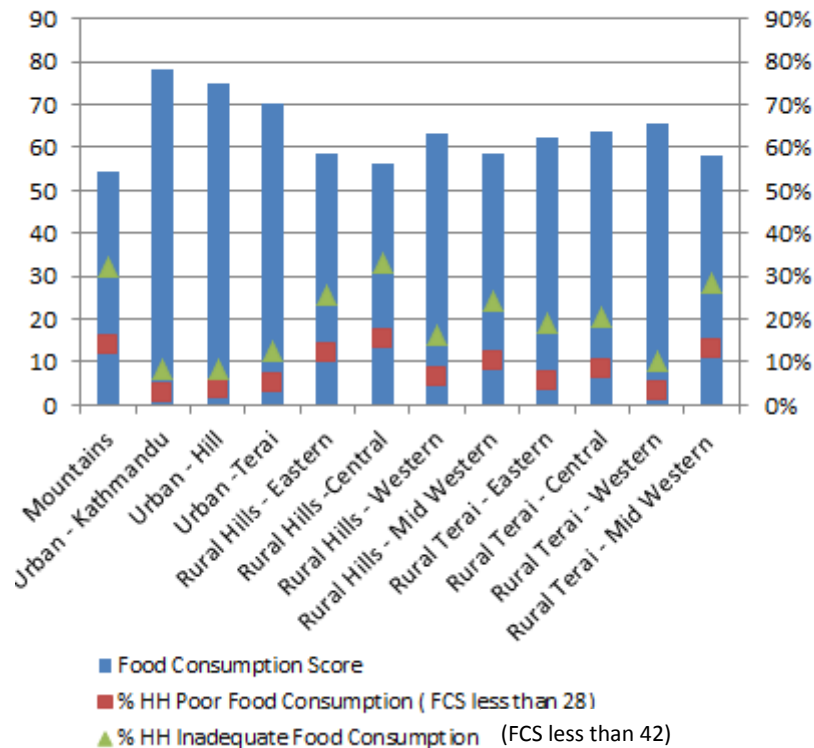
Activity level and food consumption needs

When analyzing the energy sufficiency of the diet, it is important to consider the differing consumption requirements within the population.

Households with significantly higher activity levels will require more kilocalories and a higher level of food consumption compared to households that spend more time engaged in lighter activities.

In this report, the minimum kilocalorie threshold for a healthy active life (as the measure of diet quantity) assumes a relatively "light" level of activity. However, an analysis of the average activity levels of males and females in Nepal reveals a high proportion of hours spent in medium and heavily energy intensive activity in some regions of the country.[8]

On average, adults in rural areas spend an extra 13 hours per week engaged in energy heavy activity compared to populations in urban areas, 23.8 hours vs. 10.7 hours respectively (data not shown). Therefore, while data on dietary energy sufficiency showed that rural households consume slightly more calories than urban households, and that fewer rural households are below the "national minimum kilocalorie threshold," in reality it is likely that a greater percentage of the rural population is failing to meet their real energy needs, given their higher requirements.

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[8] As an example of how we define activity levels: working in an office is classified as a light energy activity, stall and market sales person is classified as a medium activity, and working in agriculture is considered a high energy activity.

13

Figure 8. Hours per week engaged in light, medium, and hard activity, adults (above 18yrs)
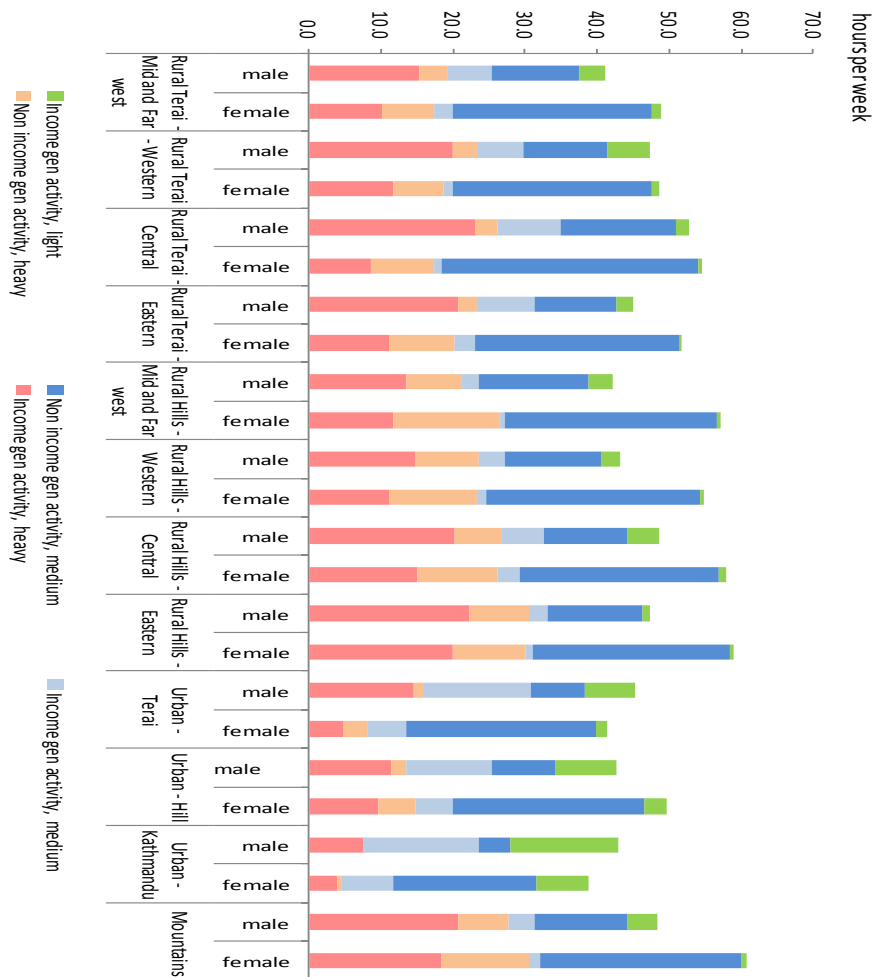
The differences in activity levels between geographical regions are considerable. For instance, in the Mountain regions the average adult spends close to 30 hours a week engaged in energy heavy activity compared to Kathmandu where the average adult spends only six hours a week engaged in such activity. This finding is important given that the average kilocalories consumed per capita per day in most Mountain and Hill regions is lower than in other parts of the country. This is also where the energy needs are highest.

On average, male and female adults tend to spend a relatively similar amount of time in heavy energy activities. However, men often spend more time in heavy energy income generating activities; whereas women spend more time in heavy non-income generating activities (see Figure 8).

The amount of time that young people (under 12 - 18) and children spend in heavy activities is important to note (see Figure 9). An even greater regional divide exists with the young and children than with adults, and a gender divide also exists. Young females and children spend more time engaged in heavy activity than young males do. For instance, young females in the Mountain and Eastern Rural Hills spend close to 20 hours per week in heavy activity, which is considerably higher than young females in other parts of the country.

Figure 9. Hours per week engaged in light, medium, and hard activity, young people (12 - 18yrs) Seasonality of consumption
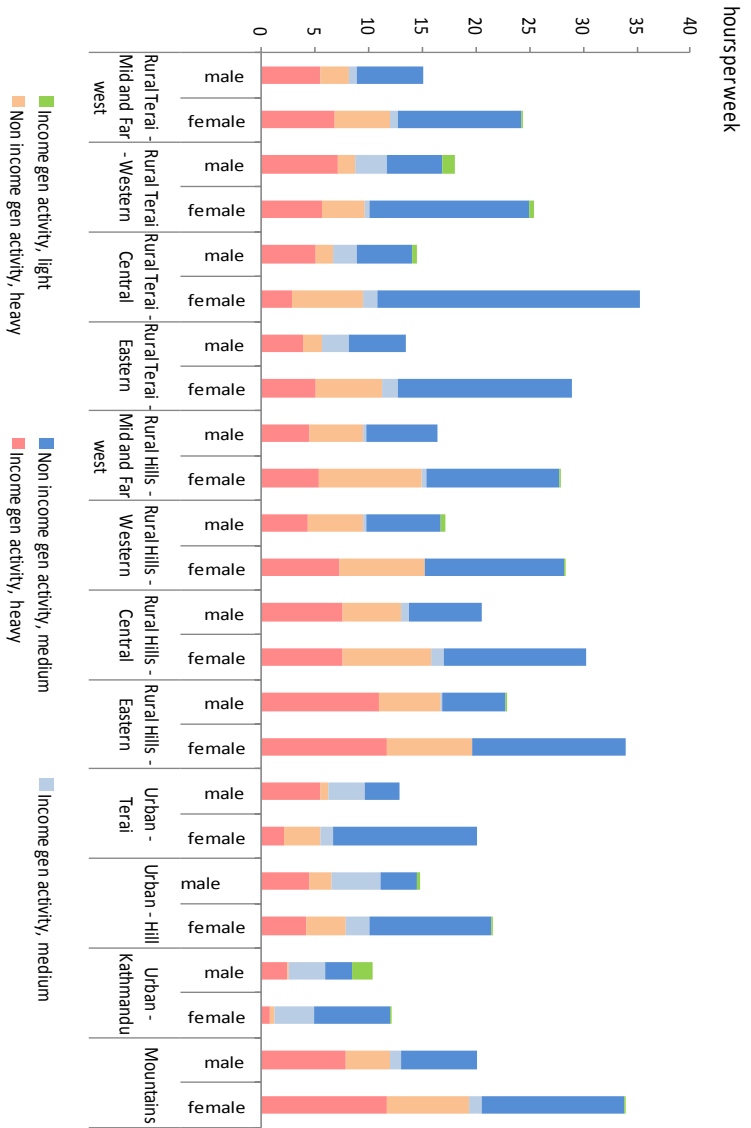
Figure 10. Hours per week engaged in light, medium, and hard activity, children (<12)
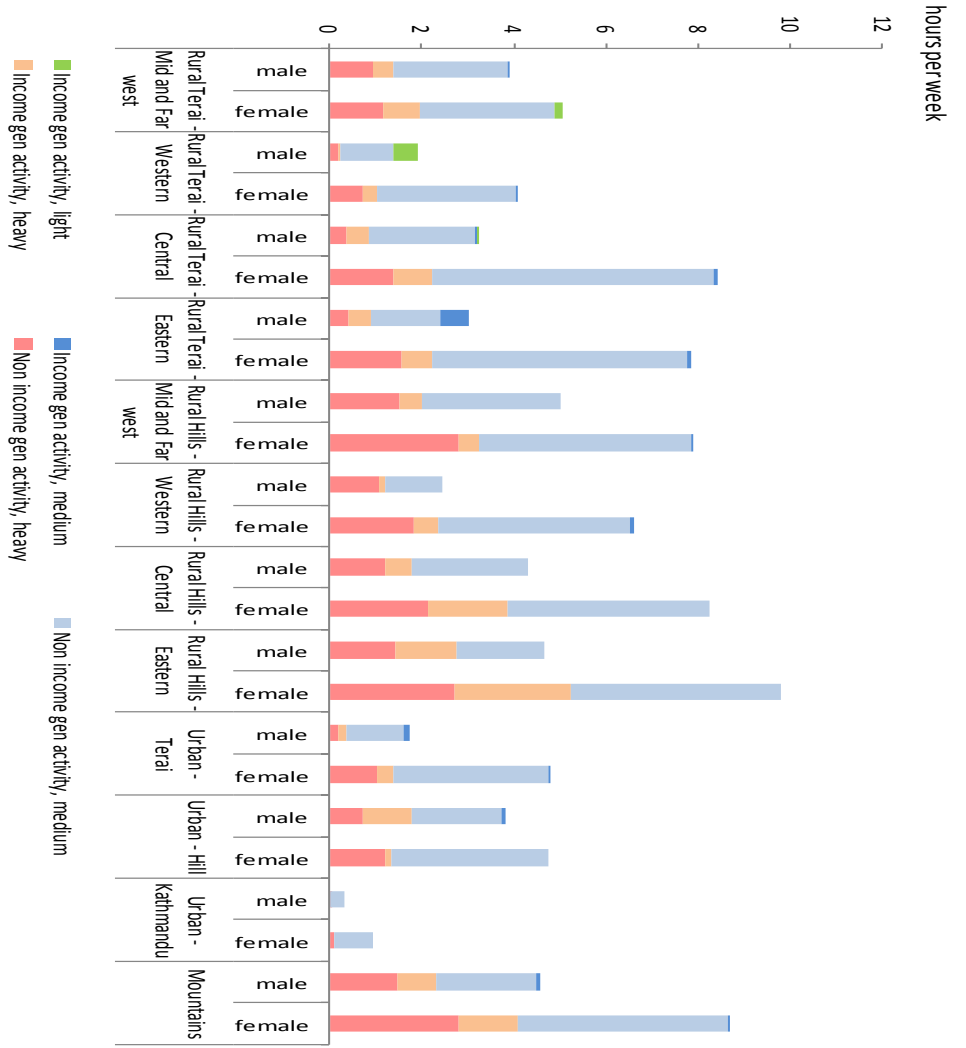
Seasonality

Analysis of average monthly consumption trends provides enhanced understanding of seasonal vulnerability to food insecurity. Seasonal vulnerability is important to understand as it highlights patterns of chronic food insecurity where households constantly slip in and out of hunger based on their own production cycles, and demonstrates an inability to sufficiently access food through purchases. It also provides important insight into when households need assistance the most. By analyzing patterns in kilocalorie consumption during 2010/11, it is possible to identify those months in which households were most energy deprived and vulnerable to hunger. Analysis of the sources of food consumed in these periods provides a basic understanding of how households maintained their food consumption during the year through a mix of own production, market purchases, and in-kind food support.

Typically, most regions of Nepal are assumed to have two agricultural lean periods per year: a summer lean period (July and August) and a winter lean period (February, March and April). Specific analysis was undertaken to determine how food consumption changed during these periods and whether agriculture lean periods were also periods of heightened food insecurity. The seasonal analysis below is divided by Hills, Mountain, and Terai.

Mountains

In the Mountain ecological zone, the bulk of food consumed is from households' own production. The average household consumes 53 percent from their own production, 40 percent from purchased food, and 7 percent in-kind. Between April 2010 and March 2011, consumption of household food production decreased during agriculture lean periods (see Figure 11). For instance, in September 2010, towards the end of the first agriculture lean period of the year, households consumed on average 760 kilocalories per day from their own production, compared to 1,650 kilocalories in October and November following the harvest period. The data suggests that households consumed the bulk of their own production in the months immediately following the harvest and relied on procured food during other periods. Given that market food prices are often highest when the most food is being procured, it appears that households were adhering to this pattern of consumption out of necessity rather than for economic reasons.

During both lean periods in 2010/11, households supplemented their diets with procured food and in-kind food support. Sufficient cash, access to credit (to purchase food) and in-kind food support is critical for maintaining a diet with adequate kilocalorie consumption. For instance, in April 2010, the average household energy consumption, whether from food produced or purchased, was below the minimum average threshold set by the Government of Nepal. As there was no in-kind food consumed at that time by surveyed households, average kilocalorie consumption was inadequate. In contrast, during the lean period in February 2011, although consumption of own production was very low, households were sufficiently able to maintain adequate kilocalorie consumption through purchasing food and receiving a significant amount of food in-kind. Also in May 2010, in-kind food support lifted many households above the kilocalorie consumption threshold.

A review of key food security indicators during the two agriculture lean periods shows that consumption was significantly worse during the *February, March, and April* lean season compared to other times of the year. Across most indicators, there was not a significant difference in consumption between the *August and September* lean period and the rest of the year.

Figure 11. Mountain population, average monthly kilocalorie consumption by source

Table 3. Mountain households, seasonal food security indicators

Mountains	% households below 2,875 kcal per day	% households with very high energy share from staples	% households consuming 4 or less food groups	% households poor food consumption (FCS 28 or less)	% households with high share of expenditure on food
Agricultural lean period 1 (30 day recall: Feb, March, April)	56%	70%	15%	20%	68%
Agricultural lean period 2 (30 day recall: Aug, Sept)	41%	53%	7%	13%	49%
Other months	41%	58%	6%	8%	60%
Total	38%	60%	9%	12%	60%

Rural Hills

In the Hill ecological zone, households purchase the bulk of food consumed. The average household consumes 40 percent from their own production, 57 percent from purchased food, and 2 percent in-kind. Compared to households living in Mountain areas, rural households in Hill areas were generally better able to assure a uniform consumption of their own production throughout the year. However, insufficient data is available to analyze food source trends at a regional level, and significant regional variability may exist.

Key consumption indicators generally indicated poorer consumption during lean periods, particularly in relation to the consumption of *very high staple diets;* 43 percent of households consumed *very high staple diets* during the first agriculture lean period and 45 percent during the second period, but it dropped to as low at 35 percent during other months. Although households were able to smooth their overall dietary energy consumption over the course of the year, during agriculture lean periods, the average household had to rely on consuming less nutritious and less expensive foods.

Figure 12. Hill population's average monthly kilocalorie consumption by source
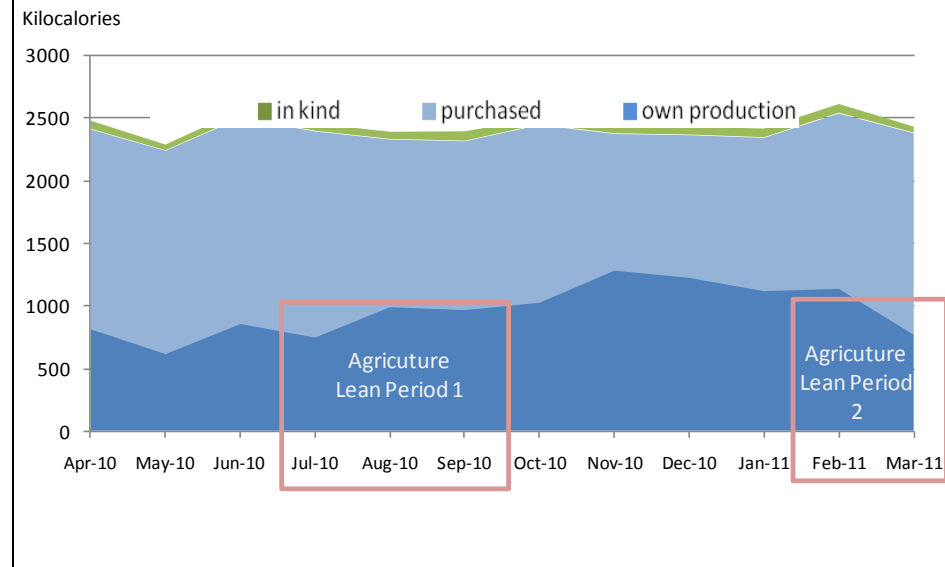
Table 4. Hill households' seasonal food security indicators

Hills	% households below 2,875 kcal per day	% households with very high energy share from staples	% households consuming 4 or less food groups	% households poor food consumption (FCS 28 or less)	% households with high share of expenditure on food
Agricultural lean period 1 (30 day recall: Feb, March, April)	44%	43%	10%	11%	47%
Agricultural lean period 2 (30 day recall: Aug, Sept)	49%	45%	9%	9%	53%
Other months	45%	35%	6%	6%	46%
Total	**37%**	**39%**	**7%**	**8%**	**47%**

Rural Terai

Households in the Terai ecological zone purchase the bulk of food consumed. The average household consumes 43 percent from their own production, 54 percent from purchased food, and 3 percent in-kind. In 2010/11, consumption of household production in the Terai was relatively consistent year round. The most notable exception was in March, towards the end of the second agricultural lean period, when the percentage of the population with dietary energy deficiency increased to 37 percent. Throughout the year, the average household is able to even out their consumption with purchased food. When key food security indicators are considered, there were no overall fluctuations in food security associated with the agriculture lean periods. Therefore, other issues are likely have a larger impact on food security than the seasonality of household own production, such as wage opportunities, individual household shocks, and the price of food, dictated by Indian prices.

Figure 13. Terai population, average monthly kilocalorie consumption by source
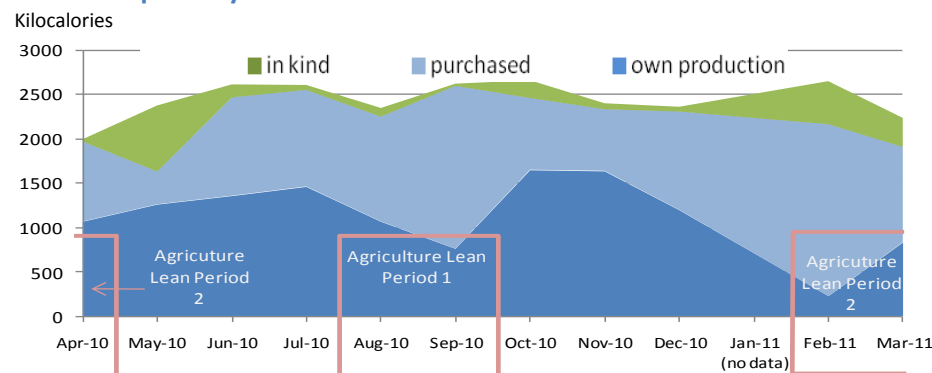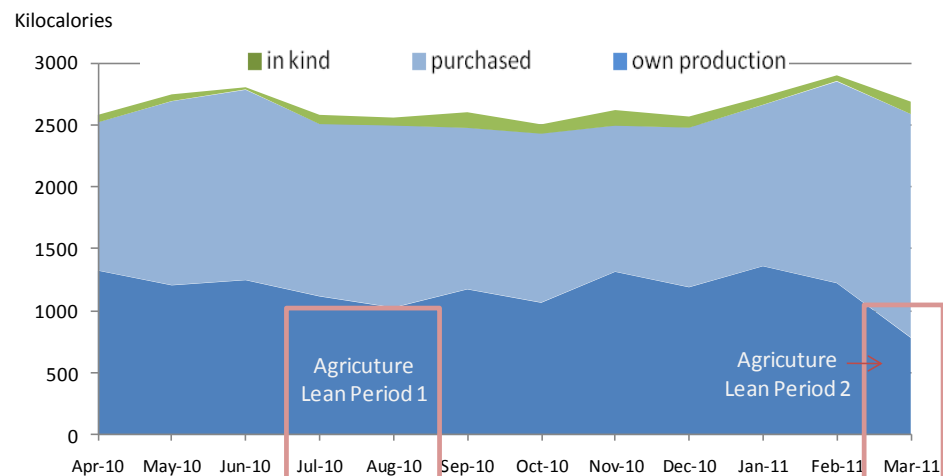
Table 5. Terai households, seasonal food security indicators

Terai	% households below 2,875 kcal per day	% households with very high energy share from staples	% households consuming 4 or less food groups	% households poor food consumption (FCS 28 or less)	% households with high share of expenditure on food
Agricultural lean period 1 (30 day recall: Feb, March, April)	37%	44%	5%	5%	37%
Agricultural lean period 2 (30 day recall: Aug, Sept)	31%	52%	7%	7%	44%
Other months	29%	52%	8%	6%	49%
Total	**30%**	**52%**	**8%**	**6%**	**47%**

Nutrition Outcomes

Poor nutrition among mothers and children is a longstanding significant public health problem in Nepal, hampering development and economic growth. Nepal has made impressive progress in expanding micronutrient programs, particularly those impacting vitamin and mineral deficiencies, i.e., vitamin A supplementation, iron and folic acid supplementation, and universal salt iodization. Other areas, such as improving feeding and care behaviors need a greater focus, particularly, maternal feeding during pregnancy, complementary feeding among children 6-24 months of age, and hygiene and sanitation, which are all critical factors in the etiology of chronic undernutrition.[9] [10]

Basic descriptive analysis of children with anthropometry

The survey includes 2,502 children below five years of age from whom anthropometric measurements were collected. The basic descriptive characteristics of these children and detailed information on the methodology employed for the analysis of nutritional status data are included in Appendix 1.

Broadly speaking, the mean height-for-age SD-score in the country among all children under five years of age was – 1.75 SD (± 1.50 SD), which is lower than the means for weight-for age – 1.55 SD (± 1.15 SD), and weight-for-height, –0.77 SD (± 1.22 SD). These data are presented in Table 6 and Figure 14.

While the overall prevalence of stunting has declined over the past ten years, the current rate is still very high. An average height-for-age SD-score of almost – 2 SD suggests that almost half of the children in Nepal are stunted. With a current under five population of 3.5 million,[11] 1.6 million children are estimated to suffer from chronic undernutrition and the severe long-term consequences associated with stunting, such as slower cognitive and mental development, poor educability and economic potential.

About 518,000 children under five years of age are suffering from acute undernutrition, or wasting, and have a heightened risk of morbidity and mortality. Severely wasted children are 5 to20 times more likely to die than their well-nourished counterparts.[12]

The absolute levels of undernutrition found in the NLSS are somewhat higher than those reported in the recent Nepal Demographic Health Survey (NDHS). However, this is likely the result of sampling differences.

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[9] SCN. 6th report on the world nutrition situation: Chapter 3 – Maternal nutrition and the intergenerational cycle of growth failure. United Nations System, Standing Committee on Nutrition, Geneva. 2010.
[10] Bryce et al. 2008. Maternal and Child Undernutrition 4. Maternal and child undernutrition: effective action at national level. Published online. January 17, 2008DOI:10.1016/S0140-6736(07)61694-8.

[11] UNICEF. State of the World's Children, 2009. http://www.unicef.org/infobycountry/nepal_nepal_statistics.html#78
[12] WHO/WFP/UNICEF/SCN Community-based Management of Severe Acute Malnutrition: A Joint Statement by the World Health Organization, World Food Programme, The United Nations System Standing Committee for Nutrition and the United Nations Children Fund, May 2007.

Table 6. Nutritional status indicators (children under 60 months of age)

	n	Range (SD)	Mean (SD)
Weight-for-Height (WFH)	2457	-4.99, 4.47	- 0.77 (1.22)
Weight-for-Age (WFA)	2484	-5.86, 3.01	- 1.55 (1.15)
Height-for-Age (HFA)	2472	-5.98, 5.28	- 1.75 (1.50)

Figure 14. Distribution of nutritional status indicators
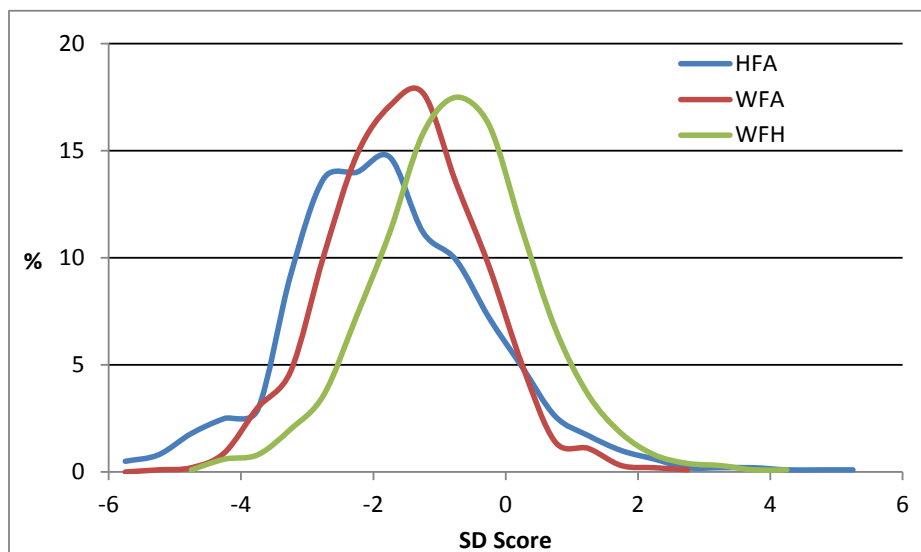
Table 7 presents the data for undernutrition stratified by key demographic indicators for all children under 60 months of age. There is a clear linear and statistically significant association between age and both stunting and underweight, with the prevalence of these two indicators increasing as children grow older, showing a dramatic upturn in the second year of life and stabilizing thereafter (see Figure 15).

Even among the children below six months of age, the prevalence of stunting was 16 percent and of underweight was almost 18 percent. This data suggests that a significant amount of growth faltering takes place in utero before birth and reflects the poor nutritional status among mothers.

Table 7. Nutritional status indicators and key demographic covariates (children under 60 months of age)

		Stunting			Underweight			Wasting	
	n	< -2 SD %	< -3 SD %	n	< -2 SD %	< -3 SD %	n	< -2 SD %	< -3 SD %
Total (0-59 months)	2472	46.1	18.4	2491	34.8	9.8	2476	14.8	3.5
Age (months)		*	*		*			*	*
< 6	202	16.0	6.6	205	17.9	8.1	195	22.0	7.9
6-11.9	243	21.4	5.1	243	29.3	7.7	243	28.3	7.9
12-23.9	463	47.1	18.4	471	33.0	11.3	468	20.8	5.0
24-35.9	503	52.4	21.1	505	34.4	9.9	506	11.0	2.8
36-47.9	543	55.5	23.1	544	40.6	10.1	543	10.2	1.8
48-59.9	518	52.6	22.0	523	40.3	9.5	521	8.7	0.8
Gender						*			
Male	1279	45.9	18.6	1287	33.8	8.3	1290	15.3	3.9
Female	1192	46.3	18.2	1207	36.1	11.3	1197	14.3	3.1
Location		*	*		*	*		*	
Urban	613	30.5	9.1	615	21.9	6.9	614	12.3	4.9
Rural	1862	48.7	20.0	1879	37.1	10.2	1873	15.2	3.3
Ecological Zone		*	*		*	*		*	*
Mountain	193	61.0	27.8	195	40.9	9.5	196	9.8	2.2
Hill	1186	46.4	18.5	1197	28.2	7.1	1194	7.5	1.7
Terai	1096	43.5	16.9	1102	39.6	12.1	1097	21.9	5.3

* p-value for Chi-Square < 0.05 (Statistical analysis based on unweighted data)

The recent NDHS reported that 18 percent of reproductive aged women, between 15-49 years of age, are either thin or wasted (BMI < 18.5 kg/m^2).[13] The prevalence of stunting was twice as high among children aged 9-11.9 months (27.7 percent) than among children 6-8.9 months of age (15.5 percent), and again twice as high among children 18-23.9 months of age (53.8 percent), remaining steady at this level for the next few years. This observation supports the theory that during the first two years of life, the rate of linear growth retardation is most pronounced.

Wasting is highest among infants under two years of age and declines among older preschool children. The prevalence of wasting (WFH < -2 SD) affects between one quarter and 30 percent of all children, aged 6-17.9 months of age in the critical post-weaning period when children are no longer exclusively breastfeeding and are required to obtain the requisite dietary energy from complementary foods. This is also the period when the burden of infectious disease is high. Over one in five children under six months of age suffer from wasting, suggesting other contributing factors prior to the introduction of solid foods, such as sub-optimal breastfeeding. The recent NDHS reported that only 70 percent of children are exclusively breastfed and only 45 percent initiate breastfeeding within the first one hour after birth. These age-specific patterns are similar to those seen in other populations in Southeast Asia. In general, there was little gender difference in the prevalence of any of the three indicators of undernutrition. However, there were a number of notable gender variations in nutrition when stratifying by ethnicity (data not shown).

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[13] Ministry of Health and Population (MOHP) [Nepal], New ERA, and ICF International Inc. 2012. Nepal Demographic and Health Survey 2011. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and ICF International, Calverton, Maryland.

Additional information on key demographic and socioeconomic determinants of undernutrition is presented in Section 2 and in the Appendix.

Figure 15. Prevalence of undernutrition by age
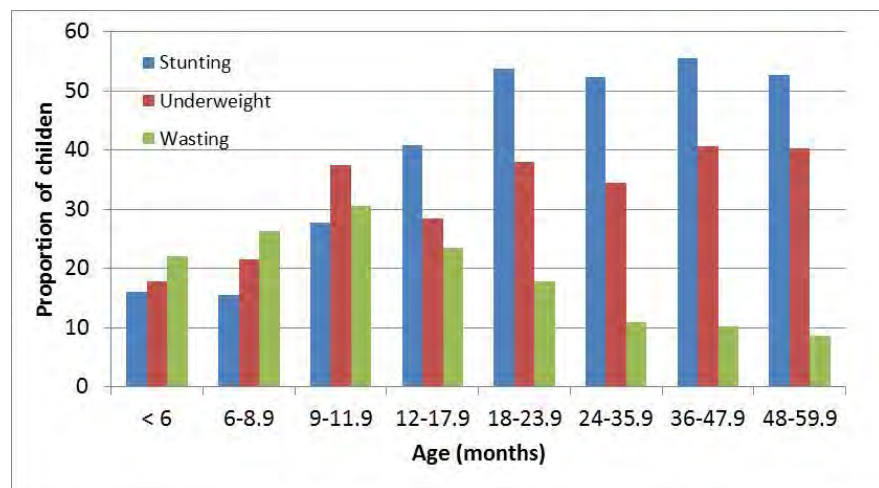
Table 8 provides an overview of the association between measures of nutritional status and indicators of food security, using conventional metrics and those adopted and presented in earlier sections of this report. There was a statistically significant relationship between overall household dietary energy sufficiency and both stunting and underweight, but not with acute undernutrition, or wasting.

Children from households in which staples comprise at least 60 percent of their total calories (*High Staple Diet*), or at least 75 percent of the total dietary energy (*Very High Staple Diet),* were significantly more likely to be stunted or underweight. In general, there was a 50 percent greater probability that a child from a HH with High or Very High Staple Diet would be severely stunted or severely underweight as compared to a child from households with smaller proportion of staples in the diet. The importance of this indicator on wasting appeared to be more significant among households that consumed 75 percent or more of their diet from staples.

Similarly, there was a positive association between the Dietary Diversity Score and indicators of chronic undernutrition, although it was most significant for severe stunting and underweight. There was a significant association between chronic undernutrition and the percentage of total expenditure used for food, with little difference if the indicator was stratified at 65 percent or 75 percent of expenditure on staples. Somewhat surprising though was the observation that households that spent less than 75 percent on staples were more likely to have wasted children than households that spent more than 75 percent of their total expenditure on staple foods. The reasons behind this are unknown. Intra-household food distribution and other behavioral factors are likely to play a significant role, but the data did not enable an analysis of these factors. Such factors may also explain why there was no relationship between household dietary energy sufficiency and wasting.

Table 8. Prevalence of nutrition status indicators by food security indicators (children under 60 months of age)

Data characteristic	Stunting		Underweight		Wasting	
	< -2 SD	< -3 SD	< -2 SD	< -3 SD	< -2 SD	< -3 SD
Household Dietary Energy	*	*	*	*		
Energy sufficient	43.2	17.3	32.6	8.8	14.9	3.8
Energy deficient	51.0	20.4	38.8	11.4	14.6	3.1
Dietary Energy from Staples	*	*	*	*	*	
< 60 % from staples	34.9	12.7	24.5	6.9	10.8	2.0
> 60% from staples	47.6 *	19.2 *	36.3 *	10.1 *	15.3 *	3.7
< 75 % from staples	40.9	14.4	28.8	7.2	11.7	2.7
> 75% from staples	50.2	21.7	39.9	11.8	17.2	4.1
Food Consumption Score	*	*	*			
Poor	58.9	30.1	49.1	12.4	15.5	4.0
Borderline	53.4	21.4	39.6	11.0	15.1	3.9
Adequate	43.0	16.3	32.0	9.2	14.6	3.4
Dietary Diversity	*	*	*	*		
> 4 food items/day	45.2	17.4	33.7	9.2	14.5	3.3
< 4 food items/day	51.4	24.8	42.5	13.2	16.6	4.9
Food expenditure (Food poverty)	*	*	*	*	*	
Above poverty line	42.5	15.5	31.5	8.2	13.9	3.4
Below poverty line	53.9	25.0	42.3	13.2	16.6	3.7
Poor Household	*	*	*	*	*	*
Above poverty line	40.0	14.1	30.0	7.2	13.5	3.0
Below poverty line	57.2	26.4	43.8	14.4	17.1	4.4
% Expenditure on food	*	*	*	*		
< 65% on food	35.9	11.4	28.0	6.8	15.5	3.4
> 65% on food	52.5 *	22.9 *	39.2 *	11.6	14.3 *	3.6
< 75% on food	41.9	15.9	32.9	9.5	16.0	3.9
> 75% on food	55.7	24.3	39.3	10.2	12.0	2.7

* p-value for Chi-Square < 0.05 (Statistical analysis based on unweighted data)

A Profile of the Food Insecure and Undernourished

Geographic dimension of food insecurity

This section provides more detailed information about the main factors associated with the outcomes discussed in previous sections. In summary, one in five households were identified as consuming an inadequate diet based on the FCS, and one in four were identified as food poor. In addition, 46 percent of preschool children were classified as suffering from chronic undernutrition.

Households in rural areas typically have worse food consumption and are more likely to be food poor than households in urban areas. There is no major urban/rural difference in terms of quantity of kilocalories consumed (urban daily average is 2,525 and rural average is 2,539 based on adult male equivalent). However, the rural population is more heavily reliant on staples; 87 percent of rural households have a diet heavily reliant on staples (more than 60 percent of the total diet), compared to 69 percent of households in urban areas. Better dietary diversity leads to an overall better food consumption score in urban areas (Urban FCS = 74) compared to rural areas (Rural FCS = 60). A diet high in staples indicates that households are choosing cheaper sources of calories. More than twice as many households in rural areas are likely to perceive themselves as having an inadequate diet than urban households (see Table 9).

There was a significantly higher prevalence of undernutrition in rural areas as compared to urban areas of the country, particularly for stunting and underweight. The prevalence of severe stunting in rural areas was twice that noted in urban areas (see Table 7).

Table 9. Urban and rural food security indicators, 2010/11

	Inadequate Food Consumption Score (FCS less than 42)	Food poverty (proportion with food expenditure below food poverty line)	Households with more than 75% share of expenditure on food	Food consumption less than adequate (self perception)
National	20%	24%	22%	16%
Urban	10%	13%	6%	8%
Rural	23%	26%	27%	18%

Populations living in the Mountains and Mid and Far Western Hills have the highest rates of poverty and relatively high rates of *inadequate FCS* and food poverty (see Figure 16). The outcomes of food security indicators vary between the different regions. Considering all indicators is important to present an accurate overview of the regional food security situation because each indicator provides a different indication of how food security impacts on differing households in differing regions. For instance, the Eastern Hill region has a relatively low proportion of the population experiencing food poverty, i.e., the value of the diet consumed by most households is enough to cover a basic diet of sufficient calories. Nevertheless, a significant proportion of the population consumes sufficient calories by spending a very high share of their income on food.

The household's perception of diet can be used to moderate the differences between other food security indicators to some extent. In

general, households tend to consider their diets to be adequate more often than they actually are. However, the relative perception between regions can be compared to the relative ranking of other indicators. For instance, in the Mid and Far Western Hills (MFWH), which is 41 percent *food poor,* 22 percent *inadequate FCS,* and in the Western Terai (WT), which is 20 percent *food poor*, 9 percent *inadequate FCS*, a considerably higher proportion of the population consumes an inadequate diet using the food poverty measure compared to the FCS. The MFWH ranks last out of 12 regions, using the food poverty measure, and 8/12 using the FCS. The WT ranks 8/12 using the food poverty measure and 3/12 using the FCS. In this case, the ranking of self-perception tends to support the ranking under the food poverty measure. The MFWH ranks 11/12 and the WT ranks 9/12. However, there are some very considerable differences in how households in different regions perceive the adequacy of their general food consumption. For instance, households in the Mid and Far Western Rural Terai have the second highest rate of food poverty and inadequate FCS, yet they significantly over-rate their own diets.

Figure 16. Regional food security indicators, 2010/11

■ Self reported, less than adequate consumption
■ Inadequate Food Consumption Score
■ Food poverty
■ More than 75% share of expenditure on food
■ Poverty
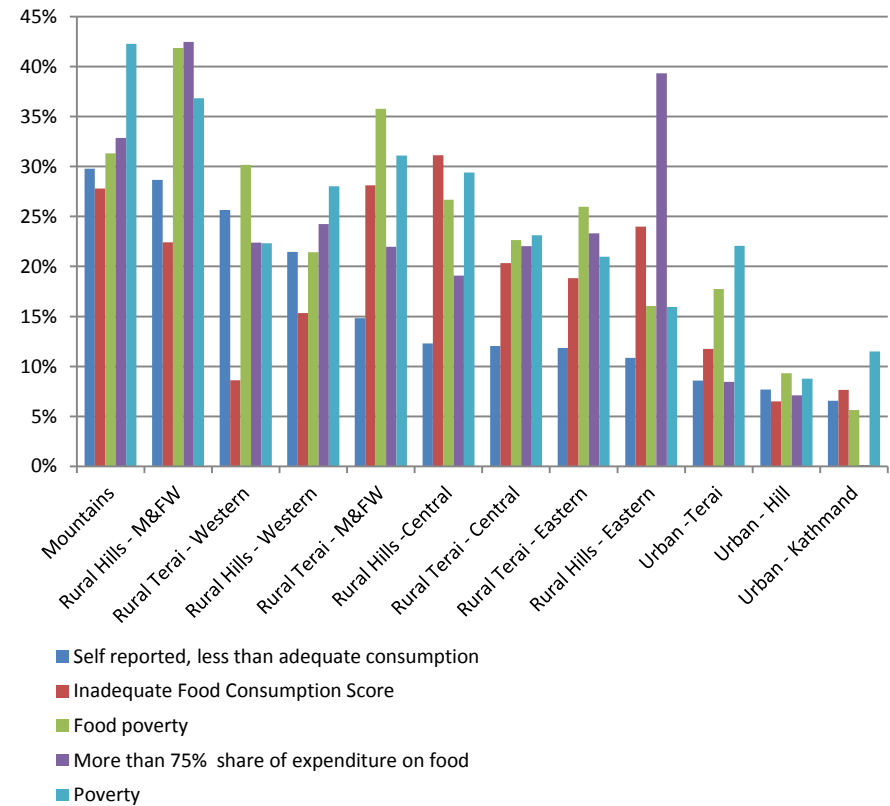
Across ecological zones, there were dramatic differences in the prevalence of nutritional status indicators, with a much higher prevalence of stunting in the Mountains than in the Hills or Terai, and a two-fold higher burden of wasting in the Terai than in the Mountains, and almost a three-fold higher prevalence than in the Hills (see Figures 17-19).

While both stunting and severe stunting is clearly highest in the Mountains, and the Rural Hills in the Mid and Far West, the Rural Hills in the East and West have the next highest levels of stunting followed closely by the Rural Terai-Central and Rural Terai-Western domains. The prevalence of wasting is highest in all four Rural Terai domains; although the prevalence of severe wasting is highest in the Urban-Terai domain. While the prevalence of chronic undernutrition was lowest in Kathmandu, it did have a higher wasting prevalence than other Urban-Hill areas and the Rural-Hills in the East. Unfortunately, the NLSS does not provide information on the inter-household distribution of food, nor does it provide detailed information relating to caring practices, feeding practices and hygiene, which are all related to nutritional status. Further analysis from datasets that provide such information, such as the DHS, is required to examine the relationships and interactions responsible for these differences across the country.

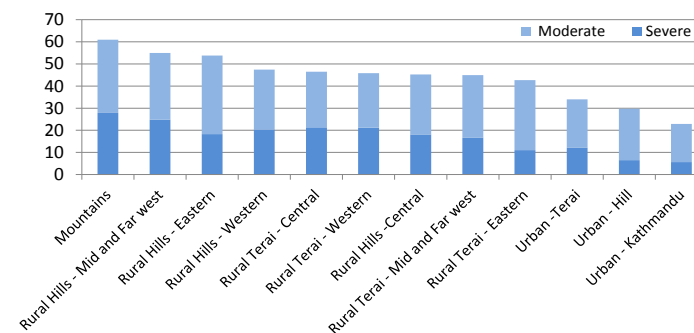**Figure 17. Prevalence of stunting, children <5 years of age**

Figure 18. Prevalence of underweight, children <5 years of age
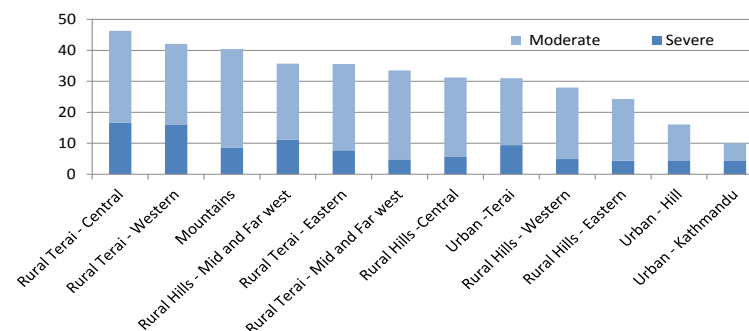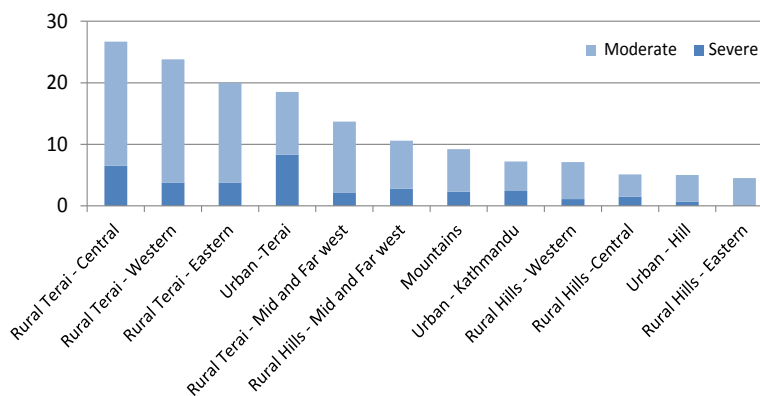

Figure 19. Prevalence of wasting, children <5 years of age

Income, wealth and livelihood dimension

Wealth determines people's ability to access food beyond their own self-production. In this report, the amount that households spend on consumption is used as a proxy for wealth.

As shown in Table 10, the poorest households are generally the most likely to be food insecure: 35 percent of the population in the poorest expenditure quintile (Q1) consider their diet inadequate compared to only 5 percent in the wealthiest expenditure quintile. All indicators improve with expenditure; the most drastic is the measure of food poverty, which is 86 percent for households in the poorest expenditure quintile and only 24 percent for households in the second poorest expenditure quintile.

Agricultural daily wage laborers and those who rely on their own farms for their primary sources of household income are generally the poorest and most food insecure (see Section 4 Trend 3, for more detailed information). Households that consumed above the minimum threshold of 2,535 kilocalories per day received an average per capita income from remittances of 15,400 NPR annually. The average remittance income per capita for households that consumed below the threshold was only 7,560 NPR.

For rural populations, the landholding size is of significant importance to the overall food consumption score. For landless rural populations, or those holding less than 0.2 ha, over 25 percent are estimated to have an inadequate diet. In comparison, only 10 percent of rural households with more than 2 ha of land are considered to have poor food consumption.

There was a significant association between household expenditures and nutritional status (see Table 16). As would be expected, children from households in the lowest expenditure quintile were much more likely to be suffering from chronic undernutrition. The prevalence of severe stunting was almost three times higher among children from the poorest households compared with those children from the wealthiest households. Moreover, the relationship with severe underweight was even more pronounced. Still, while there are variations in nutritional status by expenditure, the prevalence of both chronic and acute undernutrition was high even among the wealthiest households.

Table 10. Food security indicators by expenditure quintile, 2010/11

Expenditure Quintile	Inadequate Food Consumption Score (FCS less than 42)	Food poverty (proportion with food expenditure below food poverty line)	Households with more than 75% share of expenditure on food	Food consumption less than adequate (self perception)
Q1 (poorest)	1546	763	67%	73%
Q2	2453	1300	65%	67%
Q3	3440	2064	62%	65%
Q4	4926	3476	59%	58%
Q5 (wealthiest)	9178	10842	46%	40%

While the observation of such a close and statistically significant relationship between wealth and indicators of chronic undernutrition is not surprising, the data provide a robust estimate of this relationship. Very likely, higher overall wealth is a reflection of additional household resources to procure a number of important goods for its members, not the least of which is a sufficient and more diverse basket of food.

Caste/ethnic and religious dimension

The caste, ethnic or religious social group to which a household identifies has a strong association with food security. Dalits living in the Terai and Hill areas have the worst food consumption score; whereas Brahmins living in the same areas have the best (see Table 11). In addition, the average food security indicator scores for Dalits and Janajatis are generally worse than the average indicator scores for any one geographical region.

An interesting difference exists between self-reported food insecurity and consumption-based indicators amongst varying social groups. The Terai Middle Caste, for example, perform similar or worse across the indicators to the Chetris, but they are less likely to identify themselves as having inadequate consumption.

The distribution of nutritional status by ethnicity and caste also was considered in the analysis. Figure 20 presents the prevalence of chronic undernutrition (blue bars) and acute undernutrition (red bars) across eight ethnic and caste groupings. There is an important disparity between stunting and wasting, which also was evident when considering only the ecological zone. While the prevalence of stunting is highest among the Dalits in the Hills and Terai, it was somewhat lower among the Janajati in the Terai region. Although the prevalence of wasting was notably higher among the Janajati than in any of the other groups. Among Newars, the prevalence of both stunting and wasting were lowest.

Table 11. Caste, ethnic, religious identity and food security indicators, 2010/11

	Self reported, inadequate food consumption	Inadequate Food Consumption Score	Food Poverty	More than 75% share of expenditure on food	Poverty
Hill and Terai Brahman	9%	5%	13%	11%	11%
Hill Chetri	17%	14%	26%	20%	23%
Terai Middle Caste	14%	14%	26%	20%	29%
Hill and Terai Dalit	31%	35%	35%	39%	42%
Newar	6%	14%	12%	6%	10%
Hill Janajati	15%	30%	27%	28%	28%
Terai Janajati	12%	30%	24%	25%	26%
Other	16%	18%	12%	26%	19%

Figure 20. Caste, ethnic, religious identity and nutrition outcomes, 2010/11
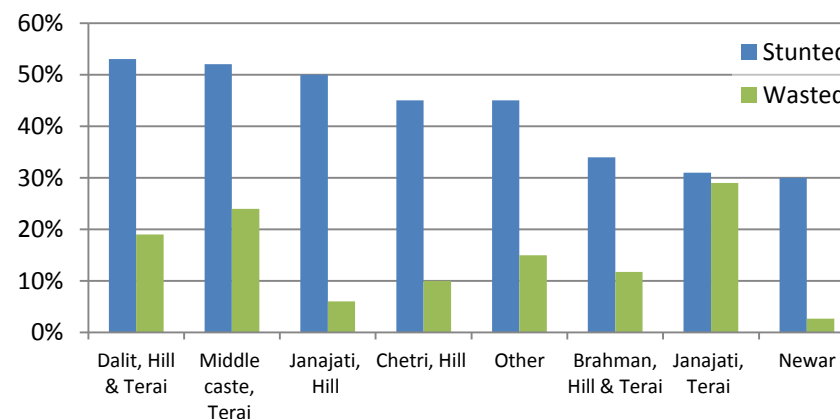
Gender dimension of head of household

Overall, there are no significant differences between the average consumption of male and female-headed households. However, the prevalence of wasting is significantly lower among women headed households (11.4% vs. 15.8%), as is the prevalence of underweight (30.4% vs. 36.2%).

Households are often female headed because the husband has out-migrated – a source of employment associated with improved food security. When this dimension is considered and female-headed households are compared, it is evident that food security is significantly worse for households that are female headed. In terms of nutritional status, households that are female headed and do not receive remittances are also more likely to have undernourished children. Female-headed households that receive some remittances had better nutritional status than male-headed households (see Table 13). Interestingly, the opposite is true for households that are male headed with a female migrant. These households are more likely to have undernourished children.

Table 12. Gender of head of household and food security indicators, 2010/11

	Self reported, less than adequate consumption	Inadequate Food Consumption Score	Food poverty	More than 75% share of expenditure on food	Poverty
Male-headed household	18%	25%	23%	15%	26%
Female headed household	21%	25%	20%	18%	24%

Figure 21. Type of female-headed household and key food security indicators
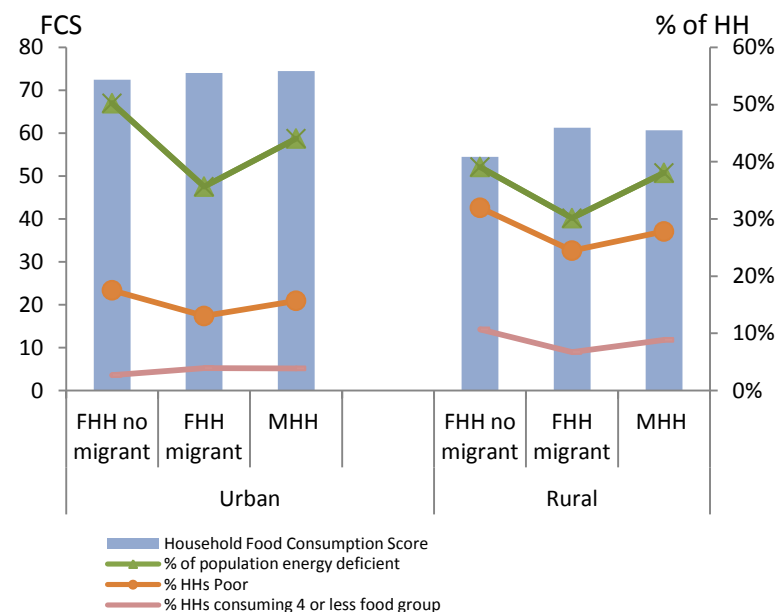
Table 13. Gender of head of household and nutrition indicators

	n	Stunting < -2 SD %	< -3 SD %	n	Underweight < -2 SD %	< -3 SD %	n	Wasting < -2 SD %	< -3 SD %
Female HH Head	550	45.3	16.8	554	30.4	7.3	555	11.4	2.5
No Remittances	458	46.1	16.9	461	31.2	7.0	462	11.5	2.5
Remittances	92	40.6	16.0	93	26.2	8.7	93	10.9	2.5
Male HH Head	1925	46.3	18.9	1940	36.2	10.5	1944	15.8	3.8
No Remittances	799	44.3	15.0	805	34.6	11.1	808	16.7	4.2
Remittances	1126	47.6	22.0	1135	37.4	10.0	1136	15.0	3.5

Because the NLSS did not capture consumption differences between household members, detecting differences in consumption patterns between men and women was impossible. While previous studies have shown that women, particularly young women, often consume the worst diets within a household, there was no significant difference in the prevalence of undernutrition amongst children by gender.

Education and literacy

Literate head of households tend to consume a better quality diet than those with an illiterate head of household. While overall calorie consumption is similar, households headed by a literate family member tend to consume a more diverse diet (see Table 16).

There is a significant difference between the food consumption scores of households where the head has less than five years of formal education (average FCS 58) compared to households with 5-7 years of formal education (average FCS 65), 8-10 years (FCS 72), and 11+ years (FCS 78).

Table 14. Literacy of head of household and food security indicators, 2010/11

	Proportion of population energy deficient	% below 4 food groups	Share staples of food	Inadequate Food Consumption Score	Poor
Literate head	38%	6%	78%	14%	17%
Illiterate head	38%	11%	71%	28%	35%

There was a strong association between maternal education and nutritional status amongst children (see Table 15). The children of mothers with little or no education were more than twice as likely to be suffering from stunting and four times more likely to have severe stunting as compared to children of mothers having 12 or more years of education. Similar observations were noted for the prevalence of both underweight and severe underweight. This result shows the importance of maternal education as a key determinant of chronic undernutrition in the country. Little difference existed in the prevalence of stunting, underweight, and wasting among children whose mothers had little or no education, as compared to those who had only limited education. This finding suggests that at least some minimum level of educational achievement (at least five years) may be necessary to realize the tangible benefits of education in the nutritional well-being of children.

While there was an association between maternal education and the prevalence of wasting, this did not reach the same level of statistical significance as with the other nutritional status indicators. While there was a relationship between literacy and improved dietary diversity, there were no differences in household dietary energy correlated with maternal education status.

Table 15. Nutritional status indicators and maternal education (children under 60 months of age)

		Stunting			Underweight			Wasting	
	n	< -2 SD %	< -3 SD %	n	< -2 SD %	< -3 SD %	n	< -2 SD %	< -3 SD %
Maternal education		*	*		*	*		*	
None	616	54.1	24.5	620	43.3	13.4	614	16.7	3.7
Literate	603	53.7	23.1	612	42.1	14.6	611	16.3	4.6
Completed 5-7 years	474	45.8	16.9	477	30.2	5.7	474	13.8	2.1
Completed 8-10 years	368	38.8	11.9	367	29.2	5.1	375	13.0	4.1
Completed > 11 years	414	23.0	6.2	418	16.1	3.5	413	11.4	2.5
Expenditure(quintile)		*	*		*	*			
Lowest	496	57.7	27.5	499	46.1	16.0	498	16.2	5.1
2	494	53.6	23.2	501	39.1	11.8	497	17.2	3.1
3	494	49.2	16.3	495	37.6	8.2	496	13.1	2.4
4	496	38.1	13.4	501	28.0	8.3	497	14.1	3.9
Highest	495	29.7	10.7	498	21.9	3.7	499	13.0	3.1
Ethnicity/ Caste		*	*		*	*		*	*
Brahman, Hill & Terai	298	33.7	7.3	301	26.7	4.7	300	12.3	2.2
Chetri, Hill	484	45.2	18.5	489	32.1	7.3	489	10.2	3.1
Dalit, Hill & Terai	399	53.1	21.7	406	42.7	13.4	404	19.3	4.1
Janajati, Hill	541	50.0	20.2	541	27.5	6.3	545	6.4	1.7
Janajati, Terai	139	31.2	13.9	141	40.9	12.0	138	29.0	5.5
Middle Caste, Terai	364	51.6	22.3	365	45.8	15.9	362	23.7	5.6
Newar	114	29.8	7.0	114	10.3	1.4	113	2.8	0.0
Other	136	44.9	22.1	137	35.9	11.8	136	15.3	5.5

* p-value for Chi-Square < 0.05

Key determinants of undernutrition

This nutrition analysis was undertaken to help guide the government policy decisions, and more specifically, to determine which nutrition intervention(s) will be most effective in improving Nepalese nutrition. Table 16 provides a summary of some of the key determinants of undernutrition emerging from the NLSS.

Age is clearly an important covariate and reinforces the notion that the major impact of poor nutrition is during the prenatal, perinatal, and early childhood periods. The high burden of chronic undernutrition in infants under six months of age and that almost 50 percent of children are stunted by two years of age supports the theory that the rate of linear growth retardation is most pronounced during the first two years of life. Therefore, nutrition interventions should target this vulnerable period and the pre-and immediate postnatal period.

It is essential to determine whether nutritional "behaviors" and practices are sound in these critical developmental periods, especially the quality and frequency of feeding during pregnancy, infancy, and early childhood. The high levels of undernutrition among even the "wealthiest" households suggests that for a sizable proportion of the population there are determinants other than income and food security that need to be better understood. (These households can purchase food even if they live in a food insecure area). **Given the significance of underlying cultural and social dynamics among some population sub-groups, there is very likely a potential dynamic of social exclusion at play in the observed differences in nutritional status.** This was seen in the marked nutrition differences across ethnic and caste groups.

Table 16. Summary of key determinants of undernutrition in Nepal

	Stunting < -2 SD %	Underweight < -2 SD %	Wasting < -2 SD %
Age (months)	***	***	***
Gender			
Location	***	***	*
Ecological Zone	***	***	***
Economic status			
Maternal education	***	***	*
Expenditure(quintile)	***	***	
Ethnicity/ Caste	***	***	***
Risk of Infection / Nutrition Behaviours			
Head of Household / Migration status	*	**	**
Access to Latrines	***	***	***
Breastfeeding (under 6 months of age)			
Food Security (Accessibility)			
Household Dietary Energy	**	**	
Dietary Energy from Staples	***	***	**
Food expenditure (Food poverty)	***	***	**
Poor Household	***	***	**
% Expenditure on food	***	***	
Food Security (Dietary Quality)			
Food Consumption Score	***	***	
Dietary Diversity	**	***	

* p-value < 0.05, ** p < 0.01, *** p < 0.001

Another key determinant of poor nutrition is infectious disease, and the extent to which inadequate hygiene and poor sanitation contribute to an increased exposure and severity of acute and chronic infection, and the potential effect on nutrition/metabolism, growth, and development. While there were no data on morbidity in the NLSS, access to "improved" sanitation was significantly related to both chronic and acute undernutrition.

Indicators of food security were more closely related to chronic undernutrition than to acute undernutrition in this data set, with respect to both food accessibility and the quality of the diet. Indeed, more in depth analysis of sub-groups of the population, particularly in areas where wasting was high, is needed to better understand those factors most closely linked to the risk of wasting.

In general, data on the prevalence of undernutrition observed in the NLSS, and its patterns by age and gender are similar to those seen in other South Asian countries. The underlying importance of poverty is important and clearly has an impact on household food accessibility and dietary quality, leading to high prevalence of chronic undernutrition. It is noteworthy that the prevalence of undernutrition is high even among the wealthiest households, suggesting that other factors beyond food availability and income are influencing nutrition. Also, the role of cultural practices and social exclusion needs to be considered. The analysis suggests that important positive benefits accrue among households headed by women and where remittances increase discretionary income.

While this report presents the important links between food availability, food access, and nutrition, it is important to gain a complete understanding of factors that affect food utilization and nutritional status.

The triangulation of data from the NLSS together with the recent NDHS, which did gather information on morbidity, early child feeding and caring practices, will be helpful. Such analysis will help inform the development and refinement of policies that will improve nutrition throughout the country.

Key Food Security & Nutrition Trends

Trend 1 **Food Preferences and Sources of Consumption**

Consumption increases nationally and regionally while diet diversity improves

The Nepalese population significantly has increased both overall quantity of food consumption and diversity compared to previous NLSS reporting periods (see Section 2). This section focuses on the changes in the types of food that households are consuming, rather than the overall quantity of that consumption. Figures 22 and 23 provide a more detailed overview of the trend towards improved dietary diversity at a regional level. Across all regions, the share of staples in the diet and the overall number of food groups consumed has improved.

Figure 24, illustrates the share of various food groups within household diets at a regional level.

Figure 22. Average share of staples in household diet 1995/96 – 2010/11, by region
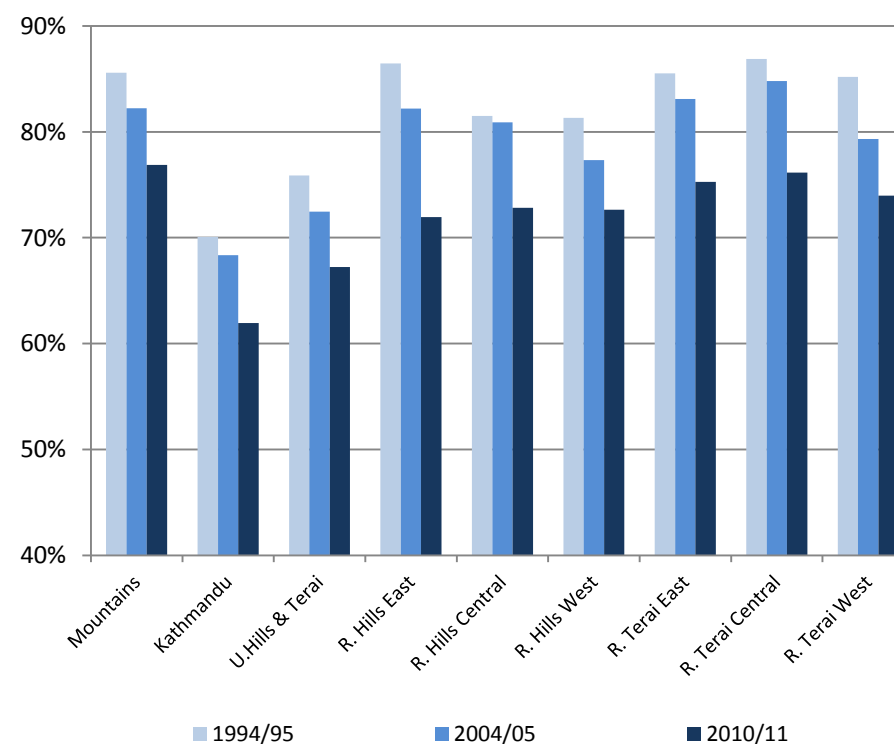
Figure 23. Average Dietary Diversity Score 1995/96 – 2010/11, by region

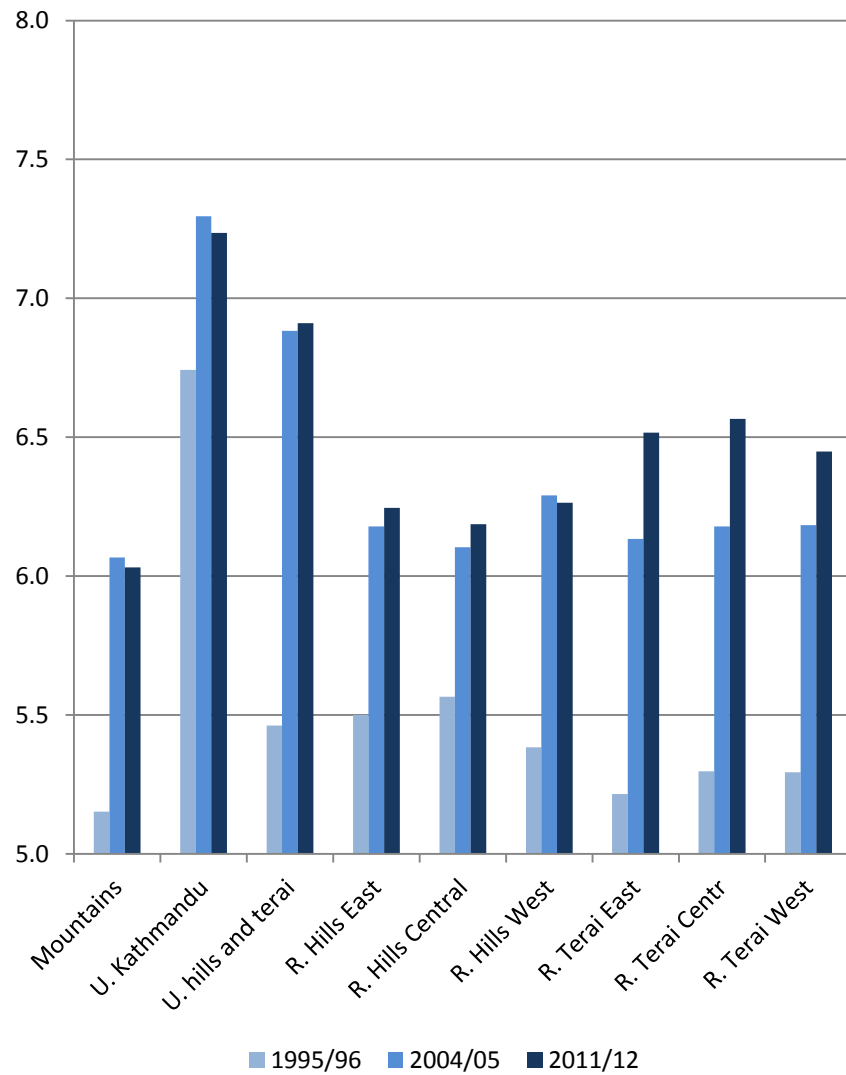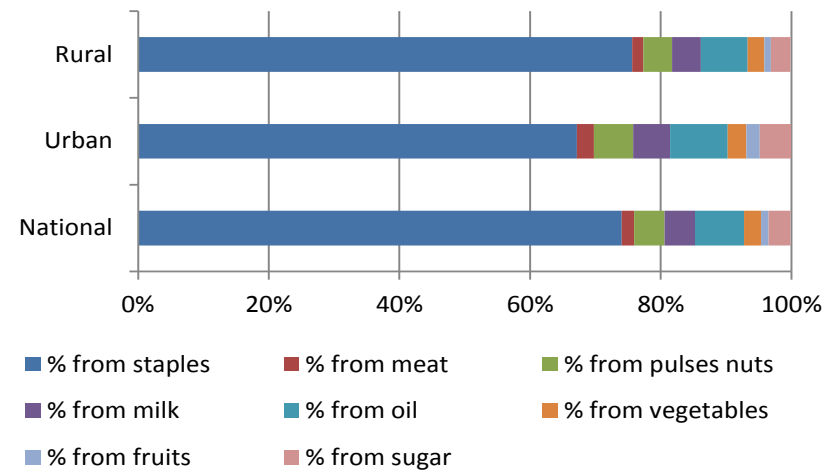Legend: 1995/96, 2004/05, 2011/12

Figure 24. % of calories consumed from varying food groups, urban and rural, 2010/11

- % from staples
- % from meat
- % from pulses nuts
- % from milk
- % from oil
- % from vegetables
- % from fruits
- % from sugar

Nepalese households are changing the foods they consume relatively rapidly. Notably, households are consuming a much greater quantity of protein and micronutrient rich food items compared to 2003/04. For example, household vegetable consumption almost tripled compared to 2003/04[14] (from 470g per month to 1,309g) and more than double the amount of meat and fish was consumed (from 402g per month to 847g). Potato consumption increased by almost 40 percent (from 1,413g per month to 1,951g), and bean and lentil consumption increased by 33 percent (from 503g to 669g). The consumption of fruit, oil/ghee and eggs increased by more than 50 percent when compared to 2003/04. Figure 25 demonstrates the change in the quantity of different food items consumed at a household level between 1995/96 and 2010/11 and between 2003/04 and 2010/11.

Compared to 2003/04, the Nepalese in both rural and urban areas increased their per capita consumption of coarse rice (up by 17%) and decreased their consumption of fine rice (down by 24%). The reason for this is not evident from the data, and contrasts with the expected trend of increased consumption of fine rice and a decrease in coarse rice due to increased wealth.

Changes in food consumption of households also showed some potentially less healthy trends. In particular, households are consuming on average 84 percent more sugar than reported in the NLSS 2003/04, and the consumption of sweets has increased almost ten-fold from an estimated 16g per month to 137g.

Figure 25. National change in average monthly household food consumption (based on quantity of food items consumed)

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[14] Quantity consumed is based on household estimates of the total weight of consumed food items in a one-month period. Potatoes for the purpose of this analysis are considered separately or as staples.
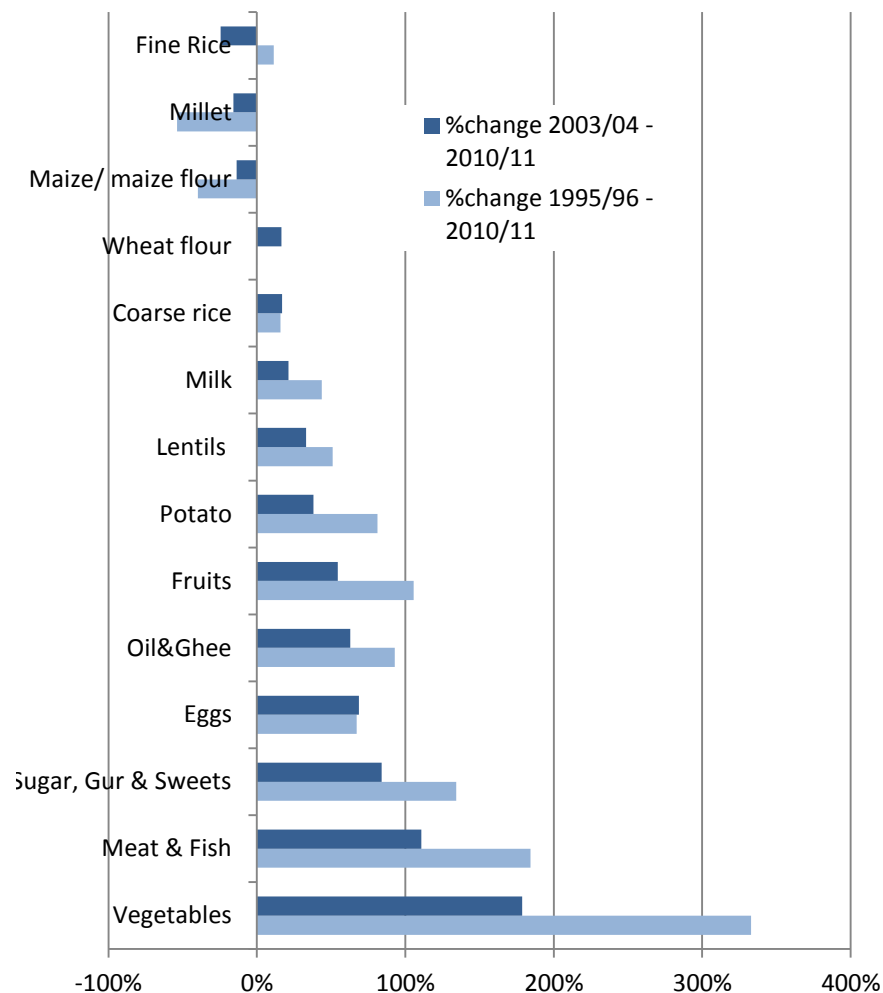
The two charts in Figure 26 show how the average urban and rural diets have changed since the 1995/96 NLSS and provide detailed information on two of the most significant dietary trends in Nepal. The first is the increasing consumption of meat, poultry, and fish and the second is the increasing consumption of potatoes, other vegetables, and fruits. The increase in meat, fish, and poultry consumption has been substantial over the past seven years. In rural areas, it has more than doubled; the greatest increases have been in the consumption of chicken (an increase of 180% since 2003/04) and of fish (an increase of 105% since 2003/04). The consumption of potatoes, considered as a staple in this report, has significantly increased since the NLSS 2003/04. The most dramatic increase in potato consumption has been in Mountain areas, where average per capita consumption has increased by 38 percent since 2003/04. Consumption of other vegetables and fruits also has increased substantially, especially in the Terai.

The increase in vegetable and fruit consumption is particularly important to overall micronutrient intake. Anemia is a serious issue in Nepal and has been raised by a number of health reports. While overall consumption of fruits and vegetables may still be below the recommended intake, these results are encouraging and demonstrate that general food consumption trends are heading in the right direction in Nepal. The next section highlights in more detail the regional trends of households that are not consuming adequate diversity in their diet. In addition, section three highlighted that poor dietary diversity is related to wealth, caste and ethnic group, and mothers' educational attainment. However, causation cannot be attributed using this data.

Figure 26. Food item contribution to total calories consumed; average urban, rural, and national diet

- Share of calories to sugar
- Share of calories to fruits
- Share of calories to vegetables
- Share of calories to oil
- Share of calories to milk
- Share of calories to pulses nuts
- Share of calories to meat
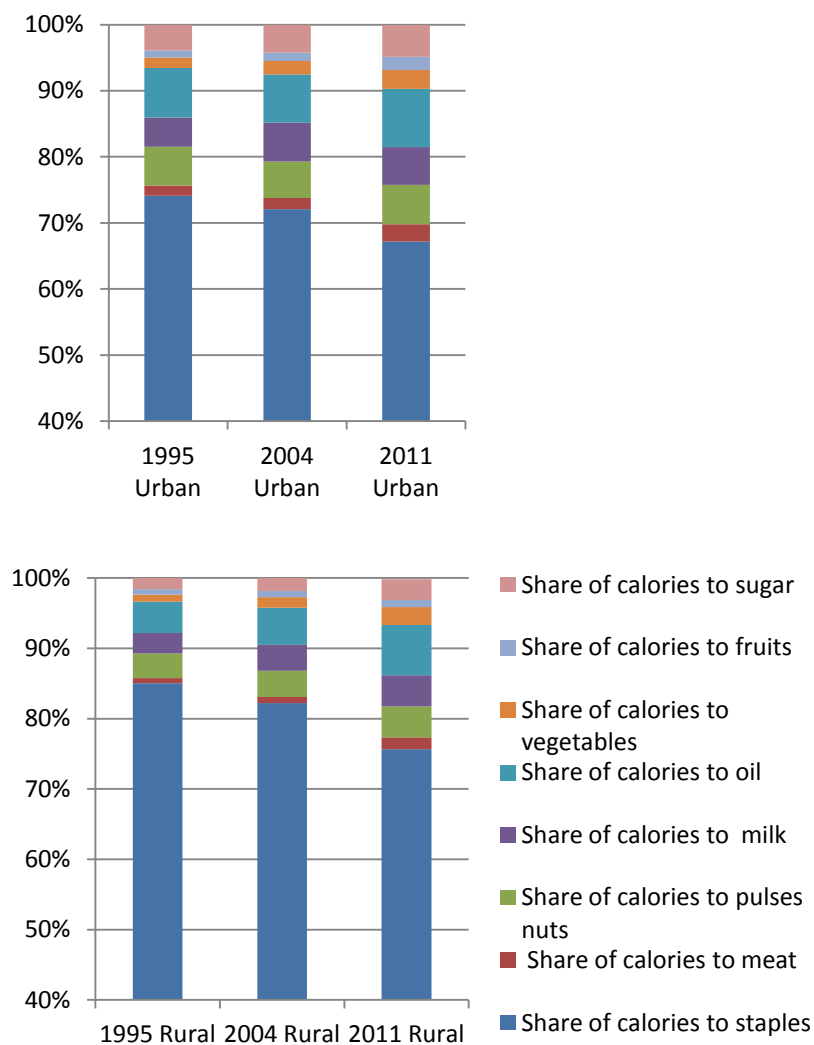- Share of calories to staples

Figure 27. Household consumption of poultry, meat and fish; grams per capita per typical month
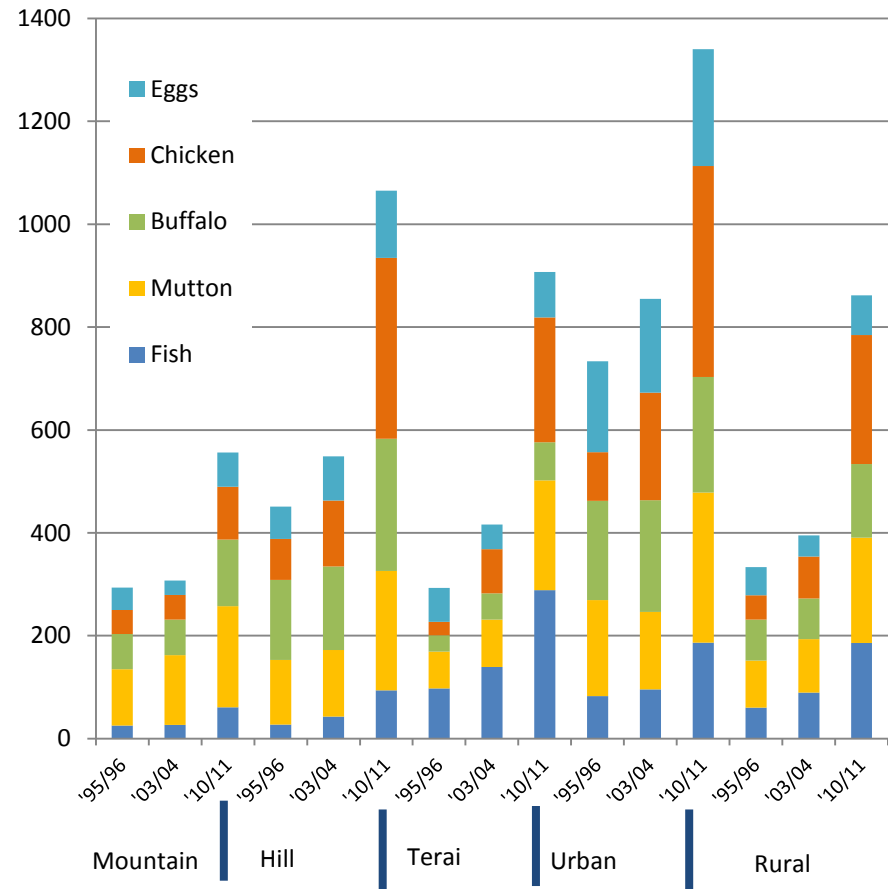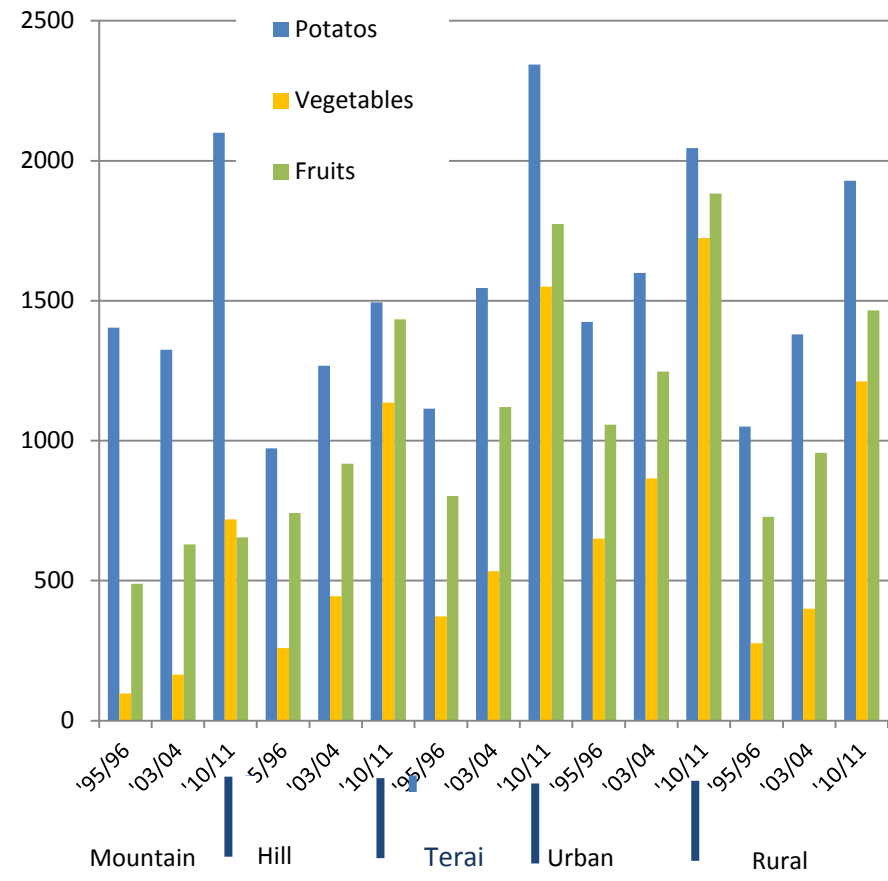

Figure 28. Household consumption of potatoes, other vegetables and fruits; grams per capita per typical month

Poor variety in food group consumption

Twenty percent of the overall population has inadequate food consumption score (see Section2). This section provides a more detailed national and regional level analysis of the food groups that are not being consumed regularly.

Figure 30 highlights the percentage of households that did not consume particular food items during a seven-day recall period. Nationally, a high proportion of households did not consume any meat, fish, eggs or fruit. Nearly 30 percent of the population did not consume any milk or dairy products during the seven days. Figure 31 shows the average number of times per week that households consumed varying food groups, including households that consumed the item at least once.

When analyzed together, Figures 30 and 31 show that the dietary diversity challenges vary across differing regions. For instance, in the Eastern and Central Hills the consumption of meat, fish, eggs, and pulses is particularly low. Nevertheless, more households in these regions eat fruit regularly compared to other regions.

Figure 29 provides insight into the low consumption of iron and vitamin A rich foods by much of the population. More detailed information on micronutrient intake was collected from the recent NDHS, which reported that only one in four children consumed foods rich in iron in the 24 hours prior to the survey, and 47 percent of children aged 6-23 months consumed foods rich in vitamin A the day or night preceding the survey. Children whose mothers had some secondary education were twice as likely to consume iron-rich foods as those whose mothers had no

education, according to the NDHS. There are other important causes of anemia other than iron deficiency. For instance, poor iron status could also be related to the high amount of phytate in the diet from staples which inhibit iron absorption.

Although data on anemia were not collected as part of the NLSS, the 2011 NDHS found 46 percent of children to be anemic, only a 2 percent decline over the past five years.

The proportion of children with anemia was higher among children 6-17.9 months of age (72-78%) than among children in other age groups. Finally, the NDHS did not find a significant relationship between anemia prevalence and wealth, although children of mothers with no education were more likely to be anemic.

Figure 29. % of HHs that *did not* consume various nutrient rich foods over 7 day recall period
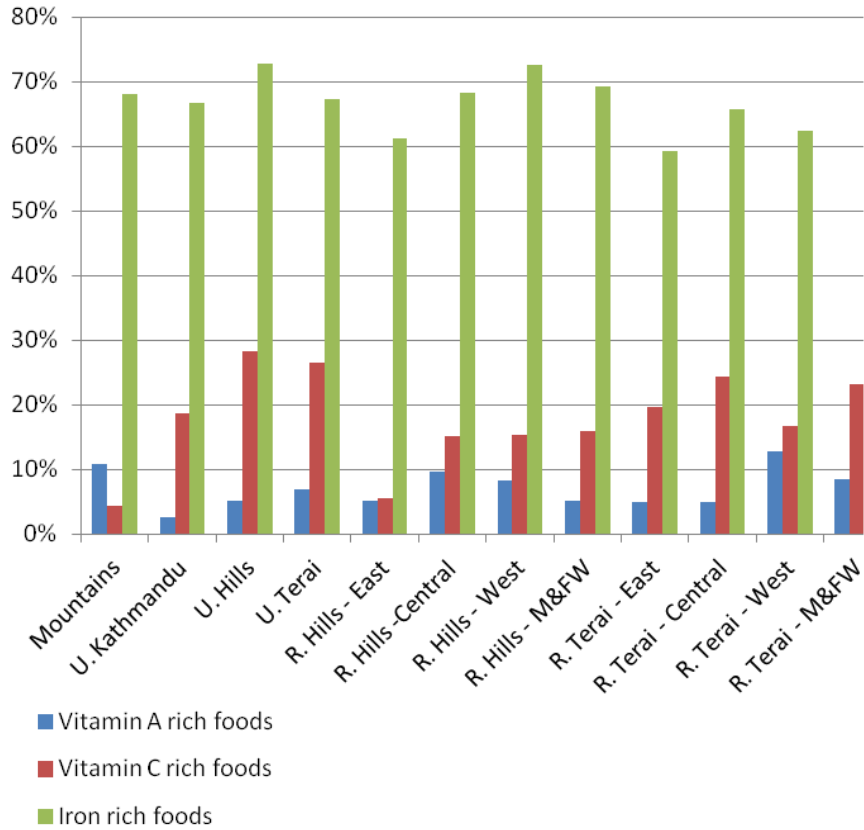
Figure 30. % of households that *did not* consume varying food types within 7 day recall period, by region

41
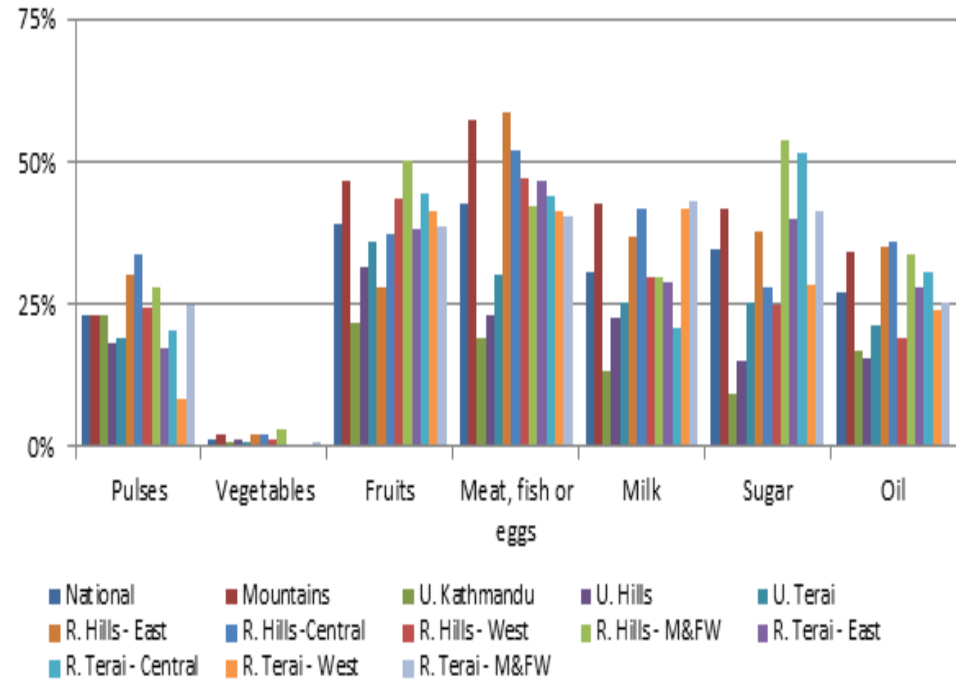
**Figure 31. The number of days per week that households consumed varying food types within 7 day recall period (*if the household consumed the item)*
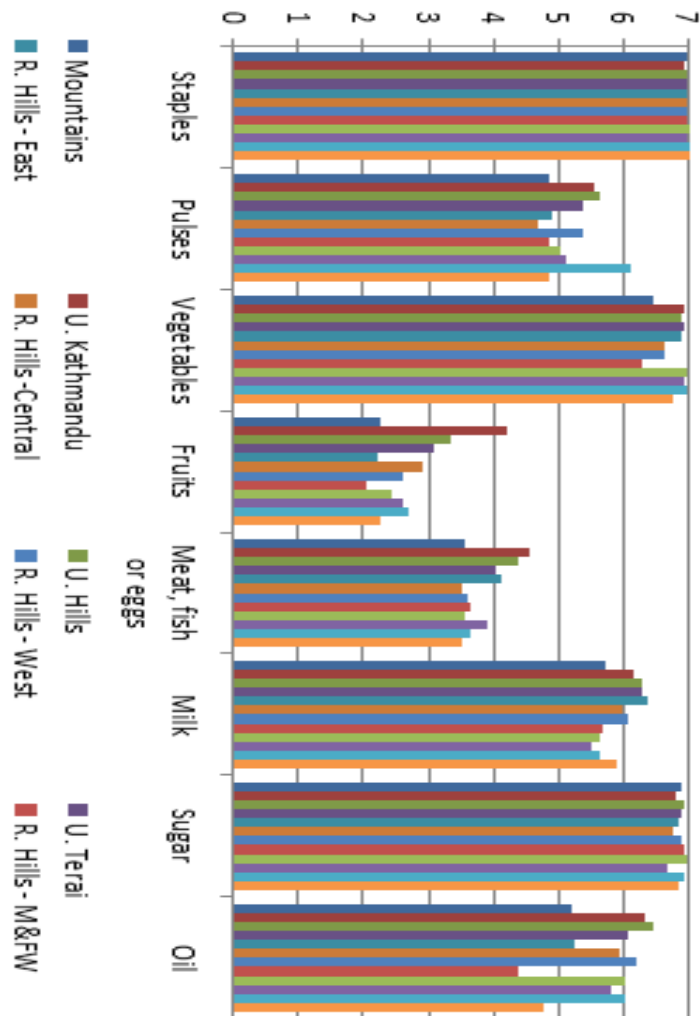
Sources of consumption

Understanding the source of food consumption provides insight into how food preferences and nutritional needs are supported, i.e., through own production, purchases, and in-kind support. By analyzing the source of consumption, it is possible to determine which households are most reliant on market purchases and which are the most self-sufficient. Knowing the source also increases understanding of the role of trade and production in dietary diversity. The source of consumption is therefore useful to indicate which households are most vulnerable to increased market prices (see next section), and which to drought and other events that lead to poor crop harvests and reduced self-production.

Across Nepal, households are most reliant on self-production of milk, staples, vegetables, and pulses to meet their dietary preferences. Sugars, oils, and meats usually are purchased. In contrast, the most significant in-kind contribution to overall consumption is fruits, and this finding is in-line with Nepalese culture, which considers fruits an auspicious gift to respect important occasions throughout the lifecycle and the Nepalese religious and festive calendar.

Figures 31 and 32 provide an overview of the source of consumption of food types across the different regions of Nepal. Figures 33 shows that the regions most reliant on their own production, in both absolute and relative terms, tend to be the most food insecure, including the Mountains, Eastern Rural Hills, Mid and Far Western Rural Hills, Western Rural Terai and Mid and Far Western Rural Terai.

Figure 32. Source of food consumed, by urban/rural source of varying foods

Urban
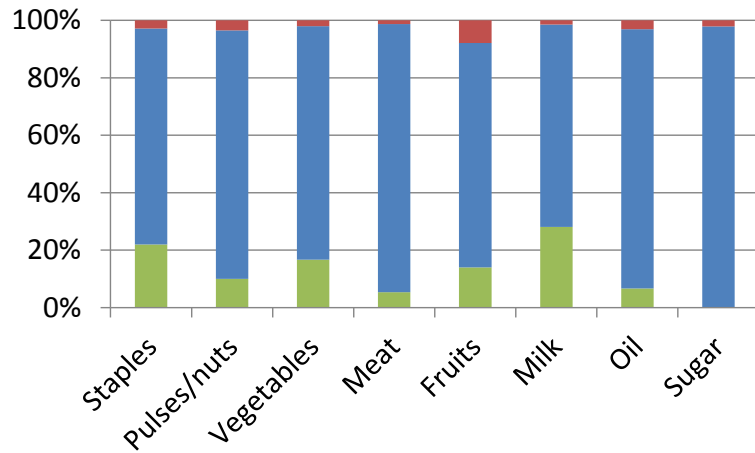
Rural
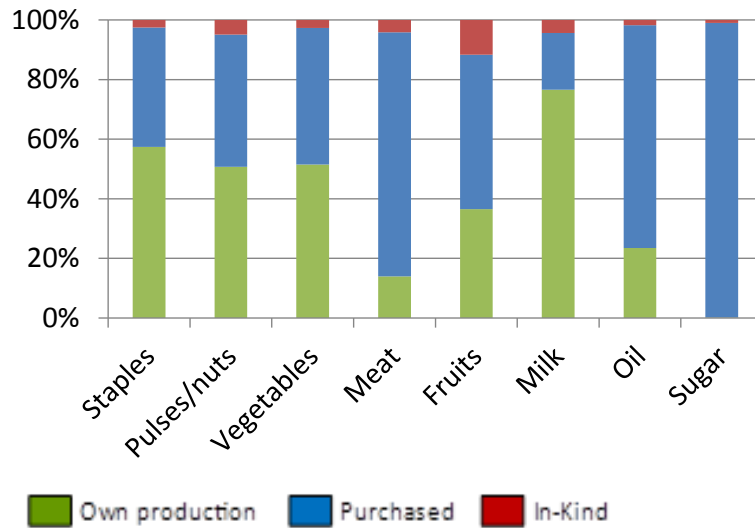
Legend: Own production · Purchased · In-Kind

This finding contradicts the commonly held belief that food insecure regions in Nepal generally produce less and therefore consume less of their own production than in other areas.

The difference in overall adequacy of consumption between regions is largely a result of households in more food secure regions purchasing more food and more diverse food than those in less food secure areas. Household food purchases are facilitated by improved market access, including physical and financial access. For instance, in the Mid and Far Western Hills and Mountains – an area with poor trade access routes and relatively high food prices - households rely on their own production to meet 59 percent of their food needs. Households in this region consume relatively more milk, vegetables, and pulses from their own production than any other region. Yet their overall consumption of such foods is relatively poor because they do not supplement their diets with purchased food items to the same extent as households in other areas. Production patterns across the varying regions are discussed in more detail later in the report.

Figure 33. Source of Consumption (based on kilocalories consumed)

Source of total kilocalories consumed, by region

44

Expenditure on Food and Food Prices

The urban-rural gap in food expenditure closes while food prices rise

Even though the food expenditure gap is closing between urban and rural areas, changing food preferences and increased food prices effect the amount spent on food. In 2010/11, the average amount spent on food per month per capita was 4,308 NPR. Urban residents spent more on food than rural residents (5,669 NPR compared to 3,689 NPR).

In 2010/11, food expenditures averaged 54 percent of total household expenditure in Nepal. In urban areas food expenditure accounted for a smaller proportion of overall household expenditure compared to rural areas, 52 percent compared to 55 percent. However, this represents a significant closing of the rural-urban divide, in 2003/04 it was 39 percent compared to 63 percent.

Households in poorer quintiles spend a significantly greater share of their money on food compared to the wealthier quintiles (see Table 18). The poorest two quintiles spend on average 65 percent or more of their total expenditure on food – a figure that is considered very high. Despite the large amount of money that the poor spend on food (see Section 3), almost 50 percent of the population in the lowest wealth group have an inadequate food consumption score.

With such a high level of expenditure on food, it is difficult for poorer households to break the cycle of poverty since they are unable to spend appropriate resources on building assets. And when shocks occur, they are very quickly forced to sell assets for cash.

Compared to 2003/04, the proportion of money that the poorer quintiles spend on food has decreased due to increased wealth. However, the wealthiest quintile is now spending a greater proportion per capita on food than in 2003/04. This is largely due to the combination of changing food preferences and increased food prices, which have had a relatively larger impact on this group because they purchase more of their food.

Table 17. Food expenditure in urban and rural areas, 2010/11 and 2003/04 comparison[15]

	Food expenditure per capita per month 2010/11	Non-food expenditure per capita per month 2010/11	Average share of expenditure on food 2010/11	Average share of expenditure on food 2003/04	Average share of diet that is purchased 2010/11
National	**4,308**	**3,689**	**54%**	**59%**	**54%**
Urban	5,669	5,273	52%	39%	80%
Rural	3,989	3,317	55%	63%	48%

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[15] Reflecting nominal consumption.

Table 18. Food expenditure by quintile, 2010/11 and 2003/04 comparison[16]

Expenditure Quintile	Food expenditure per capita per month 2010/11	Non-food expenditure per capita per month 2010/11	Average share of expenditure on food 2010/11	Average share of expenditure on food 2003/04	Average share of diet that is purchased 2010/11
Q1 (poorest)	1546	763	67%	73%	46%
Q2	2453	1300	65%	67%	49%
Q3	3440	2064	62%	65%	46%
Q4	4926	3476	59%	58%	54%
Q5 (wealthiest)	9178	10842	46%	40%	69%

Food price inflation and the impact on food security and nutrition

Figure 34 provides a national overview of food price increases in Nepal between 1969/70 and 2009/10. Food prices across virtually all commodities have increased dramatically in recent years.

Compared to 2003/04, the price of coarse rice has increased by almost 77 percent, basmati rice by 70 percent, wheat flour by more than 50 percent and potato by 219 percent. Most lentils and beans are now more than double the price (blackgram or black lentil) up by 114%, lentil up by 146%, pigeon pea up by 230%). Meat and fish prices are also close to double 2003/04 prices (mutton up by 78%, chicken up by 84 percent, fish and buffalo meat – or buff - up by close to 92 percent). When compared to 1994/95 prices, inflation to current day prices is around double these figures for most commodities.

Food price inflation has been steadily increasing over the past 30 years (see Figures 35-38), with a significant acceleration for most commodities over the past decade and a rapid increase around 2007/08 at the time of the world food crisis. However, prices in Nepal continued to experience steep inflation even after the official end of the world food crisis, and there has been virtually no respite in recent years.

Figure 34. Food retail prices, 1969/70 - 2009/10; grains and flour[17]

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[16] Reflecting nominal consumption.
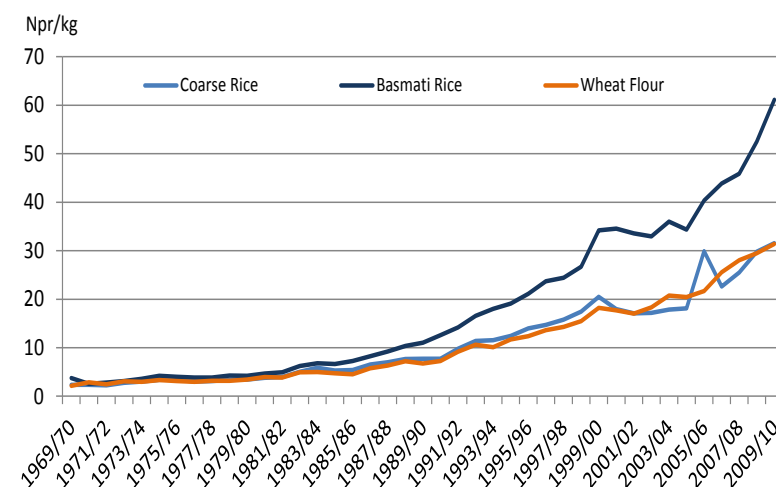
[17] Ministry of Agriculture, Agribusiness Centre data, WFP in house analysis 2011.

Figure 35. Food prices, 1969/70 - 2009/10; Meat and Fish

Figure 37. Food prices, 1969/70 - 2009/10; Non-animal protein sources

Figure 36. Food prices, 1969/70 - 2009/10; Vegetables
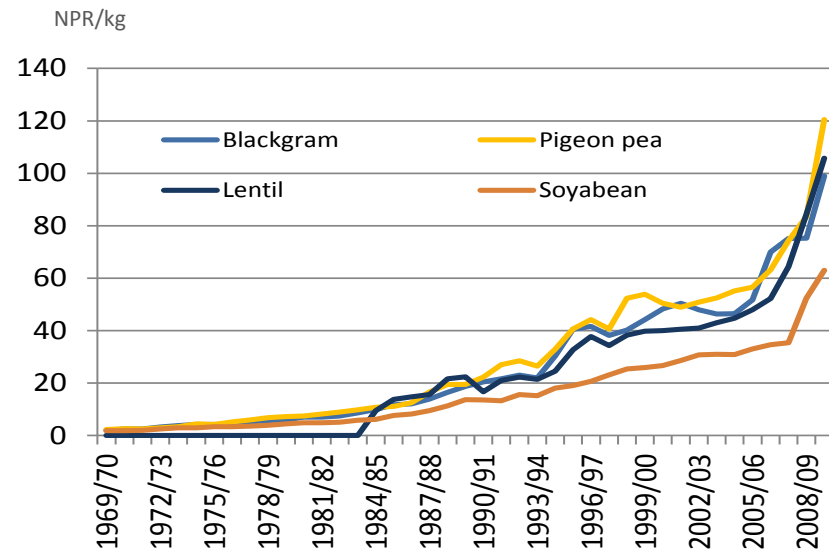
Figure 38. Food prices, 1969/70 - 2009/10; Fats
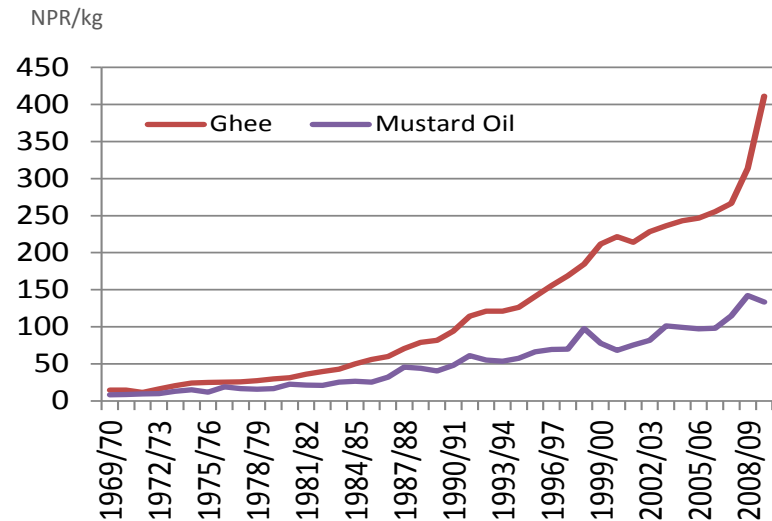
Despite the significant increase in food prices, this report highlights the gains in food security made across Nepal since the 2003/04 NLSS. While food price inflation is undoubtedly slowing the pace of consumption improvement, urban and rural households alike are now on average consuming greater quantities of more diverse food. And this is true across different development zones and socioeconomic groups.

For the poorest and most disadvantaged, however, rapid food price inflation may have exacerbated food insecurity. An analysis of the proportion of the population with high and very high food expenditure indicates that amongst some of the poorest households, food price increases have indeed increased economic vulnerability to food insecurity and has pushed a small proportion of households deeper into poverty.

While the *average* proportion of expenditure that the poorest households make on food has reduced since the 2003/04 NLSS, a greater percentage of households are spending a "high" proportion on food (> 65 percent of total expenditure). This level of expenditure on food creates significant economic vulnerability amongst households. With this level of expenditure on food, households living below or near the poverty line will not be able to cover their other essential needs. On the other hand, households living close to the poverty line will not be able to invest in productive assets or other activities to improve their long-term food security.

The percentage of households spending a *"very high"* proportion of their income on food (> 75 percent of total expenditure) has also increased. This level of expenditure on food is of considerable concern. For poor households, it indicates potential erosion of existing assets and for households that are near the poverty line, it means that some other basic

living costs – such as health education etc., may be sacrificed to cover consumption needs. The trend of *high* and *very high* food expenditure being reduced as wealth increased as seen between 1995/96 and 2003/04 has been reversed as shown in Figure 39. In rural areas, the proportion of the population with *high* food price expenditure is now slightly higher than in 1995/96.

Figure 39. % HHs with high and very high expenditure on food
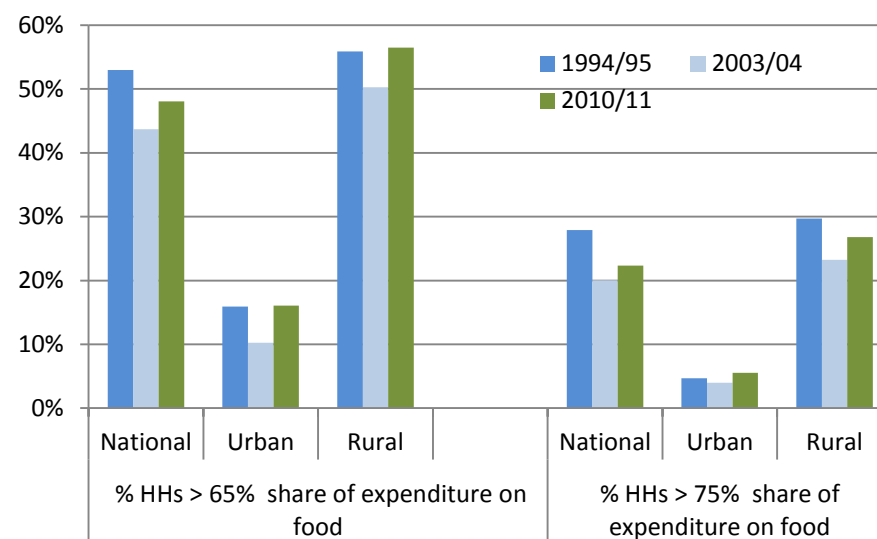
Table 19. % HHs with high and very high expenditure on food with confidence intervals

		% HH >65% share of expenditure on food	Std. Err.	95% Confidence interval
National	1995	0.53	0.02	0.50 - 0.56
	2005	0.44	0.01	0.41 - 0.46
	2011	0.48	0.01	0.46 - 0.50
Urban	1995	0.16	0.02	0.11 - 0.21
	2005	0.10	0.02	0.07 - 0.13
	2011	0.16	0.02	0.13 - 0.19
Rural	1995	0.56	0.02	0.52 - 0.59
	2005	0.50	0.02	0.47 - 0.53
	2011	0.56	0.01	0.54 - 0.59

		% HH >75% share of expenditure on food	Std. Err.	95% Confidence interval
National	1995	0.28	0.01	0.25 - 0.31
	2005	0.20	0.01	0.18 - 0.22
	2011	0.22	0.01	0.21 - 0.24
Urban	1995	0.05	0.01	0.02 - 0.07
	2005	0.04	0.01	0.02 - 0.05
	2011	0.06	0.01	0.04 - 0.07
Rural	1995	0.30	0.01	0.27 - 0.33
	2005	0.23	0.01	0.20 - 0.26
	2011	0.27	0.01	0.25 - 0.29

The *high* and *very high expenditure* rate on food has increased similarly in both urban and rural areas, which is to be expected. In urban areas, the poor rely more heavily on purchased food; therefore, the poor are more vulnerable to food price increases. Whereas in rural areas, a greater percentage of the population is considered poor; thus, the overall population is more vulnerable.

The regional economic vulnerability to food insecurity based on the percent of households with high and very high food expenditure is shown in Figure 40. The differences in vulnerability are a function of the relative changes in food prices in different regions; the magnitude of poverty in the regions; and the degree to which households are reliant upon market purchases versus their own production. The analysis considers households that may have benefited from increased food prices. However, as virtually all poor households purchase more food than they sell, this is not a significant factor. The most significant increases in the past seven years have been in the Urban Hills and Terai, the Rural Western Hills and the Western Terai. The latter two regions are of significant concern because of the substantial increase in the percentage of the population spending more than 75 percent of their income on food.

Figure 40. % HHs with high and very high expenditure on food

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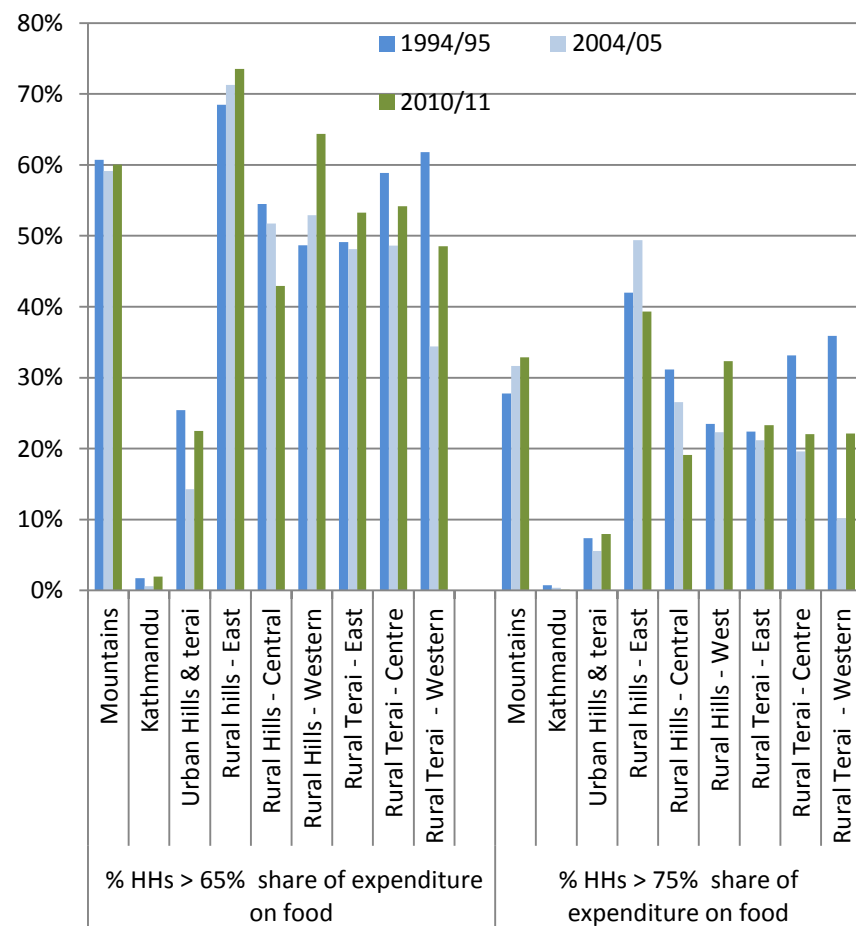
Declining poverty improves food security and nutrition but people depending on certain livelihoods remain vulnerable

The relationship between poverty,[18] food insecurity, and nutrition is strong, with poor households often lacking the resources required to access and consume sufficient nutritious food to live a healthy active life. Based on 2010 estimates, Nepal's GDP[19] per capita (PPP) of $1,200 USD ranks 206th out of 227 countries worldwide. According to the NLSS 2010/11, 25 percent of the population are estimated to live below the poverty line.

A strong linear relationship exists between the expenditure quintile to which a household belongs and their food consumption (as measured by the food consumption score) and nutrition. Almost half of all households in the lowest expenditure quintile have *inadequate food consumption*, compared to only 3 percent in the wealthiest quintile. Similarly, 25 percent of households in the lowest

Box 1. Poverty line calculation

The **absolute poverty rate** captures the proportion of the population falling below an estimated poverty line, which is based on the cost of a food basket that yields 2,220 calories per capita per day, plus an allowance for basic non-food items.
Based on the 2010/11 NLSS, the Absolute Poverty Line per capita in Nepal is estimated at 19,261 NPR, equivalent to approximately $237 USD.

Box 2 Wealth quintiles

Wealth quintiles in the NLSS 3 are determined by how much households spend, or consume.

expenditure quintile are considered to have *poor food consumption* compared to only 1 percent in the wealthiest quintile. Food poverty is very high amongst households in the poorest expenditure quintile—that is the value of their own food they consume is insufficient to provide for a basic adequate diet based on local market prices.

Figure 41. Food consumption score and food poverty based on expenditure quintile

Household Food Consumption Score
% HHs Poor Food Consumption Score (FCS 28 or less)
% HHs Inadequate Food Consumption (FCS less than 42)
% HHs that are Food Poor (food expenditure below food poverty line)

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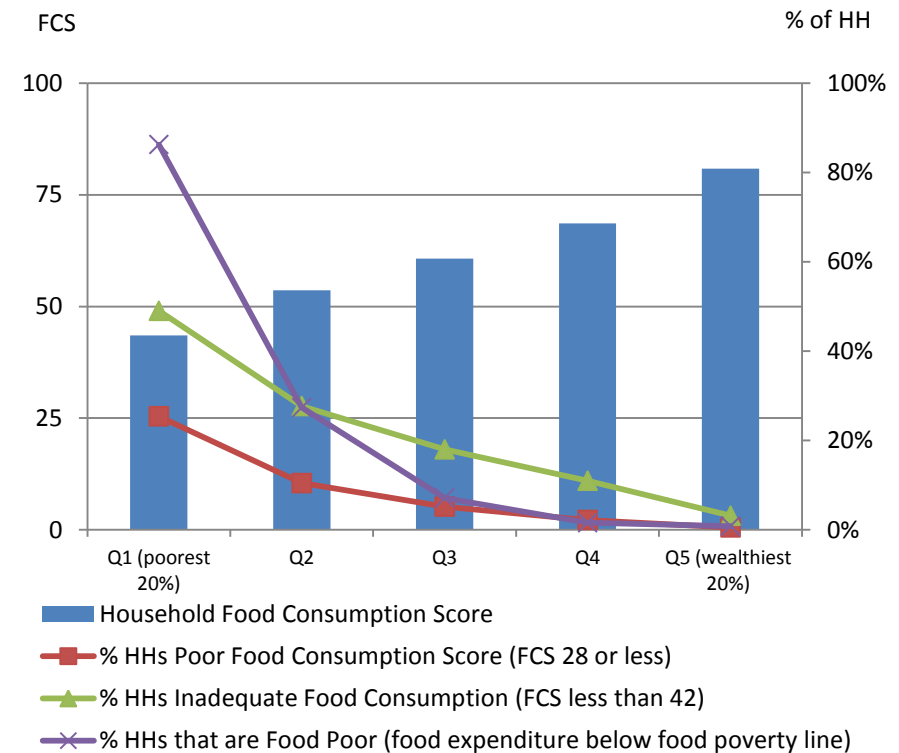
[18] Defined as an inability to earn sufficient income to buy food and cover basic needs.
[19] http://databank.worldbank.org/ddp/home.do?Step=12&id=4&CNO=2.

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Poverty in Nepal is predominantly a rural phenomenon. In 2010/11, 27 percent of the rural population lived below the poverty line as compared to 15 percent of the urban population. In urban areas, households rely on home production to meet 26 percent of their overall diet (in terms of caloric consumption). Whereas rural households rely on home production to meet 62 percent of their consumption needs.

The majority of households (69%) in the lowest wealth quintile are energy deficient, compared to 19 percent in the wealthiest quintile. In addition, poorer households are often engaged in more energy intensive activities, such as agricultural labor or manual construction, and require more calories than the "average minimum threshold."

In addition to consuming more calories, wealthier households also consume a more diverse diet. The percentage of households consuming less than four food groups per week is significantly higher amongst the lowest wealth quintile (29%) compared to the other wealth quintiles (see Figure 43). The share of staples in the diet, as a portion of the total kilocalories consumed, also declines as wealth increases. Most households in the poorest wealth quintile (86%) have a diet that is considered *very high in staples,* compared to only 10 percent of households in the wealthiest quintile.

Figure 42. Quantity of food consumed per expenditure quintile
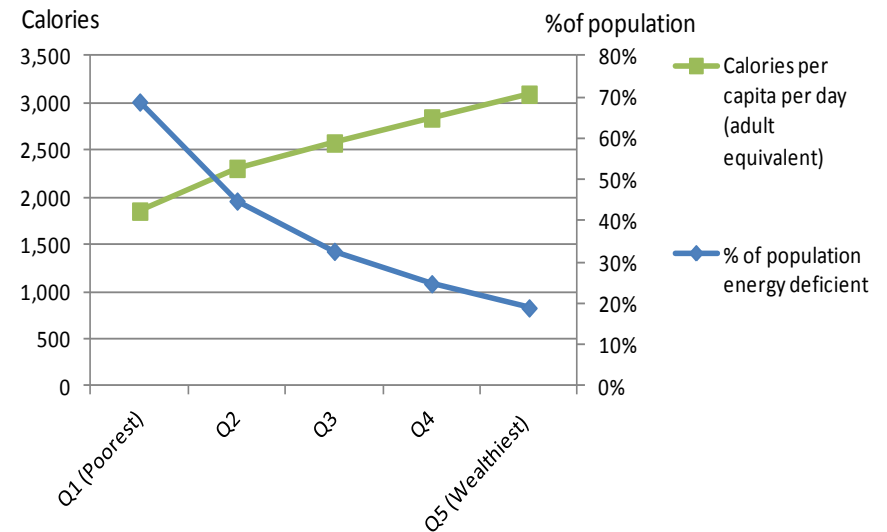
Figure 43. Quality of food consumed, per expenditure quintile
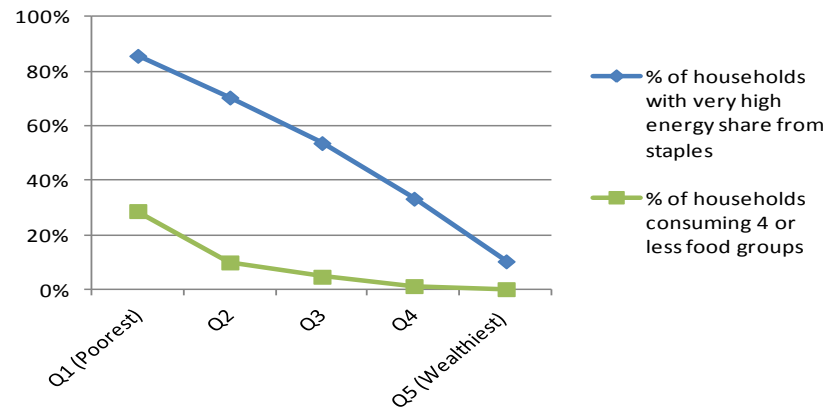
Figure 44. Expenditure quintiles and rural and urban household consumption
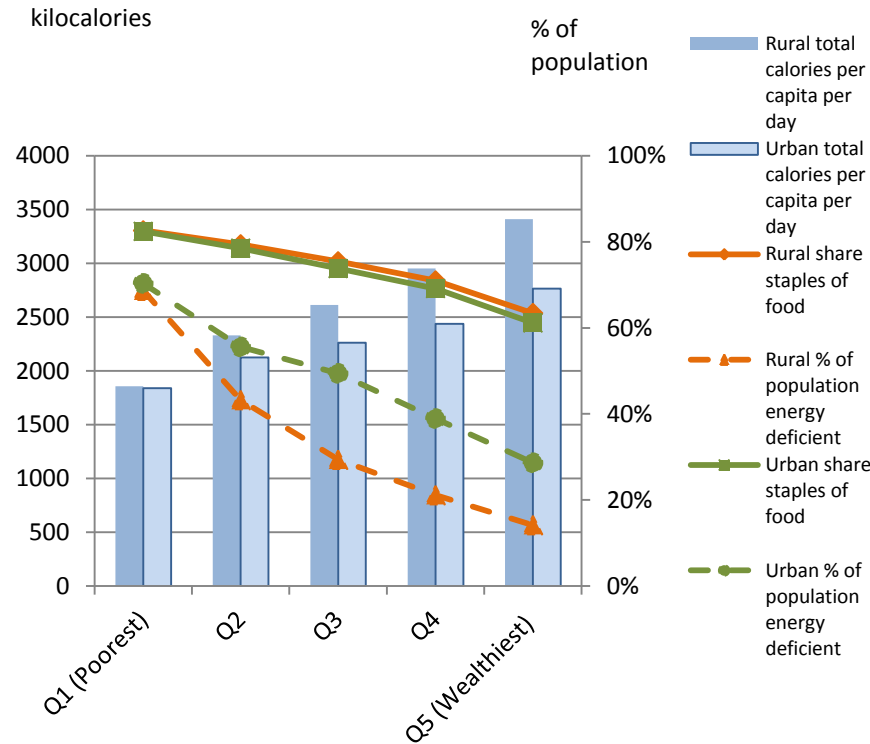
kilocalories | % of population

Legend:
- Rural total calories per capita per day
- Urban total calories per capita per day
- Rural share staples of food
- Rural % of population energy deficient
- Urban share staples of food
- Urban % of population energy deficient

There was a significant association between household expenditures and nutritional status (see Figure 45). As would be expected, children from households in the lowest quintile of wealth were much more likely to be suffering from chronic undernutrition, and the prevalence of severe stunting was almost three times higher among children from the poorest households compared with children from the wealthiest households. The

relationship with severe underweight was even more pronounced, perhaps due to the high burden of acute undernutrition in the poorest households.

In contrast to the relationship between household expenditures and stunting, there does not seem to be an association between household expenditures and wasting (see Figure 45).

Figure 45. Prevalence of undernutrition by expenditure quintile
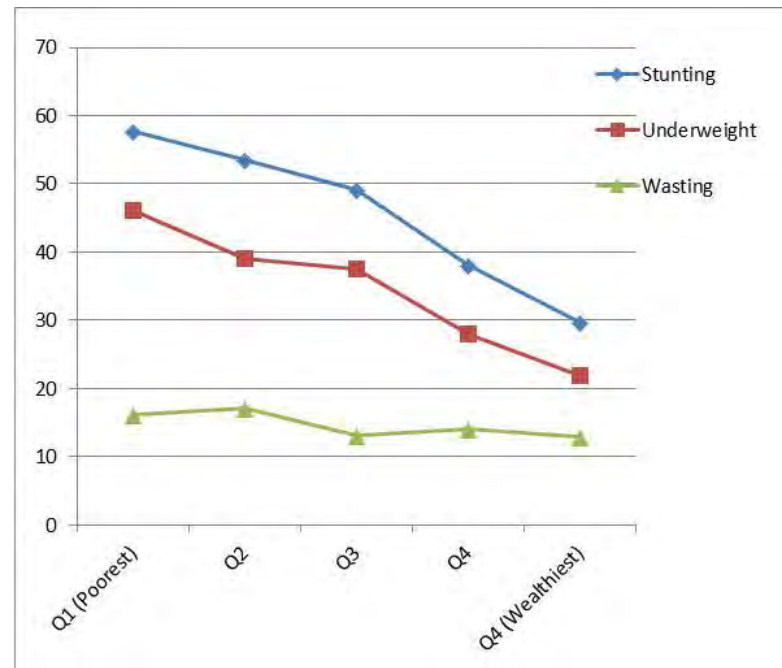
A reduction in the percentage of the population living in poverty between 1995/96 and 2010/11[20] has resulted in even greater reductions in the percentage of the population that consume a poor diet (see Figure 46).

Figure 46. Reduced poverty and improved food consumption, 1995/96 - 2010/11

Food Expenditure and Poverty

Food accounts for a significantly higher rate of total expenditure in poorer households than in wealthier households. Households belonging to the lowest expenditure quintile spend on average only 2.309 NPR per capita per month and 66 percent of this is spent on food. This compares to households in the highest expenditure quintile, which spend on average 20,002 NPR per capita per month, and only 46 percent is spent on food.

Households for which food expenditures account for more than 65 percent of total expenditures are classified as having *high food expenses* and have been described as *vulnerable* to food insecurity (COCA, 2006). In 2010, 48 percent of households in Nepal had *high food expenses*.

Households with *high food expenses* are most likely to be poor households. Seventy-eight percent of households in the lowest wealth quintile had *high food expenses* compared to only 15 percent in the highest wealth quintile.

Rural households were much more likely to have *high food expenses* than urban households (56% compared to 16%). There is also significant regional disparity; for instance, the Central and Western Hill areas have similar rates of poverty (29% and 28%, respectively). However, the Western Hill area has a significantly higher percentage of the population with *high food expenses* (58% compared to only 43% in the Central Hills.

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[20] Poverty numbers over time are not comparable because the poverty line was changed in 2010-2011.

At a national level, 48 percent of households are considered to have *high food expenses.* While the portion of households living in poverty has decreased, the portion of households with *high food expenses* has increased in both rural (from 50% to 56%) and urban (from 10% to 16%) areas. In rural areas, the portion of households experiencing *high food expenses* is at the same level as it was in 1995/96.

Twenty-two percent of households are classified as having *very high food expenses*. For these households, food expenditure contributes more than 75 percent of total expenditures. Households with *very high food expenses* live primarily in rural areas. This group accounted for 27 percent of rural households and 6 percent of urban households. Households in this situation are considered very economically vulnerable to shocks.

Figure 47. Total expenditure per capita per month and share of expenditure on food, 2010/11

Figure 48. % Households with high and very high food expenditure, by region
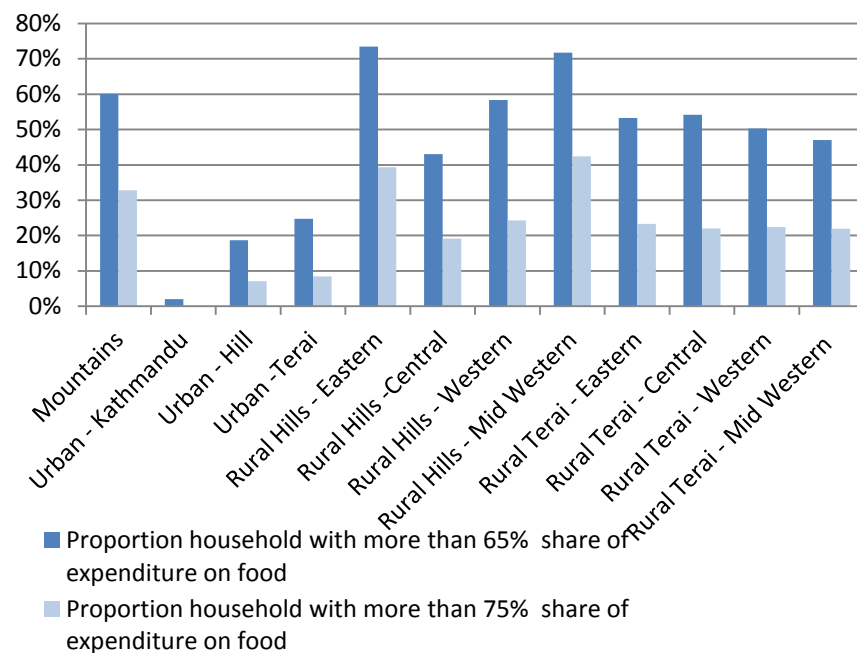
Figure 49. % of poor households and households with high food expenditure

Legend:
- Urban % of poor HHs
- Urban % of HHs with a high share of expenditure on food
- Rural % of poor HHs
- Rural % of HHs with a high share of expenditure on food
- National % of poor HHs
- Natoinal % of HHs with a high share of expenditure on food
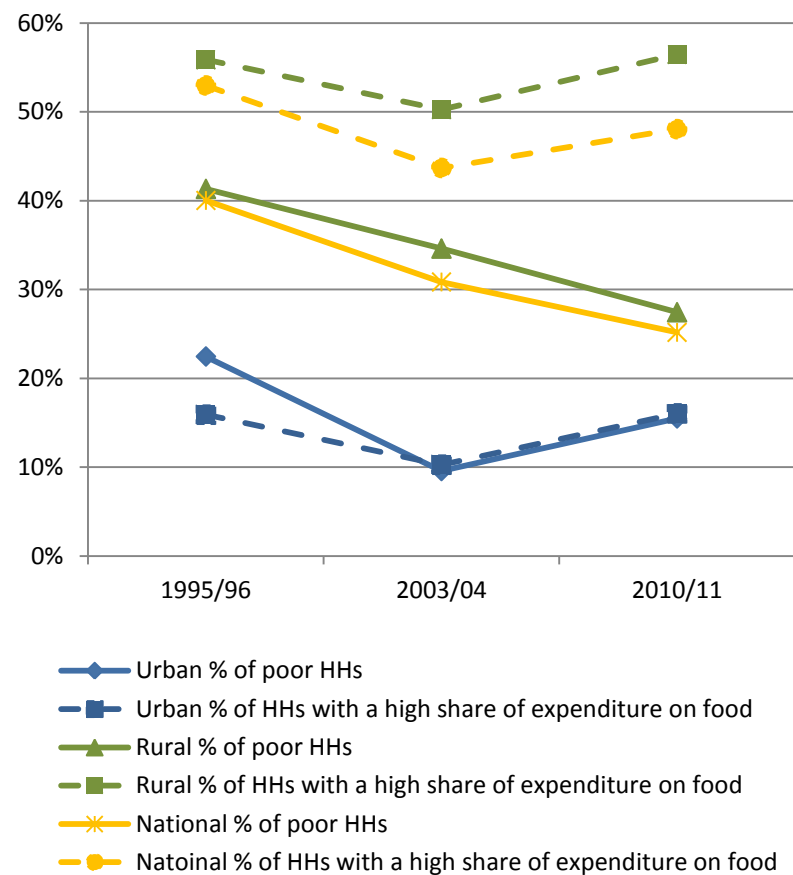
Livelihood type, food insecurity, and nutrition

Certain professions are particularly vulnerable to food insecurity and food insecurity often stems from poverty because of the low income of those professions. In both rural and urban areas, agriculture wage earners are the most likely to be poor and to demonstrate poor performance on other food security indicators.

Considerable differences also exist between urban and rural areas. For instance, in rural areas, households with livelihoods that rely on cash crops and/or livestock as the primary source of income are more likely to be poor, energy deprived, and consuming un-diverse diets compared to other households. However, in urban areas these households are amongst the better off and tend to have better diets than other livelihood groups.

Table 20. Rural Food security indicators by livelihood, 2010/11

	Inadequate Food Consumption Score (FCS less than 42)	Food Poverty	Did not have enough food in the past 30 days	Household with more than 75% share of expenditure on food
Office worker	5%	6%	2%	1%
Services and shops	6%	10%	3%	2%
Farming (cash crops and livestock)	16%	21%	4%	6%
Forest income	14%	18%	5%	10%
Artisans and construction workers	17%	15%	8%	10%
Machine operators	12%	14%	1%	4%
Agricultural laborer	36%	32%	14%	38%

Table 21. Urban food security indicators by livelihood, 2010/11

	Inadequate Food Consumption Score (FCS less than 42)	Food Poverty	Did not have enough food in the past 30 days	Household with more than 75% share of expenditure on food
Office worker	9%	11%	3%	7%
Services and shops	10%	12%	2%	10%
Farming (cash crops and livestock)	12%	9%	3%	17%
Forest income	24%	29%	7%	29%
Artisans and construction workers	27%	22%	12%	23%
Machine operators	14%	16%	3%	13%
Agricultural laborer	43%	38%	26%	43%
Other	34%	31%	12%	34%

Trend 4 — Migration and Remittances

Remittances play an important role in providing food security for the poor

In recent years, urbanization and migration have been key driving forces behind poverty reduction in Nepal. Foreign remittances now constitute a quarter of the income of all households and almost two-thirds of the income for those receiving money from abroad. In FY 2009 "official remittance" totaled US$2.7 billion, or 22 percent of GDP. This figure excludes remittance from India and informal flows Therefore, according to the World Bank (2011), total inflows could easily exceed 25 percent of GDP. International migration has thus become the most important economic activity in Nepal. A recent World Bank study (2011) found that socioeconomic progress, or "escape from poverty" between 2000 and 2009 was almost twice as fast for households with migrants than those without.

Wealthier households are more likely to earn remittances from overseas and earn more per capita, as Table 22 shows. Remittances also represent a greater percentage of overall household income in wealthier households. However, because poorer households spend more of their income on food, remittances play a particularly important role in the food security of the poor.

Table 22. Remittances per capita amongst differing expenditure quintiles

Source Remittance:	All	Domestic	Abroad All	India	Gulf	Malaysi	Other
Remittance per capita (in '000)							
Poorest	3.56	0.42	3.14	1.32	1.72	0.07	0.03
2	3.82	0.59	3.22	1.15	1.55	0.48	0.04
3	6.66	0.80	5.86	1.05	3.83	0.59	0.39
4	11.89	1.13	10.77	2.16	5.60	1.08	1.91
Richest	12.82	1.18	11.64	0.97	4.22	1.41	5.04
All	7.7	0.82	6.93	1.33	3.38	0.7	1.48
Remittance per capita for receiving households (in '000)							
Poorest	8.85	8.88	8.75	4.65	26.64	9.48	3.96
2	10.05	8.18	10.00	5.39	19.15	17.95	9.24
3	17.18	8.48	19.3	8.91	25.63	16.69	21.85
4	25.14	13.78	26.7	18.81	27.84	14.72	48.64
Richest	43.15	18.74	48.3	26.65	41.00	30.37	84.33
All	19.97	11.48	21.26	8.68	28.25	19.15	57.78
Share of remittance in Total							
Poorest	9.2	10.2%	9.1%	19.9	10.2%	2.0%	0.3%
2	9.8	14.4%	9.3%	17.3	9.1%	13.1%	0.6%
3	17.2%	19.4%	16.9%	15.7	22.6%	16.3%	5.3%
4	30.7%	27.3%	31.1%	32.5	33.1%	29.8%	25.8%
Richest	33.1%	28.6%	33.6%	14.6	24.9%	38.8%	67.9%
All	100.0	100.0%	100.0%	100.0%	100.0	100.0	100.0%

Source: Table adapted from NLSS III Survey.

The wealth creation generated from remittances has undoubtedly had a positive impact on food security. As households escape from poverty, they also tend to escape from food insecurity. As outlined earlier, 86 percent of households in the bottom wealth quintile suffer food poverty (the value of their diet is not high enough to meet minimum requirements) compared to only 1-2 percent in the top two wealth quintiles. Results from the NLSS support these findings and show that poor households with a migrating household member in 2010/11 are less likely to be energy deficient and more likely to eat an adequately diverse diet (see Table 19).

The average annual per capita remittance received by households above the food poverty line is significantly higher than for those below the food poverty line: 15,636 NPR vs. 3,824 NPR, as shown in Table 22. Households that consume a sufficient quantity of food, also generally have significantly higher remittances than those that do not.

The World Bank study (2011) found that of households that receive remittances, 40 percent are fully dependent on the inflows to cover their basic needs, and another 45 percent regard them as very important for going beyond basic needs. In fact, 60 percent of receiving households (and 18 percent of all Nepali households) derived more than half of their income from remittance.

According to NLSS findings, almost 70 percent of households used remittances primarily to cover day-to-day food consumption costs (see Figure 50). In addition, a significant portion of the population, 14 percent, use remittance income primarily to pay back loans, which is consistent across all wealth quintiles. For the poorest households, which spend most of their income on food, loans allow consumption to be maintained when households face shocks or abnormal expenses.

Table 23. Food security indicators for households with and without a migrant member, by expenditure quintile

Expenditure Quintile	Migrants	Rural % HHs with inadequate consumption	Rural % of population energy deficient	Urban % HHs with inadequate consumption	Urban % of population energy deficient
Q1	no migrants	52%	73%	50%	71%
(poorest)	migrants	50%	62%	49%	68%
Q2	no migrants	32%	45%	29%	59%
	migrants	28%	39%	27%	51%
Q3	no migrants	18%	33%	16%	49%
	migrants	14%	28%	14%	46%
Q4	no migrants	13%	25%	11%	39%
	migrants	14%	17%	13%	31%
Q5	no migrants	5%	20%	4%	30%
(richest)	migrants	4%	7%	4%	20%

Table 24. Average remittance received for food secure and food insecure households

Food Security Status	Remittances received per capita per year	Share of remittances to total income
Food consumption above food poverty line	15,636	18%
Food consumption below food poverty line	3,824	15%
Not energy deficient	16,398	19%
Energy deficient	7,412	14%

Few households use a substantial proportion of remittances for capital investment or household assets. However, utilizing remittance income for businesses or investment was a common secondary use of remittances. These findings indicate that while remittances are leading to better overall diets, the improvement in food security seems to be highly dependent on the continuation of household remittance income.

Table 25 highlights differences in the remittances received per household, the share of remittances of total income by development region, and the percentage of households with migrants. The Urban Hills and Kathmandu regions receive the highest overall level of remittances yet have fewer households with migrants compared to other areas. The areas most reliant on remittances in terms of the contribution to total income are the Mid and Far Western Terai, Western Terai, and the Western Hills.

Table 25. Regional remittances per household

Region	Remittances per household	Share remittances of total income	% HHs foreign migrants
Mountains	32064	19%	61%
Urban - Kathmandu	75084	14%	30%
Urban - Hill	77844	21%	52%
Urban -Terai	59221	17%	48%
Rural Hills - Eastern	32167	13%	54%
Rural Hills -Central	56934	18%	52%
Rural Hills - Western	72070	25%	71%
Rural Hills - Mid & Far Western	23223	16%	58%
Rural Terai - Eastern	52571	22%	60%
Rural Terai - Central	48793	21%	56%
Rural Terai - Western	72265	24%	61%
Rural Terai - Mid & Far Western	401547	25%	66%

Figure 50. Use of remittances by wealth quintile, 1st and 2nd most important purpose
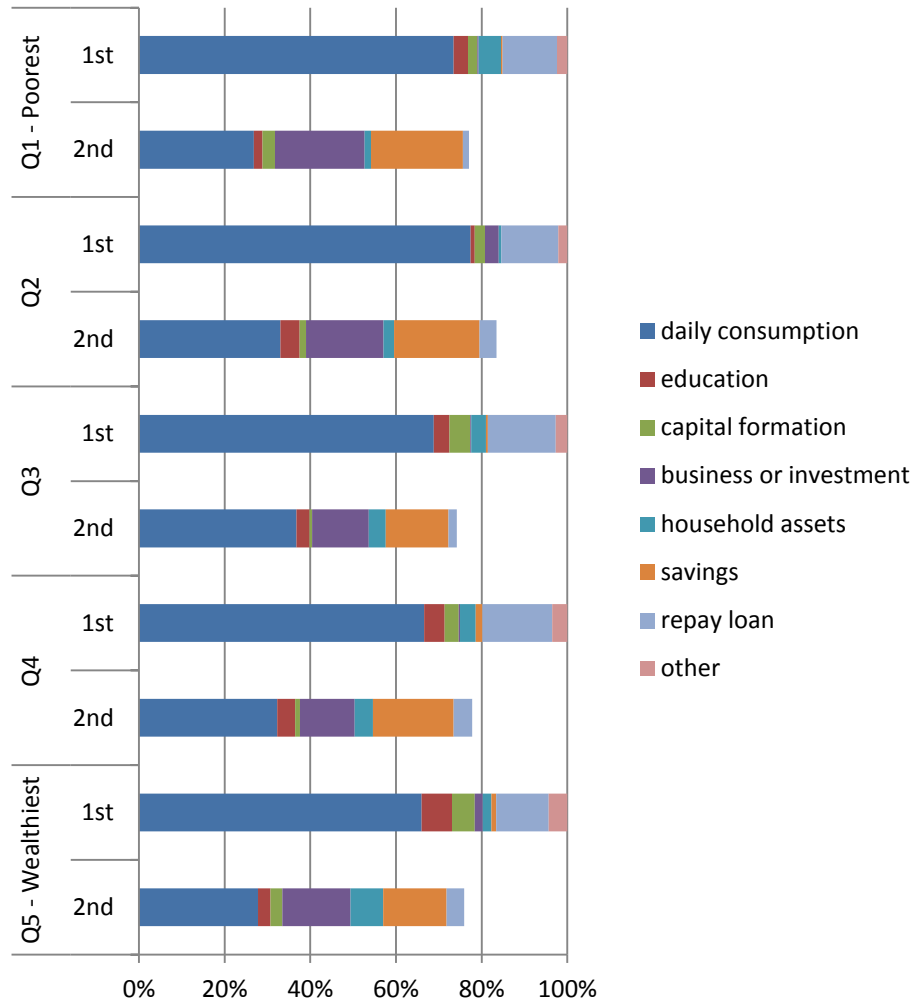
Agricultural inputs and outputs are changing and women are spending more time in agricultural activities

The agriculture sector dominates the Nepalese economy. Agricultural production, including livestock, is fundamentally interlinked with food security and nutrition. This section provides an overview of agricultural performance and important trends for decision makers.

Agriculture provides about 35 percent of GDP, and employs more people than the manufacturing, service, and tourism sectors combined. Agriculture absorbs about 75 percent of Nepal's labor force and three-quarters of all households are employed in the sector. About two-thirds of agriculture's contribution to GDP is from the crops sub-sector; the remainder derives from the livestock sub-sector. Close to 16 percent of the country is arable land. The average household owns 0.8 ha of land, but the majority of households (45%) own less than 0.5 ha, with the average household farm size decreasing over the last several decades. Most agricultural holdings can be classified as subsistence family farms (64%), with only 3.1 percent classified as actual commercial farming operations.

The analysis highlights three key phenomena related to agriculture in Nepal: (i) an increasing food balance deficit; (ii) the increasing feminization of agriculture; and, (iii) changes in land ownership and patterns of use.

A review of agricultural performance

Compared to other countries in Southeast Asia, Nepal has relatively poor yields for key cereal crops. Figure 51 shows annual paddy yields since 1989. Nepal's production is highly reliant on rain fed irrigation, and therefore production is relatively variable between years.

Figure 52 shows the trends in cereal supply and requirement in Nepal since 1994/95. The cereal balance is determined by the production of five major cereal crops: paddy, maize, millet, wheat, and barley. In recent years, potato production has become more important, especially in mountain areas. Potatoes are therefore included in this analysis as a key staple crop.

Between 1995/96 and 2010/11, edible cereal production grew at an average annual rate of 3.4 percent (incl. potatoes). The overall national cereal balance has been positive in most years since 2000, with the exceptions of 2006/07 and 2009/10 when national drought affected production.[21]

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[21] Note that the reduction in requirement in 2009/10; 2010/11, as demonstrated in Figure 52, is due to the adjustment made in view of the 2011 population census.

Figure 51. Paddy yields in S.E Asia (per ha), 1989-2009
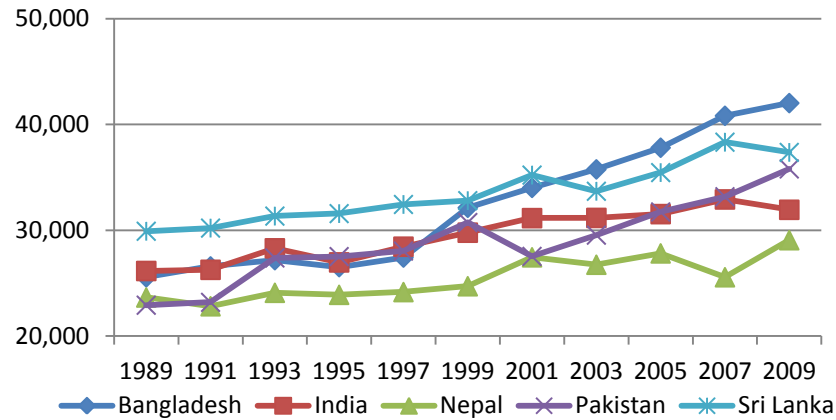
Source: FAOSTAT, 2011.

Figure 52. Cereal production trends, 1994-2011
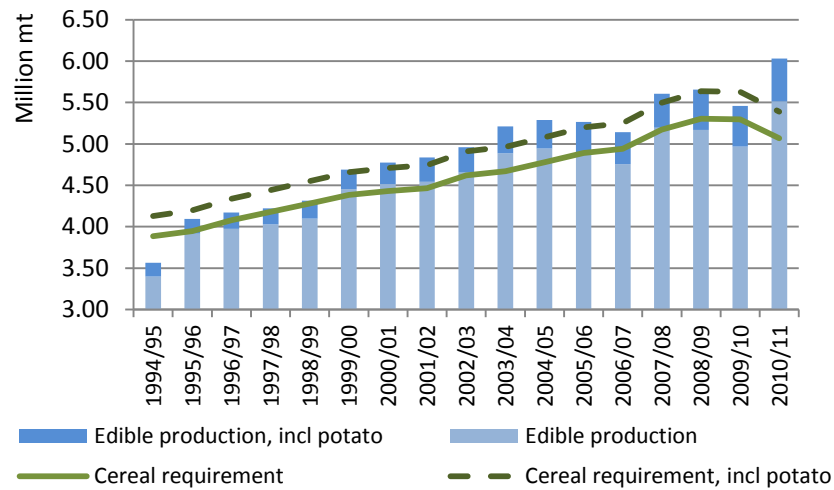
Figure 53. Production, yield, and area under production (cereals incl. potato)

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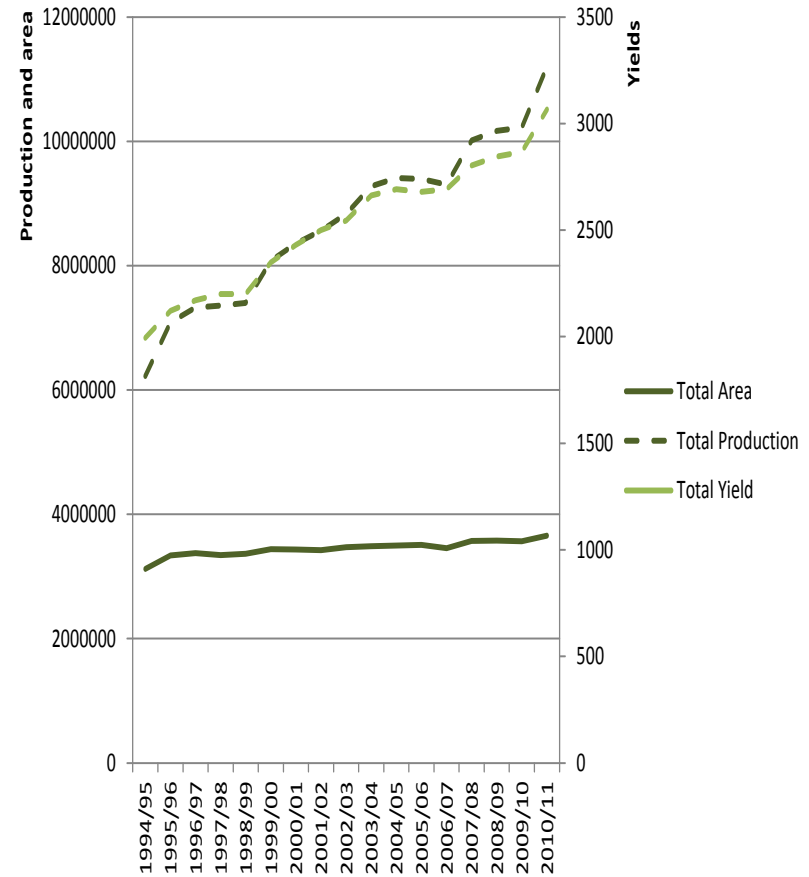
Production trends

Since 1995/96, the increase in production of most staples has been driven by improvements in yield, with the exception of potato and millet. The predominant driving factor for the increased production of potato and millet was the increased area of production.

Since 1995/96, paddy production has increased by 53 percent, maize by 59 percent, wheat by 85 percent, and potato by 231 percent. Millet yields have been relatively stable after reaching a peak in 1999, when the area of land cultivated was significantly increased. Production of millet has increased by 20 percent since 1995/96. In contrast, barley production has been decreasing consistently since 1996. This is believed to be the result of reduced winter snowfall and recurrent winter droughts in key production areas, which has encouraged the plantation of alternative crops (Regmi, 2007).

Table 26. Change in production, yield, and area cultivated between 1995/96 and 2010/11 (%)

	Production	Yield	Area
Paddy	53%	40%	9%
Maize	59%	35%	17%
Millet	20%	1%	18%
Wheat	85%	51%	23%
Barley	-19%	12%	-27%
Potato	231%	59%	108%

There are substantial regional differences in cereal food balances (local production vs. local requirements). The Mid and Far Western Hills and Mountains have been food deficit for many years, whereas districts in the Eastern Terai have become deficit in cereal food production only in recent times.

Livestock and Poultry

Livestock constitutes an integral part of the Nepalese agriculture system. A majority of agricultural households keep livestock. Roughly half of all agricultural households keep cattle, 38 percent of households have at least one buffalo, 52 percent have goat or sheep, 44 percent have poultry, and 10 percent have pigs. Cattle, goats, and sheep are more popular among farmers in the mountains, while buffalo and poultry are more popular in the hills. Piggeries are most common in the Rural Eastern Hills.

The average number of cattle, buffalo, goat, sheep, and poultry among agriculture households are 1.4, 0.7, 2.2, 2.4, and 3.4, respectively. The average number of cattle, goat, and sheep per holding is higher in the Mountains compared to the Hills and Terai. The average number of poultry birds per holding is the highest in the Hills. The majority of households keep fewer than six animals as livestock.

Table 27. Average livestock holdings

	Agriculture households with					
	Cattle	Buffalo	Goat	Goat-Sheep	Pig	Poultry
Development Region						
Eastern	75.8	38.2	68.6	69.2	27.1	65.3
Central	52.1	50.0	65.6	65.7	6.0	43.3
Western	49.2	63.0	64.4	64.5	8.2	55.8
Mid West	77.2	40.9	63.1	64.9	12.3	63.5
Far West	84.3	48.3	54.2	54.9	6.0	37.6
Ecological Zone						
Mountains	80.5	42.8	62.1	63.3	14.6	56.2
Hills	66.9	57.0	69.2	69.4	16.3	67.2
Tarai	58.2	40.2	60.2	60.9	8.2	38.7
Urban/Rural						
Urban	45.2	33.8	49.3	49.5	10.6	39.6
Rural	66.2	49.9	66.2	66.8	12.8	55.1
Analytical Domain						
Mountains	80.5	42.8	62.1	63.3	14.6	56.2
Urban-Kathmandu Valley	5.5	0.0	8.2	8.2	1.4	27.0
Urban-Other Hills	47.2	44.8	60.0	60.0	7.2	46.9
Urban- Tarai	49.0	30.9	46.7	47.0	12.7	34.7
Rural Hills- Eastern	82.1	46.8	68.8	69.1	46.8	85.0
Rural Hills- Central	62.7	59.3	74.2	74.2	13.5	68.6
Rural Hills- Western	51.3	76.0	72.8	72.8	11.4	66.6
Rural Hills- Mid & Far Western	88.9	48.0	67.5	68.1	5.9	62.6
Rural Tarai- Eastern	74.4	35.5	69.4	69.9	10.0	51.3
Rural Tarai- Central	46.7	49.1	60.4	60.4	1.0	19.3
Rural Tarai- Western	51.6	39.1	53.5	53.9	3.1	35.2
Rural Tarai - Mid & Far Western	65.1	38.1	59.2	62.5	19.9	60.8
Consumption Quintile						
Poorest	72.4	44.1	62.8	63.6	14.5	55.9
Second	71.4	47.3	65.3	65.8	13.9	55.8
Third	68.2	51.1	68.8	69.4	13.0	56.4
Fourth	61.2	50.8	67.3	67.8	11.3	52.4
Richest	45.7	47.3	56.5	56.7	10.1	46.9
Nepal	64.2	48.4	64.6	65.1	12.5	53.6

Source: NLSS 2010/11 Statistic Report, VII, CBC, NPC, November 2011.

Changes in agricultural ownership and land holding area

In Nepal, 74 percent of households operate agricultural land holdings and/or rear livestock. Out of the total agricultural households operating land, 58 percent live in the Hills, 43 percent in the Terai and 9 percent are in the Mountains. The majority of households operating land are in rural areas (91%) and the Central Development Region has the highest proportion of agricultural households as a percentage of the population.

Land tenure refers to arrangements or rights under which the holder operates or uses holding land. About 95 percent of agricultural households own land and 10 percent rent out some or all of their land to others; 32 percent of agricultural households operate at least some rented land

The average size of agricultural land holdings is 0.7 hectares. About 53 percent of farms are classified as "small" farms (operating less than 0.5 ha of land) and 4 percent are considered "large" farmers (operating 2 ha or more of land). However, in total, small farmers operate only 18 percent of total agricultural land, while large farmers operate 22 percent of land. The Gini concentration index[22] of agricultural land area in the country is estimated at 0.51.

In rural areas, households that demonstrate better food security tend to have larger land holdings, as indicated in Table 28. For instance, the average net operated area for food poor households is 0.47 hectares, compared to 0.59 hectares for the non-food poor.

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[22] This is a common measure of concentration. The index is one when all area is operated by one holding and a large number of holdings have zero area. The index is zero when all holdings have the same area.

Table 28. Average landholding size for households that demonstrate positive or negative outcomes against varying food security indicators

	Net operated area (ha)		
	Yes	No	Difference
Poor	0.42	0.61	0.19
FCS (poor or borderline)	0.39	0.62	0.23
Food poor	0.47	0.59	0.12
Very high share of expenditure on food >75%	0.47	0.60	0.14
Very high share of food cons on staples >75%	0.50	0.64	0.15
Energy deficiency	0.50	0.60	0.10

Because of population growth, household land holdings are being split many times over as land ownership transfers between generations. Land fragmentation poses a significant challenge to food security in Nepal. As discussed previously, the majority of agricultural households produce insufficient food to meet their entire consumption needs, and in many rural areas, sufficient alternate income generating opportunities are lacking. The average size of agriculture land has decreased significantly in the last 15 years. Between 1995/96 and 2010/11, the number of households that operate less than 0.5 hectares of land has increased by around 13 percent. On the other hand, the number of households with 2 ha or more of land has decreased from 12 percent in 1995/96 to 4 percent in 2010/11. Smaller landholding size reduces the self-sufficiency of farms, and it also reduces incentive for farmers to invest in advanced farming infrastructure and tools due to weak economy of scale.

Figure 54. Average net area operated by agricultural households (in ha)
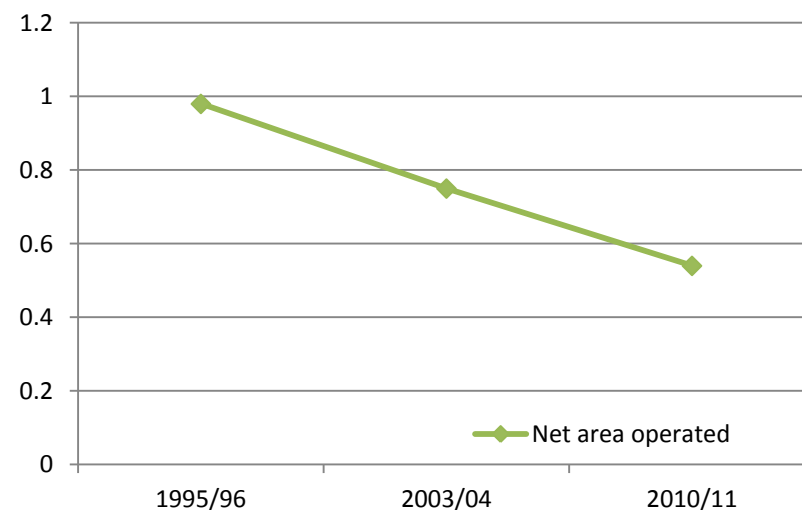
Table 29. Average land holding size (ha) of agricultural households across Nepal

	1995-96			2003-04			2010-11		
	Area owned	Net operated area	Gross cultivated area	Area owned	Net operated area	Gross cultivated area	Area owned	Net operated area	Gross cultivated area
Small Farmers,Mountains	0.48	0.52	0.79	0.52	0.54	0.94	0.45	0.52	0.92
Small farmers, E&C Hills	0.49	0.53	0.89	0.47	0.51	0.89	0.44	0.54	0.97
Small Farmers, Western Hills	0.51	0.53	0.81	0.52	0.54	0.93	0.45	0.51	0.89
Small Farmers, Terai	0.46	0.55	0.92	0.43	0.53	1.00	0.41	0.55	1.06
Medium Farmers, Terai	1.16	1.40	2.32	0.92	1.37	2.58	1.11	1.24	2.38
Medium Farmers, Eastern Hills & Mountains	1.26	1.40	2.22	1.18	1.37	2.35	1.19	1.25	2.15
Medium Farmers, Western Hills & Mountains	1.27	1.35	2.08	1.30	1.31	2.29	1.19	1.23	2.05
Large farmers	3.63	4.09	6.62	2.78	3.27	5.90	2.81	2.96	5.33
Agricultural wage labourers	0.04	0.05	0.08	0.05	0.04	0.11			
Terai non-farm	0.25	0.03	0.05	0.26	0.04	0.10	0.04	0.16	0.32
other non-farm	0.12	0.08	0.14	0.12	0.07	0.14	0.05	0.11	0.21
Total	0.88	0.98	1.58	0.66	0.75	1.35	0.44	0.54	0.98

Use of farming inputs and infrastructure

Agricultural inputs in Nepal have relatively low usage. This section includes a spatial analysis of the use of agricultural inputs and compares changes since NLSS 1 and 2. The analysis focuses on the extent to which access to, and use of, agricultural inputs such as seeds, fertilizers, assets, and credit correlates with better food security and nutrition by household characteristics and location. The analysis shows that wealthier households are substantially higher users of inputs and enhanced infrastructure, as are farmers in the Terai. Farmers in the Mountains have the lowest usage of advanced seeds, irrigation, and fertilizers.

Under Use of Improved Seeds

Only a small proportion of farmers use improved seeds (also known as "high-yielding varieties" or "high-response varieties") for cereal crop production. On average, about one-third of households growing winter potato use improved seeds followed by onion (29%), summer vegetables (26%), winter vegetables (16%), paddy (15%), wheat (13%), and summer maize (9%).

The highest proportion of growers using improved seeds for paddy, wheat, summer maize, and onion are in the Central region. While the highest proportion of growers using improved seeds for winter potato and vegetables are in the Western region.

Table 30. Usage of improved seed varieties in Nepal, 2010 - 2011

	Main Paddy	Wheat	summer Maize	Winter Potato	Onion	Summer Vegetables	Winter Vegetables
Development Region							
Eastern	4.4	13.9	6.7	29.8	32.6	21.6	15.7
Central	23.0	21.7	17.8	32.1	35.1	30.4	20.3
Western	22.2	19.6	3.3	49.1	32.3	39.9	20.9
Mid West	12.9	4.3	9.0	34.1	24.3	20.3	12.8
Far West	5.1	3.2	4.1	12.5	10.0	10.3	7.9
Ecological Zone							
Mountains	5.3	2.9	9.9	16.0	12.1	9.3	6.4
Hills	6.3	5.8	7.1	29.0	19.9	24.0	13.9
Tarai	23.6	22.6	13.1	41.8	40.3	33.8	23.6
Urban/Rural							
Urban	17.7	15.2	14.1	32.7	24.1	34.0	27.9
Rural	14.7	13.2	8.1	34.1	29.1	25.5	15.3
Analytical Domain							
Mountains	5.3	2.9	9.9	16.0	12.1	9.3	6.4
Urban-Kathmandu Valley	28.8	28.6	22.0	53.4	100.0	42.3	35.6
Urban-Other Hills	8.9	8.7	12.9	27.8	15.2	35.4	29.8
Urban-Tarai	23.2	16.2	14.1	34.4	29.4	31.6	25.4
Rural Hills-Eastern	1.8	4.0	4.4	14.6	7.5	6.7	4.0
Rural Hills-Central	14.6	12.6	14.5	28.5	31.1	26.9	17.1
Rural Hills-Western	1.9	5.8	2.8	42.5	25.8	39.2	18.7
Rural Hills-Mid & Far Western	2.7	2.6	6.1	23.3	15.0	11.4	7.2
Rural Tarai-Eastern	5.4	18.9	16.6	38.8	48.0	34.8	29.9
Rural Tarai-Central	29.7	29.7	25.6	41.2	50.0	44.2	30.8
Rural Tarai-Western	54.0	39.3	5.9	64.4	45.8	36.4	17.5
Rural Tarai - Mid & Far Western	15.3	4.7	7.1	33.3	24.5	24.6	17.3
Consumption Quintile							
Poorest	11.2	7.2	4.8	29.4	24.0	15.7	7.8
Second	13.7	12.9	6.0	32.2	28.6	21.4	12.8
Third	13.9	14.6	8.9	34.1	28.2	26.3	15.7
Fourth	13.8	13.5	10.4	34.8	28.0	30.4	20.4
Richest	23.5	21.5	13.4	38.3	34.5	37.0	24.8
Nepal	15.0	13.3	8.6	34.0	28.6	26.3	16.5

Source: NLSS 2010/11 Statistic Report, VII, CBC, NPC, November 2011.

Chemical fertilizers

Table 31 shows the percentage of growers using chemical fertilizers for selected crops. Chemical fertilizers are fertilizers prepared from inorganic materials manufactured through an industrial process. The percentage of growers using chemical fertilizers is highest for paddy (71%), wheat cultivation (53%), summer maize (38%), and winter potato (32 %).

Agriculture equipment

Most farmers rely on locally made agricultural tools for the majority of their farm work. Only 52 percent of farmers own a basic or improved plough (*bikase halo*), and only 33 percent use bins or containers for grain storage. Only one percent of farmers own a tractor or power tiller, and similarly only one percent of farmers own a thresher.

Table 31. Usage of chemical fertilizer usage in Nepal, 2010 - 2011, area (ha) fertilized

	Main Paddy	Wheat	Summer maize	Millet	Lentil	Winter Potato	Mustard	Summer vegetables	Winter vegetables
Development Region									
Eastern	66.9	67.7	41.2	17.7	1.8	40.4	11.1	7.5	3.6
Central	86.1	69.4	67.2	31.1	14.9	38.4	17.9	12.9	6.5
Western	72.0	52.3	34.5	15.3	8.6	30.0	24.0	6.0	2.0
Mid West	59.2	27.8	17.9	4.4	1.3	19.0	8.9	8.4	6.0
Far West	43.4	40.4	6.6	0.9	1.6	9.6	10.0	3.0	1.3
Ecological Zone									
Mountains	32.6	14.4	42.0	23.0	0.0	15.8	7.1	3.8	0.9
Hills	54.4	27.9	37.2	15.3	0.7	26.3	7.4	6.9	4.1
Tarai	88.7	83.8	30.4	14.9	8.8	37.6	23.3	10.6	4.5
Urban/ Rural									
Urban	75.3	68.3	39.3	38.7	5.6	37.3	20.5	15.0	8.0
Rural	69.6	51.4	36.2	15.5	6.6	30.2	14.4	7.3	3.5
Analytical Domain									
Mountains	32.6	14.4	42.0	23.0	0.0	15.8	7.1	3.8	0.9
Urban-Kathmandu Valley	83.1	78.8	34.9	50.0	.	69.9	24.7	27.3	27.8
Urban-Other Hills	68.7	39.6	47.5	37.2	0.0	43.2	8.5	16.3	7.2
Urban- Tarai	79.6	83.1	26.1	43.8	7.6	30.9	28.4	12.5	7.2
Rural Hills- Eastern	37.3	24.9	41.0	16.9	6.7	25.3	3.3	3.2	0.7
Rural Hills- Central	74.3	43.9	65.9	24.3	0.0	33.7	18.9	11.4	8.5
Rural Hills- Western	53.6	26.5	33.9	12.8	2.7	28.7	9.3	4.9	1.6
Rural Hills- Mid & Far Western	37.6	20.3	13.0	1.3	0.0	9.7	2.1	4.1	4.5
Rural Tarai- Eastern	83.8	89.9	36.7	15.8	1.5	52.2	13.2	10.2	5.3
Rural Tarai- Central	96.7	93.8	59.8	7.7	16.4	45.7	18.0	18.1	4.5
Rural Tarai- Western	96.9	84.1	23.1	0.0	10.8	27.3	39.5	5.2	1.6
Rural Tarai - Mid & Far Western	79.7	61.3	18.1	0.0	3.1	21.8	20.7	8.4	4.3
Consumption Quintile									
Poorest	63.2	44.3	19.9	10.6	4.5	27.9	6.9	3.1	1.4
Second	65.0	49.1	28.2	13.5	6.0	26.7	10.0	3.7	2.0
Third	70.4	51.9	38.0	19.7	8.4	27.9	15.2	9.2	5.7
Fourth	71.8	58.9	45.8	18.6	5.5	32.4	19.6	12.3	5.9
Richest	81.0	62.4	50.6	24.4	8.0	39.0	23.1	10.5	3.8
Nepal	70.1	52.5	36.5	16.8	6.5	30.8	14.9	8.0	4.0

Source: NLSS 2010/11 Statistic Report, VII, CBC, NPC, November 2011.

Irrigation

Across Nepal, 37 percent of gross agricultural land is irrigated. The share of irrigated land area is highest in the Terai. Sixty-five percent of farmers use some form of irrigation; however, irrigation is often seasonal, and only 46 percent of farmers irrigate year-round (see Table 32).

Trend analysis for use of irrigation, purchased seeds, and fertilizer

While the use of purchased seeds has increased in Nepal, as shown in Figure 55, the total gross irrigated and fertilized agricultural area has slightly decreased. Tables 32, 33 and 34 show changes in the overall investment of farmers per hectare of their land and indicate that this has significantly increased over time.

Figure 55. Use of Inputs 1995/96 - 2003/04

Legend:
- % farmers using fertiliser
- % farmers using purchased seeds
- % farmers using irrigation
- % of net agricultural land irrigated
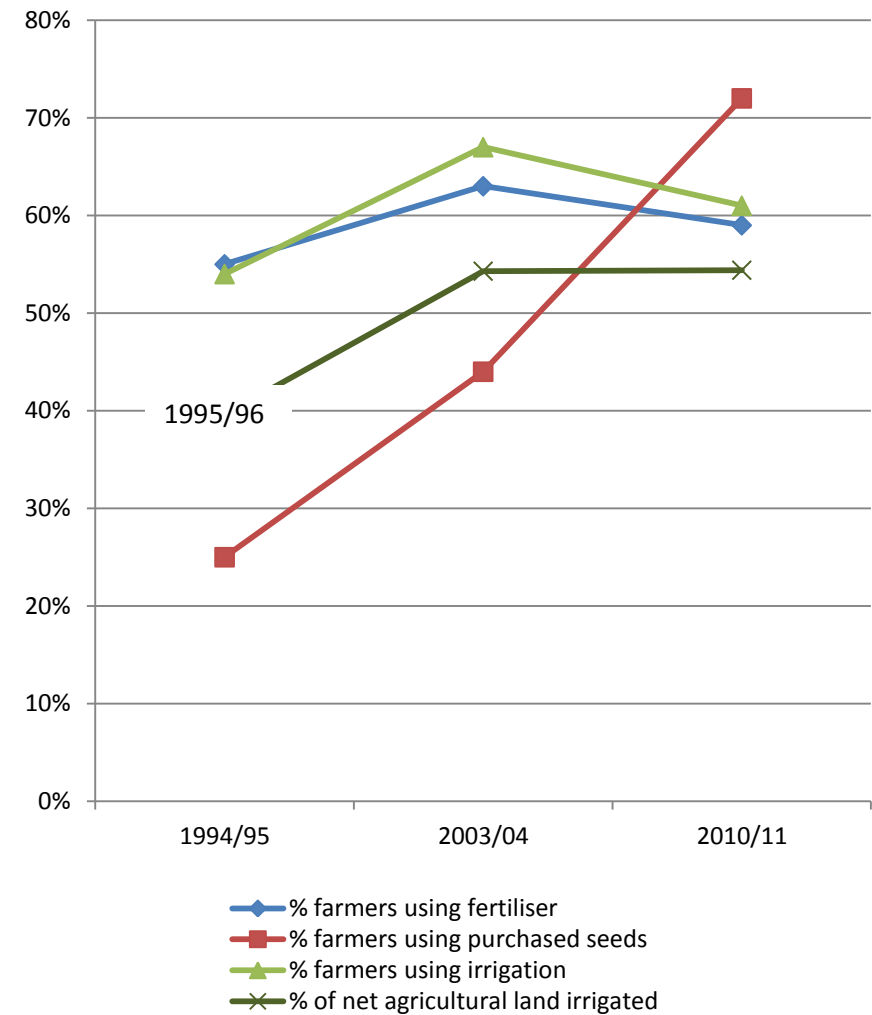
Table 32. Use of irrigation in Nepal

	% farmers using any type of irrigation	% farmers using all year irrigation	Average % of gross area irrigated
National	**65%**	**46%**	**37%**
Mountains	57%	44%	27%
Kathmandu	48%	34%	29%
Urban – Hills	66%	44%	30%
Urban –Terai	68%	48%	45%
Rural Hills – Eastern	62%	40%	29%
Rural Hills –Central	66%	47%	31%
Rural Hills – Western	60%	35%	24%
Rural Hills - Mid & Far Western	53%	38%	21%
Rural Terai – Eastern	69%	49%	45%
Rural Terai – Central	76%	62%	57%
Rural Terai – Western	68%	48%	48%
Rural Terai - Mid & Far Western	73%	55%	50%

Table 33. Average value of agricultural input expenditure, 1995/96 - 2010/11

	Seeds	Fertilizer	Labor	Irrigation
1995/96				
Cost of input				
Small, 0.2-1 ha	410	974	1289	192
Medium 1-2 ha	348	889	1153	136
Large 2+ ha	408	1070	1651	432
National	**399**	**964**	**1287**	**197**
2010/11				
Small, 0.2-1 ha	1054	2504	3315	494
Medium 1-2 ha	895	2286	2963	350
Large 2+ ha	1049	2751	4244	1110
National	**1025**	**2479**	**3308**	**506**

Table 34. Expenditure per hectare of cultivatable land, 1995/96- 2010/11

	% of cultivation costs spent on varying inputs					cost per hectare
	seeds	fertilizer	labor	irrigation	other	
1995-96	8	29	41	3	19	1384
2003-04	7	32	35	3	23	2026
1010-11	11	26	34	5	24	3774

Link between inputs and food security

There is a strong linkage between use of varying inputs and improved food security indicators (see Figure 56). The use of inputs is generally higher amongst wealthier farming households, which can afford to invest more in their farms, and the use of inputs results in enhanced production and improved food security.

Figure 56. Food security scores for households that use or do not use varying inputs
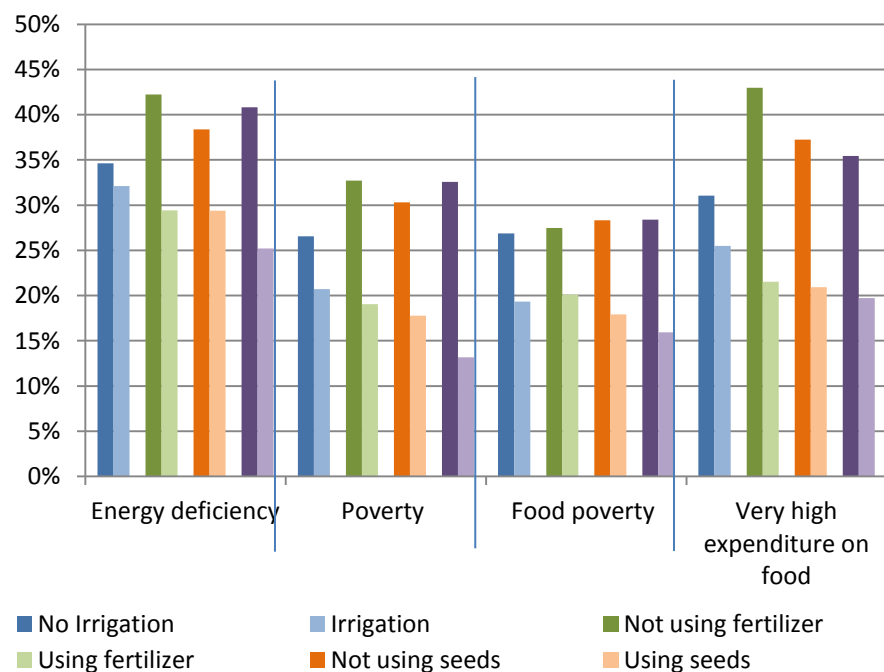
Table 35 highlights the importance of agricultural income to a households' overall income. It is most important to overall income in the Rural Hills, constituting an average of 55 percent of household income.

Table 35. Importance of agricultural income by region

Region	Nominal Average Income	Average share of farm income in total income
Nepal	42,857	27.7%
Mountains	36,816	36.7%
Urban - Kathmandu	98,336	1.4%
Urban - Hills	72,529	15.8%
Urban - Terai	56,100	12.5%
Rural Hills - Eastern	36,750	55.1%
Rural Hills - Central	42,768	10.5%
Rural Hills - Western	38,510	37.6%
Rural Hills - Mid & Far Western	25,334	45.1%
Rural Terai - Eastern	36,491	29.0%
Rural Terai - Central	34,906	27.8%
Rural Terai - Western	40,491	26.3%
Rural Terai - Mid & Far Western	33,063	32.4%

Source: NLSS 2010/11 Statistic Report, VII, CBC, NPC, November 2011.

The importance of agriculture income in total income is declining nationally from 61.1 percent of total income in 1995/96 to 27.7 percent in 2010/11, as shown in Table 36.

Table 36. Importance of agricultural income in national income

	1995/96	2003/04	2010/11
Nominal Average Income	43,732	80,111	202,374
Average share of farm income in total income	61%	47.80%	27.70%

The share of household product sold is shown in Table 37. This share has increased since the 1995/96 and 2003/04 NLSS.

Table 37. Share of crop production sold

	1995-96	2003-04	2010-2011
Paddy	13	21	22
Wheat	10	26	13
Summer maize	8	9	11
Lentils	27	32	22
Winter potato	19	34	40
Summer potato	17	51	56
Sugarcane	74	79	95
Ginger	6	15	56
Cardamom	91	90	69
Winter veg	30	**43**	35
Banana	24	59	70
Miller	11	12	5
Total	16	25	41

The feminization of agriculture and non-agriculture income generation

The feminization of agriculture and the shift away from agriculture towards other income earning activities – including remittance income – are two widely reported phenomena in Nepal's agricultural sector. Examining the hours spent in income earning activities provides insight into these phenomena.

A review of time use data shows that for adults living in rural areas, the time spent engaged in agriculture has increased since 2004, by about 15 percent. However, as a proportion of total time spent engaged in income generating activities, the time spent in agricultural work has decreased from 70 percent of total working time in 2003/04 to 64 percent in 2010/11.

Figures 57 and 58 show the changes in time spent by adults in agriculture and non-agriculture income generating activities. In urban areas, the time spent by males in agriculture has decreased significantly compared to 2003/04, whereas in rural areas, it is similar to 2003/04.

In urban areas, women are spending a similar amount of time engaged in agriculture compared to 2003/04. However, in rural areas, time spent by women working in agriculture has increased significantly. Adult women are now spending the same amount of time engaged in agriculture compared to males, on average 1,300 hours per year.

In recent years, the amount of time that children and young people (12-18) have spent in agricultural activities has slightly increased in-line with an overall increase in income generating activity. However, when other income generating activities are considered, the proportion of time spent

by children and young people in agriculture has declined, as a percentage of total time engaged in income generation.

Figure 57. Average time spent per year by rural dwelling adults in agriculture and non-agriculture income generating activities

Rural - Adult

Legend:
- Other non-agriculture economic activities
- Self employed not agriculture
- Wage not agriculture
- Self employed in agriculture
- Wage in agriculture
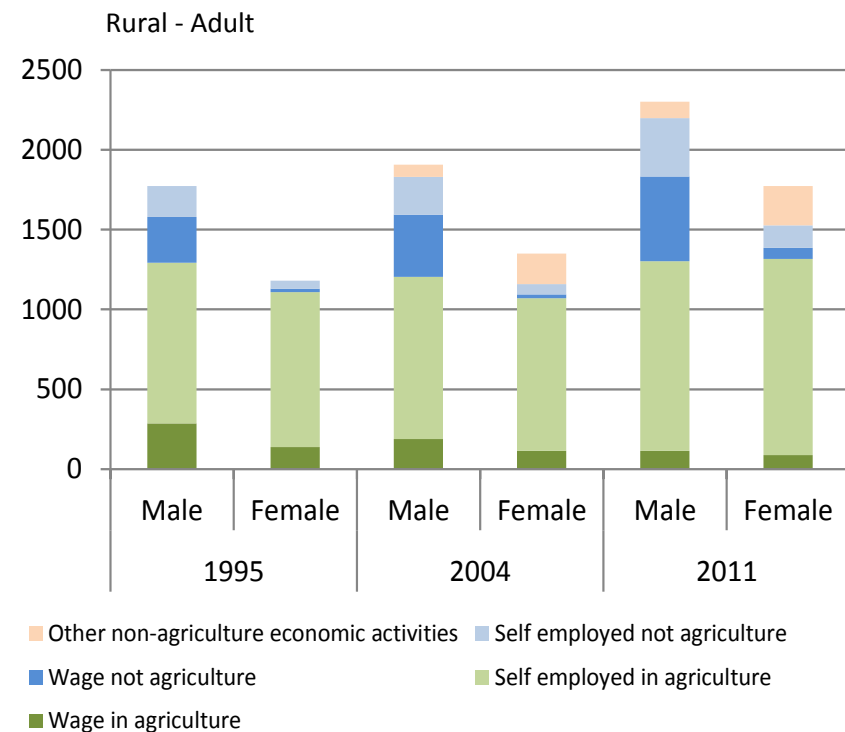
Figure 58. Average time spent per year by urban dwelling adults in agriculture and non-agriculture income generating activities

Urban - Adult

Legend:
- Other non-agriculture economic activities
- Self employed not agriculture
- Wage not agriculture
- Self employed in agriculture
- Wage in agriculture

Figure 59. Average time spent in agriculture income generating activities by young people and children in female headed and male headed households (self employed and wage employed)

Rural - Young Adult

Legend:
- SE not in agriculture
- WE not in agriculture
- SE in agriculture
- WE in agriculture
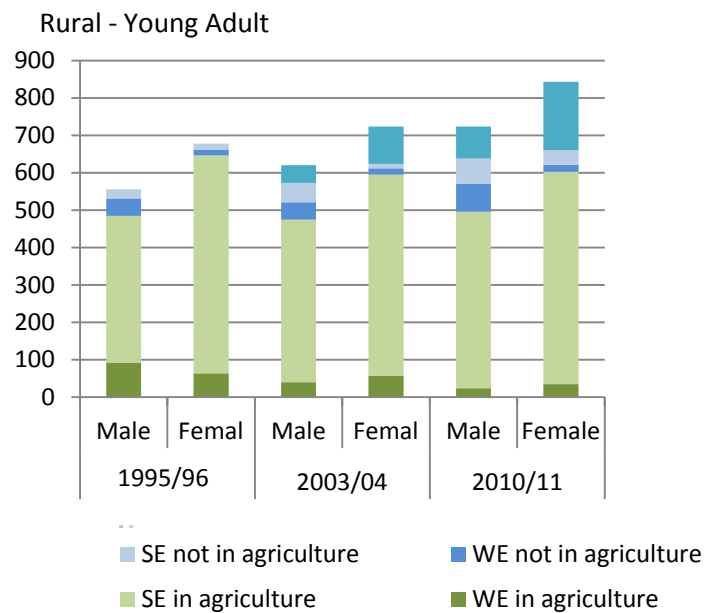
Nepal needs to consider the serious implications of climate change projections on food security.

Food security and nutrition is one of the most climate-sensitive sectors in Nepal (MoE, 2010). Climate variability and change could affect food security and nutrition through a combination of reduced food production, higher food prices, and lower food utilization due to increased infections and more intense and frequent climate-related disasters, which could negatively affect livelihoods and access to critical health and social facilities.

Nepal's rainfall climatology is influenced by the Indian Ocean summer monsoon, and agriculture is predominantly rain-fed, depending heavily on these rains (Shrestha *et al.*, 2000). Increasingly erratic rainfall patterns in recent years (Parthasarty *et al.*, 1992; Staubwasser *et al.*, 2002) and a perceived decline in precipitation, especially in food deficit areas since the 1960s (Kothyari and Singh, 1996), suggest that continued climate variability could have a detrimental effect on food security in Nepal. The combination of consecutive winter droughts and a poor monsoon in 2009, which affected 3.4 million people, further illustrates the sensitivity of the Nepalese food security sector to climate (Oxfam, 2011).

Recent climate variability has adversely impacted livelihoods and food security in Nepal. Over the last decade, data reveal that around 30,845 hectares of land owned by almost 5 percent of households became uncultivable due to climate-related hazards—the Central part of the country has been the most affected (CBS, 2004). In the Eastern Terai, for example, the unusually low rains of 2005/2006 associated with the early monsoon resulted in crop losses of 30 percent (Regmi, 2007). The cold wave of 1997/1998 also had negative impacts on agricultural productivity, resulting in losses of up to 38 percent for chickpea and lentils, and 28 percent for potato (NARC, 1998).

In addition, recent declines in rainfall from November to April have affected winter and spring crops. In particular, rice yields are highly sensitive to climatic conditions—with continued climate variability, declines in rice yields in key production areas could exacerbate poverty and food insecurity (DFID, 2009). Aside from impacts on food production, climate change could have detrimental impacts on food prices through

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CLIMATE PROJECTIONS FOR NEPAL

General circulation models (GCMs) and regional circulation models (RCMs) both indicate an **increase in temperature** across Nepal due to increases in atmospheric greenhouse gas concentration. According to the global models, temperatures in Nepal are expected to increase by 1.2 degrees Centigrade by 2030, compared to the 2000 baseline. While regional models project a temperature increase of 1.4 degrees in the same period. In general, models agree that higher temperature increments are expected in the **winter season**, especially in the Far Western region (IPCC, 2007; MoE, 2010).

Precipitation projections show little agreement, but the majority of models suggest minor or no decreases in precipitation patterns in western Nepal, and increases of up to 10 percent annual rainfall in eastern Nepal. Most of this increase is due to more **intense monsoon precipitation,** resulting in up to 20% increase in rainfall in the summer months. Overall, models also suggest a **decrease in post-monsoon rainfall** in winter months. Winter precipitation provides the main source of water for communities in the mountain and hill regions whose livelihoods depend on livestock and winter crops, and significant declines could exacerbate poverty and food insecurity trends in these areas. (IPCC, 2007; MoE, 2010).

Sources: IPCC (2007); MoE (2010).

reduced agricultural production, higher reliance on imports from India and difficulty in transporting food to remote markets. In Nepal, expenditure on food items accounts for 54 percent of total household expenditure. Given the high reliance on markets in the country, climate-induced food price changes could have significant impacts on the most at-risk groups.

Climate extremes could also affect food security in Nepal. Climate-related disasters such as inundations, landslides, and droughts have had a significant impact on livelihoods and food security. The 2008 floods, which affected over 6 million people (30% of the population), and the 2008/2009 drought, which resulted in over a 15 percent decline in winter crop production, illustrate the potential impact of climate extremes on at-risk populations. In addition, emerging risks, including glacier lake outburst floods (GLOFs), have great potential for devastation in a single event (Kattelmann, 2003). Due to accelerate melting of glaciers, the Tsho Rolpa Lake in the Central Region of Nepal has grown six-fold (from an area of 0.23 square kilometers in the late 1950s to 1.5 square kilometers at present). This process poses a high risk to people downstream in the village of Tribeni. As 30 million cubic meters of water are released, about 10,000 lives, thousands of livestock, agricultural land, and critical infrastructure could be affected (Rana *et al.,* 2000). The destruction could result in costs of up to US$22 million (Richardson, 2004).

Climate and crop production

Historically, climate trends and agricultural production have had a strong correlation in Nepal. Almost 50 percent of the variability in crop yields can be explained by variations in temperature and precipitation in the period 1965-2005 (see Table 38). This correlation is much higher than those found in global analyses, highlighting the high sensitivity of food production in Nepal (cf. Lobell and Field, 2007).

Table 38. Summary statistics of regression models (Δyield = Δtemperature + Δprecipitation), 1965-2005

Crop	Model R^2 (p-value)
All crops	*0.471 (<0.05)*
Pulses	0.483 (<0.05)
Wheat	0.475 (<0.05)
Maize	0.474 (<0.05)
Paddy	0.425 (<0.05)
Millet	0.353 (<0.05)
Potatoes	0.042 (<0.05)
Barley	0.019 (0.061)

The majority of the model's explanatory value comes from a positive correlation with rainfall (see Figure 60). In particular, paddy production is highly sensitive to variations in precipitation (R=0.490, p<0.05). The correlation is particularly strong (R=0.686, p<0.05) in the earlier part of the observational record (1965-1995), during which increases in rainfall were associated with higher yields. In recent years, however, the correlation between precipitation and yields has been weaker—this could be interpreted in terms of potential adaptation strategies such as improvement of irrigation techniques, selection of different crops due to changes in food preferences (see Section 3.1), or changes in the timing of specific agricultural practices.

Figure 60. Precipitation and yield correlations, 1995-2005

The explanatory power of seasonal precipitation is higher for winter crops (close to 50%) than for summer crops (close to 30%), as shown in Table 40. These results indicate that winter crop yields are highly dependent on post-monsoon rains. In recent years, changes in the monsoon behavior associated with El Nino cycles have resulted in lower winter precipitation (or none at all in some years) (Shrestha *et al.*, 2000), which have affected wheat and barley production. The lower correlation between summer precipitation and summer crop yields is explained by the high inter-annual variability in monsoon rain. Moreover, summer crops (paddy to a lesser extent) can be affected by extreme precipitation and flood events, which are likelier to occur in the summer.

Table 39. R value for varying crops

Crop	R value
All	0.388
Paddy	0.490
Maize	-0.183
Millet	-0.197
Wheat	0.025
Barley	0.181
Potatoes	0.054
Pulses	0.086

Table 40. Correlation between crops and growing season precipitation

Crop	Correlation (p-value)
Wheat (winter crop)	0.533 (<0.05)
Barley (winter crop)	0.495 (<0.05)
Paddy (summer crop)	0.460 (<0.05)
Maize (summer crop)	0.357 (<0.05)
Millet (summer crop)	0.349 (0.061)
Potatoes (summer crop)	0.292 (0.082)

Climate impacts on food sources

How will climate affect food sources? As previously observed, the majority of food is obtained through own production or purchases (Trend 1), and both food sources are sensitive to climate (see Table 41). These two sources account for at least 90 percent of all food in all zones. Generally, there is a higher reliance on markets in urban areas, especially for rice, because households in cities produce a deficit and must purchase most of their food. With increasing food prices, urban areas might be particularly affected (Trend 2). Climate-related disasters could contribute to food price volatility through reduced food production.

Under a climate change scenario, food access in mountain areas could be affected in two ways. First, production of winter crops could decline significantly, as described earlier in this section, thereby increasing household reliance on markets. In addition, climate events such as landslides and floods provide challenges to accessing markets, especially in remote mountain areas. Localized heavy rainfall events could increase flooding and further exacerbate difficulties to access markets. Access is complicated further by sandy roads during the dry season and muddy ones during the wet season, hindering access to markets. Climatic changes, impeding access to markets during shocks, can exacerbate food insecurity, particularly in these regions. Similarly, wealthier households tend to produce more of the food that they consume, while poorer households purchase their food from bazaars and markets.

In all zones, the poorest households receive payment in-kind, in the form of grains, for work carried out for the wealthier groups. Therefore, poorer households meet some of their food requirements from gifts and payments in-kind from wealthier households. The poorest households usually take loans in pre-harvest months when staple food prices are high and repay them after the harvest when their economic situation improves. Therefore, the poorest households are dependent on the middle and better-off to meet their basic food needs.

Table 41. Climate sensitivities of food sources

Food source	Climate sensitivity
Own production	Erratic rainfall patterns could lead to floods and droughts that could affect crop production, and therefore the availability of food. While wealthier households obtain more food from their own production, the poorest households in the Mountains and Western parts of the country also obtain a significant proportion of their food from their own production. If production of poorer households decreases, they are likely to depend increasingly on markets.
Purchase	Across Nepal, the poorest households are highly market-dependent and purchase most of their food. Changes in production due to climate-related phenomena are likely to increase food prices, thereby reducing the ability of households to buy food. Climate extremes could also pose challenges to accessing markets: inundation and glacier-related floods could destroy roads that enable poor households to access markets.

Overall, this suggests that the poorest households, in both rural and urban areas, are highly vulnerable to food price changes due to lower production, higher reliance on imports, and difficulty accessing markets under a climate change scenario. Under this assumption, the most vulnerable households are located in areas that primarily buy (import) food and have limited access to markets in the Western and Mountain parts of the country. Indeed, the percent of expenditure on food is highest in the Hills and Mountains, with the highest food expenditure in

the Far Western region of Nepal, further highlighting the vulnerability of the region.

Climate and seasonality of food consumption

In the Rural Hills and Terai, food consumption is rather stable throughout the year because households are able to purchase food during the lean season (see Section 2 for analysis of food consumptions seasonality). In the mountain areas, although the bulk of consumption comes from household production, purchased food and in-kind support provide an important source of food during the lean seasons. Therefore, in the Mountain areas, cash, credit, and in-kind support are important mechanisms for households to meet their food requirements.

Under a climate change scenario, two outcomes could limit the ability of households to meet their food needs, particularly in the lean seasons. Reduced winter crop production due to lower post-monsoon precipitation would force households to purchase more of their food. Higher food prices would require households to spend more of their income on food.

Climate impacts on income

Certain professions are more closely linked to food insecurity because of of their inherent low incomes (Trend 3). In particular, households dependent on income from cash crops and/or livestock, their own farm and/or forest, and agricultural labor are more likely to be poor or consuming poorer diets than other households. These three activities are highly sensitive to climate (see Table 42).

Table 42. Climate sensitivities of income sources

Income source	Climate sensitivity
Cash crops/livestock	Changes in rainfall patterns are expected to decrease the quantity and quality of water available for crop and livestock production, resulting in lower quality crop yields, and lower livestock, meat, and milk quality.
Own farm/forest	Agriculture in Nepal might be affected by erratic rainfall patterns, which could reduce the growing season and yields.
Agriculture laborer	Agricultural labor is likely to be affected by seasonal and long-term changes in rainfall patterns. Labor availability under climate change is likely to become unpredictable, potentially lowering income for agricultural laborers.

Food Security and Nutrition Country Profile

2010/11	Diet Quantity		Diet quality					Overall consumption			Economic Vulnerability		Under nutrition					
	Daily food energy consumption per capita (KCALS)	Population with food energy deficiency	% energy derived from staples	Households with high energy share from staples	Household with very high share of energy from staples	Household diversity score	Households with low dietary diversity	Households with Poor Food Consumption	Households with inadequate Food Consumption Score	Population Food Poor	Household with very high percentage of expenditure on food	Population below poverty line	% Stunted	% Stunted, severe	% Underweight	% Underweight severe	% Wasted	% Severe wasting
National	2536	38%	72%	84%	46%	6.49	9%	8%	20%	24%	22%	25%	46%	18%	35%	10%	15%	3%
Urban	2525	43%	66%	69%	24%	7.01	5%	4%	10%	13%	6%	15%	31%	9%	22%	7%	12%	5%
Rural	2539	37%	74%	87%	52%	6.35	10%	10%	23%	26%	27%	27%	49%	20%	37%	10%	15%	3%
Area																		
Mountains	2403	45%	77%	91%	60%	6.03	12%	14%	32%	40%	33%	42%	61%	28%	40%	9%	9%	2%
Urban – Kathmandu	2481	53%	62%	60%	13%	7.24	2%	3%	8%	12%	0%	11%	23%	6%	10%	4%	7%	2%
Urban – Hill	2524	42%	65%	69%	20%	7.03	5%	4%	8%	9%	7%	9%	30%	6%	16%	4%	5%	1%
Urban –Terai	2553	38%	69%	76%	35%	6.84	8%	5%	13%	16%	8%	22%	34%	12%	31%	9%	19%	8%
Rural Hills – Eastern	2542	43%	72%	82%	48%	6.25	10%	12%	25%	17%	39%	16%	54%	18%	24%	4%	5%	0%
Rural Hills – Central	2422	45%	73%	85%	46%	6.19	15%	15%	33%	28%	19%	29%	45%	18%	31%	6%	5%	1%
Rural Hills – Western	2452	42%	70%	78%	37%	6.42	8%	7%	16%	25%	24%	28%	47%	20%	28%	5%	7%	1%
Rural Hills – Mid & Far Western	2331	49%	76%	93%	57%	6.07	15%	10%	24%	41%	42%	37%	55%	25%	35%	11%	11%	3%
Rural Terai – Eastern	2640	28%	75%	90%	58%	6.52	6%	5%	19%	21%	23%	21%	43%	11%	36%	8%	20%	4%
Rural Terai – Central	2762	23%	76%	93%	59%	6.57	10%	9%	21%	20%	22%	23%	47%	21%	40%	17%	27%	7%
Rural Terai – Western	2590	34%	72%	82%	44%	6.63	6%	3%	10%	20%	22%	22%	46%	21%	42%	16%	24%	4%
Rural Terai – Mid & Far Western	2515	37%	76%	90%	56%	6.30	12%	13%	29%	29%	22%	31%	45%	17%	34%	5%	14%	2%
Wealth quintile																		
1 (lowest 20%)	1856	69%	82%	98%	84%	5.07	33%	28%	52%	86%	37%		58%	28%	46%	16%	16%	4%
2	2309	45%	78%	96%	68%	5.87	13%	13%	29%	24%	32%		54%	23%	39%	12%	17%	2%
3	2578	33%	74%	92%	52%	6.45	6%	4%	16%	6%	24%		49%	16%	38%	8%	13%	3%
4	2844	25%	70%	83%	35%	6.89	1%	4%	13%	2%	18%		38%	13%	28%	8%	14%	5%
5 (Highest 20)	3095	19%	63%	61%	14%	7.44	1%	1%	5%	1%	9%		30%	11%	22%	4%	13%	2%
Male-headed household	2535	39%	73%	85%	48%	6.45	10%	8%	20%	24%	23%	26%	46%	19%	36%	11%	16%	4%
Female headed household	2539	34%	71%	81%	40%	6.60	8%	9%	22%	24%	20%	24%	45%	17%	30%	7%	11%	3%
Caste/Ethnicity																		
Brahman, hill & terai	2721	31%	64%	66%	18%	6.85	4%	2%	5%	13%	11%	11%	34%	7%	27%	5%	12%	2%
Hill Chetri	2540	39%	70%	79%	34%	6.62	7%	5%	14%	26%	20%	23%	45%	19%	32%	7%	10%	3%
Terai middle caste	2687	27%	76%	94%	60%	6.38	10%	4%	14%	26%	20%	29%	52%	22%	46%	16%	24%	6%
Dalit, hill & terai	2360	43%	78%	94%	66%	6.02	15%	16%	35%	35%	39%	42%	53%	22%	43%	13%	19%	4%
Newar	2521	47%	67%	73%	25%	7.00	4%	4%	14%	12%	6%	10%	30%	7%	10%	1%	3%	0%
Hill Janajati	2377	49%	74%	87%	52%	6.30	13%	14%	30%	27%	28%	28%	50%	20%	28%	6%	6%	2%
Terai Janajati	2629	31%	78%	94%	69%	6.39	9%	12%	30%	24%	25%	26%	31%	14%	41%	12%	29%	5%
Other	2582	30%	74%	88%	54%	6.65	6%	6%	18%	12%	26%	19%	45%	22%	36%	12%	15%	5%

Conclusion

5.1 Key Policies relating to food security and nutrition

Nepal has a comprehensive range of policies, strategies, and initiatives to promote food security and nutrition. Nepal's overall development strategies traditionally have been outlined in Five Year Plans. Due to the political changes in 2006, leading to the Comprehensive Peace Agreement that ended the Maoist insurgency, the end of the monarchy, and the election of a Constituent Assembly, a Three Year Interim Plan (TYIP 2007/8-09/10) was launched, which provided a new mechanism to outline major development plans. A second TYIP has been finalized, covering the period between 2010/11-12/13.

The objectives for the agriculture sector as expressed in the TYIP (2010/11-12/13) and addressed by the National Agriculture Sector Development Priority plan (NASDP 2011-2015), and the associated Country Investment Plan are

- To ensure food and nutrition security,
- To make agriculture sector competitive and business-oriented, with increased production and productivity,
- To reduce poverty by increasing employment and income generating opportunities in the agriculture sector,
- To minimize adverse effects of environment, climate variability, and climate change in the agriculture sector,
- To develop cooperatives for agriculture development,

- To develop human resources for the management of a sustainable agriculture development process.

According to the Three Year Interim Plan (TYIP) Approach Paper 2010/11-2012/13, the Agriculture Perspective Plan (APP), and the National Agriculture Policy 2004 (NAP) are the principle policies guiding food security. The measurable outcome indicators for the TYIP (2010/11-2012/13) are largely framed around production. However, the government is currently designing indicators that include food security parameters as well. This thematic report has highlighted the key indicators and will provide a valuable benchmark as the government tracks its progress in meeting key food security goals. The Agricultural Development Strategy (ADS) is being prepared and will replace the APP. In parallel, the Food and Nutrition Security Plan (FNSP) is also being prepared and will be incorporated in the ADS.

This report's findings update Nepal's progress *in food availability and food access.* They are especially relevant to monitoring progress and challenges towards the APP and NAP. In particular, the report highlights the outcomes and challenges of varying regions and demographic groups, which can assist in prioritizing strategies at a more micro level. Measures of agriculture production and market prices are particularly important for determining food *availability* responsive to demand. Whereas measures of food poverty are important for better understanding household *access* (see the following section on Measurement Techniques).

To improve nutrition, the National Planning Commission (NPC) has developed an innovative Multi-Sectorial Nutrition Plan (MSNP), which is

based on recommendations of the 2010 Nutrition Assessment and Gap Analysis (NAGA).

The long-term policy in the MSNP is to improve maternal and child nutrition focusing on the critical period of vulnerability, that is the period from conception, through pregnancy, infancy, and early childhood for the first two years of a child's life. This early period in life is critical for healthy cognitive, mental, and physical development. Poor nutrition during the first two years of life may cause irreversible damage and lifelong burdens. Interventions that enhance nutrition during this critical window of opportunity have the greatest impact on improving chronic undernutrition and will contribute to interrupting the intergenerational cycle perpetuating poor nutrition.

The focus of the MSNP is based on evidence that about half of chronic undernutrition is rooted in poor maternal nutrition, and the other half in poor infant and young child nutrition (IYCN).[23] The past ten years of data indicate that about one in five babies in Nepal are born with low birth weight. Recent data from the NDHS and the NLSS confirm that by two years of age, about a half of all children suffer from chronic undernutrition, after which undernutrition rates change little until age 5.

5.2 Linking Outcomes to Policy

Nepal has achieved significant improvements in food security and nutrition during the last 15 years. The data analyzed for this report illuminates the way forward to further ensure food and nutrition security for the Nepalese. Anthropometric measurements conducted on children aged 0–59 months indicate very high stunting, underweight, and wasting rates, especially within the first two years of life of children, and particularly amongst children from poor families. While food availability and access remain the major challenge for the poor, the persistently high prevalence of chronic undernutrition (child stunting) at 46 percent indicates that household access to food through income, own production, etc., and the availability of food of adequate quantities and quality through markets, etc., is inadequate to guarantee improvements in child undernutrition. This is particularly evident given the incredible 30 percent stunting rates in the highest income quintile in Nepal.

This reports key implications for food security and nutrition policy and programming are summarized below.

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[23] Ministry of Health and Population (MOHP) [Nepal], New ERA, and ICF International Inc. 2012. Nepal Demographic and Health Survey 2011. Kathmandu, Nepal: Ministry of Health and Population, New ERA, and ICF International, Calverton, Maryland.

Target groups requiring attention

Despite significant improvement in food security across Nepal, some populations still lag behind. Households in rural areas have worse food consumption and are more likely to be food poor than urban areas. A significantly higher prevalence of undernutrition is found in rural areas compared to urban areas. Populations living in the Mountains and Mid and Far Western Hills have a poorer food consumption and a higher prevalence of undernutrition, particularly for stunting.

Food security and undernutrition are highly related to wealth. All food security indicators improve with wealth, and the measure of food poverty improves most dramatically. For households in the poorest wealth quintile, the food poverty indicator is 86 percent and only 24 percent for households in the second poorest quintile. While undernutrition also improves with wealth, it is relevant that the prevalence of undernutrition is still high even among the wealthiest households, suggesting that other factors beyond food availability and income are influencing nutrition. The role of cultural practices and social exclusion needs to be considered further at all levels.

The caste, ethnic or religious social group to which a household identifies, is one of the key determinants of food and nutrition security. Marked differences in nutrition exist across ethnic and caste groups. Dalits living in the Terai and Hill areas have the worst food consumption score, whereas Brahmins living in the same areas have the best. In addition, the average food security indicator scores for Dalits and Janajatis are generally worse than the average indicator scores for any one geographical region. This finding highlights the importance of providing assistance to marginalized households living in relatively better off areas, in addition to geographically based programs of support, to achieve national food and nutrition security.

Infants under six months of age bear a high burden of chronic undernutrition, and almost fifty percent of children are stunted by the time they reach two years of age. Because the rate of linear growth retardation is most pronounced during the first two years of life, nutrition interventions are critical during this vulnerable development period, and the pre- and immediate postnatal period. Poor educational attainment by the household head and mothers is linked to poor food and nutrition security outcomes in the findings. Literate heads of households tend to consume a better quality diet than illiterate heads of households. Mothers with little or no education were more than twice as likely to have children suffering from stunting compared to children with mothers having 12 or more years of education. Sustaining and improving education is a priority intervention to ensure overall food and nutrition security countrywide.

Relationship between food insecurity and undernutrition, and key determinants of undernutrition

There was a statistically significant relationship between overall dietary energy sufficiency of household consumption with stunting and underweight, but not with acute undernutrition, or wasting. This implies that intra-household distribution of food and other factors relating to caring and feeding practices underlie the levels of wasting in some areas.

Children from households consuming at least 60 percent of their total calories from staples (*High Staple Diet*) or at least 75 percent of the total dietary energy from staples (*Very High Staple Diet)* were significantly more likely to be stunted or underweight. In general, there was a 50 percent greater probability that a child from a household with a High or Very High Staple Diet would be severely stunted or severely underweight as compared to a child from a household with a more diverse diet. The importance of this indicator on wasting appeared more significant among households that consumed 75 percent or more of their diet from staples.

Similarly, there was a positive association between the Dietary Diversity Score and indicators of chronic undernutrition, although it was most significant for severe stunting and underweight.

Besides food security, the analysis on key determinants of malnutrition identified the followings as among the factors affecting child undernutrition: age, as demonstrated by a high burden of chronic undernutrition among infants under six months of age; behaviors and practices, as seen from a marked difference in nutrition outcomes across ethnic and caste groups; infectious diseases exacerbated by inadequate hygiene and poor sanitation; and poverty.

The analysis on key determinants of malnutrition and food security identified the following as among the factors affecting child undernutrition:

- age, as demonstrated by a high burden of chronic undernutrition among infants under six months of age;
- behaviors and practices, as seen from a marked difference in nutrition outcomes across ethnic and caste groups;
- infectious diseases exacerbated by inadequate hygiene and poor sanitation; and
- poverty.

The analysis revealed the important links between food security and nutrition, but the factors affecting food utilization and nutritional status could not be captured fully due to the lack of those variables in the dataset. The triangulation of data from the NLSS together with the recent NDHS, which did gather information on morbidity, early child feeding and caring practices, will be useful in the future.

Agriculture and Food Security

The majority of Nepalese households rely on income from farming activities as their primary livelihood. This report has highlighted that farming households with access to improved farming inputs and assets are typically more food secure. However, usage of such inputs such as fertilizers and improved seeds is still considerably low in Nepal. In particular, usage of storage facilities is limited across the country, which contributes to large stock losses every year. Most farmers rely on locally made agricultural tools for the majority of their farm work. Only 52 percent of farmers own a basic or improved plough (bikase halo), and only 33 percent use bins or containers for grain storage.

The findings also highlight the importance of improving access to irrigation to improving food security. Currently, all season irrigation has low use rates countrywide. Targeted investment in agriculture should remain a national priority to ensure sustainable food security in Nepal.

Climate change implications

Ongoing and new agricultural policies in Nepal need to consider the serious implications of climate change on food security, particularly the potential for increasingly erratic rainfall and the long-term suitability of crops in certain areas. The likelihood of reduced winter crop production due to lower post-monsoon precipitation in some regions is of particular concern to food security amongst those in poor Hill and Mountain areas that are economically and environmentally highly vulnerable to climate changes.

Poverty, high food prices and the hunger trap

Increased wealth in Nepal generally has resulted in better food security outcomes. Nonetheless, a portion of the population remains trapped in extreme poverty and hunger. For the poorest households in Nepal, high food prices result in reduced consumption and force them to spend even more of their income on food. Households with very high food expenses live primarily in rural areas. This group accounted for 27 percent of rural households and 6 percent of urban households.

Income determines people's ability to access food beyond their own self-production. The poorest households are generally the most likely to be food insecure: 35 percent of the population in the poorest wealth quintile (Q1) consider their diet inadequate compared to only 5 percent in the wealthiest quintile (in this report, consumption is a proxy for wealth). All indicators improve with wealth. The most dramatic improvement is the measure of food poverty, which is 86 percent for households in the poorest wealth quintile, and only 24 percent for households in the second poorest quintile.

Agricultural daily wage laborers, and those dependent on their own farms as their primary source of household income, generally are the poorest and most food insecure (see Section 4).

Targeted food and cash transfer interventions for the poor and most food insecure populations are likely to have a considerable impact on their food consumption.

Transfers to support food consumption and overall nutrition

A higher proportion of income spent on food helps reduce food insecurity and improves nutrition. This finding suggests that a cash transfer during the lean period when this expenditure is more critical will help support food and nutritional security of vulnerable populations.

In Mountain areas where noticeable seasonal food security exists, timely in-kind food or cash assistance smoothed out consumption through the lean period. When in-kind food is unavailable or provided too late, consumption dipped considerably. Thus, findings demonstrate that the timing of transfers of assistance is important when targeting the seasonally food insecure.

The need to continue to support improved dietary diversity

Nepal significantly has improved its dietary diversity in recent years. Household vegetable consumption has almost tripled compared to 2003/04 (from 470g per month to 1,309g), and meat and fish consumption has more than doubled (from 402g per month to 847g). Despite improvements, dietary diversity remains relatively weak; a large percentage of the overall diet derives from staples across all wealth groups countrywide.

Overall, the level of increased dietary diversity is encouraging, and a practice that needs to be promoted in some regions of the country that lag behind in consumption of fruits, vegetables, and proteins. Differences in dietary diversity also exist between caste and ethnic groups. Targeted interventions to improve the production and availability of vegetables as well as access are important going forward to support greater dietary diversity amongst the whole population. Targeted public education campaigns are necessary to improve consumption of fruits, vegetables,

and proteins amongst households that can currently afford access to such foods but are not consuming them.

Activity levels and the need for a greater understanding on how this impacts kilocalorie needs

Consumption requirements are effected by activity levels. The findings highlighted considerable difference in activity levels between regions and that young females in rural areas are engaging in strenuous physical activity. Varying intensity of activity require higher kilocalorie requirements and different consumption needs. This area of inquiry was not examined in this analysis and it therefore remains an area for future research.

The amount of time spent in activities classified as hard by young women and children, particularly in rural Mountain and Hill regions, highlights the high energy needs of this age group, and the level of physical stress placed on girls and young women of childbearing years, which raises a number of nutrition-related health concerns.

Remittance Income and food security

Remittances are important to the food security of the poor in Nepal. According to NLSS findings, over 70 percent of households in the poorest two wealth quintiles used remittances primarily to cover day-to-day food consumption costs. In addition, 14 percent of the population use remittance income primarily to repay loans, which is consistent across all wealth quintiles. For the poorest households, which spend most of their income on food, loans allow consumption to be maintained when households face shocks or abnormal expenses.

Few households use a substantial proportion of remittances for capital investment or household assets. However, a common secondary use of remittance income is for businesses or investment. While remittances have led to better overall Nepalese diets, the improved food security achieved in recent years seems to be highly dependent on the continuation of household remittance income.

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Appendix

1. Anthropometric measures

The nutritional status assessment was based on the collection and analysis of anthropometric measurements of height and weight. These measures were obtained using standard approaches by skilled fieldworkers who underwent a series of standardized training exercises. In addition, children's ages were calculated from their birthdate and the date of examination to determine the actual age as accurately as possible. From these basic parameters, data were compared to the new growth standard of the World Health Organization and individual status was generated for three indicators, weight-for-height, height-for-age and weight-for-age. The calculations were executed using software and algorithms developed by the WHO that are widely employed in nutritional status surveys throughout the world, http://www.who.int/childgrowth/software/en/. Use of these procedures assures that data from the NLSS are comparable with other data from within Nepal, as well as nutritional status data from other countries.

To estimate nutritional status of each child, standard deviation (SD) scores were computed for each of the three indicators and classified to determine the prevalence of wasting (low weight-for-height), stunting (low height-for-age), and underweight (low weight-for-age) using international criteria (e.g., values falling < -2 SD from the reference

median for the respective indicator). In this analysis, the prevalence of severe undernutrition has been classified based on the proportion of values < -3 SD from the median for each of the three indicators. To eliminate possible measurement or calculation errors, a series of outlier criteria were applied to the data and values falling above or below these ranges where coded as missing. The range of values used to determine outliers included:

Height-for-age Z-scores	- 5.99 or > 5.99
Weight-for-age Z-scores	- 5.99 or > 4.99
Weight-for-height Z-scores	- 4.99 or > 4.99 [24]

In the original analysis of the NLSS data, estimates for the nutrition indicators were based on an older version of the international reference standard. There are some differences in the estimates resulting from these two approaches, although they are not statistically significant. The data and results presented in this report were reviewed and accepted by the Central Bureau of Statistics. The absolute levels of undernutrition in the NLSS are somewhat higher than those reported in the 2010 NDHS, but these can be explained by sampling differences. More importantly, there were similar patterns and observations noted between the two surveys with respect to the key determinants of chronic and acute undernutrition, including geographic and socioeconomic covariates.

[24] World Health Organization. Anthro for personal computers, version 3.1, 2010: Software for assessing growth and development of the world's children. WHO, Geneva, 2010, http://www.who.int/childgrowth/software/en/, (Section 3.4.2).

Basic descriptive analysis of the anthropometric data was undertaken using a series of household weights to accommodate the complex sample design in which "clusters" of households and individuals within villages, as basic enumeration units, were selected. Estimates of undernutrition were stratified by key demographic variables to identify the sources of variation associated with undernutrition in the country, focusing on indicators of food security, recognizing that many of the most important factors influencing nutrition were not included in the NLSS data set.

Basic Descriptive Analysis of Children with Anthropometry

Anthropometric measurements were collected from 2,502 children under five years of age and included in the survey. Table 43 presents the basic descriptive characteristics of these children.

Table 43.Basic characteristics of children in NLSS, 2011

Characteristic	n	%
Total	**2502**	**100.0**
Age group (months)		
< 6	208	8.3
6-11.9	243	9.7
12-23.9	472	18.9
24-35.9	507	20.3
36-47.9	548	21.9
48-59.9	524	20.9
Gender		
Boys	1295	51.8
Girls	1207	48.2
Location		
Urban	619	24.7
Rural	1883	75.3
Ecological belt		
Mountain	197	7.9
Hill	1201	48.0
Terai	1104	44.1
Analytical domain		
Mountains	197	7.9
Urban - Kathmandu	213	8.5
Urban - Hill	140	5.6
Urban -Terai	242	9.7
Rural Hills - Eastern	137	5.5
Rural Hills -Central	199	8.0
Rural Hills - Western	184	7.4
Rural Hills - Mid and Far west	328	13.1
Rural Terai - Eastern	213	8.5
Rural Terai - Central	304	12.2
Rural Terai - Western	156	6.2
Rural Terai - Mid and Far west	189	7.6

2. Food Consumption and the Dietary Diversity Score

Food consumption is a reflection of food availability and food access at the household level. It is frequently used as a proxy indicator of the current food security situation. The Food Consumption Score (FCS) is a composite score based on the dietary diversity, food frequency, and relative nutritional importance of various food groups consumed by a household.

Households were asked on how many days in the past week prior to the survey they had eaten a food item from a list of various food items eaten commonly in the local context. These food items are divided into eight standard food groups: main staples (such as bread, cereals, tubers and roots); legumes and nuts; meat, fish, poultry and eggs; vegetables (including green leafy vegetables); fruits; oils and fats; milk and other dairy products; and sugar.

Once the items are categorized into the appropriate food groups, the nutritional value of each group (see table below) and the frequency of consumption (with a maximum of seven days per group) are used to calculate the FCS using the following formula:

$$FCS = a_{cereals} x_{cereals} + a_{pulses} x_{pulses} + a_{veg.} x_{veg.} + a_{fruits} x_{fruits} + a_{animal} x_{animal} + a_{dairy} x_{dairy} + a_{sugar} x_{sugar} + a_{oil} x_{oil}.$$

a_i = Relative nutritional weight of food group

x_i = Number of days of consumption for each food group (≤ 7 days)

Table 44. Grouping of food items and their relative nutritional weight

Food item	Food group	Weight
Bread, rice, wheat, potatoes and cassava	Cereals, tubers and root crops	2
Beans, peas, lentils and nuts	Pulses	3
Vegetables	Vegetables	1
Fruits	Fruit	1
Pork, beef, goat/sheep, poultry meat, eggs and fish	Meat and fish	4
Milk and other dairy	Milk	4
Sugar and honey	Sugar	0.5
Oil, butter and other fats	Oil	0.5

The FCS is a continuous variable with a range from 0 to 112. To provide more meaningful descriptive analysis of food consumption than reporting average scores, households are categorized into food consumption groups based on their FCS. The standard food consumption groups are poor, borderline and acceptable.

The standard thresholds of 21 and 35 are used to define the three household food consumption groups (poor, borderline and acceptable). The household FCS is categorized using standard thresholds that indicate the status of the household's food consumption. WFP's standard thresholds are applied when a score of 21 and 35 reflect a poor or moderate diet with low micronutrient value. However, when oil and sugar are consumed daily, a score of 21 and 35 contains an even lower amount of dietary diversity. In this situation, the standard threshold is raised to 28 and 42.

Table 45. Food consumption thresholds

Food consumption group	Standard threshold	Adjusted thresholds*
Poor food consumption	0 – 21	0-28
Borderline food consumption	21 - 35	28 – 42
Acceptable food consumption	> 35	> 42

with oil and sugar eaten on a daily basis

To ensure that the FCS is an appropriate and valid proxy indicator of food security, it was tested for correlations with other proxy indicators of food access and food utilization. These other indicators include the Wealth Index, the Coping Strategies Index (CSI), per capita monthly food expenditure, per capita total expenditures, and the share of monthly expenditures on food. Bivariate correlation analysis showed expected coefficients with statistical significance. Based on these results, the FCS was considered an adequate proxy for measuring the current food security situation.

The higher thresholds have been used in Nepal as a result of a validation analysis using the NLSS III data (A WFP report on this validation analyses is forthcoming).

The Dietary Diversity Score is simply the count of the number of food groups (as defined above) eaten in a week. Note that although we have included sugar in the score, we have used the threshold to identify inadequate and adequate diversity corresponding to IFPRI's recommendation[25]. If the household eats four or less food groups in a week it is considered as inadequate diversity.

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[25] See Smith, L. and Subandoro, A. 2007. "Measuring Food Security. Using Household Expenditure Surveys" Food Security in Practice technical guide series. IFPRI, Washington, D.C..

3. NAGA

The Nepal Nutrition Assessment and Gap Analysis (NAGA) was undertaken to provide the information necessary to develop a detailed Multi-Sector Nutrition Action Plan for the next five years. The NAGA process reviewed the primary determinants of undernutrition in Nepal, also emphasizing the importance of poor food- and care-related behaviors, including hygiene and sanitation, inadequate food quality/nutrient density, and the high prevalence of infections that reduce food absorption and utilization.

The NAGA review led to the articulation of a series of specific, evidence-based, feasible, interventions across the relevant sectors – health, agriculture, education, local development, gender, social welfare, and finance, which form the basis of the Multi-Sectoral Nutrition Plan (MSNP). Figure 63 was developed by the Government of Nepal to describe key policies and areas for intervention. In designing appropriate and effective programs to improve nutrition over the long term, the questions and potential interventions included in Figure 61 need to be considered. The steps are not necessarily iterative or hierarchical, but are reflective of the need to be comprehensive and thorough with respect to all major determinants of poor nutrition.

Figure 61. Assessment of the Key Determinants of Nutritional Status to Guide Policy[26]
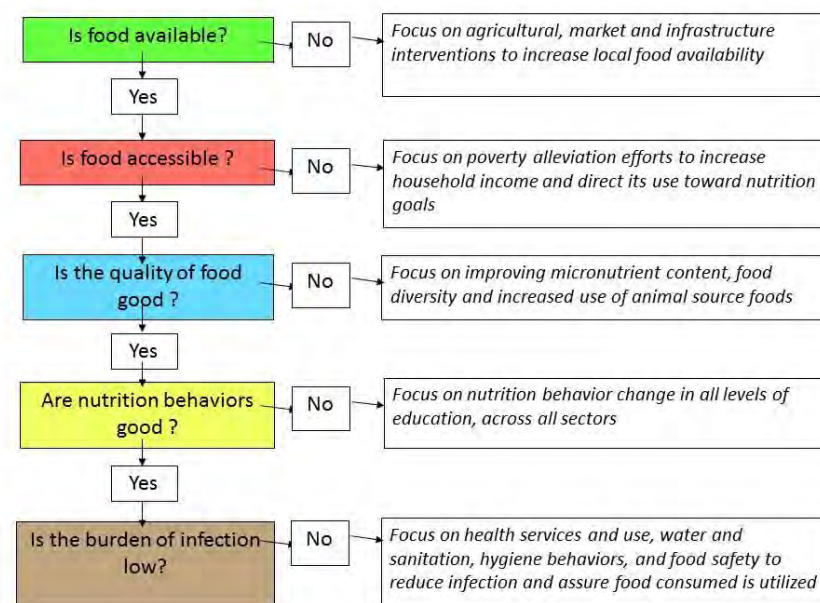
[26] Pokharel, R.J., Houston, R., Harvey, P., Bishwakarma, R., Adhikari, J., Pani, K.D., Gartoula, R. *Nepal Nutrition Assessment and Gap Analysis*. Kathmandu: MOHP, 2009.

In addition to providing information related to *availability* and *access* to food, this report provides some information relating to other elements of the *Conceptual Framework of the Determinants of Chronic Undernutrition,* which is relevant to the implementation of nutrition policy. There are limited data in the NLSS on breastfeeding, the introduction of complementary foods, and critical behaviors that are known to influence nutrition, such as cultural preferences towards food, the role of gender within households, and social exclusion in household resource allocation decision making. Analyzing these factors are important to appreciate fully the complexities of nutrition and the strategies that may be effective. The current report should not be taken to suggest that food consumption is the sole determinant of the nutritional status of the population.

Some of the key results of the 2011 Nepal Demographic and Health Survey (NDHS) are presented in this report as appropriate to provide a more complete assessment, and highlight other factors that influence nutritional status.