Research article

UNDERSTANDING THE ROLE OF KEY DETERMINANTS TOWARDS REALIZING FOOD INSECURITY AMONGST THE RURAL HOUSEHOLDS: A CASE FROM BAJHANG AND MORANG DISTRICTS OF NEPAL

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ABSTRACT

Food insecurity is one of the single largest determinants to challenge Nepal from realizing its ambition of graduating to a developing country. In line with the imminent national challenge, this study has tried to delve into the real-time findings from the rural part of the country to understand the crucial determinants of food insecurity. A household (HH) level survey with a sample size of 502 was adjudged using Krejcie and Morgan (1970) method. Semi-structured HH survey was administered to collect the socio-economic status of the respondent. Household Food Insecurity Access scale (HFIAS) was used to assess HHs food insecurity, whereas poverty status was assessed using the multidimensional poverty index (MPI). Finally, to identify the determinants of food security binary logistic regression technique was used. The MPI adjudges the aggregate status as 21%, 30.6% in Bajhang, and 14% for Morang. HFIAS tool unveiled that 47% HH were food secure. The disaggregated figure stands as 46% and 48% of households being food secure in Bajhang and Morang districts, respectively. Among the surveyed households, half of the households expressed food insecurity as the greatest concern and the consequential uncertainty ahead. The assessment further found that the Per Capita Income score ($p<.01$), access to financial institutions (cooperative) ($p<0.01$), holding livestock ($p<.05$), and expenditure on food ($p<0.01$) have a positive relationship in the case of Bajhang household. On the other hand, wage labor ($p<0.01$) earning members in the village (only for Morang), MPI poor ($p<0.05$) HHs and abroad migration ($p<0.05$) (only for Bajhang), ethnic cast Dalit (for both) ($p<.05$) had a significant negative relationship on household food security.

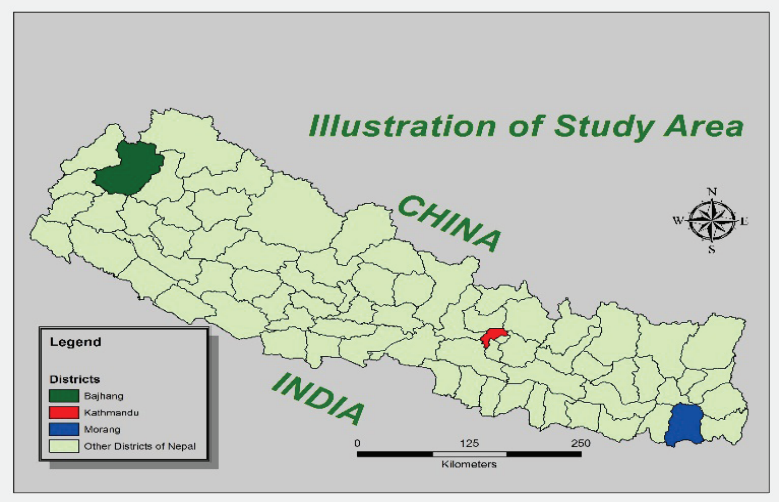
Keywords: Food security, MPI, HFIAS, Logit

INTRODUCTION

Food and nutrition security remains a critical global concern. In the 1950s, food security scope was limited to understanding self-sufficiency in significant staples. Later in the 1970s, the definition widened to include access to sufficient food. During that time, Nepal was a net food exporter and could produce sufficient food to feed its population. More than 65% of households (HHs) in Nepal are engaged in agriculture and food production; domestic production is insufficient to meet the need (Ministry of Agriculture and Development, MoAD 2016). Since then, production and imports have not kept pace with the increased demand from an increasing population. Nepal is considered a low-income food-deficit country due to its' low agriculture production and slow economic growth rate (LIFDC) (FAO, 2016). Over the period, the definition of food security and its dimensions have been realigned, readjusted, and refined to the contemporary realization. According to FAO World Food Summit, 1996, food security is achieved when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs for an active and healthy life. It has well-established four pillars (availability, access, stability, and utilization), which must be fulfilled to be food secure. However, in the case of Nepal, where countries always struggle for sufficient food production, food availability can play a significant role in addressing the food insecurity issues.

About 795 million (11%) people were suffering from chronic undernourishment in the world in 2014-2016 (FAO, IFAD, UNICEF, WFP, and WHO, 2017). In the same period, a similar percentage (2.3 million, 8.34%) was estimated to be a chronic state of undernourishment in Nepal which was a praiseworthy change from a staggering 4.1 million in 2004-2006 (FAO et al., 2017). Within the same period, the poverty level of Nepal fell from 30.9% in 2004 to 25.2% in 2011 (ADB, 2017). The reduction substantiates UN arguments that food security is not the sole cause of hunger and starvation; it might be the inability of people to access food, which is generally a cause of poverty. Recent figures revealed that the condition of global hunger index (GHI) (37.4 to 19.5 in 20 years; 2000 to 2020) and food insecurity is improving in Nepal. Similarly,

World Bank had estimated that 8% of Nepal's population lived in extreme poverty in 2019 (Von Grebmer, et al., 2020). On the other hand, different organizations have reported that in 2016, the food security situation had deteriorated in sub-Saharan Africa, South-East Asia, and Western Asia (FAO et al., 2017). An adequate supply of food at the regional, national or international level does not guarantee household-level food security (FAO, 2008), which is also true for Nepal. Due to geographic barriers and high climatic variability, location-specific food insecurity cannot be generalized using district or national food status data. The food deficiency condition of the household in Nepal is characterized by the region of the country and by the location of the particular district (NPC and WFP, 2019). Most of the Tarai districts, the southern plain area of Nepal is often dubbed as the food basket of Nepal, are food sufficient in production, and the data confirms that many of them are in surplus. However, due to disparity in development and economic growth among regions, poverty, and lack of income, people are deprived of accessing the quantity and quality foods. As a result, people in the remote villages are compelled to survive on low quantity and quality foods. Bajhang, a mountainous district in the west part of Nepal, had a food deficit in production and availability (MOAD, 2016), while the Morang, which lies in the south-eastern plain of Nepal, was a food surplus district and supplied food to other adjoining districts (Sunsari, Dhankuta, Udaipur, etc.).



Study site

MATERIALS AND METHODS

Sample size was adjudged by using Krejcie and Morgan (1970) method to represent the status of total population size of the respective area. Household (HH) survey was done to collect primary data in August-September 2018 and secondary data were taken from published and gray articles. The sources of secondary data were from the District veterinary hospital and livestock expert center (then Livestock Service Offices, Agriculture Knowledge Center (then District Agriculture Development Offices), Agrovet shops, Central Bureau of Statistics, and Ministry of agriculture and livestock development Nepal. In total 502 households, were surveyed using mobile phone based application AKVO-Flow. Semi-structured survey questionnaires were designed and included for the survey Pre-testing of questionnaire was organized to test the face validity and reliability of questions and real time training for the enumerators in both districts, led to finalization of the question. Out of 502 surveyed HHs, 255 were from Bajhang and 247 were from Morang. Collected data were assessed using descriptive statistical tools and techniques primarily using Microsoft Office Excel 2007 and STATA version 11.1. Despite some limitations (Gebreyesus et.al. 2015) on tool, HFIAS tool developed by Food and Nutrition Technical Assistance (FANTA) Washington DC USA was used (Coates et al., 2007) to measure the household food insecurity. This is a basically 4 level of scaling technique in which 1 denotes as food secure, 2 denotes mildly food insecure, 3 denotes moderately food insecure access and 4 denotes severely food insecure access. However, it is very difficult to find a single tool to measure the food security (Webb, et.al, 2006; Riely et. al., 1999).

For HH poverty measurement multidimensional poverty index (MPI) designed by Alkire and Foster

(2011) was used. The MPI is an index designed to measure acute poverty.

Binary logistic regression technique was used to identify the determinants of food security. The households' food security status was estimated using Household food insecurity access scale as either food secure (1) or food insecure (0). Hence, binary logistic regression was used because the dependent variable (household food security) expresses the status of the households.

The general form of the logistic regression equation can be written as (Field 2009);

$$P(Y) = \frac{1}{1 + e^{-(b_0 + b_1 x_{1i} + b_2 x_{2i} + \cdots + b_n x_{ni})}}$$

OR Logit (P) = $b_0 + b_1 x_1 + b_2 x_2 + \ldots\ldots\ldots + b_n x_n$ ---------- (1)

Where,

P = the probability that a case is in a particular category (here in binary logistic regression food secure = 1 or insecure = 0)

b_0 = the constant of the equation (……. 1)

$b_{1, 2, \ldots, n}$ = the coefficient of the explanatory variables

$x_{1, 2, \ldots n}$ = the explanatory variables

For this study variables given in Table 1 were used.

Table 1. Variables used for logistic regression and their description

Variables	Description	Average value
FS	1 if HH food secure, 0 food insecure	0.5179
X1: Per capita income	Yearly income category of HH individuals: 1 for less than NRs. 25,381 (below national poverty line of 25.2%), 2 for income of 25,381 to 47,034.8 (i.e. poverty head count of 1.25$), 3 for income range between 47,034.9 to 75,255.7 (i.e. poverty head count of 2$) and 4 for > 75,255.7	Yearly average income of HHs NRs 121,537.8
X2: Age category of Household head	Years in range of 1 to 4 scale (1 = 18-39 years, 2= 40-50 years, 3=51-65 years and 4 > 65 years	2.1454
X3: Family Size	Number of household member	6.43
X4: Livestock unit	Number	1.665
X5: MPI	1 if Multidimensional Poor, 0 otherwise	0.446
X6: Agriculture labor	Average number of HH members involved in agriculture work	2.133
X7: Cooperative	1 if the household holds member of cooperative	0.6773
X8: Adult member	Number of adult members at home	4.1255
X9: Migration	1 if HH member migrated to abroad	0.3605
X10: Food expense	Yearly expenses on food Nepalese rupees	65347.4
X11: Wage labor	Number of HH member working as labor	0.37251

Preliminary findings were shared among the key stakeholders and inputs included in the final version.

RESULTS AND DISCUSSION

General characteristics of Sampled HHs

The demographic and socio-economic features of the respondents are presented in Table 2. During survey, it revealed that female respondents were more than double the male respondents due to male migration for earnings. Most of the respondents were from 31 to 45 years of age category and average age of respondents was 37.52 years. It revealed that about 75% households have a major occupation as agriculture

while that of for Nepal is about two-third population are engaged in agriculture (NPC and WFP, 2019). About 59% respondents were literate; literacy percent among respondents was much higher in Morang (78.5%) as compared to Bajhang (39.6%). Of the total household surveyed households, Dalit, Janajati and Brahmin/ Chhetri/Thakuri were 18%, 23.5% and 58%, respectively. Circa 36.1% of the surveyed households were sending member as a labor migrant for household income; about 30% households of Bajhang and 42% households of Morang were found sending member(s) as a labor migrant.

Table 2. General characteristics of sampled households

Variable	Bajhang (Percent or mean value)	Morang (Percent or mean value)	Aggregate
N	255	247	502
Respondent (%)			
Male	38.8	20.6	29.90
Female	61.2	79.4	70.10
HH head (%)	40.4	26.7	33.7
Adult male	12.9	6.9	10.0
Adult Female	46.7	66.4	56.4
Age category (%)			
15 to 30 Years	36.9	32.8	34.9
31 to 45 Years	37.3	39.3	38.2
46 to 60 Years	20.0	19.8	19.9
More than 60	5.9	8.1	7.0
Mean age	36.6±14.15	38.4 ±13.54	37.52±13.87
Occupation (%)			
Agriculture	75.7	73.2	74.5
Business	2.4	11.3	6.8
Wage Labor	4.7	7.7	6.2
Job holder	3.6	1.6	2.6
Student	12.2	5.7	9.0
Other	1.6	0.4	1.0
Education level (%)			
Illiterate	60.4	21.5	41.2
Literate	8.2	27.1	17.5
Primary	2.7	8.5	5.6
Lower Secondary	9.8	19.4	14.5
SLC	9.4	13.4	11.4
Higher Secondary	7.1	7.7	7.4
Bachelors and above	2.4	2.4	2.4
Ethnicity (%)			
Dalit	23.5	12.1	17.9
Janjati	0	47.8	23.5
Madheshi	0	0.8	0.4
Brahmin/Chhetri/Thakuri	76.5	39.3	58.2
Percent of households sending member as a labor migrant (%)	30.2	42.1	36.1
Household food security access scale			

Though agriculture practices dominate the rural landscape we didn't find families fully dependent on the self-grown produce to sustain yearly consumption. It was found that the subsidiary sources of income enabling rural inhabitants to purchase of food grains from the nearby market. The income generated from the sales of milk and milk products have been one of significant determinant of support. In addition, the family members engaged in foreign employment have increasing becoming an attractive source of support to cater their needs.

Table 3 presents that HH food consumption of Morang and Bajhang study areas. The access prevalence shows that Bajhang has higher percentage of food insecure households as compared to Morang. Household fall under category four (severely food insecure) of Morang may have suffered from external factors; low rainfall (fluctuations and deprived of irrigation water in the main season as compared to Bajhang) and agricultural input unavailability on time etc.

Table 3. Household Food Insecurity Access Prevalence by study location

Category	Morang (%)	Bajhang (%)	Total (%)
Category 1: food secure	48	46.1	47
Category 2: mild food insecure	20	25.1	23
Category 3: moderately food insecure	16	25.8	21
Category 4: severely food insecure	16	3.1	9

Source: HFIAS category calculation from HH Survey data, Sept 2018

Multidimensional Poverty Index (MPI)

Multidimensional Poverty index (MPI) was calculated to measure the poverty status of each four villages of two districts. MPI percent of Morang were found 14% and the corresponding value for Bajhang study site was found to be 30.6%. The empirical finding of MPI value of two districts average value is less as compared to overall national MPI reported (26.6%) by UNDP in 2016. MPI percentage of Nepal as estimated by OPHI (2013) was 21.7% for the year 2013. Whereas, the comparison was by the regions, MPI percentage of far-western region, where the Bajhang district is located, was 28.1% and that of eastern region, where Morang district located, was 17.7%. The findings for each district's study sites are well aligning with above mentioned MPI finding. MPI percentage of Morang might be true as there are many hilly districts in the eastern region which are more deprived in any one of the ten indicators of MPI as compared to Morang district where roads and other access are comparatively better. Similarly, in Bajhang estimated value might be true as there is more backwards district than Bajhang in far-western region.

Determinants of household food security

This section presents the results of the binary logistic regression that attempts to explain the socio-economic determinants of household food security in the Bajhang and Morang district. The results are presented in Table 4. For the binary model, the estimates of relative risk are estimated based on odds ratios. The outcome of this model is for two household categories derived from HFIAS tool; namely, food secure and food insecure households. It was revealed that out of eleven variables, five for Morang district and seven for Bajhang district are statistically significant.

Per capita income (PCI)

PCI was found having significant positive impact on Bajhang household's food security while it was positive but not significant for Morang. The increase in one level of PCI category, in case of Bajhang, increases food security level by a factor of 3.743 (i.e. 274%). Since Bajhang lies in the remote area and people have less access to livelihood options and economic activities. Once the PCI increases purchasing power of each household increases that result into increase in household food security (FAO, 1994). Similar finding was observed by Arene and Anyaeji (2010).

Migration outside the country

It was oblivious to assume is that household in Bajhang having its member abroad migrant has

strong linkages to domestic food security. However the study found an inverse relationship between the household with abroad migrant and food security. It indicates that increase in the number of households with abroad migrant in Bajhang decrease the chances of a household being food secure by about a factor of 0.5329 (i.e. 46.3%). This is mainly due to migration to India, where more than 80% household members go, as seasonal migrant and earns less than NPR. 12000 ($120) (UMN HH Survey, 2016/17). However, such seasonal migrants were found spending significant portion of their earning in travelling back to their village every six to eight months and the process remains the same for all years. Hence, they were not being able to save money for any meaningful change. Further, the practice to accessing loan at more than 24%, to go to India, would mean that huge portion of their earning goes in repayment of the loan. However, among the HH where the migration to other countries then India, earned significantly higher, were found having a positive impact on food security.

Table 4. Logit model results on factor affecting household food security status

Variables (X_i)	Morang (n=247)				Bajhang (n=255)			
	β	SE	P>|z|	OR	β	SE	P>|z|	OR
PCI Category	0.2082	0.1618	0.1980	1.2314	1.3201	0.4602	0.0040***	3.7437
Age of HH	-0.1398	0.1705	0.4120	0.8695	-0.1388	0.1602	0.3870	0.8704
Access to institutions (Cooperative)	0.7302	0.3072	0.0170*	2.0756	1.0444	0.3807	0.0060***	2.8418
Family Size	0.0979	0.0983	0.3190	1.1029	0.0551	0.0541	0.3090	1.0566
Livestock unit	0.3475	0.1864	0.0620*	1.4156	0.2292	0.0936	0.0140**	1.2576
MPI	1.7456	0.4403	0.0000***	5.7293	-0.6416	0.3542	0.0700**	0.5264
Outside Country migration	-0.0503	0.3641	0.8900	0.9510	-0.6294	0.3420	0.0660**	0.5329
Wage labour	-0.8486	0.2876	0.0030***	0.4280	0.1824	0.1778	0.3050	1.2001
Agriculture involved member	0.0273	0.1272	0.8300	1.0277	-0.0197	0.1278	0.8780	0.9805
Food Expense	0.1951	0.1839	0.2890	1.2155	0.6357	0.2086	0.0020***	1.8884
Cast: Dalit	-1.1128	0.4837	0.0210**	0.3286	-0.6739	0.3916	0.0850*	0.5097
Constant	-2.7775	0.7940	0.0000	na	-3.0611	0.8128	0.0000	na
Model prediction			71.26%				72.16%	
Chi-square			68.26				58.44	
log likelihood			-137.07				-146.96	

β= coefficient, SE= Standard Error, P= probability, OR= Odds Ratio and * p < 0.10, **p < 0.05, *** p < 0.01

Livestock unit

Livestock unit has positive impact on food security with an increase of one unit of livestock the odds of being food secure increase by 0.23 and 0.35 with an odd ratio of 1.25 and 1.41, respectively in Bajhang and Morang. It explains that an increase of one livestock unit increase the odds of being food secure respectively by 74.24% and 38.44%. It's due to very limited income generating scope and activities in Bajhang as compared to Morang district, where people have multiple options to earn money and thereby spend on foods.

Cooperative

Households, in different magnitude and intensity, were found accessing cooperative for financial and technical services in the villages. It has increased people's engagement with formal way of financial transaction. Household having a membership of cooperative was found having a positive impact on food security. This is in line with finding in different countries: Bangladesh (Islam et.al, 2016), South Africa (Masuku, et.al, 2016) and Malawi (Diagne and Zeller, 2001). With an increase in member of cooperative that odds of being food security increase by 1.04 in Bajhang and 0.73 in Morang, with corresponding odd ration of

2.84 and 2.07, explaining that an increase of being member of cooperative were the odds of being food secure by a factor of 2.84 (184%) and 2.07 (107%), respectively in Bajhang and Morang. However, few financial derivatives i.e. high interest rates (up to 24%) discourage rural people to access loan to start entrepreneur initiatives. The reluctance is obvious as for many rural people it was their first experience of being engaged with formal economy.

Wage labor

It has significant reverse relation with food security of households in Morang. Wage labor has negative sign indicting that household with more family members' work as wage labor, the odds of being food secure reduces by -0.84 with an odd ration of 0.42 explaining that an increase in one unit of wage labor decrease the odds of being food secure by a factor of 0.42 (i.e. 57.2%). This might be due to lower wages rate, irregularity in availability of work for the daily workers and labor market has not been commercialized.

Multidimensional poor

Multidimensional poverty levels of HHs were estimated using MPI tool for each household in both districts. To see the relationship between food security and MPI cut off point (k=0.33), those values for individual HH were used. It was found that household fall under MPI had a positive impact on food security of Morang study area and negative impact on Bajhang. Bajhang households which falls under MPI poor was found to be increased in one unit of MPI the odds of being food secure decrease by 0.52 and surprisingly for Morang is increasing by 5.72, which was quite different to the prior anticipation.

Food expense category

Yearly expense capacity on food had a positive sign for Bajhang that shows direct relationship with food security with the magnitude of 0.35. It indicates that an increase in spending capacity of households on preferred food items will increases the chances of household becoming food secure by a factor of 1.88. This suggests that increase in household's capacity to spend on food purchasing from its monthly NPR. 4000 to NPR 8000 increases the odds of becoming food secure by 88.84%.

Ethnicity (Dalit) and migration out from village

In sample, if the household falls under Dalit caste, the chances of becoming more vulnerable on accessing foods. The data revealed that if the household was from Dalit community, then food security was found to be reduced by 49.03% and 67.14%, respectively in both Bajhang and Morang district.

CONCLUSION

Our findings illustrate multiple determinants, in different proportion, adjudges the food security status of household in two rural locations of Nepal. The assessment tools employed during the analysis are not free of limitation, nevertheless the discrete nine indicators of HFIAS and ten indicators of MPI portrays a picture with a high degree of confidence. We conclude that overall food security is more appropriately subjected to a holistic rather than convention piecemeal approach. The status of food security from two locations to some extent depicts the overall status of respective districts hence the policy makers must opt for holistic approach to achieve the food sufficiency in the country.

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