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I   Introduction

Income levels and its distribution had attracted many researchers. The focus in these researches is on finding the welfare levels of households and to compare their situation. Thus, poverty and inequality are the keywords for development researchers. Poverty exists in a given society when one or more persons do not enjoy a level of material well being deemed to constitute a reasonable minimum by the standard of that society (Sen, 1999). Nepal is also one of the poorest countries in the world with 42% of the population living below the poverty line. Moreover, World Development Report 2000/01 shows the picture of income-inequality as the most disturbing one with the top 20% of the population enjoying 44.8% of the national income whereas the lowest 20% getting 7.6% only (JICA, 2003).

Poverty and inequality depends on the household earning capacities. Recently, there is a growing recognition that rural households receive their income from a diverse portfolio of activities, one of these being the rural non-farm sector. Hence, the economic situation and the standard of living of these households cannot be adequately described by on-farm income alone (Castagnini et al., 2004). Moreover, income earned in the rural non-farm sector represents the agent of positive change for the poor in the rural economy, rather than the income earned from the traditional agricultural sector (Adams, 2001). Thus, while farming and wage labor generally remain the chief occupations of the rural poor, the rural non-farm sector's share of rural employment has increased rapidly and also accounts for 40% of rural employment in Asia (Rahman and Westley, 2001). Effect of non-farm sector on poverty and income distribution has been widely debated, with mixed results. However, most of the researches found poverty-decreasing effect of non-farm sector, its effect on income-inequality is unclear. Rahman (1999) and Elbers and Lanjouw (2001) found non-agricultural incomes to be inequality-increasing and with highest contribution in the overall income-inequality. However, in some countries non-farm sector can give an opportunity to the landless households to participate in an economic activity thus reducing the gap in the income distribution, or at least contributing less to overall income-inequality. Thus, several researches found inequality-decreasing effect of non-farm incomes (Adams, 1995). But despite such a growing importance of non-farm income, its implication for household welfare has seldom been analyzed rigorously in the literature.

In this context, the major objective of this research is to find the role of non-farm sector on poverty and income distribution among households. With the increasing contribution of non-farm sector in the rural economy, this research may add to the knowledge base to help policy makers develop suitable policies in order to reduce disparities in the income earnings and distribution.

II   Methodology

1   **Sampling, data collection, and analysis**

Purposive sampling method was used for data collection in this research. Far western region of Nepal was selected as the survey site. Far western region is divided into nine districts of which we selected (i) two hilly districts Baitadi and Dadeldhura, and (ii) two terai (plain areas) districts Kailali and Kanchanpur. Finally, 25 households from Dasharath Chand Municipality (Baitadi), 26 from Amargadi Municipality (Dadeldhura), 34 from Dhangadi Municipality (Kailali), and 39 from Mahendranagar Municipality (Kanchanpur) were selected, totaling 124 samples. For the collection of data, household heads were interviewed with the help of semi-structured questionnaire, based on the recall method for the past one year. Data were collected during the period of February and March of 2004. Data comprises of household characteristics, and total income and expenses of the households from all the enterprises including that from agricultural, livestock, and non-farm sector.

Nepal is an agricultural based nation and agriculture absorbs about 81% of economically active population (Prennushi, 1999). However, agriculture production is primarily for household consumption, even which may not be sufficient (Floyd et al., 2003). The selected regions have no differences in these terms and majority of the households are agriculturally dependent. Moreover, agriculture is subsistence in nature with diversified crops including mostly of rice, wheat, and maize. Similarly, a number of livestock, especially milk animals are also common among the households. However the terai region, which represents the low flat lands of the southern belt of the country with much infrastructural development, is suitable for cereal crop and vegetable production and also have more non-farm opportunities, the hilly zone located in the central belt is considered good for fruit and livestock production but have less non-farm opportunities. Climate of these regions represents average national conditions, with temperate (hilly region) to tropical (terai region) climates.

Data were analyzed with the help of some of the common poverty and inequality ratios (Table 1). For these analyses, we used the national poverty line of Nepal as set by Nepal Living Standard Survey and as used by World Bank. It suggested poverty line of NRS 4,404 per annum, based on Cost of Basic Needs method (Prennushi, 1999).

Table 1: Poverty and inequality indices

Estimation equation	Remarks
$H = \dfrac{q}{N}$	H = Head Count Ratio (HCR) q = Number of poor households (below poverty line) N = Total number of households y_i = Average income of poor households z = Poverty line income P_1 = Poverty Gap Ratio (PGR) P_2 = Squared Poverty Gap Ratio (SPGR) G = Gini Index R_i = Rank order of the household according to income levels y_i = Net income of the household G (y) = Decomposed Gini Index of total income S_k = Share of income by source k G (y_k) = Gini Index for income source k
$P_1 = \sum_{y_i < z} \dfrac{(z - y_i)}{Nz}$	
$P_2 = \left(\dfrac{1}{N}\right) \sum_{y_i < z} \left(\dfrac{z - y_i}{z}\right)^2$	
$G = 1 - \sum_{i=1}^{n} (R_i - R_{i-1})(y_i + y_{i-1})$	
$G(y) = \sum_{k=1}^{m} S_k R(y, y_k) G(y_k)$	$R(y, y_k) = \dfrac{[Cov.\{y_k, r(y)\}]}{[Cov.\{y_k, r(y_k)\}]}$ r (.) = Rank order of sample according to income y_k = Income from source k

2   Descriptive statistics

Table 2: Descriptive statistics of the surveyed samples

Region	Hill	Terai	All
Agriculture labor per household	2.00	1.81	1.89
Household having non-farm employment	0.65	0.78	0.73
Land holding size (ha)	1.09	1.50	1.33
Number of milk animal holdings	5.67	5.75	5.72
Number of meat animal holdings	2.35	2.29	2.31
Household having other livestock	0.22	0.36	0.30
Number of crops per year	2.04	2.59	2.36

Demographic characteristics of the selected samples were estimated (Table 2). It showed that both hill and terai of the Far Western Region have similar conditions with little differences. Despite terai being flat land with several possibilities it is not significantly different from the hills might be because of the little development efforts in this region, on the whole. However, availability of more cultivable land in terai results in higher land holding size there. Also, due to higher facilities of inputs like irrigation and so forth, number of crops per year is higher in this region. Agriculture labor is slightly higher in case of hills whereas non-farm employment in the terai. Livestock animals are also similarly distributed but milk animals are higher in terai and meat animals in hill. Other types of livestock enterprises are slightly more in case of terai.

III   Results and discussion

Table 3: Sector of non-farm employment of the employed members

Sector of employment	Hill	Terai	All
Government services	47.83	27.17	34.06
Other services	2.17	4.35	3.62
Self commerce	10.87	22.83	18.84
Wage commerce	4.35	7.61	6.52
Self manufacturing	13.04	11.96	12.32
Wage manufacturing	8.70	4.35	5.80
Other self employed	6.52	10.87	9.42
Other wage employed	4.35	3.26	3.62
Rest all	2.17	7.61	5.80
Total	100.00	100.00	100.00

Distribution of sector of non-farm employment for the individual household members was estimated (Table 3). It showed that around 90 out of 124 households have some form of non-farm employment whereas only 138 out of 902 members are employed in this sector. The analysis also showed that the dominant non-farm employment is the government services in both areas, accounting on average around 34%. Especially, government services are found to have nearly half of the non-farm employment share in the hill areas, where other non-farm opportunities are relatively less. Commerce including small businesses seems flourishing in the terai region and ranks second there whereas manufacturing takes that place in case of hills. Moreover, there seems availability of other non-farm sectors in the terai areas, which is very low in the hills.

Poverty head count shows that on average 22.58% of the samples are below the poverty line (Table 4). Similarly, estimated PGR and SPGR was around 8.09% and 4.04%, respectively. Estimates also showed that households in the hills are comparatively poorer than those in the terai. Moreover, gini index was found to be 49.63% indicating that there is a wide gap in the distribution of income among households. Comparing hills and terai, however, gini index showed that income is unequally distributed in the terai region.

On the other hand, if we compare household welfare for household with and without non-farm incomes we found that household with some form of non-farm income are less likely to be poor in both the regions. All the poverty indicators from extent, depth, and severity of poverty showed least values in case of household with non-farm incomes. Moreover, in the terai region we found none of the households with some form of non-farm employment being poor. Thus, it can be said that non-farm sector is effective in reducing rural poverty. Moreover, gini for households with non-farm income showed less values indicating less income-inequality compared with

those without it. Hence, non-farm sector can also be considered as effective for reducing income-inequality, and this also applies for both hill and terai areas.

Table 4: Welfare levels (%) for the household with or without non-farm income

Parameters	Hill			Terai			All		
	Not have	Have	All	Not have	Have	All	Not have	Have	All
HCR	88.89	15.15	41.18	43.75	0.00	9.59	67.65	5.56	22.58
PGR	39.38	2.84	15.74	12.52	0.00	2.74	26.74	1.04	8.09
SPGR	21.70	0.69	8.11	5.44	0.00	1.19	14.05	0.25	4.04
Gini	40.63	22.80	38.54	56.14	44.89	48.58	58.72	43.05	49.63

Decomposition analysis revealed that on average agriculture income has 31% share in the total household income but contributed mostly to inequality compared to other sector, contributing around 40% to gini (Table 5). Moreover, it was found to be inequality-increasing. This might be because agricultural income is positively and significantly correlated with land, which is itself quite unevenly distributed (Adams, 1995: in Pakistan; Adams, 2001: in Egypt). Estimated data also revealed high disparities in cultivated land size (Gini: hills = 46.19%, terai = 52.21%, all = 50.81%). However, in contrast, Thirtle et al. (2003) stated that agricultural growth is inequality-decreasing, especially for poorer regions. Comparing hill and terai region, agriculture has less effect in hill but have highly inequality-increasing effects in terai. This may be due to high disparities in land distribution in terai, as well as may be due to the possibility of cultivating commercial crops, good facilities for agriculture, and other reasons. On the other hand, on average we found livestock income to have inequality-reducing effect. Comparing the two regions, it was inequality-reducing in hills whereas increasing in terai. Most probably, it was observed since in the hills almost all of the households have some form of livestock whereas in terai some of the households may not have livestock at all, resulting in inequality in livestock income distribution there. Similarly, on average non-farm sector was also found to have less contribution to overall gini as well as with negative elasticity. Moreover, pseudo gini for non-farm sector is also least among all the sectors. These results showed that non-farm sector has good role to play in the distribution of income among the rural households, with inequality-reducing effects. However, Rahman (1999) and Elbers and Lanjouw (2001) found non-farm incomes to be inequality-increasing. On the other hand, if we compare hill and terai region the effect of non-farm sector is different. It is inequality-increasing in the hills but inequality-decreasing in the terai. This might be because several households in terai were involved in non-farm activities due to ease in availability of non-farm employment there as against very few households in hills. This might in turn results non-farm income to be decreasing income-inequality in terai but increasing it in hills.

Table 5: Income-inequality by factor components

Parameters	Hill			Terai			All		
	NF	LS	AG	NF	LS	AG	NF	LS	AG
Pseudo Gini coefficient	0.40	0.31	0.37	0.29	0.52	0.62	0.39	0.43	0.63
Share to total income	0.28	0.44	0.28	0.44	0.23	0.33	0.37	0.32	0.31
Gini Coefficient	0.54	0.40	0.49	0.45	0.68	0.70	0.53	0.61	0.70
Coefficient of rank correlation	0.75	0.76	0.76	0.64	0.77	0.89	0.74	0.71	0.90
Contribution to overall gini (%)	31.67	38.91	29.42	28.44	26.50	45.06	30.83	28.57	40.60
Elasticity of overall Gini	0.05	-0.09	0.02	-0.28	0.04	0.18	-0.11	-0.05	0.14

Note: NF = non-farm; LS = livestock; AG = agriculture

Demographic characteristics of poor and non-poor households showed fewer differences in hill and terai region but within these regions differences do exist between rich and poor (Table 6). On average, poor households are more dependent and employed in the agricultural sector whereas non-poor households have more non-farm employment. Poor households also have less land and are cultivating less number of crops per year. Livestock is also unequally distributed with both the number of milk and meat animals lower in case of poor households. Other livestock than these two categories are, however, nearly equally distributed. On the other hand, estimates showed that poor households derive only around 8% of the income from non-farm sector whereas it is 46% for non-poor. Regionally also the trend is similar and in the terai even it is found that none of the poor have non-farm employment. It shows that if we can increase the non-farm opportunities for poor households, we can increase their living standards and hence decrease poverty. This will most probably also decrease the gap in income distribution among the poor and the rich households and hence will lead to the decreased income-inequality.

Table 6: Comparison of poor and non-poor households

Characteristics	Hill		Terai		All	
	Non-poor	Poor	Non-poor	Poor	Non-poor	Poor
Agriculture labor per household	1.60	2.57	1.77	2.14	1.72	2.46
Household having non-farm employment	0.93	0.24	0.86	0.00	0.89	0.18
Land holding size (ha)	1.35	0.72	1.60	0.55	1.52	0.68
Number of crops per year	2.17	1.86	2.61	2.43	2.47	2.00
Number of milk animal holdings	5.87	5.38	5.71	6.14	5.76	5.57
Number of meat animal holdings	2.87	1.62	2.33	1.86	2.50	1.68
Household having other livestock	0.17	0.29	0.36	0.29	0.30	0.29
Income from non-farm source (%)	39.47	11.00	48.93	0.00	45.97	8.25

IV Conclusion

Role of non-farm sector was found to be vital with high share in household income (37%). Also, lower values for poverty head count was found for the household with some form of non-farm employment (on average 5.56%) compared with those without it (on average 67.65%). Gini index for household with and without non-farm employment also revealed income-inequality to be higher among the households without non-farm employment (on average gini value was 58.72% compared to 43.05%). Similarly, both hill and terai region were found to follow this pattern.

Decomposition analysis revealed that agriculture is the main source of income-inequality in the selected households (contributes 40% to overall gini and has positive elasticity). This might be due to high disparities in the size of cultivated land among the households. Again, both hill and terai region was found to hold these results. However, since agricultural sector is still dominant and contributes a large share for the rural poor, appropriate policy consideration is required to increase agricultural income, may be through increased productivity, subsidies in crucial inputs, price protection, and so forth, with especial emphasis to the poor households so as to minimize further deterioration in income-inequality. On the other hand, livestock sector was found to be negatively related with income-inequality and also with less contribution to gini. Again, it is less important in terai but is important in the hills. Livestock sector, thus, could also contribute significantly and help reduce poverty and inequality with appropriate policy recommendations, especially in the hills. Similarly, on average non-farm income was also found to be inequality-decreasing. The negative elasticity and low contribution of non-farm sector in gini showed the role it can play in the household welfare. But it has less effect in case of hills and hence for instance

is of less importance there whereas it has significant and vital role in the terai with inequality-decreasing effects, hence, needs especial consideration and appropriate policy recommendation. On top of this, since the effect was different for hill and terai, different policies suitable for individual settings might be necessary.

As the major focus of this research is in the non-farm sector, the major policy implication of this research could be that related with the role of non-farm sector. Since, on average non-farm incomes are found to be reducing poverty as well as income-inequality, availability of more non-farm earning opportunities may be helpful to combat poverty and inequality. This may be useful especially for the rural poor because they still have less access to non-farm economic activities and derive only a small share (around 8% of household income). Hence, policy should be directed to promote rural non-farm economic activities, with focus on poor households. Although a sudden change could not be expected, a gradual and long-term policy may be of use in this case. Moreover, in this research we found that government services are dominant in both hills and terai, but it could not be suddenly increased and hence is beyond the scope of this paper. However, commerce or business activities accounts for nearly one-fourth of the non-farm employment on average and one-third in case of terai, hence policies like availability of loan, may be in the form of micro-credits for poor households may help promote these activities. Similarly, ease in capital formation may help increase the activities of manufacturing sector. Other non-farm sector could also be promoted with appropriate policy measures. However, again a detail study is recommended to find the role of individual sectors and a suitable policy recommendation.

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