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Comparative analysis of nutritional security among various villages of Dibharna VDC in Arghakhanchi district of Nepal

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Abstract
More than 60% of all food consumed was made up of cereals in the four villages (village 1-Amile, village 2-Bhaishithala, village 3-Jogi Mare & village 4-Rampath) of Dibharna Village Development Committee (VDC) in the Arghakhanchi district of Nepal. Fish and egg consumption were found to be very insignificant in case of all four villages. Among the non-food expenditure, Education was the area in which majority of their expenditure was spent (> 10% of their total expenditure). As cereals were the main component in their diet, it was found that calorie, carbohydrate and protein intake were maximum from cereals. In case of fat intake, the main source was edible oil, followed by cereals and milk. When the recommended doses of calorie (2425 kcal/capita/day), carbohydrate (130 gm/capita/day), protein (60 gm/capita/day) and fat (20 gm/capita/day) were compared with their actual intake, it was prominent that the sample respondents of all four villages had consumed more than the recommended doses, except for village-4, i.e. Rampath. While, the sample respondents of village-4 (Rampath) were found to have consumed more amount of carbohydrate, protein and fat than the recommended doses but they did not consume enough amount of calories (2307.41 kcal/capita/day).

Keywords: Nutritional security, recommended dietary allowance, calorie, carbohydrate, proteins, fat

Introduction
There are six fundamental rights of human beings-food, water, air, clothes, shelter and security. Among them, one of the most crucial fundamental rights is the right to food. Nutrients are the constituents of food that assist our bodies function properly, grow and replace their components and protect our organs. The individual is considered to be in a state of optimum nutrition, also known as adequate nutrition or good nutrition, when their diet is able to cover their nutritional needs while also allowing for moderate stress and strain. Optimum nutrition provides all essential nutrients in correct balance, which are further utilized to promote the highest level of physical and mental health. As a result, diet is one of the most significant variables influencing a child's growth and development. But the sad reality is- a major fragment of the population of most developing countries are not capable enough to fulfil the optimum level of nutrients in their diet, which is also true in case of Nepal. Food production alone is insufficient for households situated in highlands of Nepal. Nepal has relied on food imports from India to sustain its increasing population since the 1990s. 75 percent of families in these areas have at least one male family member who migrates for employment-mainly to India-to supplement the family's income (Oxfam, 2011) [7]. According to recent media reports, the global financial crisis has resulted in funding cuts to numerous food assistance organisations. This means that Nepal's nutritional security situation will likely deteriorate in the near future (Shively *et al*., 2011) [8]. In this regard, we as responsible researchers, have tried to find out the extent of nutritional security of the inhabitants living in the villages named Amile (Village-1), Bhaishithala (Village-2), Jogi Mare (Village-3), Rampath (Village-4) of Dibharna VDC under Nepal.

Objective of the study
The present study focuses on examining the consumption pattern, expenditure with regards to food and non-food items and also to look into the extent of nutritional security prevalent among various villages of Dibharna VDC of Arghakhanchi district of Nepal.

Materials and Methods

Selection of study area and sampling design

In Nepal, under the zone of Lumbini, Arghakhanchi district has been purposively selected. Among a number of Village Development Committees present in this district, Dibharna Village Development Committee has been purposively selected as well. In the third phase, Amile (Village-1), Bhaishithala (Village-2), Jogi Mare (Village-3), Rampath (Village-4) villages have been selected to form a cluster of 4 villages, out of many villages in Dibharna Village Development Committee. After that, a list of total households has been prepared for each village, from which 25 households from each of the villages have been selected. In this way, a total of 100 sample households have been selected by using Simple Random Sampling Without Replacement method (SRSWR method).

Collection of data

The primary data have been collected by using the Survey Method, that is personally interviewing the head of the sample households by visiting door to door.

Tabular analysis

The data which was collected have been put together and organized using simple tabular analysis.

Result and Discussion

Calorie calculation, carbohydrate calculation and protein & fat intake calculation

Table for food composition

Detailed information regarding the nutritional composition of various food items can be found in a food composition table (Table 1). The Central Nutritional Laboratory, National Nutrition Program, Department of Food Technology and Quality Control, under the ministry of Agriculture Development, Nepal, have compiled and analysed the results carried out on the data of food consumption. Due to the resemblance of food consumption pattern, food availability and culture of Nepal with that of neighbours India, data, the "Recommended Dietary allowances" data and Balanced diet have cited from the Expert committee of the Indian Council of Medical Research, 1988 and "Recommended Intake of nutrients" data have been cited from the handbook of human nutritional requirement, published by Food and Agriculture Organization (F.A.O.) (NNP, 2012) [5].

Table 1: Nutrition Value (Average) of the Food Commodities taken under consideration

Food Commodities	Units	Energy (in kcal)	Carbohydrate (in gm)	Fat (in gm)	Protein (in gm)
Cereals (paddy/rice/wheat)	Kilograms	3451.82	713.36	22.45	95.45
Dals	Kilograms	3538.67	507.67	46.02	262.45
Cooking oil	Kilograms	9000.00	0.00	1000.00	0.00
Spices	Kilograms	2508.33	373.00	55.17	126.17
Tea	Kilograms	70.54	0.00	0.00	16.40
Sugar	Kilograms	3980.00	994.00	0.00	1.00
Milk	Litre	860.00	59.00	53.00	37.50
Fish	Kilograms	1110.00	29.00	24.00	195.00
Meat	Kilograms	1905.00	5.50	154.50	201.00
Egg	In number	130.00	0.00	10.00	10.00
Vegetables (Seasonal)	Kilograms	398.14	74.86	1.37	17.95
Fruits (seasonal)	Kilograms	611.54	126.77	2.54	6.62

Source: NNP (2012)

Distribution of sample households on the basis of Consumption pattern

The next table, i.e. Table 2 shows us the consumption pattern of the sample households in the villages under Dibharna Village Development Committee (VDC) in Arghakhanchi district of Nepal.

Table 2: Village-wise as well as Food-item wise consumption in Sample Households of Dibharna VDC (per capita per annum) in the year 2011-12

Food Items	Units	(Village 1) Amile	(Village 2) Bhaishithala	(Village 3) Jogi Mare	(Village 4) Rampath	Overall
Cereals	Kilograms	218.80	207.26	224.08	196.24	211.60
		(63.74)	(60.41)	(62.27)	(64.06)	(62.62)
Dals	Kilograms	6.60	7.28	7.01	6.29	6.79
		(1.92)	(2.12)	(1.95)	(2.05)	(2.01)
Cooking oil	Litres	5.18	5.72	5.82	4.36	5.27
		(1.51)	(1.67)	(1.62)	(1.42)	(1.56)
Spices	Kilograms	4.66	4.75	4.24	4.60	4.56
		(1.36)	(1.39)	(1.18)	(1.50)	(1.35)
Tea	Kilograms	1.33	1.73	1.52	1.35	1.48
		(0.39)	(0.50)	(0.42)	(0.44)	(0.44)
Sugar	Kilograms	6.83	8.48	7.08	6.72	7.28
		(1.99)	(2.47)	(1.97)	(2.19)	(2.15)
Milk	Kilograms	34.12	42.52	40.40	31.44	37.12
		(9.94)	(12.39)	(11.23)	(10.26)	(10.98)
Fish	Kilograms	1.43	1.25	1.78	2.18	1.66
		(0.42)	(0.36)	(0.49)	(0.71)	(0.49)
Meat	Kilograms	7.46	8.92	8.74	7.30	8.11
		(2.17)	(2.60)	(2.43)	(2.38)	(2.40)

Vegetables (seasonal)	Kilograms	50.48	48.48	51.96	40.16	47.77
		(14.71)	(14.13)	(14.44)	(13.11)	(14.13)
Fruits (seasonal)	Kilograms	6.36	6.68	7.22	5.68	6.49
		(1.85)	(1.95)	(2.01)	(1.85)	(1.92)
Egg	in nos.	6.76	0.88	7.68	16.20	7.88

*Figures in the parentheses indicate percentage to the total.

An in depth analysis of food consumption pattern in Dibharna VDC (Table 2) showed that among all the food items, cereals were the main source. Consumption of cereals was estimated to be more than 60 percent of the total consumption of the sample households which was subjected to availability of the food and purchasing power of the respondents. In case of village-1 (Amile), cereals comprised 63.74 percent of their total consumption followed by vegetables (14.71 percent), milk (9.94 percent), meat (2.17 percent), sugar (1.99 percent), pulses (1.92 percent) and fruits (1.85 percent), respectively.

The same trend of consumption has also been observed in case of village-2 (Bhaishithala), where the consumption of cereals was again the highest (60.41 percent) among all food items, followed by vegetables (14.13 percent), milk (12.39 percent), meat (2.60 percent), sugar (2.47 percent), pulses (2.12 percent) and fruits (1.95 percent), respectively.

In village-3 (Jogi Mare), the consumption of cereals was recorded as 62.27 percent, followed by vegetable (14.44 percent), milk (11.23 percent), meat (2.43 percent), fruits (2.01 percent), sugar (1.97 percent) and pulses (1.95 percent), respectively.

Similarly, in case of village-4 (Rampath) too, where the consumption of cereals comprised 64.06 percent of total food items, the share of other food items were-13.11 percent by vegetables, 10.26 percent by milk, 2.38 percent by meat, 2.19 percent by sugar, 2.05 per cent by pulses and 1.85 percent by fruits.

The average value regarding the consumption of food items in all 4 villages of Dibharna VDC showed that the average consumption of cereals was 211.60 kg per capita per annum in absolute term, preceded by vegetables (47.77 kg per capita per annum), milk (37.12 lit per capita per annum), meat (8.11 kg per capita per annum), sugar (7.28 kg per capita per annum), pulses (6.79 kg per capita per annum) and fruits (6.49 kg per capita per annum), respectively. It has been observed that the consumption of fish and eggs were very low in all villages.

The Table 3 explains per capita per annum consumption expenditure on food and non-food items in Dibharna VDC.

Table 3: Village Wise and Food Item Wise Per Capita Consumption Expenditure for Food and Non-food Items in Sample Households of Dibharna VDC (NRs./Annum) 2011-12

Details of Food Items	Unit	Village-1 (Amile)	Village-2 (Bhaishithala)	Village-3 (Jogi Mare)	Village-4 (Rampath)	Overall
Cereals	NRs	7721.45	7314.21	7907.78	6925.31	7467.19
		(27.05)	(24.93)	(25.96)	(27.51)	(26.31)
Pulses	NRs	690.67	762.29	733.81	658.84	711.40
		(2.42)	(2.60)	(2.41)	(2.62)	(2.51)
Edible oil	NRs	692.95	764.59	777.96	582.80	704.57
		(2.43)	(2.61)	(2.55)	(2.32)	(2.48)
Spices	NRs	322.71	329.08	293.62	318.58	315.99
		(1.13)	(1.12)	(0.96)	(1.27)	(1.11)
Tea	NRs	332.60	432.20	379.20	337.50	370.38
		(1.17)	(1.47)	(1.25)	(1.34)	(1.31)
Sugar	NRs	446.14	554.34	462.87	439.08	475.61
		(1.56)	(1.89)	(1.52)	(1.74)	(1.68)
Milk	NRs	1446.69	1802.85	1712.96	1333.06	1573.89
		(5.07)	(6.14)	(5.62)	(5.30)	(5.55)
Fish	NRs	313.72	274.56	390.72	479.60	364.65
		(1.10)	(0.94)	(1.28)	(1.91)	(1.28)
Meat	NRs	2346.17	2805.34	2748.73	2295.85	2549.02
		(8.22)	(9.56)	(9.03)	(9.12)	(8.98)
Egg	NRs	53.94	7.02	61.29	129.28	62.88
		(0.19)	(0.02)	(0.20)	(0.51)	(0.22)
Vegetables	NRs	1582.04	1519.36	1628.43	1258.61	1497.11
		(5.54)	(5.18)	(5.35)	(5.00)	(5.28)
Fruits	NRs	557.84	585.90	633.27	498.19	568.80
		(1.95)	(2.00)	(2.08)	(1.98)	(2.00)
Total fooding	NRs	16506.91	17151.74	17730.63	15256.70	16661.50
		(57.84)	(58.45)	(58.22)	(60.61)	(58.71)
Kerosene	NRs	171.95	161.31	188.53	187.17	177.24
		(0.60)	(0.55)	(0.62)	(0.74)	(0.62)
Fuel	NRs	662.33	646.05	686.90	652.98	662.06
		(2.32)	(2.20)	(2.26)	(2.59)	(2.33)
Electricity	NRs	224.63	263.17	223.90	203.82	228.88
		(0.79)	(0.90)	(0.74)	(0.81)	(0.81)
Clothing	NRs	1862.49	1662.14	1781.57	2007.22	1828.36
		(6.53)	(5.66)	(5.85)	(7.97)	(6.44)
Medical expenses	NRs	1194.29	1291.86	1328.56	1039.26	1213.49

		(4.18)	(4.40)	(4.36)	(4.13)	(4.28)
Ceremonial expenses	NRs	1215.55	1346.76	1141.50	1212.66	1229.12
		(4.26)	(4.59)	(3.75)	(4.82)	(4.33)
Educational expenses	NRs	5275.46	5403.33	5930.00	3315.93	4981.18
		(18.48)	(18.41)	(19.47)	(13.17)	(17.55)
Others	NRs	1427.45	1418.00	1444.20	1297.88	1396.88
		(5.00)	(4.83)	(4.74)	(5.16)	(4.92)
Total Non-fooding	NRs	12034.16	12192.62	12725.16	9916.92	11717.22
		(42.16)	(41.55)	(41.78)	(39.39)	(41.29)
Grand Total	NRs	28541.07	29344.37	30455.79	25173.62	28378.71
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

*Figures in the parentheses indicate percentage to the total.

It was observed that in village-1 (Amile), expenditure on food items was 57.84 percent and in case of non-food items, it was 42.16 percent of total expenditure. From the amount spent on food items, maximum percent of expenditure was spent on cereals (27.05 percent of total expenditure) followed by meat (8.22 percent), vegetables (5.54 percent) and milk (5.07 percent). The maximum expenditure on non-food items was spent for educational purposes (18.48 percent) for their family members, whereas amount spent on clothing, ceremonial purpose and medical purpose was 6.53, 4.26, 4.18 percent respectively.

Similarly, in village-2 (Bhaishithala), 58.45 percent of the total expenditure was done towards food items and 41.55 percent was spent on non-food items. From total consumption expenditure spent, 24.93 percent was for cereals, followed by meat (9.56 percent), milk (6.14 per cent) and vegetables (5.18 percent), respectively. However, in case of expenditure on non-food items, 18.41 percent of the total expenditure was spent for the education, followed by clothing (5.66 percent), ceremonial (4.59 percent) and medical cost (4.40 percent), respectively.

Again, in case of village-3 (Jogi Mare), 58.22 percent and 41.78 percent of total expenditure were done for food and non-food items. In this village also, maximum food expenditure was done towards cereals (25.96 percent), followed by meat (9.03 percent), milk (5.62 percent), vegetables (5.35 percent), pulses (2.41 percent) and other expenditure was recorded as less important. Non-food expenditure was maximum for the educational purpose (19.47 percent) of the sample respondents followed by clothing (5.85 percent), medicinal (4.36 percent) and ceremonials purpose (3.75 percent).

In case of village-4 (Rampath) too, maximum food expenditure was spent towards cereals (27.51 percent), followed by meat (9.12 percent), milk (5.30 percent) and vegetables (5.00 percent). Non-food expenditure was maximum for the educational purpose (13.17 percent) of the sample respondents followed by clothing (7.97 percent), ceremonials (4.82 percent) and medical cost (4.13 percent).

It is clear from the above table (Table 3) that among all the villages, village 4 (Rampath) was the only one where respondents were spending much lower for educational purposes compared to other three villages due to their less disposable income.

Nutritional status of food consumed by sample respondents

Calorie Intake

The following table (Table 4) shows the per capita daily energy/calorie intake from various food items in Dibharna VDC.

Table 4: Village Wise and Food Item Wise Calories Intake Per Capita Food Consumed in Sample Households of Dibharna VDC (kcal/capita/day) 2011-12

Details of Food Items	Village-1 (Amile)	Village-2 (Bhaishithala)	Village-3 (Jogi Mare)	Village-4 (Rampath)	Overall
Cereals	2069.20	1960.07	2119.13	1855.85	2001.06
	(80.84)	(78.02)	(79.82)	(80.43)	(79.77)
Pulses	63.95	70.58	67.94	61.00	65.87
	(2.50)	(2.81)	(2.56)	(2.64)	(2.63)
Edible oil	127.82	141.04	143.51	107.51	129.97
	(4.99)	(5.61)	(5.41)	(4.66)	(5.18)
Spices	32.02	32.66	29.14	31.61	31.36
	(1.25)	(1.30)	(1.10)	(1.37)	(1.25)
Tea	0.26	0.33	0.29	0.26	0.29
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Sugar	74.45	92.51	77.24	73.28	79.37
	(2.91)	(3.68)	(2.91)	(3.18)	(3.16)
Milk	80.39	100.18	95.19	74.08	87.46
	(3.14)	(3.99)	(3.59)	(3.21)	(3.49)
Fish	4.34	3.80	5.40	6.63	5.04
	(0.17)	(0.15)	(0.20)	(0.29)	(0.20)
Meat	38.94	46.56	45.62	38.10	42.30
	(1.52)	(1.85)	(1.72)	(1.65)	(1.69)
Egg	2.41	0.31	2.74	5.77	2.81
	(0.09)	(0.01)	(0.10)	(0.25)	(0.11)
Vegetables	55.06	52.88	56.68	43.81	52.11
	(2.15)	(2.11)	(2.13)	(1.90)	(2.08)
Fruits	10.66	11.19	12.10	9.52	10.87

	(0.42)	(0.45)	(0.46)	(0.41)	(0.43)
Total	2559.50	2512.11	2654.97	2307.41	2508.50
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

*Figures in the parentheses indicate percentage to the total.

The table (Table 4) reveals that in village-1 (Amile), cereals have provided maximum energy (80.84 percent of total calorie intake) followed by edible oil (4.99 percent of total calorie intake), milk (3.14 percent of total calorie intake), pulses (2.50 percent of total calorie intake) and vegetables (2.15 percent of total calorie intake), respectively. The total energy consumed by the sample respondents was 2559.50 kcal/capita/day in village-1 (Amile).

In case of village-2 (Bhaishithala) also, highest calorie intake has been absorbed from cereals (78.02 percent of total calorie intake) followed by edible oil (5.61 percent of total calorie intake), milk (3.99 percent of total calorie intake), sugar (3.68 percent of total calorie intake) and pulses (2.81 percent of total calorie intake) respectively, where total energy consumed from these different food sources was 2512.11 kcal/capita/day.

In village-3 (Jogi Mare), calorie intake from cereals was the maximum (79.82 percent of total calorie intake) followed by edible oil (5.41 percent of total calorie intake), milk (3.59 percent of total calorie intake), pulses (2.56 percent of total calorie intake), sugar (2.91 percent of total calorie intake) and vegetables (2.13 percent of total calorie intake), respectively. The total energy consumed was 2654.97 kcal/capita/day from all the mentioned food items.

Cereals provided highest energy (80.43 percent of total calorie intake) followed by edible oil (4.66 percent of total calorie intake), milk (3.21 percent of total calorie intake), sugar (3.18 percent of total calorie intake) and pulses (2.64 percent of total calorie intake), respectively in village-4 (Rampath), where total energy consumption was 2307.41 kcal/capita/day by all the sample respondents.

In all the four villages, energy intake from spices, tea, eggs, fish and meat was found to be negligible. Overall, the consumption of energy was highest in village-3 (Jogi Mare) i.e., 2654.97 kcal/capita/day whereas the situation was worst in case of village-4 (Rampath), i.e. 2307.41 kcal/capita/day, which is less than the recommended dose of energy (2425 kcal/capita/day).

Carbohydrate intake

Carbohydrate intake by sample respondents are shown in Table 7 in gm/capita/day from different food sources in Dibharna VDC.

Table 7: Village Wise and Food Item Wise Carbohydrate Intake Per Capita of Food Consumed in Sample Household S of Dibharna VDC (gm/capita/day) 2011-12

Details of Food Items	Village-1 (Amile)	Village-2 (Bhaishithala)	Village-3 (Jogi Mare)	Village-4 (Rampath)	Overall
Cereals	427.63	405.07	437.95	383.54	413.55
	(89.38)	(87.58)	(89.14)	(89.02)	(88.78)
Pulses	9.17	10.13	9.75	8.75	9.45
	(1.92)	(2.19)	(1.98)	(2.03)	(2.03)
Edible oil	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Spices	4.76	4.86	4.33	4.70	4.66
	(1.00)	(1.05)	(0.88)	(1.09)	(1.00)
Tea	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sugar	18.59	23.10	19.29	18.30	19.82
	(3.89)	(5.00)	(3.93)	(4.25)	(4.26)
Milk	5.52	6.87	6.53	5.08	6.00
	(1.15)	(1.49)	(1.33)	(1.18)	(1.29)
Fish	0.11	0.10	0.14	0.17	0.13
	(0.02)	(0.02)	(0.03)	(0.04)	(0.03)
Meat	0.11	0.13	0.13	0.11	0.12
	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Egg	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Vegetables	10.35	9.94	10.66	8.24	9.80
	(2.16)	(2.15)	(2.17)	(1.91)	(2.10)
Fruits	2.21	2.32	2.51	1.97	2.25
	(0.46)	(0.50)	(0.51)	(0.46)	(0.48)
Total	478.46	462.53	491.29	430.86	465.78
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

*Figures in the parentheses indicate percentage to the total.

Observation revealed that in village-1 (Amile), carbohydrate intake from cereals was maximum (89.38 percent of total carbohydrate intake) followed by sugar (3.89 percent of total carbohydrate intake), vegetables (2.16 percent of total carbohydrate intake), pulses (1.92 percent of total carbohydrate intake) and milk (1.15 percent of total carbohydrate intake), respectively. The remaining carbohydrate was received from other food items like spices, fish, meat, egg, and fruits, which were very negligible in amount. Next to cereals, sugar, vegetables, pulses and milk were contributing carbohydrate to their diet. The same trend was found in village-1 (Amile) and village-3 (Jogi Mare), where more than 88 percent of total carbohydrates intake was absorbed from cereals, followed by sugar, vegetables, pulses

and milk. In case of Village-2 (Bhaishithala), carbohydrate intake from cereals was maximum (87.58 percent of total carbohydrate intake) followed by sugar (5.00 percent of total carbohydrate intake), pulses (2.19 percent of total carbohydrate intake), vegetables (2.15 percent of total carbohydrate intake) and milk (1.49 percent of total carbohydrate intake). Just like village-2 (Bhaishithala), in case of village-4 (Rampath) also, maximum carbohydrate intake was taken from cereals, followed by sugar, pulses, vegetables and milk.

Among all the villages of Dibharna VDC, maximum carbohydrate intake was found in village-3 (Jogi Mare) (491.29 gm per capita per day) and minimum in village-4 (Rampath) (430.86 gm per capita per day).

Protein intake

The following Table (Table 5) represents the protein intake in gm/capita/day from different food sources in Dibharna VDC.

Table 5: Village Wise and Food Item Wise Protein Intake Per Capita Food Consumed in Sample Households of Dibharna VDC (gm/capita/day) 2011-12

Details of Food Items	Village-1 (Amile)	Village-2 (Bhaishithala)	Village-3 (Jogi Mare)	Village-4 (Rampath)	Overall
Cereals	57.22	54.20	58.60	51.32	55.34
	(76.49)	(73.59)	(75.13)	(74.97)	(75.05)
Pulses	4.74	5.23	5.04	4.52	4.89
	(6.34)	(7.11)	(6.46)	(6.61)	(6.63)
Edible oil	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Spices	1.61	1.64	1.47	1.59	1.58
	(2.15)	(2.23)	(1.88)	(2.32)	(2.14)
Tea	0.06	0.08	0.07	0.06	0.07
	(0.08)	(0.11)	(0.09)	(0.09)	(0.09)
Sugar	0.02	0.02	0.02	0.02	0.02
	(0.03)	(0.03)	(0.02)	(0.03)	(0.03)
Milk	3.51	4.37	4.15	3.23	3.81
	(4.69)	(5.93)	(5.32)	(4.72)	(5.17)
Fish	0.76	0.67	0.95	1.16	0.89
	(1.02)	(0.91)	(1.22)	(1.70)	(1.20)
Meat	4.11	4.91	4.81	4.02	4.46
	(5.49)	(6.67)	(6.17)	(5.87)	(6.05)
Egg	0.19	0.02	0.21	0.44	0.22
	(0.25)	(0.03)	(0.27)	(0.65)	(0.29)
Vegetables	2.48	2.38	2.56	1.97	2.35
	(3.32)	(3.24)	(3.28)	(2.89)	(3.19)
Fruits	0.12	0.12	0.13	0.10	0.12
	(0.15)	(0.16)	(0.17)	(0.15)	(0.16)
Total	74.81	73.66	78.00	68.45	73.73
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

*Figures in the parentheses indicate percentage to the total.

In case of village-1 (Amile), intake of protein from cereals was maximum (76.49 percent of total protein intake) followed by pulses (6.34 percent of total protein intake), meat (5.49 percent of total protein intake), milk (4.69 percent of total protein intake) and vegetables (3.32 percent of total protein intake), respectively. The remaining protein received from other food items like spice, tea, sugar, egg and fruits was observed as negligible.

Almost same trend was observed for village-2 (Bhaishithala), village-3 (Jogi Mare) and village-4 (Rampath) also. Among all the four villages, the maximum amount of protein intake in absolute term was found in village-3 (Jogi Mare) (78 gm per capita per day) and the minimum was recorded in village-4 (Rampath) (68.45 gm per capita per day).

Fat intake

Fat intake of sample respondents are shown in the following table (Table 6) in gm/capita/day from different food sources in Dibharna VDC.

Table 6: Village Wise and Food Item Wise Fat Intake Per Capita Food Consumed in Sample Households of Dibharna VDC (gm/capita/day) 2011-12

Details of Food Items	Village-1 (Amile)	Village-2 (Bhaishithala)	Village-3 (Jogi Mare)	Village-4 (Rampath)	Overall
Cereals	13.23	12.75	13.79	12.07	12.96
	(33.53)	(31.61)	(33.30)	(35.57)	(33.42)
Pulses	0.88	0.92	0.88	0.79	0.87
	(2.23)	(2.28)	(2.13)	(2.34)	(2.24)
Edible oil	16.25	15.67	15.95	11.95	14.95
	(41.19)	(38.85)	(38.52)	(35.20)	(38.56)
Spices	0.71	0.72	0.64	0.70	0.69
	(1.80)	(1.78)	(1.55)	(2.05)	(1.78)
Tea	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sugar	0.00	0.00	0.00	0.00	0.00

	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Milk	4.93	6.17	5.87	4.57	5.38
	(12.50)	(15.30)	(14.17)	(13.45)	(13.88)
Fish	0.08	0.08	0.12	0.14	0.11
	(0.21)	(0.20)	(0.28)	(0.42)	(0.28)
Meat	3.13	3.78	3.70	3.09	3.42
	(7.94)	(9.36)	(8.94)	(9.10)	(8.83)
Egg	0.17	0.02	0.21	0.44	0.21
	(0.42)	(0.06)	(0.51)	(1.31)	(0.54)
Vegetables	0.03	0.18	0.20	0.15	0.14
	(0.07)	(0.45)	(0.47)	(0.44)	(0.36)
Fruits	0.04	0.05	0.05	0.04	0.04
	(0.11)	(0.12)	(0.12)	(0.12)	(0.11)
Total	39.45	40.34	41.39	33.94	38.78
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

*Figures in the parentheses indicate percentage to the total.

In case of village-1 (Amile), fat intake from edible oil was maximum (41.19 percent of total fat intake), followed by cereals (33.53 percent of total fat intake), milk (12.50 percent of total fat intake), meat (7.94 percent of total fat intake), and pulses (2.23 percent of total fat intake), respectively. The remaining fat received from other food items like spices, fish, egg, fruits and fruits were recorded as meagre. Next to edible oil, cereals, milk, meat, and pulses were contributing fat to their diet. The trend for fat intake was found to be the same in village-1 (Amile), village-2 (Bhaishithala) and village-3 (Jogi Mare), where more than 38 percent fat intake was absorbed from edible oil. But the exception was found in village-4 (Rampath), where fat intake from cereals was maximum (35.57 percent of total fat intake) followed by edible oil (35.20 percent of total fat intake), milk (13.45 percent of total fat intake), meat (9.10 percent of total fat intake) and pulses (2.34 percent of total fat intake). However, the contribution of fish, egg, vegetables and fruits were found to be minimum in all four villages.

Recommended doses and present intake of Calorie, Carbohydrate, Protein and Fat of sample respondents in Dibharna VDC

The following table (Table 8) shows the difference between the recommended dose and present intake of Calorie (kcal/capita/day), Carbohydrate (gm/capita/day), Protein (gm/capita/day) and Fat (gm/capita/day) of sample respondents in Dibharna VDC.

Table 8: Village Wise Variation between Per Capita Recommended and Present Intake Dose of Calorie, Carbohydrate, Protein and Fat of Sample Households of Dibharna VDC (2011-12)

Village	Calorie (Kcal/capita/day)	Carbohydrate (gm/capita/day)	Protein (gm/capita/day)	Fat (gm/capita/day)
Recommended Dose*	2425	130	60	20
Present Intake				
Village-1(Amile)	2559.50	478.46	74.81	39.45
Village-2 (Bhaishitala)	2512.11	462.53	73.66	40.34
Village-3 (Jogi Mare)	2654.97	491.29	78.00	41.39
Village-4 (Rampath)	2307.41	430.86	68.45	33.94
Overall	2508.50	465.78	73.73	38.78

***Source:** NNP, 2012.

Variation has been observed between the recommended dose and the present intake value (NNP, 2012). Overall result presented in the above table showed that village-3 (Jogi Mare) has the highest present intake of calorie (2654.97 kcal/capita/day) followed by village-1 (Amile) (2559.50 kcal/capita/day), village-2 (Bhaishithala) (2512.11 kcal/capita/day l) and village-4 (Rampath) (2307.41 kcal/capita/day). It can be concluded that among all the villages, only the sample respondents of village-4 (Rampath) could not satisfy the recommended daily calorie requirement (2425 kcal/capita/day).

In case of Carbohydrate, Protein and Fat intake, sample respondents of all four villages in Dibharna VDC consumed more than the recommended doses. In case of village-3 (Jogi Mare), intake of both carbohydrate, protein and fat was the maximum (491.29 gm/capita/day, 78 gm/capita/day, 41.39 gm/capita/day respectively) whereas the sample respondents of village-4 (Rampath) has taken the minimum amount.

Summary and Conclusion

- Consumption of cereals was estimated to be more than 60 percent of their total consumption in all villages of Dibharna VDC. The maximum amount of cereals was consumed in village-3 (Jogi Mare) and the minimum was taken in village-4 (Rampath). Other than cereals, major portion of their diet was prevalent with vegetables, milk, meat, sugar, pulses and fruits. Consumption of fish and eggs were found to be insignificant in all villages.
- Among all the food items, consumption of cereals, meat, vegetables and milk constituted a major portion of their total food expenditure. Expenditure on food items was found to be maximum in village-4 (Rampath) (60.61 percent of their total expenditure) and minimum in village-1 (Amile) (57.84 percent of their total expenditure). As the inhabitants of these villages were aware of the importance of education, more than 18 percent of their total expenditure was spent on education, except in village-4 (Rampath).
- Sample respondents of all four villages mainly consumed energy (calorie) from cereals, followed by edible oil and milk. It has been observed that village-3 (Jogi Mare) was the most superior among all (2654.97 kcal per capita per

day) where minimum calorie intake by village-4 (Rampath) was observed (2307.41 kcal per capita per day). Among all the four villages, only village-4 (Rampath) fell under the food insecured category, which couldn't fulfill the minimum calorie requirement (2425 kcal per capita per day). Main food source of Carbohydrate intake was cereals in Dibharna VDC. After cereals, major contribution of sugar, vegetables, pulses and milk has been observed in all four villages. The Maximum and minimum amount of carbohydrate have been taken by the sample respondents of village-3 (Jogi Mare) and village-4 (Rampath), respectively. Carbohydrate intake in all four villages has been found to be much higher compared to its recommended dose (130 gm/capita/day).

- Similarly, in case of protein intake also, main source was cereals, followed by pulses and meat. More than 73 percent of total protein intake came from cereals. The reason for this is that cereals were taken in larger quantities than any other food items, which also contain reasonable protein content. Here, sample respondents of village-3 (Jogi Mare) consumed maximum amount of protein (78.00 gm per capita per day) and minimum was consumed by village-4 (Rampath), they intook only 68.45 gm protein per capita per day. Overall, the sample respondents of all the villages were taking more than the recommended amount of protein (60 gm /capita/day).
- In case of fat intake, the main source was edible oil, followed by cereals, milk, meat and pulses. Except in village-4 (Rampath), where cereals were the main source of fat instead of edible oil. Sample respondents of village-3 (Jogi Mare) were taking maximum fat (41.39 gm per capita per day) and the minimum amount of fat was taken by the sample respondents of village-4 (Rampath), which was 33.94 gm per capita per day. In all the villages of Dibharna VDC, intake of fat was found to be higher than the recommended dose (20 gm/capita/day).
- By comparing the present intake of calorie, carbohydrate, protein and fat with its recommended doses of requirement, it was found that the sample respondents of all the villages were able to satisfy their recommended doses of carbohydrate, protein and fat. But in case of calorie consumption, analysis of food nutrients showed that the sample respondents of village-4 (Rampath) could not meet their daily recommended dose and fell under the food insecured category.

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