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Pulses Consumption and its Determinants among Rural Households: A Micro-level Evidences from Central Zone of Uttar Pradesh

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ABSTRACT

The present study was undertaken with the aim to analyze the status of pulses consumption in rural household representing different socio-economic strata in central Uttar Pradesh state of India. A total of two hundred farm households were sampled for the study using stratified random sampling technique from five villages namely Barapur, Kuitkheda, Muhamadpur, Sariapur and Bewan of purposively selected district of Kanpur Dehat. Size of the landholding owned by the households was the criterion for the stratification of the households. Personal interviews using a pretested interview schedule along with 24-hour dietary recall method were used to collect primary data from the active male and the female of the households together about consumption of pulses in household and was later compared to the Recommended Dietary Allowances (RDA) to assess the adequacy status. The findings showed that pigeon pea and chickpea were cultivated by all the sampled households (100%) belonging to large land holding category followed by about 82 per cent and 72 per cent in medium land holding category and about 94 and 64 per cent in small land holding categories, respectively. The per cent area under black gram was observed to increase with decrease in land holding category. In addition, mung bean was also observed to be most preferred among small land holding category that was grown on an average 0.22 acres of land for every sampled mungbean growers which was about 23 per cent of the gross area under pulse crops among the same category. Among the pulse products consumed, the frequency of consumption of chickpea products was found to be highest among all the categories of households with a large variation in ranging from 61 to 208 times per year. However, with respect to recommended per capita intake of pulses there were significant variations for medium farmers (-39.13%), small (-39.98%) and landless categories (-77.56%) of farmers except for the large farmers for whom the gap was found to be only -2.63%. The average family education score of selected farm households showed a decreasing trend within the land holding categories with the reduction in the landholding size.

Key words: Pulses, consumption, pulses products, famers' categories and Uttar Pradesh

INTRODUCTION

Pulses are one of the basic components of every day Indian diet and contribute as important source of protein. Pulses offer a perfect mix of vegetarian protein component of high biological value when supplemented with cereals (Ali and Gupta, 2012). In addition to constituting about 18 to 32 per cent of protein, pulses are also rich source of dietary fiber, complex carbohydrates, resistant starch and a bevy of vitamins and minerals such as folate, all the 15 essential minerals required by man including selenium, potassium, Fe and Zinc and hence also known as power-house of nutrients (Singh and Kanaujia, 2015). Pulse consumption has an important role in the individual's nutritional status (Padmaja *et. al.,* 2016). With the annual domestic availability of 27.44 million tonnes (Anonymous, 2017), India is the largest consumer of pulses in the world. Pulses are primarily consumed as thick curry called *dhal* in the country or they are used as an ingredient of indigenous Indian snacks. However, regional variations and preferences in consumption of pulses are reported to exist in the country. Household income level, prevailing market price and availability of pulses also influence the consumption pattern of pulses. The overall demand of pulses in the country has outpaced the production levels of pulses, thereby limiting the per capita availability of pulses. The current per capita availability of pulses is 42 gm per day in the country against the recommended Dietary Allowances (RDA) of 60 gm and 55 gm per day for adult male and female (Tewari and Shivhare, 2016).

Uttar Pradesh (UP) state is an important pulse growing state of the country contributing around 10 per

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cent of the total pulse area and 8 per cent of total pulse production. As per the census 2011, the state has a high per centage of vegetarian population (47%) (Anonymous, 2017), for whom pulses are assumed to constitute an important source of protein in their daily diets. An assessment of consumption of pulses among the rural households across different land holding categories was carried out in central zone of Uttar Pradesh to gain an understanding of the extent of utilization of pulses as source of protein among rural societies and the factors attributing to the variation. The present study generated insight into the household level pulse consumption with the relative preference and the factors contributing to the pulse consumption among the rural households.

METHODOLOGY

The Central zone of UP state represents one the major pulse producing zones of the state with pulse crops being an important component of the prevailing cropping systems. The zone has about 19 per cent of total pulse area and contributes about 15 per cent of the total pulse production in the state (ESD of Planning Department, UP Gov.). Chickpea, pigeon pea, lentil, mungbean and urdbean are the major pulse crops grown in this zone.

The primary data for the study was collected by utilizing personal interviews using the pretested interview schedule along with 24-hour dietary recall method from sampled households. Two hundred farm households were sampled for the study using stratified random sampling technique from five villages namely Barapur, Kuitkheda, Muhamadpur, Sariapur and Bewan of Kanpur Dehat district of central zone of UP state. Size of the landholding owned by households was the criterion for stratification of the households into four categories, *viz.* landless, small (< 2 ha.), medium (more than 2 ha to less than 5 ha) and large (> 5 ha) categories and the sampled households were equally drawn from these categories.

The primary data was collected from the active male and the female of the households together. The female member of the household who cooked the food was asked to respond and the mean intakes of pulses were compared with Recommended Dietary Allowances to assess the adequacy status. The quantities of protein intake by using the multiplying the total food item consumed with conversion factors given by Gopalan *et. al.,* (1999). It was hypothesized that factors like operational land holding, family size, family education status, number of pulses grown, total pulses produced and sold were indifferent towards the pulse consumption pattern of a household, and therefore these were considered in the study as the variables of null hypothesis. Primary data collected from the sampled households were subjected to simple statistics namely frequency, per centage and rank to draw meaningful conclusions. To determine the factors influencing the consumption of pulses among rural households in Central Uttar Pradesh, a multiple regression model was built with consumption (unit) as the dependent variable (Equation 1). Independent variables included category of farmers, family size (unit), FES (unit), Operational Land (unit), pulse crop grown (unit) and total pulse produced (unit).

RESULTS AND DISCUSSION

Land distribution pattern for pulses cultivation among different household categories

The average land allocation pattern for pulse crops with respect to the total land tilled across different landholding categories was observed to increase (30.6% to 55.3 %) with decrease in total operational land holding category among the sampled households. Pigeon pea, chickpea, green gram and black gram were the pulse crops primarily cultivated by the sampled households across the different landholding categories.

Table 1: Details of background of sampled households

Categories of farmers	Family education score	Ave. family size	Ave Landholding (acres)
Large	18.2	7.5	9.63
Medium	10.3	6.7	4.05
Small	11.6	6.3	2.06
Landless	7.4	5.8	-

(Conversion: 1 ha is equal to 2.5 acres)

The relative distribution of land for the four pulse crops in relation to the gross area under pulse crops was studied and it was observed that among large land holding category (LLHC) chickpea, pigeon pea and urd bean occupied about 47, 27 and 15 per cent area, respectively while among medium land holding category (MLHC), the allocation of land for chickpea and pigeonpea was almost similar (about 42%). Among the households belonging to small land holding category (SLHC), 35 per cent of the land was allocated to chickpea, while almost equal per cent of land was utilized for cultivating pigeonpea (22.8%), mungbean (22.8%) and urdbean (19%).

With respect to the observation on cultivation of different pulses in the sampled households, Pigeon pea and chickpea crops were observed to be cultivated by all the sampled households (100%) belonging to large land holding category, about 82 per cent and 72 per cent in medium land holding category and about 94 and 64 per cent in small landholding categories, respectively. Green gram was observed to be grown by minimum per cent of sampled households in all the three landholding categories. Chickpea was the most preferred pulse crops

across the categories covering about 35 to 47 per cent of the gross area under pulses, while Pigeon pea crop occupied about 42 per cent of the gross area under pulse crop among the medium land holding category (Table 2). The per cent area under black gram was found to increase (15.2 % to 19.3%) with the decrease in the landholding category. In addition, mung bean was also recorded to be most preferred among small land holding category that was grown on an average 0.22 acres of area which was about 23 per cent of the gross area under pulse crops among the same category.

Among these four pulse crops, chickpea followed by pigeon pea was the most preferred for cultivation across all the land categories in terms of number of households as well as average area under cultivation of these crops. Among the small farmers better diversification in land allocation for inclusion of more pulse crops was observed.

Consumption pattern of pulse and pulse based products among the farm families

Chickpea, pigeon pea, black and green gram were the major pulses utilized for consumption among the selected farm families. Among all, chickpea and chickpea products were found to be consumed in maximum amount among all the four categories of households with variation in average consumption from about 8 to 68 kg/year/ household (Table 2).This was followed by consumption of pigeon pea (11-43 kg/year/household).

The data presented in Table 2, revealed that the average annual consumption of chickpea and pigeon pea reduced with reduction in landholding size. Among the sampled households, pulses were observed to be consumed as dhal- a curry of pulses and as products. It could be also observed from the same table that among all the pulse, consumption of chickpea was highest as products, while consumption of lentil followed by field pea was found to be the least across all the categories of households. Green gram was also primarily consumed in form of products among the sampled households.

The average annual consumption of pulses in the sampled households was computed to reduce with the reduction in land holding size from large farmers (145.8kg) to landless (26.7kg).

The results reflected that the sampled households primarily consumed the pulses that they cultivated. The low consumption of lentil and field pea could be attributed to the almost negligible area under these crops among the sampled households.

Table 2: Average annual consumption of pulses among different categories of households in kgs

n=200

Pulses	Large	Medium	Small	Landless
Chickpea	10.03	4.29	3.77	3.22
Chickpea products	58.94	28.01	27.34	6.75
Total	68.97	32.30	27.34	7.97
Pigeon pea	43.19	33.30	29.36	11.21
Black gram	15.07	8.45	6.51	3.58
Black gram products	11.01	4.58	3.87	0.75
Total	26.01	13.03	10.38	4.33
Green gram	0.83	1.01	1.15	0.05
Green gram products	3.95	1.44	2.70	0.51
Total	4.78	2.45	3.85	0.56
Lentil	1.11	-	0.10	-
Field pea	1.67	0.08	0.09	0.065
GRAND TOTAL	145.80	81.16	74.88	26.72

Annual frequency of consumption of pulses among different categories of households

The annual frequency of consumption of pigeon pea as dhal was found to be highest among all the pulses consumed across all the category of households varying from 139 times among large category of households to 64 times in a year among landless households. The frequency of consumption of pigeon pea gradually decreased with the decrease in the size of the landholding. The average annual frequency of consumption of black gram was found to vary from 34 to 18 times among the sampled households. Lentil was consumed least frequently among the sampled households. Regarding the pulse products consumed, the frequency of consumption of chickpea products was found to be highest (208 times) among households belonging to large category and least among landless category (61times) Table 3. Consumption of pulses as *dhal* or products was observed to be a regular feature of sampled households with variation as per the landholding size.

Table 3. Average annual frequency of consumption of pulses among different categories of households

n=200

Pulses	Large	Medium	Small	Landless
Consumption as *dal*				
Chickpea	23.56	9.30	9.4	15.6
Pigeon pea	139.60	118.00	103.40	64.00
Black gram	39.30	24.60	16.72	18.40
Mixed	33.60	23.80	20.40	0.60
Green gram	8.60	4.20	1.50	0.20
Lentil	4.60	-	0.40	-
TOTAL	240.26	179.90	151.82	98.8

Consumption as products				
Chickpea products	208.20	155.70	130.40	61.45
Black gram products	11.90	6.30	4.40	1.70
Green gram products	4.9	3.5	3.0	0.1
Pea	2.5	0.6	2.1	0.6
Total	227.5	166.10	139.90	63.85

Per capita per day consumption of pulses among the sampled households

The per capita consumption of pulses was observed to be highest i.e., 53 gm/day among the large land holding category, followed by about 33 gm/day/person in medium as well as small land holding category. The per capita per day consumption was found to be least among the landless category of households (12.34 gm/day) Table 4. This is negatively skewed from the recommended dietary allowance of protein 55 gm /day (Anonymous, 2010). Among the major pulses consumed in the sampled households, the per capita per day consumption of chickpea products was found highest (21gms) in the large category of households, whereas, in other three categories of households, the per capita consumption of pigeon pea was highest among all the pulses consumed. With respect to recommended per capita intake of pulses there were significant variations for medium farmers (-39.13%), small (-39.98%) and landless categories (-77.56%) of farmers except for the large farmers for whom the gap was found to be only -2.63 per cent (Table 4). The per capita per day consumption of pulses among the sampled households was found to be below the recommended dietary allowances.

Table 4: Per capita per day consumption of pulses among different categories of households (g/day)

Pulses consumed	Large (n=50)	Medium (n=50)	Small (n=50)	Landless (n=50)
Chickpea	3.67	1.75	1.64	1.52
Chickpea products	21.53	11.45	11.89	3.18
Pigeon pea	15.78	13.52	12.77	5.29
Black gram	5.50	3.45	2.83	1.69
Black gram products	4.02	1.87	1.68	0.35
Green gram	0.30	0.41	0.50	0.02
Green gram products	1.74	1.00	1.67	0.26
lentils	0.40	-		
Peas	0.61	0.03	0.03	0.03
TOTAL	53.55	33.48	33.01	12.34
Recommended dietary allowances		55 gm /day		
Variation with regards to RDA	-2.63%	-39.13%	-39.98%	-77.56%

Average seasonal variation in consumption of pulse and pulse products:

The consumption of pulses among the sampled households was also analyzed for assessing the monthly/seasonal variation and it was found that consumption of chickpea and pigeon pea was high among all the categories of households during the months of April- July (summer season) with the highest consumption in the months of May-June. In case of black gram, the consumption was mainly in the winter months November to February with the highest consumption during December and January months (Fig 1).

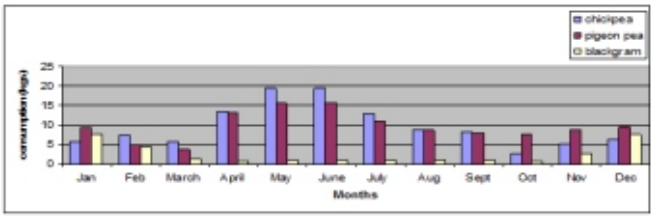

Fig. 1 Monthly variation in consumption of pulses among different categories of households (Kgs/month)

The consumption of pulses in the sampled households thus observed to primarily depend upon the availability of pulses in tandem with the post harvest season of the particular crop.

Share of pulses to total dietary intake of protein among farm families

Pulses, milk and milk products, food grains, vegetables and fruits were the major protein sources observed in the diets of the sampled households (Table 5). The relative contribution of these sources of protein was assessed to daily diets of sampled respondents across different landholding categories. The data presented in Table 5 reflected that among sampled households belonging to large land holding category, milk and milk products were the major sources of total dietary protein (18.34gm) closely followed by pulses (17.25gm) and food grains (17.2 gm) whereas households belonging to medium, small and landless categories intake of protein from food grains was highest followed by pulses. The total protein intake was 60.69gm, 44gm, 39.8gm and 35.6 gm in large, medium, small and landless category of households, respectively. Pulses contributed as high as 29 percent (17.25 gm) of total daily protein intake in sampled households of large landholding category, this was closely followed by contribution of 28 percent (12.31gm) of protein in medium land category, and 24 percent (12.68gm) of protein in small land category. In landless category pulses contributed about 22 percent (8.73 gm) of total daily protein intake of protein. Thus pulses contributed a significant portion of dietary protein in the daily diets of sampled households across different landholding categories. In similar lines, Nutrition foundation of India assessed that between 1972-73 and 2004-05, among the upper income groups there has been a greater dietary diversification with increase in

consumption of milk and animal products and among the poorer segments of the population pulses remain the major source of protein.

Table 5: Contribution of different sources of protein to total protein intake of sampled households

Sources	Large	Medium	Small	Landless
Pulses	17.25 (28.83)	12.31 (27.98)	12.68 (23.95)	8.73 (22.5)
Milk& Milk products	18.34 (29.92)	9.86 (21.11)	9.25 (23.35)	6.87 (22.5)
Food grains	17.19 (28.53)	18.23 (40.89)	16.34 (41.21)	16.15 (44.67)
Veg & fruits	7.50 (12.21)	5.10 (11.66)	1.48 (3.73)	3.85 (1.19)
Miscellaneous (animal protein)	0.31 (0.51)	0.18 (0.58)	0.45 (1.19)	0.15 (0.5)
TOTAL	60.59	44.01	39.78	35.59

Figures in parenthesis indicate percent contribution

Determinants of pulses consumption among rural households-regression estimates

The selected independent variables were subjected to regression analysis with the dependent variable pulses consumption. The results have been depicted as in Table 6. It could be seen that the F value was 29.70 and was significant at 1 per cent level indicating the overall goodness of fit of this multiple regression model. Results indicated that family size and operational land holding were having the positive and significant impact on consumption of pulses among rural households. The model could explain 88 per cent variation in the extent of pulses consumption among all categories of respondents.

Table 6: Determinants of pulses consumption among rural households-regression estimates

	Coefficients	Standard Error	t Stat	P-value
Intercept	11.26	29.72	0.38	0.7075
D1	-3.19	20.22	-0.16	0.8757
D2	2.46	24.09	0.10	0.9193
D3	-16.96	32.18	-0.53	0.6019
family size	5.98	2.20	2.72	0.0105
FES	-0.73	0.74	-0.99	0.3307
Operational Land	**4.63**	**1.64**	**2.82**	**0.0083**
Pulse crop grown	4.14	4.55	0.91	0.3705
Total pulse produced	0.00	0.01	0.23	0.8195

Note: F value 29.70 with p-value <0.01, R Square 0.88 and Adjusted R Square 0.85

CONCLUSIONS

The study revealed the importance of pulses as source of proteins in the daily diets of rural population in central zone of Uttar Pradesh state of India. Pulses were primarily consumed as curry -dhal and different other products. The variation of pulses consumption was observed season-wise, pulse type wise and also farmers' categories wise. Pigeon pea was observed to be most preferred pulses followed by chickpea and other pulses. The per capita consumption of pulses was found to be below the recommended daily allowances across all the categories of households with the variations from -2.63 per cent in large holding category to -77.56 per cent in sampled households of landless categories of farmers. Therefore, it is suggested that the rural communities through health and nutrition education, should be encouraged to include more pulses in their diets as per the recommended allowances. Except for large households, pulses assumed the most important source of dietary protein (22.5 % to 27.98%) in the sampled households after food grains. However, in large category, milk and milk products contributed about 29 per cent of the total protein intake.

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