



**Food Sustainability, Food Sufficiency, Food Safety and
Healthy Food in Nepal:
Principles and Practices of Food Security**

**Abstracts and Table of Contents Submitted by Authors
October 2017**

Theme: OVERALL FOOD SECURITY

Food Security Status and Challenges in Nepal: Policy Options/choices for Federal Republic of Nepal

*Basu Dev Kaphle, Yadav Sharma Bajagai, Bed Prasad Khatiwada, Yamuna Ghale and
Devendra Gauchan*

Abstract

Nepal being a Net Food Importing country since eighties, the country still suffers from food insecurity such as 30 districts still are food deficit. Intra-household food insecurities due to gender differences are still prevalent. However, it is worth to note that the Constitution of Nepal provisioned for food security, rights and sovereignty. Therefore, it is the responsibility of the State to ensure food security for all through formulation of appropriate policies and programmes. The process of State restructuring provides immense opportunity for the country to prepare food security policies and programmes applicable for both the national and sub-national governments. The objective of this paper is to present status and challenges of food security in Nepal and provide policy options and choices to establish sustained and equitable food security options. The information and data for this paper is derived from the review of food security literature and policies related to agriculture and economic development in Nepal, supplemented by the expert consultation and experiences of authors working in Nepal. Spatial and temporal production and requirements of food production are analyzed and synthesized to summarize the trend of food availability, access and stability in the country.

Approximately two-thirds of the Nepalese people are engaged in the food and agriculture sector contributing one third of the GDP. The total edible food production, availability and requirement is sufficient to meet food requirement at the national level, however there is a wide disparity in availability and access of food across agroecological regions, locations and intra-house gender disparities exist. Difficult terrain with limited connectivity through road to the food deficit areas makes food security a spatial problem, while climatic and price variability over the years make it temporal problem. Besides, lack of storage and preservation facilities and food losses make food surplus areas also insecure throughout all seasons.

Nepal has made some efforts, especially in the past decade, to adopt policies and programmes appropriate to addressing food insecurity problems, particularly through the Agricultural Perspective Plan (APP) (1995-2015), different periodic Plans and more recently in Agriculture Development Strategy (ADS 2015-2035), Food and Nutrition Security Plan and the New Constitution of Nepal (2015). Food production, timely supply and household consumption were emphasized in these policies considering the food availability, access, utilization and stability-the four pillars of food security with some embedded technological options such as food subsidy and supply for the hunger stricken areas, subsidy in chemical fertilizers and improved seeds to boost production in plain areas. However, the implementation of these policies remained partially effective in responding the demand of food.

Since majority of the food deficit families belong to farming hhs and women in specific, agriculture sector is still considered as one of the major sector to fulfil the food security needs of the country. However, this sector is heavily underfunded to come up with innovative options for youth and women in specific to remain in agriculture to fulfil food security needs.

Among the others, utilization of locally available food and culturally accepted food is one of the major concerns. Due to increasing urbanization, improving connectivity and flow of

remittances, the Nepali food basket is increasingly being composed of by the animal nutrition based protein supplies. The recent urbanization trend has severely impacted the locally available options such as ‘Dharam Bhakari’ (the traditional practices of local level food and seed security) are being challenged. Therefore, food utilization is not only in the choices of the women and hhs, but largely influenced by the market dynamics.

In the Federal Republic of Nepal, there are ample opportunities to prepare food security policies and programmes as per their local competences, needs and demands. The recently appointed local elects as a duty bearer already have legal mandate to prepare inclusive, equitable and locally adapted policies, plans and programmes to respond the needs of their constituencies.

Keywords: Food security status, food availability trend, policy gaps, challenges, policy options

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- Food Utilization situation: Use diverse safe nutritious quality food and absorption capacity, nutrition and health status of the people, gender specificities of needs and provisions.
- Food Stability status : Production stability, market and distribution stability, import of foods and trend
- Major disconnects to address food security of vulnerable communities in specific to gender differentiated needs

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- Climate change –drought, flooding, water scarcity, adaptation of seeds
- Outmigration of youth from rural areas and feminization of agricultural tasks
- Market and price volatility impacting on choices of food
- Population growth and declining arable land (with urbanization and land use of non-agricultural purposes e.g. plotting)
- Declining investment in agricultural R & D
- Inequity in land ownership and marginal farm size

5. Policy choices and Options for future in Nepal:

- Constitutional provisions
- Policies, legislation, institutions and program for food and nutrition
- Translation of policies into programs at the sub-national and national level
- Integration of food and nutrition security program at sub-national and national level

Theme: FOOD SUSTAINABILITY

Nepalese Agriculture in Crossroad: Diagnostic Review of Success and Failure to Attain Food Security, Sustainability and Social Wellness.

KP Sharma, KP Paudel, and KR Dahal

Abstract

Food production system of Nepal is in crisis since recent past. Spiralling dependence on imported agricultural products is highly undesirable and suffocating for a country with history of food sufficiency and existing huge potential at present and the future. Increased tendency of rural youth to exit from farm engagement in lack of social dignity of occupation and secured incentives is a serious question for future of agriculture. Agro-chemical based green revolution technology introduced four decades ago displaced organic integrated farming system of the past and achieved some goals of increased production. But, paradoxically it inherited many anomalies that resulted into multiple negative impacts such as environmental degradation, declining soil productivity and human health issues/crisis. This has created an unsustainable situation for food production system increasing rural and urban food and nutrition insecurity.

The objective of the study is to better understand the scenario of agriculture development and come out with pragmatic approach to address the issues raised. This paper is mainly based on desk review with special focus on the policies that country has adopted and practices that farmers are exercising in farming systems for food production and security. The diagnostic review will analyse past, present and proposed plans and establish the links between set objectives and achievements of sustainable agricultural development for food security. The expertise's' experiences and observations of authors on farming practices and farmers' perception along with data and figures to support the strength and weakness of the agricultural development frameworks, strategies and design would be used during diagnostic review. Although green revolution agriculture yielded higher production with higher economic returns in the history of agricultural development, its socio-cultural and environmental costs are unexpectedly huge. Loss of biodiversity, soil quality degradation, food and environmental poisoning, increasing cost of production and dependence of farmers on external inputs lowering their resilience to emerging adversities including climate change are few among others. Similarly, increasing rates of patients with high blood sugar, pressure, heart damage and kidney failures are some of the chronic human health issues due to the chemical based food. The failure of past approach to attain the long term objectives of food safety, security, sustainability and environmental health is threatening the future of our agriculture. The overall scenario suggests that the damage of both soil and human health and environmental quality seem irreversible if not acted and corrected before too late. Therefore, it is the conscious responsibility of all stakeholders to transform agro-chemical based to natural organic production practice. The lesson learned from Organic Revolution of Cuba and agricultural transformation in Sikkim will be used as examples. Based on present knowledge, experiences and true understanding, immediate corrective steps of food production practices is inevitable. All stakeholders from policy makers to consumers should come forward with the realization that Nepalese agriculture with specific characteristics must be treated differently than copying the technologies from elsewhere. Adaptive Agro-ecological Approach (AAA) that best fits into social, cultural and ecological systems can only be the viable and sustainable solutions to addressing all negatives of agro-

chemical based farming and promote healthy-nutrient rich food production system that shoulders sustainable development and human wellness.

Keywords: green revolution, organic agriculture, food security, adaptive agro-ecological approach, climate smart agriculture.

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 - V. Adaptive Agro-ecology: Solution for Social Health and Wellness
 - VI. Way Forward – Policy Recommendation (integration, intensification and Conservation of Agriculture and Forest land)
-

Crisis and Challenges include: landuse, ownership, urbanization, agriculture land loss, labour shortage, climate change, excessive and uncontrolled use of agro-chemicals, geo-politics (giant agriculture economy of two neighbours).

Capacity Building of Food Value Chain Actors in Nepal: Why and How
Ramjee Ghimire, Dr. Katsuhige Nakason, Dr. Lekh Nath Chalise

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Sustainable Management of Food Production Chain for Food Security: An Interdisciplinary Approach

Rubel Chowdhury, Prerna Khawas and Shanker Dhakal

Abstract

According to the 1996 World Food Summit, “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets dietary needs and food preferences for an active and healthy life”. This book chapter will utilize a systematic interdisciplinary (multi-disciplinary) approach to assess the key sustainability challenges of the national food production chain (that includes food production, food storage and transportation, food processing and marketing, and food consumption systems) and to identify the management and policy options to overcome these challenges to achieve food security in Nepal. A schematic representation of the concept of the book chapter is presented in Figure-1.

The current assessment will focus on the following key factors relating to the food production chain:

1. Food production

- Sustainable supply of key fertilizers such as phosphorus and nitrogen.
- Availability of fertile agricultural lands
- Climatic conditions and natural disasters
- Geographic conditions and land forms
- Availability of technology
- Environmental pollution

2. Food storage and transportation

- Sufficient infrastructure/facilities/technologies for food storage to minimize spoilage
- Infrastructure and facilities for food transportation from farm to industries and market

3. Food processing, and supply chain/food market

- Infrastructure and industrial facilities for food processing
- Appropriate storage facilities for minimizing spoilage
- Food innovation in processing and production of healthy food
- Minimizing food wastage
- Regulations relating to food price and food expiry dates

4. Food consumption

- Knowledge and education on healthy diet
- Nutrition of babies and children
- Sufficient access to healthy food
- Regulatory framework for equitable distribution of food
- Awareness regarding waste minimization

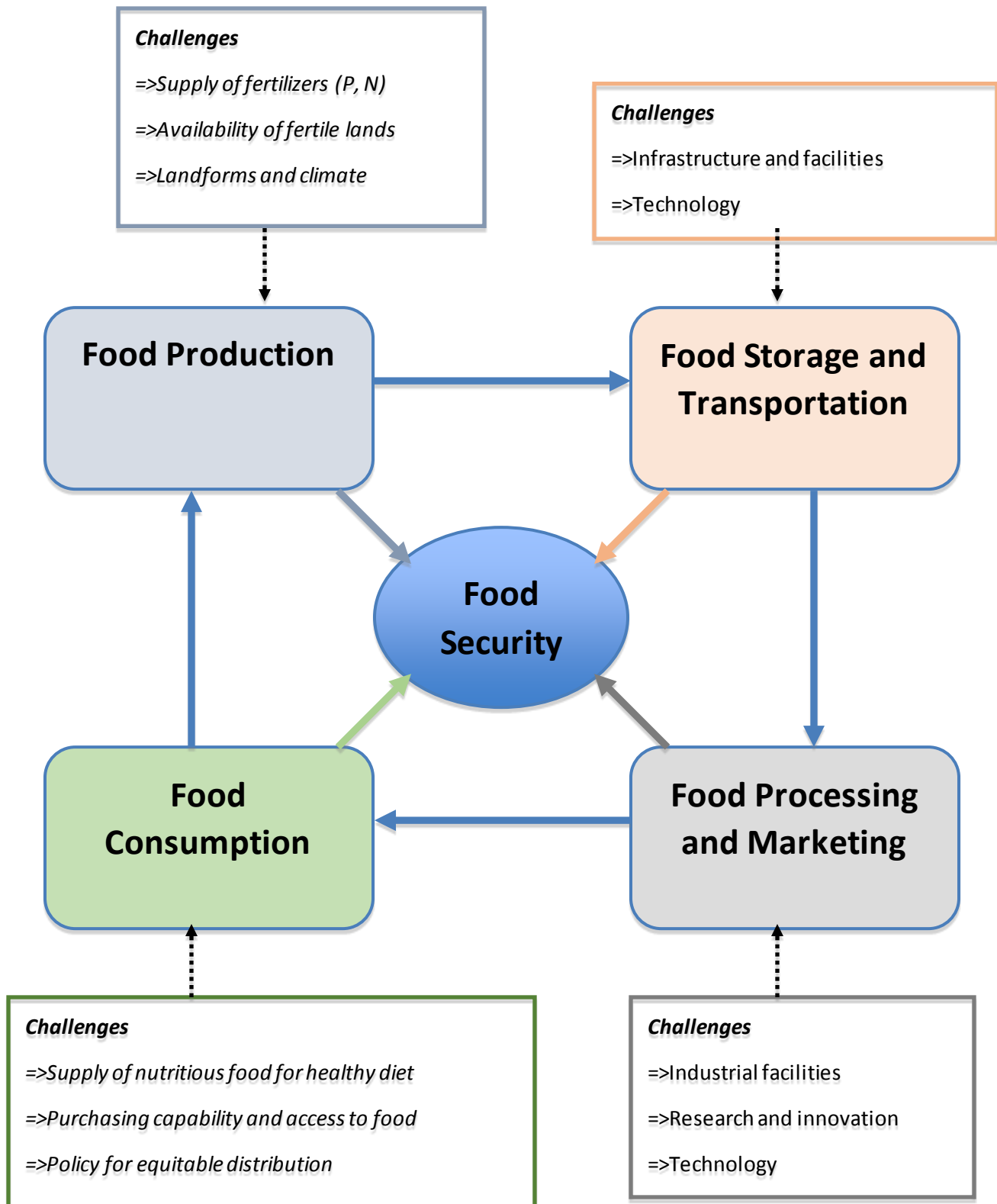


Fig. 1: An schematic diagram of the concept of the proposed book chapter.

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Sustainable Soil Management for Agroecosystem Resilience and Food Security

Rajan Ghimire, Upendra Sainju and Ram Acharya

Abstract

Securing food for growing population without any negative impacts on the environment will continue to be a great challenge for 21st century. In an effort to increase food, forage, fiber and energy supply to meet increasing demand of growing population, 60% of the ecosystems services assessed globally have either been degraded or used unsustainably. There is a need of production systems to increase food production and conserve natural resources. The occurrence of extreme climate events and increased variability in temperature has increased the vulnerability of crops to biotic and abiotic stresses and negatively affected agroecosystem resiliency and food security. Soil and crop management practices that increase soil organic matter (SOM) accumulation, improve nutrients and water use efficiency, and mitigate greenhouse gas emissions while supporting crop production can increase sustainability and profitability. Improved management practices such as reduced-tillage, crop residue management, and diversified crop rotations, and integrated nutrient management practices have improved agroecosystem performance through their effects on SOM and nutrient dynamics. These practices could benefit the rain-fed agriculture in South Asia including Nepal through improvements in soil quality and crop production. In this chapter, we discuss improved soil and crop management practices that support improving soil health and agricultural sustainability in the small-holder farming conditions of Nepal. We also analyze the economic prospects of adopting improved management.

Keywords: Soil management, crop production systems, food security, conservation agriculture

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Principles, Practices, and Future Direction of Sustainable Animal Production in Nepal

Uma Karki, Lila Karki, Rudra Poudel, Dala Ram Pradhan, and Laxman Sherchand

(Submitted on October 25, no abstract)

- Introduction/background
- Principles of Sustainable Animal Production
 - Economic/profitable
 - Environmentally friendly
 - Socially good
 - Stewardship
 - Continuity
 - Whole system approach
 - Long-term
 - Diversity
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 - Economic importance of livestock enterprise (household economy, employment, GDP contribution, farming system)

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 - Demand and supply of livestock and livestock products
 - Essential features for operating economically viable livestock farms
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- Program and policy recommendation

Theme: FOOD SUFFICIENCY

Cereal Crop Production for Food Sufficiency through Crop Improvement

Khusi R. Tiwari Hem S. Bhandari, Dhruva Thapa, Jiban Shrestha, and Dilip Panthee

Abstract

Cereals are the most important food group and integral part of Nepalese diet, therefore cereal crops are most important part of **food sufficiency** system in Nepal. Rice (*Oryza sativa* L.), Maize (*Zea mays* L.) and wheat (*Triticum aestivum* L.) are the most important cereal crops accounting for over 95 % of all cereal food production. Despite the research work of several decades on production technologies and varietal improvement by Department of Agriculture (DOA) and Nepal Agriculture Research Council (NARC), majority of the farmers are still dependent on local varieties with traditional production practices. Here we will **review the current research work** in Nepal and around the globe and provide guidance on future strategies to increase food production in Nepal. Hybrid varieties of maize and rice will be very important to increase production. Lack of availability of improved seed, fertilizer, irrigation, and plant protection measures are key factors affecting low food production in Nepal. Here recommendations will be made on the appropriate use of production inputs including improved crop varieties, fertilizer, irrigation, pest management and discuss future strategies to improve food production in Nepal with specific focus on crop improvement.

Keywords: Food Production, Genetics, Plant Breeding, Biotechnology, Yield.

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Agroecological Crop Intensification and Food Security for Nepal

*Ram B Khadka, Tejendra Chapagain, Krishna Dhital, Rajendra Uperty, and Norman Uphoff,
Sharad Pande, and Suresh Mehata*

Abstract

System of rice intensification (SRI) is package of principles and techniques for enhancing rice productions through manipulation of growing environment giving special attention in soil, plant and water. SRI was introduced in Nepal in 1999 and developing as holistic solutions for contemporary issues in rice productions such as low productivity, low fertility, land degradation, climate change impact, and biotic-abiotic stresses. Several trials and demonstration on diverse context and situation of Nepal including terai to mountain, landraces to modern varieties shows that SRI can enhance the yield by many folds by manipulating locally available resources. SRI enhance the rice quality, suitable for organic production and is less affected by biotic (disease and pest) and abiotic (drought, storm and flood) stresses compared to conventional farming. Several new initiatives have been started in Nepal through research and extension to make this techniques more suitable for local context since last one and half decade. The higher grain yield under organic condition, higher response with inoculation of beneficial microbes, lower seed and water consumption than conventional practices are most attractive particularities with SRI in Nepalese context. Almost double grain yield gain in SRI compared to available best cultivation practices in premium rice landraces in Himalayan region shows the opportunities for the export market of Nepalese aromatic rice landraces through mass production using SRI practices. Ultra low seed consumption in SRI compared to conventional practices indicates the opportunities to reduce the conventional seed cycle length by producing sufficient seed through scarce breeder seed to accelerate the adoption of newly released varieties.

This book chapter will bring the scattered knowledge, experienced, result gained both in scholar and farmer's field in last one and half decade in SRI innovation in Nepal. The chapter will cover the historical perspective to recent attempt for mechanization, localization of SRI in Nepal. Furthermore the chapter will highlight about the application and opportunities of SRI principles in other crops beyond rice. Still several challenges are in face for the wider adoptions of SRI, the chapter will analyse those technological and socio-political challenges for SRI scale up in Nepal. Finally the chapter will be wrapped up with way forward for research, extension and policy changes for SRI adoption in Nepal.

Keywords: SRI, climate smart, premium rice, mechanization, soil and water management

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Climate smart technology

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SRI in seed system

Biotic and abiotic Stresses Mitigation

Opportunities for organic production of premium rice

Microbial inoculation

Mechanization options in SRI
Gender Balance in rice cultivation

SRI beyond rice

System of Wheat Intensification
System of Finger Millet Intensification
Sustainable Sugarcane Initiative
Other crops

Issues, challenges and way forward

Research
Extension
Policy

Household Food Security in Nepal

Bhawani Mishra and Krishna Lal Poudel

Abstract

Mostly food security is viewed as inadequate production or supply of food in a region or in a community. However, food security is an outcome of many factors. These factors related to socio-economic and/or environmental, and /or institutional, and/or health. This study will focus on the socio-economic issues of food security at the household level in Nepal. This study will also explain the different methods of food security analysis. In addition, this study will also explain major factors affecting household food security in a Nepalese context.

Objectives: The main objective of this chapter is to explain food security issues at the household level of a food sufficient district of Nepal. The other objective of the study will be understanding of complexities of household food security system. This chapter will also familiarize the methods of food security analysis at the household level. The final objective of this study is to give feedback to policy makers to intervene a household's food security system to improve the food security situation in a food sufficient district.

Methods/Data Sources: This study will be based on literature review. The main focus of literature will be the author's previous publications and relevant other recent literature. This study will explore literatures on approaches of food security analysis at the household level along with their differences.

Data for author's previous publications were collected through a household survey, group discussions, and a key informant survey were conducted in randomly selected households. In additional, government data will also be used to explain some other food security issues.

Expected Results/Findings: Food security will likely to be a complex issue at the household level. Therefore, food sufficiency at the aggregate level will less likely to determine food security at the household level. Study will also explore on the issue of households' year-round security stability. It will also explore the role of non-food items in household's food security.

Conclusion: Food security is a complex issue and should not be viewed as equivalent as food sufficiency. This study will explain the household's food security issues of a food sufficient district of Nepal.

Keywords: Food availability, food stability, calorie requirement, caste\ethnic groups.

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Factors Determining Food Security/Insecurity

Prem B. Bhandari, Lila B. Karki and Drona P. Rasali

Abstract

This chapter focuses on the major factors determining food security with particular emphasis in Nepal. The food security scenario will be presented at the household level. This chapter will address two major questions: (i) Does household level food in/security vary by geographic regions, and (ii) Do household socio-economic and cultural contexts influence food security? To answer the first question, we will examine geographic inequality in food security with particular reference to seven geographical provinces envisaged by the new constitution, three ecological regions and rural-urban locations. To answer the second question, we will use the sustainable livelihood framework and/or social exclusion framework wherever appropriate to explain the associations between food insecurity and a household's socio-economic and cultural context.

We use the nationally representative 2011 Nepal Demographic Health Survey data recently collected from 10,826 households. Of particular interest to this study, this survey collected data on household food in/security access indicators by using the commonly used Household Food Insecurity Access Scale (HFIAS) format (Coates, 2004¹; Coates, Swindale and Bilinsky, 2007²). Altogether this scale collects data on seven scale items that are grouped into three domains: (i) Anxiety and uncertainty about the household food supply; (ii) Insufficient quality (including variety and preferences of food type); and (iii) Insufficient food intake and its physical consequences.

We employed multilevel multivariate regressions (both binary logistic and ordinary least square (OLS) techniques) to estimate the associations between food in/security with various explanatory measures. Depending upon the nature of our outcome measures, we used PROC MIXED and PROC GLIMMIX procedures in SAS to estimate our multilevel equations.

Our estimates show that there is a large variation in household level food /in/security by geographical regions. By provinces, in all 3 domains of food in/security, province #6 is the most food insecure. As opposed to this, province #4 is the most food secure region in all 3 domains of food /in/security. By ecological regions, while the Mountain region is food insecure in terms of anxiety and uncertainty (domain 1) and insufficiency in quality (domain 2), Hill region is most insecure in terms of insufficiency in food intake (domain 3). Similarly rural-urban differences are observed. Our findings further suggest that both-socio-economic and cultural contexts are equally important in determining food in/security adjusting for the effects of geographic differences and other confounders theoretically known to influence both outcome and other independent measures. Socially disadvantaged caste/ethnic groups (such as Dalit, Janajatis, and Muslims) and economically disadvantaged households (with the lowest wealth quintile) were among the most vulnerable group of households in terms of food insecurity. These results provide empirical evidence with important policy implications to eradicate hunger (zero hunger, Sustainable Development (SD) Goal #2) and to reduce poverty (no poverty, SD Goal 1), which has implications in reducing health inequality (SD Goal #3). This area of inquiry is salient both from a theoretical as well as a policy perspective.

Keywords: Access, food In/security, caste/ethnicity, income inequality, geography, Nepal

¹ Coates, Jennifer, Anne Swindale and Paula Bilinsky. 2007. Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide (v. 3). Washington, D.C.: FHI 360/FANTA.

² Coates, Jennifer. Experience and Expression of Food Insecurity Across Cultures: Practical Implications for Valid Measurement. Washington, D.C.: Food and Nutrition Technical Assistance Project, FHI 360, 2004.

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Measuring food in/security

Geographic and socio-cultural context

Household economic context

Food in/security situation in Nepal

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Geographical factors (ecological, rural-urban, provincial variation)

Natural factors (climate/weather, temperature, rainfall etc.)

Socio-cultural factors (education, caste/ethnic variation, cultural taboos etc.)

Economic factors (land holding, land ownership, land quality, /income/earning power, employment opportunities etc.)

Evidence from Nepal

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Hypothesis

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Neoliberal Globalization, Migration and Food Sufficiency: The Case of Nepal

Kalpana Khanal and Kanchan Joshi

Objective

Early 1990s saw a new wave of global politics with the advent of Washington Consensus (neoliberal policies). Since then, manifestations of neoliberal privatization and deregulation, along with new geopolitical developments, have further altered post-World War II patterns of food production and distribution. However, little systematic work has been done to take account of these changes especially in emerging economies like Nepal. The main objective of this chapter is to explain the changes in food governance, production, distribution and consumption as well as explore the implication of these changes in the case of Nepal.

Method:

This book chapter will follow a mix of qualitative and quantitative methods and it will be developed on the basis of an historical and institutional foundation. This requires a methodological framework resting on grounded theory.

The method of grounded theory can be described as a process in which researchers, or more specifically economists create their theory 'directly' developed from data; and in which data collection, theoretical analysis and theory building proceed simultaneously. The use of the method begins with the economist's becoming familiar with, but not dogmatically committed to, the relevant theoretical, empirical and historical literature that might assist him/her in approaching, understanding and evaluating the data relevant to his/her research interest. Then, one engages in 'field work' by collecting comparable data from economic events from which a number of specific categories or analytical concepts and their associated properties are isolated and the relationships between them identified..... An essential property of the theory is that it explains why and how the sequence of economic events represented in the data took place. The process ensures that the resulting theory is conceptually dense as well as having causal explanatory power (Lee, 2000, p.793-794).³

The data/ literature will be based on secondary sources such as journal articles, white papers published by Nepali government, reports published by national and international non-government organizations etc.

Keywords: Globalization, neoliberalism, migration, food-sufficiency

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- a. Introduction
- b. Global context to changes in food governance, production, distribution, and consumption during the neoliberal era
- c. Changes in food governance, production, distribution, and consumption during the neoliberal era in Nepal
- d. Implication of migration and remittance flows to food security and sufficiency in the case of Nepal
- e. Policy recommendations to ensure food security and sufficiency in Nepal

³ Lee, S.Frederic.2002. "Theory Creation and the Methodological Foundation of Post Keynesian Economics," *Cambridge Journal of Economics*, 26, p.789-804.

Innovation in Food and Agriculture Technologies for Food Security

Yakindra Timilsena, Prakash Oli, Raju Adhikari, and Benu Adhikari

Abstract

The innovation in food and agriculture technologies and products are being governed by two major drivers. In one hand, there is a need for ensuring food security, i.e., providing enough food to meet the basic nutritional function in developing country like Nepal. On the other hand, there is a need to develop technologies to produce foods with special functional or health needs to consumers in developed countries.

The innovation in producing high protein and energy foods and their preservation technologies would cater for the nutrition and calorie needs of people in developing countries. Similarly, the health promoting potential of foods can be increased either by addition of healthier ingredients or by removal of unwanted (less healthy) components. Due to the increased consumer awareness in recent years, functional and health promoting foods is increasing quite rapidly. As a consequence, the need for innovations in food science and agricultural technologies has increased significantly. For example, the importance of innovative approaches that reduce the consumption of saturated fats, sugars and salt being increasingly realised. Products with added levels of polyunsaturated fatty acids, reduced glycaemic index and reduced salt content are becoming more and more popular.

Consumers prefer natural or fresh foods. Thus the processing technologies need to deliver processed food products in less altered or fresher condition. For this purpose non-thermal technologies or innovative thermal technologies are being developed and commercialised in increasing speed.

In this chapter, we have critically reviewed and analysed innovative or trend-setting technologies being used in food (post-harvest agriculture) and pre-harvest agriculture. We have also discussed the food safety and food security issues. Advanced technologies that minimise the degradation of functional ingredients during processing and preservation have also been included. Latest technologies that are used in increasing the agricultural productivity and also produce minimally processed and fresh-looking food products are highlighted. The content presented in this chapter will be useful for food and agriculture engineers, food scientists and technologists, researchers, policy makers as well as postgraduate and undergraduate students.

Keywords: Functional foods, Glycemic index, Food processing, Sprayable polymers, non-thermal food processing, innovative-thermal processing

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1. Introduction
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 - a. Foods with added benefits (Fortified and enriched foods)
 - b. Foods for specific health conditions
 - i. Foods with low glycaemic index
 - ii. Foods with reduced sugar, salt and saturated fat
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 - d. Functional foods and nutraceuticals
3. Food processing and product development

- a. Removal of anti-nutritional factors
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5. Advances in agricultural technologies
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6. Innovative Food Processing Technologies
 - a. High hydrostatic pressure
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7. Role of technologies in food security
8. Future perspectives
9. Conclusion

Food Self-Sufficiency and Child Nutrition in Nepal

Ram N. Acharya and Apar GC

Abstract

The primary objective of this study is to evaluate food sufficiency and human nutrition in Nepal using secondary data. We will use district level population, climate, land, yield, and crop production data to develop food supply and demand measures and use them to identify food deficit areas. We will also evaluate the impact of regional food deficit on child nutrition using data from the 2010/2011 Nepal Living Standard Survey (NLSS). Based on the empirical results, we will attempt to draw plausible policy options for attaining food sufficiency, particularly for the deficit regions.

Introduction

Food insecurity is one of the complex challenges faced by the humanity. It has multiple dimensions and may manifest in many ways - malnutrition, starvation, chronic hunger, wasting, and stunting (Misselhorn, 2005; Tanumihardjo *et al.*, 2007; Barrett, 2010). Recent studies show that even a few sporadic occurrences of food insecurity can seriously damage health (Kirkpatrick *et al.*, 2010; Van den Berg *et al.*, 2012). Moreover, the impact of prolonged hunger on infants and kids would be much more severe than on adults as it can cause devastating physical, emotional, and mental damages (Binagwaho *et al.*, 2011). Furthermore, these hunger induced health and cognitive development problems are irreversible and may lead to poor behavioral, academic, and economic outcomes in later life of an affected child (Weinreb *et al.*, 2002).

Despite a concerted effort from various national and international agencies to alleviate poverty and enhance food security for many years, one in eight people is still suffering from chronic hunger (FAO, 2013, p 8). The FAO report also shows that the problem of hunger is much more perilous in the sub-Saharan Africa and South Asia than anywhere else in the world. Despite recent economic growth experienced in Nepal and many other countries in the region, one in four people is still undernourished. Moreover, the proportion of stunting remains consistently higher in Nepal (42 percent) and other countries in the region (FAO, 2013; Shively and Sununtnasuk, 2015).

Recent studies show that a wide range of factors including household income (Coleman-Jensen *et al.*, 2013), agricultural commercialization, food price and other shocks (Yamano *et al.*, 2005; D'Souza and Jolliffe, 2013), farm production (Wheeler and von Braun, 2013), initial endowment of production input (Hagos and Holden, 2013), quality of human (Kneuppel *et al.*, 2010; Seligman *et al.*, 2010), social (Gundersen *et al.*, 2011), and natural capitals (Di Falco and Chavas, 2009; Sasson, 2012) play a critical role in determining the level of food security and health outcomes. Since each society or region is endowed with a different combination of these resources, it was difficult to find a common set of factors that are equally effective in achieving food security under all possible scenarios (Wheeler and von Braun, 2013). Therefore, it is important to evaluate each region empirically to understand the situation better and identify policy instruments that are likely to be most effective in enhancing food security and nutritional status of the population. In this light, this study aims to evaluate food security and its impact on stunting in a different region of Nepal.

Research Methodology

A broad array of methods and indicators are used in the literature for measuring various aspects of food security (Pinstrup-Andersen, 2009; Masset, 2011). In the second part of the study, we will primarily focus on household level food access, individual consumption, and the future impact of food security on child health. Stunting, particularly among less than five years old child, is primarily caused by a combination of factors including poor diet, health, sanitation, and care (Deolalikar, 1996; Yamano *et al.*, 2005; Alderman *et al.*, 2006). An individual's access to these health inputs depends on various environmental and socioeconomic factors including household income, capital endowments (e.g., natural, human, and social), and community attributes. Accounting for these factors, we will specify a child nutritional outcome function. In addition to the food sufficiency index developed from the market analysis, we will construct a second index using NLSS data and use it to evaluate the impact of food security on child nutrition outcome.

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Dynamics of Food Basket Composition among Marginalized Communities: A Special Reference to Chepangs

Luni Piya and Niraj Prakash Joshi

Objective

Chepangs, one of the highly marginalized indigenous nationalities of Nepal, depend on a variety of wild tubers, fruits, and vegetable to supplement their often insufficient farm produce. At the same time, these communities are also dependent upon market for food procurement, especially during the dry season when food storage at home depletes. The annual food basket of Chepang households thus comprises of food staples procured from three major sources: farm, forest, and market. This chapter quantifies and compares the calorie contribution from these three sources of food. This analysis will shed light on the relative contribution of different sources in the annual food basket of the Chepang community. The dynamics will also be analyzed using panel household data set, which examines how the relative contributions of the different food sources have changed over time.

Methods/data. The analysis will be based on primary data collected through household surveys in 2010 and 2015. The first phase of household survey in 2010 was conducted in Chitwan, Makwanpur, Dhading, and Gorkha districts, which houses the majority of Chepang population. One Village Development Committee (VDC) from each district was purposefully selected based on the dominance of Chepang households. Within each VDC, few hamlets were chosen for the purpose of household sampling. Sixty households were randomly selected from each VDC, thereby forming a total of 240 sample households. The second phase of household survey covered the same households only in Chitwan and Makwanpur districts, thus acquiring a panel data set for 120 households. Major chunk of data analysis for this chapter will be based on the panel data set 3 covering 120 households in Chitwan and Makwanpur districts. However, references will be made occasionally to our previous publications that include results from 240 sample households in four districts. This study employs a mix of cross-section/time-series and panel data analysis as applicable depending upon the variable of interest. Quantitative analysis is supplemented with qualitative information collected during numerous field visits aside from the two household surveys.

Expected results. This chapter will contribute to a deeper understanding of how forest and market supplements own farm production to determine the food security of a marginalized community living in remote Mid-Hills of Nepal. The relative contribution of each of these sources will be quantified and compared. Furthermore, the panel data set will demonstrate how the relative contribution of farm, forest, and market to the annual food basket have changed over the years. The findings will highlight the transformation in the food basket of the rural hilly community.

Keywords: Wild and uncultivated food; market; own farm production; household panel data; Chepang

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I. Introduction

This section will provide a background to the chapter. The importance of the topic will be highlighted and the objectives will be clarified.

II. Chepangs – The study community

This section discusses the identity of Chepang community as one of the highly marginalized indigenous nationalities of Nepal. This is followed by a description of the livelihood portfolio of the community.

III. Literature review

A descriptive summary of similar studies done in Nepal will be presented. In addition, reviews will also be done for relevant topic among similar communities across the world. Consequently this section will highlight the originality of this study.

IV. Research design

i. Study sites

This section explains the criteria for selecting the study sites. A brief description of the selected hamlets will also be done.

ii. Sampling

This section describes the sampling methodology and sample size.

iii. Data collection

This study utilizes a panel data set collected through semi-structured household surveys conducted during 2010 and 2015.

iv. Methods of data analysis

This section mainly describes the method to standardize the calorie contribution of food items from various sources in the food basket.

V. Components of annual food basket

The section presents a qualitative description of what comprises the annual food basket of the Chepang community. It will identify the major food items procured from three sources: own farm production, forest, and market.

VI. Relative calorie contribution and the dynamics

This section will quantify the annual calorie contribution for major food staples acquired from farm, forest, and market. Comparative analysis will be made for the three sources during the two different time periods of survey. The analysis will reflect the changes in the food basket and the factors contributing to such changes.

VII. Conclusion

VIII. References

Theme: FOOD SAFETY

Food Safety and Food Quality Regulations: Current Status, Issues and Way Forward for Federal Nepal

Yadav Sharma Bajagai, Bed Prasad Khatiwada, Pramod Koirala and Raju Adhikari

Abstract

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- International Regulatory Frameworks in Food Safety and Food Quality and its relevance to Nepal
- Current Regulatory Frameworks for food safety and quality
- Infrastructure for food safety and quality
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- Major Issues on food safety and quality
- Current status of the implementation of food safety and quality related legislations and recommendations for federal Nepal

Non-destructive Technologies for Food Safety and Quality Assessment: Review and Way Forward

Bed Prasad Khatiwada

Abstract

Food safety and quality issues are getting attention in recent days and are an integral component of the food security system. Physical, chemical and microbiological hazards can make food unsafe for consumption while assessment of nutrition composition of the food including carbohydrates, proteins and fats are also crucial. Traditional methods of assessment of food safety and quality are tedious, time taking, expensive and uneconomical. Recently, optical methods of assessment of food safety and quality are in practice in developed countries which allow online, real time assessment of food quality. This involves scattering and absorbance properties of light while passing through the food and extracting chemical information from food using chemometric method. Non-destructive method of quality assessment is in practice along the supply chain in food system commercially since last two decades in developed economy. This chapter presents basic and recent advances on use of near infrared spectroscopy (NIRS) to assess food safety (adulteration, toxicity, frauds, authenticity, pesticides residues) and quality (carbohydrates, proteins, fats, dry matter, soluble solids, internal defects) and pave a path for advancing food safety and quality assessment and its regulations in Nepalese food system. Examples will be from meat and dairy industry, cereals and grain industry, fruit and vegetable industry. Despite a good initial investment in infrastructures and facilities, NIRS is a proven and cost-effective tool for long term quality control and food safety and quality surveillance.

Keywords: non-destructive, near infrared spectroscopy, regulations, safety

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1. Food safety and quality assessment : A historical review
2. Non-destructive techniques of quality assessment
 - X rays
 - Nuclear magnetic resonance /MRI
 - Near Infrared spectroscopy
3. Use of Near Infrared spectroscopy (NIRS) for food safety and quality assessment
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 - 3.2 Food quality
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 - Proteins
 - Fats
 - Dry matter
 - Soluble solids
 - Internal defects
 - Colours
4. Food safety and quality assessment in Nepal and way forward
5. Conclusion

Theme: FOOD FOR HEALTHY LIVING

Improving Fruits and Vegetables for Healthy Living

Dilip R. Panthee, Khusi R. Tiwari, Hem S. Bhandari, Tek P. Gotame and Surendra Shreshtha

Abstract

Living a healthy life is the prime objective of each individual in every society. Growing proportion of the population is looking for a balance diet every day. Vegetables play a key role in providing a good combination of vitamins, proteins, minerals, and fibers that are required for a balanced diet. Objective of this chapter is to review the contribution of plant breeding to improve the nutritional status of vegetables that are beneficial to improve the overall human health. We present the status of this research in various crops including Solanaceae, leafy vegetables, legumes and other indigenous crops. Information from Nepal as well as international level will be presented for comparative analysis purpose. Based on critical analysis, we conclude the current status of contribution of plant breeding towards the improvement of nutrition in vegetables and any crop improvement gap to be addressed in the future for the overall health benefit of the society. This analysis may be helpful for plant breeders as well as public health related researchers and policy makers.

Keywords: health benefits, nutritional requirements, protein improvement, vegetable improvement

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Fruits

Vegetables

Current area, production, import and export status

Fruits

Vegetables

Economic contribution to the national economy

Fruits

Vegetables

Nutritional requirements and contribution from fruits and vegetables

Nutrition-related major diseases: Fruits

Nutrition-related major diseases: Vegetables

Contribution from fruits

Contribution from vegetables

Nutrient supply from fruits and vegetables

Anti-oxidants

Lycopene

Vitamins

Efforts on nutritional improvement in fruits and vegetables

Anti-oxidants

Lycopene

Vitamins

Example of an individual crop

Apple

Citrus

Mango

Solanaceae including potato vegetables

Legumes

Leafy vegetables

Crucifers

Indigenous fruits and vegetable and its scope of improvement to capture international potential market

Comparative nutrient status in selected fruits and vegetables

Conclusion

References

Healthy Eating for Health and Well Being

Drona P. Rasali and Shanthi C. Johnson

Keywords: Non-communicable diseases (NCDs), Nutritious diet, Healthy eating, Sodium intake, Sugary drinks

Introduction

For the Nepali New Year 2074 (2017-18), the Government of Nepal has announced a yearlong 'My Year 2074: Healthy Me, Healthy Country' campaign that includes 'nutritious diet' and healthy eating as a core part of the campaign agenda aimed at reducing the burden of diseases. For consistent use of meaning, "healthy eating" as per HealthLinksBC (2017) can be described as a pattern of eating that contributes to best possible health through positive relationships with food and diverse, balanced food choices that meet a person's needs for nutrients and energy. It is rightly referred so, as it "promotes and supports social, physical, and mental wellbeing for all people at all ages and stages of life and contributes to the overall health of individuals, families, and communities", while it "helps minimize the risk and occurrence and supports the management of diseases".

This chapter describes what, in the context of Nepal, makes a healthy and balanced food, how to access healthy food, what constitutes healthy eating habits and how we can change healthy eating behaviours. Families and individuals' personal ability to know, access, conserve and prepare healthy foods make a huge difference in healthy eating behaviors in the households. Sodium and sugar pose detrimental effects on health, when they are consumed by the people in excessive amounts in the regular diet of the people. Reducing their excessive intake among the people is becoming increasingly important especially among sedentary people in urban areas in recent times. A set of recommendations for healthy eating practices specific to geo-ecological regions of Nepal have been considered. The sources of information used in this chapter are the readily available web information, authors' relevant research and personal life experiences.

Diseases, Illness and Food

Disease risk factors

NCDs do not have specific disease causing agent like infectious diseases, but they occur as consequences of a number of risk factors, such as high blood pressure, tobacco use and exposure to second-hand smoking, obesity (high body mass index), physical inactivity, excessive alcohol use, diets low in fruits and vegetables, and diets high in sodium and saturated fats, which are commonly associated with these diseases. Evidence demonstrates that tackling the preventable risk factors associated with NCDs, such as obesity, unhealthy diet, and physical inactivity can significantly improve health and avoid related health care costs through prevention of these diseases (Rasali et al, 2013).

Non-communicable diseases

As the infectious diseases become controlled in developing countries like Nepal, the burden of NCDs become increasingly more prominent in the population. Non-communicable diseases (NCDs) such as diabetes, cancer, heart diseases are increasingly recognized as the leading burden on the health of people in developed or developing countries alike in the world, and Nepal is no exception in acquiring this global tendency today. The substantial burden of NCDs is attributed to eating unhealthy food and drinks.

Food contamination and poisoning

The contamination of food with infectious agents, toxins and chemical poisons is still a threat to health and life of the people in Nepal.

Nutritional deficiencies

Access to Healthy Foods

Geographic accessibility

Cost of food as a factor

Traditional healthy foods

Other factors influencing access to healthy food

Balancing Diet- (in the context of food security)

Nutritional needs for health

Energy and nutrients intakes

Energy and macronutrients (Carbohydrates, Dietary fibre, Dietary Fat, Cholesterol, Protein)

Vitamins (Folate, Niacin, Pantothenic acid, Riboflavin, Thiamin, Vitamins- B6, B12 & C)

Electrolytes (Potassium and Sodium)

Food supplementation

Eating Habits and Practices

Therefore, among various lifestyle choices and influences, choosing and practising habits that promote healthy eating is very important (Rasali et. al., 2013).

Breastfeeding

Infant and young childhood feeding

Adolescents' food habits

Adults' food habits

Food habits and women's health

Seniors' eating habits

Food Knowledge and Skills

Knowledge to distinguish edible and inedible things, healthy and unhealthy foods, amount of healthy food.

Knowledge of preservation and storage of healthy foods

Food skills to prepare and eat healthy meals.

Sodium Knowledge and Intake

Sodium and sugar pose detrimental effects on health, when they are consumed by the people in excessive amounts in the regular diet of the people. Reducing their excessive intake among the people is becoming increasingly important especially among sedentary people in urban areas in recent times.

Knowledge of healthy sodium intake

Situation analysis (empirical data availability/)

Sweets and Sugary Drinks

Knowledge of merits and demerits

Situational analysis (Data availability?)

Conclusions and Recommendations

A set of recommendations for healthy eating practices specific to geo-ecological regions of Nepal have been considered. The sources of information used in this chapter are the readily available web information, authors' relevant research and personal life experiences.

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