



Assessment of Cereal Based Food Security Situation in Bagmati Province of Nepal: Inclusive Transformation Perspective

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Abstract

This study identified the prevalence of food insecurity as per social and economic characteristics of people living in Bagmati province, thereby, giving information to plan and design the intervention appropriate and adequate enough to bring desirable changes in those areas. Food security is a complex and multidimensional concept. Measuring the concept with a single indicator is difficult due to its complexity and context specificity. This article explored the various aspects of food security in Bagmati province through primary and secondary data. This article offers a thorough analysis of different components related to food transformation systems contributing to achieve food security. It examined the food system's numerous parts and interdependence, highlighting pressing issues and possible solutions. Encouraging women, educated and economically active youths using innovative ways would contribute improving long-term food security. Land ownership of women is directly responsible for food surplus or deficit condition of in the study area. Governments and international organizations should prioritize investment in agriculture, research and development, and infrastructure to promote sustainable and inclusive food systems.

Keywords: Food security, food transformation, food system, production, food surplus



Open Access

1. Introduction

With millions of people suffering from hunger and malnutrition, food security is a crucial worldwide concern. The importance of maintaining a sustainable and resilient food system grows as the world's population rises. Food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food. Food security is built on four pillars: availability, access, utilization and stability. Food systems overlap with agricultural systems in the area of food production, but also comprise the diverse set of institutions, technologies and practices that govern the way food is marketed, processed, transported, accessed and consumed (Searchinger, 2013). The food system activities are grouped into four categories: producing food, processing and packaging food, distributing and retailing food, and consuming food. They intersect in agricultural and food systems at the global, national and local levels. Today, the main concern for the food and agricultural sector is to provide simultaneously enough food, in quantity and quality, to meet the nutritional needs of a growing population and to conserve natural resources for future generations (Godfray, 2016). A sustainable food system supports food security, makes optimal use of natural and human resources, is culturally acceptable and accessible, environmentally sound and economically fair and viable, and provides the consumer with nutritionally adequate, safe, healthy and affordable food for present and future generations (Ruben, Cavatass, Lipper, & Smaling, 2021). Changes in both food consumption and food production are important to ensure more sustainable food systems and to achieve food and nutrition security. There are two main points of view on food security. The primary solution to under-consumption and famine was one that focused on increasing production. The other is a new viewpoint that accepts the need to address a wide range of issues, not simply production,

and is more social and ecological. The first is primarily agricultural-focused; the latter one is a food systems approach. A series of dynamic interactions between and within the bio geophysical and human environments are referred to as food systems. These interactions lead to the production, processing, distribution, preparation, and consumption of food. They include aspects of (i) food accessibility (with elements related to affordability, allocation, and preference); (ii) food availability (with elements related to production, distribution, and exchange); and (iii) food utilization (with elements related to nutritional value, social value, and food safety). Food security has always remained the national priority in Nepal, however not able to progress significantly (Pudasaini & Sharma, 2020).

The objective of this research was to analyze the food security status of Bagmati province to know the extent of inclusive growth of agriculture across high hill, mid hill and plain area. For this purpose, present production, harvested area and production trend of cereals in Bagmati province was analyzed and food balance sheet of Bagmati province was also prepared. Literatures were reviewed based on inclusive transformation perspective regarding the fulfillments of the sustainable development goals.

2. Materials and Methods

This paper complies with the necessary methodological design to make a more scientific (Khatri, 2022). The section of the study areas, data sources, sampling techniques/sample size and data analysis are described below.

2.1. District selection

The five (5) districts from Bagmati province were selected purposively by representing at least one district in each ecological region. Kavrepalanchowk, Sindhuli and Dhading has represented mid hill districts, Chitwan has represented plain/terai area and Rasuwa represented high hill area. The Bagmati province and districts are depicted in Figure 1.

Figure 1

Map Showing Districts of Bagmati Province



2.2. Data source

Both secondary and primary data/information was utilized to accomplish the study. The primary data were collected from the three sources: House hold survey (HHS), Focus Group Discussion (FGD) and Key Informant Interview (KII). The secondary data were collected from the district published or unpublished sources, dataset of crop production, population, MOALD- Bagmati province publications, respective Agriculture Knowledge Centre (AKC), respective Project Implementation Units (PIU) located in the districts, related government and non-government offices, scientific papers, books and journal articles, web pages related to food and nutrition availability, hunger and malnutrition and population and.

2.3. Sampling technique and sample size

This study used the records from AKC. Farmers (245) were selected based on the lists provided by AKC of respective districts.

Table 1

Study Population (N) and Sample Household Number

| Districts | Number of farmers (N) | Sample HH number (n) |
|--|-----------------------|---|
| Kavrepalanchowk, Sindhuli, Chitwan, Dhading and Rasuwa | 245 | 150 Obtained (from sample size formula, 5% margin of error) |

For the household survey, 30 farmers from each district were selected randomly (lottery method) and selected from production pocket or block of each district producing cereals. For the selection of pocket or block and farmers, the researcher had consulted with the AKC and PIU of each district.

Table 2

Distribution of Sample Household Number Across Different District of Bagmati Province

| SN | Districts | HHs |
|----|-----------------------|-----|
| 1 | Kavre (mid hill) | 30 |
| 2 | Sindhuli (mid hill) | 30 |
| 3 | Chitwan (plain/terai) | 30 |
| 4 | Dhading (mid hill) | 30 |
| 5 | Rasuwa (high hill) | 30 |
| | Total (n) | 150 |

2.4. Tools and techniques used in primary data collection

Tools used for household survey was structured questionnaire. Pretesting and finalization of structured questionnaire was done

2.5. Focused group discussion (FGD) and key-informant survey (KIS)

The field visit was organized in various date for organizing focus group discussion and key informant survey (KIS). Five FGDs (Rasuwa, Dhading, Chitwan, Sindhuli and Kavre) by organizing 5-10 persons of the same organization and discussed in common issues in crop production and food security. Likewise, ten (10) key experts from Municipalities, AKC Offices and Senior Officers, and experts engaged in crop production and marketing of district offices of Rasuwa, Dhading, Chitwan, Kavre, and Sindhuli district were consulted. Simple checklist was used for the officers, experts and Marketing manager in order to collect descriptive as well as quantitative information. Online and telephone discussion was also done while gathering information.

2.6. Data entry and analysis

The collected data were verified, synthesized, tabulated and analyzed according to the scope of work and suitable 'excel'. Both descriptive and quantitative methods were used to analyze the data to count frequency, percentage, median, and trend analysis. Then, inference was drawn in the form of graphs, diagrams and narrative summary.

3. Results and Discussions

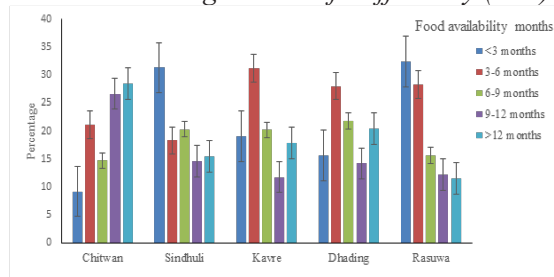
3.1. Household survey results

3.1.1. Food self sufficiency

Food self-sufficiency (FSS) is the measurement of own production by consumption and measured in percentage. FSS and continuity of subsistence farming had negative relationship, it meant one unit change from one category to other (3 month to 6th month or 6 months to up), continuity of subsistence farming likely decreased (Fig 2). Higher FFS means, less likely they are commercial.

Figure 2

Districts Showing Food Self-Sufficiency (FSS)



Source: Field Survey, 2022

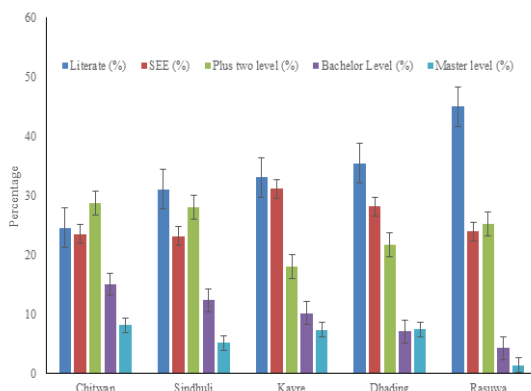
3.1.2. Education

Education of the respondents had positive effect on probability of achieving food security but showed insignificant relationship at 5% level. Although they were cent percent literate in education but this does not mean that they were financially literate. As shown in Fig 3, median value of education lies for SLC level. Around 40% respondent had education higher than SLC/SEE (intermediate 25%, bachelor 6.3% and master 9%). Majority of the higher degree respondents were from Chitwan. Higher education would have high impact in food

security. Education was not the most effective variable in food security case.

Figure 3

Districts Showing Education Level



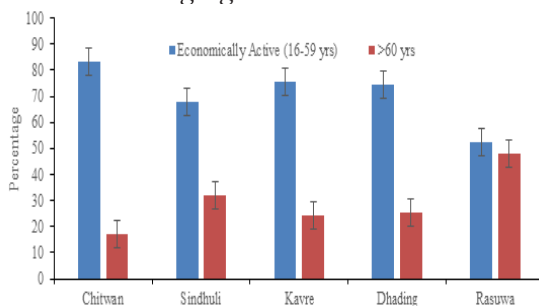
Source: Field Survey, 2022

3.1.3. Age

Age of the farm head had negative but significant relationship with the continuation of food security. Heads above than 60 years were one-tenth (Fig 4). The more the economically active person at home meant higher active they were in income earning from on-farm and translated it into purchasing food too.

Figure 4

District Showing Age Level

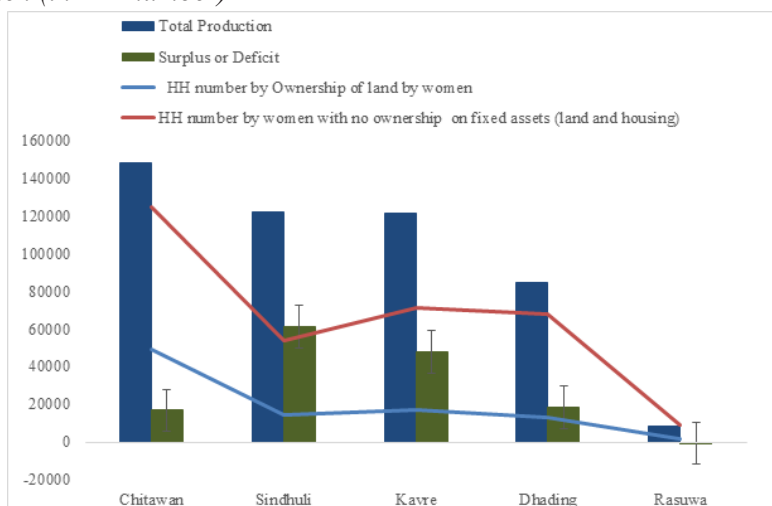


Source: Field Survey, 2022

Further analysis took place by counting their on-farm and off-farm engagement as they said crop farming was the secondary occupation. Almost all respondents used farm income for payment to purchase food and said that income is not enough for continuing income (FGD, 2022).

Figure 6

Districts Showing Different Levels of Food Production (MT) and Land Ownership of Women (in HH number)



Source: NSO, 2021

As the associated HH number by women's ownership on land decreased, food deficiency also decreased in hilly area (Fig 6). Gendered participation in agriculture could have influenced this phenomenon. Whereas, in the plain (Chitwan) less surplus food was observed as compared to Sindhuli and Kavre (Fig 6). It might be due to larger population in the plain as compared to hilly area. The food deficit district (Rasuwa) was found to be associated with least HH number by ownership of land by women. Chitwan (no

food deficit district), had the highest number by ownership of land by women as compared to other four districts (Fig 6). As the HH number by ownership of land by women In case of Global Hunger Index 2022, Nepal ranks 81st out of the 121 countries. With a score of 19.1, Nepal has a level of hunger that is moderate.

3.2. Food security status of Bagmati Province

Table 3

Food Balance Sheet of Bagmati Province, 2078/79
(Unit : Mt)

| District | Population | Edible Food | | | | | | | Required Cereals | Surplus or Deficit |
|---------------|------------|-------------|--------|--------|------------|--------|--------|---------|------------------|--------------------|
| | | Rice | Maize | Millet | Buck-wheat | Wheat | Barley | Total | | |
| Dolakha | 174365 | 3845 | 16887 | 3995 | 321 | 6025 | 46 | 31118 | 33304 | -2186 |
| Sindhupalchok | 265053 | 21203 | 62274 | 15162 | 56 | 6805 | 57 | 105558 | 50625 | 54933 |
| Rasuwa | 47121 | 1917 | 4536 | 847 | 5 | 981 | 93 | 8380 | 9000 | -620 |
| Ramechhap | 171877 | 10379 | 56256 | 4669 | 5 | 6973 | 24 | 78306 | 34547 | 43759 |
| Sindhuli | 302801 | 29822 | 70696 | 9064 | 179 | 12132 | 18 | 121912 | 60863 | 61049 |
| Kabhre | 367406 | 20752 | 72935 | 3726 | 165 | 23707 | 185 | 121469 | 73849 | 47620 |
| Bhaktapur | 436129 | 11075 | 6165 | 96 | 1 | 10315 | 8 | 27660 | 87662 | -60002 |
| Lalitpur | 556770 | 10168 | 28242 | 662 | 16 | 9812 | 15 | 48915 | 111911 | -62996 |
| Kathmandu | 2060472 | 14525 | 24451 | 1074 | 2 | 9254 | 1 | 49306 | 414155 | -364849 |
| Nuwakot | 265827 | 41761 | 38483 | 5960 | 64 | 13296 | 55 | 99618 | 53431 | 46187 |
| Dhading | 328723 | 30124 | 35204 | 6102 | 33 | 12803 | 107 | 84374 | 66073 | 18301 |
| Makwanpur | 470384 | 24888 | 65131 | 2746 | 118 | 11260 | 98 | 104241 | 94547 | 9694 |
| Chitwan | 726518 | 57170 | 69982 | 1390 | 385 | 19396 | 8 | 148329 | 131500 | 16829 |
| | 6173447 | 277628 | 551241 | 55493 | 1350 | 142759 | 715 | 1029186 | 1221467 | -192281 |

Source: MOALD, 2022

In 2078/79, Bagmati province was food deficit by 192281 MT of cereals. Among 13 districts of Bagmati province, five districts were food deficit namely Kathmandu, Lalitpur, Bhaktapur, Dolakha and Rasuwa (Table 3). According to the Food Security Monitoring Unit, Ministry of Agricultural Development and the World Food Program; Dhading of Bagmati province, was “highly food insecure” in 2018. Nepal Food Security Bulletin states that “external assistance” is necessary for providing food and non-food demands. Highly food insecure population resembles people whose food consumption gaps are higher than normal. These people can meet minimum food needs only through “accelerated depletion of livelihood assets”. Family size, gender, age and education levels, together with land ownership, household income, remittance and improved access to markets and roads seems to be strongly associated with food security (Hem, Rijal, & Sapkota, 2019). Most of those mentioned variables are potentially significant for inclusive transformation of agrifood system in Nepal. Based on an analysis of the results from interviewing 384 farm households from three agro-ecological zones in Bagmati Province, 56% of the farm households, experienced food insecurity (Karki & Burton, 2021).

The number of people in the household is negatively associated with food security, the larger the household, lower the averages. The income from non-farm activities is another important determinant. As this income results in a higher overall income, food security increases. Total expenditure and food expenditure are similarly associated (KII, 2080).

3.3. Food system transformation and food security

Food system transformation has been a widely discussed topic in international society over time. These transformations ensure not only food availability, timeliness, and nutrition, but also in terms of the ecological, social, and economic sustainability, feasibility, and justice of food security (Yujia Lu, 2022). Food security itself is a multi-dimensional concept, with goals ranging from ensuring survival and health to gradually considering food preferences,

involving food accessibility, availability, utilization, and stability and it operates within social, economic, environmental, and political contexts (Rutten, Yaroch, & Story, 2011). Food security is a complex and multidimensional concept. Measuring the concept with a single indicator is difficult due to its complexity and context specificity (Bhandari, 2018). Globally, the in-depth structural transformation of agrifood systems is expected to be achieved in the future in a more inclusive way i.e., delivering healthy food for human beings, and that it should be resilient to shocks from climate change, economic risk, and market failures (FAO, 2021). Current trends in poverty, malnutrition, climate change and economic turmoil have driven global food insecurity suggesting widespread failures in food systems (Pereira, Drimie, Maciejewski, Tonissen, & Biggs, 2020). The COVID-19 pandemic continues to expose the weaknesses of current global food systems and heighten concerns over food security risks, especially in low- and middle-income countries.. It has been observed that the evolution of our food systems should shift from exclusively boosting production to nourishing people in a more inclusive and sustainable approach, to ensure those future generations will be better provided for food (Caron, et al., 2018). As food system transformation is expected to reflect the approach of pursuing social, environmental, and nutritional and health outcomes and potential influences, ensuring global food security and to achieve the Sustainable Development Goals.

4. Food system transformation and sustainable development goals

By addressing various facets of sustainability, such as food security, poverty reduction, environmental protection, and social fairness, food system transformation is essential to reaching the Sustainable Development Goals (SDGs). The following are some significant ways that the restructuring of the food system helps to achieve the SDGs:

4.1. No poverty

By boosting agricultural output and expanding small-scale farmers’ prospects

for income, changing the food system can contribute to the reduction of poverty. Access to markets, the development of value chains, and sustainable agricultural methods can improve smallholder farmers' lives and help them escape poverty (FAO, Hunger Report, 2021).

4.2. Zero hunger

Food system transformation is crucial for achieving zero hunger. It involves promoting sustainable agricultural practices, investing in research and innovation, improving access to nutritious food, enhancing food distribution systems, and reducing food waste and loss. Integrated approaches that address the entire food value chain can help ensure food security and end hunger (OCHA, 2022).

4.3. Good health and well-being

A transformed food system can contribute to improved health outcomes by promoting sustainable diets and reducing the consumption of unhealthy and processed foods. It involves promoting diversified, nutritious, and safe food options, supporting local food production systems, and reducing the use of harmful agrochemicals (Nutrition, 2021).

4.4. Clean water and sanitation

Transforming the food system can help address water scarcity and pollution issues associated with agriculture. Sustainable water management practices, such as precision irrigation, water-efficient technologies, and watershed management, can reduce water consumption and minimize water pollution from agricultural activities.

4.5. Responsible consumption and production

Food system transformation involves promoting sustainable production and consumption patterns. It includes reducing food waste and losses, adopting sustainable agricultural practices, promoting organic farming, and improving resource efficiency throughout the food value chain. Sustainable food choices and consumer behavior can

contribute to reducing the environmental footprint of the food system (FAO, The State of Food and Agriculture, 2019).

4.6. Climate action

The food system is a significant contributor to greenhouse gas Emissions. By encouraging climate-smart agricultural methods, minimizing deforestation for agriculture, enhancing land and soil management, and implementing low-carbon food production and distribution Systems, the food system can be transformed to help mitigate climate change (IPPC, 2019).

These are just a few instances of how changing the food system helps achieve the Sustainable Development Goals. To achieve sustainable and equitable food systems, it will involve coordinated efforts from a variety of stakeholders to bridge the complex and diverse connections between the food system and the SDGs.

5. Conclusion

The transformation of our food system plays a critical role in ensuring food security for a growing population. Firstly, it was evident that less surplus production and deficiencies in all the districts of Bagamati province faces numerous challenges, including population growth and resource constraints. These challenges necessitate a transformation towards more sustainable and resilient practices. By adopting innovative technologies and sustainable farming methods, we can increase food production while minimizing the negative environmental impacts. Population, age and education as socio-demographic variable are important to reduce inequalities within the food system transformation. The HH number of women owning land is positively associated with increased production and decreased food deficiency.

Competing Interests

The authors declare that they have no competing interests.

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References

- Bhandari, P. (2018). Regional variation in food security in Nepal. *Dhaulagiri Journal of Sociology and Anthropology*, 12, 1-10.
- Caron, P., Ferrero, Y., De Loma-Osorio, G., Nabarro, D., Hainzelin, E., Guillou, M., et al. (2018). Food systems for sustainable development: Proposals for a profound four-part transformation. *Agron. Sustain*, 29-31.
- FAO. (2019). *The state of food and agriculture*. Rome, Italy: FAO.
- FAO. (2021). *Hunger report*. FAO.
- Godfray, H. C. (2016). *The state of food insecurity in the world. The multiple dimensions of food security*. FAO.
- Hem, R., Rijal, K., & Sapkota, R. (2019). Factors influencing food insecurity in Nepal. *Journal of Institute of Science and Technology*, 22-29.
- IPPC. (2019). *Climate Change and Land*. IPPC.
- Karki, S., & Burton, P. (2021). Status and drivers of food insecurity and adaptation responses under a changing climate among smallholder farmers households in Bagmati Province, Nepal. *Environment, Development and Sustainability*. Pages 14642–14665.
- Khatri, B. B. (2022). Writing an effective abstract for a scientific paper. *Nepalese Journal of Development and Rural Studies*, 19(01), 1-7. <https://doi.org/10.3126/njdrs.v19i01.51910>
- MOALD. 2080. Retrieved from <https://caidmp.gov.np>.
- National Statistics Office. 2021. *National population and housing census: National report*. Retrieved from https://censusnepal.cbs.gov.np/results/files/result-folder/National%20Report_English.pdf
- Nutrition, H. L. (2021). Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. *Climate-ADAPT*.
- OCHA. (2022). *The state of food security and nutrition in the world 2022: Repurposing food and agricultural policies to make healthy diets more affordable*. ReliefWeb.
- Pereira, L., Drimie, S., Maciejewski, K., Tonissen, P., & Biggs, R. (2020). Food system transformation integrating a political–economy and social-ecological approach to regime shifts. *Int. J. Environ. Res. Public Health*, 1313.
- Pudasaini, A., & Sharma, M. (2020). Food security has always remained the national. *South Asian Journal of Social Studies and Economics*, 16-36.
- Ruben, R., Cavatass, R., Lipper, L., & Smaling, E. (2021). Towards food systems transformation— five paradigm shifts for healthy, inclusive and sustainable food systems. *Opinion Piece*, 1423-1430.
- Rutten, L., Yaroch, A., & Story, M. (2011). Food systems and food security: A conceptual model for identifying food system deficiencies. *Hunger Environment*, 239-246.
- Searchinger, T. H. (2013). *Creating a sustainable food future*. World research institute.
- Lu, Y., Zhang, Y., Hong, Y., He, L., & Chen, Y. (2022). Experiences and lessons from Agri-Food system transformation for sustainable food security: A review of China's practices. *Foods*, 11(2), 137.