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High Valued Animal Products Consumption Pattern in Rural and Urban India

KEYWORDS: food expenditure, milk products, decile, Engel's law

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ABSTRACT *This paper analyzes growth in food expenditure, state wise comparison, percentage change in consumption, regression, correlation and income elasticity of demand for high valued animal products. It also analyses different economic class (decile) individual's preferences and consumption pattern of animal products (fluid milk, baby food, milk powder, ghee, butter, egg, chicken, fish prawn and meat) in rural and urban India by using national sample survey data for the year 2009-10.*

According to results, as individual's income increases, animal products consumption expenditure, as also share of the animal products consumption in total food expenditure increases. The study revealed that Indian consumer's food expenditure has more than doubled (109 percent) in a decade and continue to increase consumption of animal products, but the consumption patterns have changed.

There has been a rise in the demand for animal products in India. Increases in income received by higher-income individuals do increase their animal product consumption and expenditures, but animal product consumption patterns for lower and higher income individuals in rural and urban areas are highly different. Response to changes in income is higher for dairy products, both in urban (16 percent) and rural (13 percent) India which indicates that increasing income increases dairy products (specially, fluid milk) consumption share more than other items. However, the shares for poultry and aquatic products consumption will increase substantially for higher income groups. As a consequence, the expenditure share will be gradually increasing as incomes grow and diet preferences change in both urban and rural individuals.

There is a strong link between food expenditures and income. In general, analysis of data confirms Engel's law. Engel's law states that, as income increases, the share of individual's budget spent on necessities, such as food grains, will decrease. However, it also suggests that the actual amount spent on high valued food products like milk, chicken, fish and egg may increase because individuals may alter the composition of their food bundle as their income rises. Information in this section also examines differences in animal food expenditure by different income group. Across the sample for food expenditure averages Rs 294 to Rs 1156 and Rs 370 to Rs 1845 from the lowest to highest income decile in rural and urban India respectively.

Introduction

Indian food consumption pattern have changes over time. In recent years, there have been substantial increase in demand for food in India. It is largely due to population growth, rise in per capita income, urbanization, higher consumer expenditure on food, changes in relative prices associated changes in life styles and the availability of non grain food etc. However, research continues to emphasise basic foods, and the demand for animal products remains poorly understood. India's animal product consumption behaviour was analysed for both urban and rural individual's using a complete regional consumption data set that was augmented by using national sample survey data for the year 2009-10.

A number of factors can influence individuals' consumption patterns. These can be economic (e.g., income and price changes), social (e.g., urbanization leading to dietary changes), cultural (e.g., influences by exotic lifestyles) and market development that makes new foods available (Zhou *et al.* 2005). Among these factors, however, income is seen to be the most influential. Many studies show that the level of income affects not only the level but also the composition of food consumption (Cranfield *et al.* 1998; Regmi *et al.* 2001; Jones *et al.* 2003). The increase in consumer income in fast-growing developing countries tends to induce greater changes in the composition of food consumption (Cranfield *et al.* 1998; Guo *et al.* 2000; Gould 2002).

The National Sample Survey Organization (NSSO) survey results show that the average monthly per capita cereal consumption in the urban areas of India has dropped from 11.2 kg in 1973-1974 to 9.39 kg in 2009-10. The corresponding decline in the rural area is 15.3 kg and 11.35 kg respectively. The decline in per capita consumption of cereals was faster in rural areas than in the urban centers.

MATERIALS AND METHODS

The National Sample Survey (NSS) data are used in our analysis. The NSS data are collected by the National Sample Survey Organization (NSSO) under the Ministry of planning from a large sample of individual's through various annual rounds. The data have a high reputation and acceptance in research and policy. Not all annual rounds extensively cover individuals' consumption behavior; instead, a comprehensive data collection takes place about every 5 or 6 years. In this study, we use comprehensive information from NSS surveys conducted in 1999-00 and 2009-10. These are national surveys with sample sizes of over 100,000 individual's (both rural and urban). The rural and urban samples are distinct and their results are reported separately. This study includes 8 animal originated product groups are namely (1) Fluid milk, (2) Baby food and milk powder (3) Curd, ghee and butter (4) Ice cream and others (5) Egg (6) Fish, prawn (7) Chicken and 8) Other meat (goat, mutton, beef/buffalo, pork, oyster and other).

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RESULTS AND DISCUSSION

Results from table1 show that the average monthly per capita food expenditure in the rural areas of India has increased from Rs 329 in 1999-2000 to Rs 683 in 2009-10. The corresponding food expenditure in the urban area is Rs 432 and Rs 905 respectively. Food expenditure has grown by 109 percent in a decade. Average monthly per capita food expenditure on milk products in both urban and rural has increased in rupees. However, Share of food expenditure on milk products in the rural areas of India has dropped from 16 percent in 1999-2000 to 10 percent in 2009-10. The corresponding decline in the urban area is 19 and 10 percent respectively. The pattern varies across states as shown in the table.

Table 1. Share of food expenditure on animal products during 1999-2000 and 2009-10 in India

	Monthly per capita food expenditure (in Rs)				Expenditure on milk byproducts (in Rs)				Expenditure on egg, fish, chicken and meat products (in Rs)			
States	Rural		Urban		Rural		Urban		Rural		Urban	
	1999-2000	2009-10	1999-2000	2009-10	1999-2000	2009-10	1999-2000	2009-10	1999-2000	2009-10	1999-2000	2009-10
AP	274	717	367	1002	27 (10)	40 (6)	53 (14)	54 (6)	20 (7)	61(6)	26 (7)	48 (7)
Bihar*	256	504	345	736	26 (10)	51 (10)	48 (14)	79 (13)	10 (4)	73 (10)	39 (11)	33 (7)
Gujarat	330	640	442	882	78 (24)	80 (13)	110 (25)	96 (13)	4 (1)	12 (1)	9 (2)	8 (1)
Haryana	397	815	418	1001	164 (41)	187 (23)	146 (35)	181 (20)	2 (1)	17 (2)	7 (2)	6 (1)
HP	383	793	563	1100	95 (25)	106 (13)	151 (27)	121 (13)	8 (2)	17 (2)	18 (3)	18 (2)
J and K	424	777	529	902	94 (22)	83 (11)	112 (21)	97 (11)	26 (6)	49 (5)	48 (9)	43 (6)
Karnataka	295	577	422	869	33 (11)	36 (6)	61 (14)	48 (7)	18 (6)	45 (5)	30 (7)	33 (6)
Kerala	411	843	457	970	37 (9)	40 (5)	48 (11)	45 (5)	61 (15)	104 (11)	70 (15)	96 (11)
MP*	233	480	330	707	32 (14)	56 (12)	63 (19)	81 (14)	5 (2)	36 (5)	12 (4)	31 (7)
MH	272	623	441	999	29 (11)	37 (6)	72 (16)	59 (7)	14 (5)	45 (5)	29 (6)	26 (4)
Orissa	239	507	352	749	7 (3)	11 (2)	29 (8)	22 (3)	13 (5)	48 (6)	29 (8)	30 (6)
Punjab	388	795	424	933	127 (33)	151 (19)	129 (30)	151 (17)	6 (1)	13 (1)	9 (2)	7 (1)
Rajasthan	327	647	405	798	109 (33)	113 (17)	125 (31)	121 (17)	4 (1)	14 (2)	9 (2)	6 (1)
U P*	268	655	349	788	49 (18)	126 (19)	72 (21)	97 (13)	10 (4)	37 (5)	12 (4)	21 (3)
T N	302	635	443	876	25 (8)	36 (6)	57 (13)	50 (7)	24 (8)	58 (7)	34 (8)	48 (8)
W B	300	604	453	907	14 (5)	15 (2)	40 (9)	49 (7)	35 (12)	111 (12)	65 (14)	61 (10)
UT	438	918	544	1125	60 (14)	63 (7)	94 (17)	77 (8)	43 (10)	98 (9)	57 (10)	71 (8)
N E-Goa-Sikkim	381	770	489	937	23 (6)	27(4)	44 (9)	32 (4)	60 (16)	120 (13)	82 (17)	100 (13)
All India Average	329	683	432	905	57 (16)	70(10)	81 (19)	81 (10)	20 (6)	53 (6)	32 (8)	38 (6)

Note: Figures in parenthesis is percentage of food expenditure on respective products

Rural India outperformed urban India in the percentage change in the consumption of milk products between 1999-2000 and 2009-10. In urban India, ice cream segment recorded a maximum growth of 174 percent followed by baby food - milk powder and fluid milk which recorded 147 and 25 percentage change respectively. Union territories, Himachal Pradesh and Jammu Kashmir recorded negative percentage change in milk products consumption. It is noted that except baby food and milk powder, rural India out performed urban India in the percentage change in consumption of milk products in all the segments. The Income elasticity of demand estimated for milk and milk products category was 0.09 and 0.53 in urban and rural India respectively. The estimate suggests that expenditure on milk products will increase with increasing income, but by a less than proportional amount. Some rural, urban states and union territories recorded negative income elasticity of demand indicating that expenditure on milk products will decrease with increasing income. (Table 2).

Table 2. Income elasticity of demand and Percentage change in consumption of milk and milk products between 1999-2000 and 2009-10 in India

States	Percentage change in consumption of milk and milk byproducts								Income elasticity of demand for milk and milk products	
	Liquid milk		Baby food		Curd, ghee and butter		Ice cream, others			
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
AP	30	47	774	181	0.3	69	190	230	0.45	0.81
Bihar*	129	108	185	300	-19	-47	96	290	0.95	1.28
Gujarat	6	12	64	8	-21	-65	37	22	-1.44	0.08
Haryana	19	24	-29	56	24	-47	138	380	0.45	0.60
HP	-3	17	-56	-22	-34	-32	-39	590	-0.58	0.48

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J and K	9	-13	-46	553	-39	-48	-31	680	-0.94	-1.32
Karnataka	-1	13	816	92	-32	-56	146	25	-0.19	0.47
Kerala	-1	1	-8	99	155	1014	229	420	0.03	0.17
MP*	81	93	319	100	-10	-42	276	100	0.47	1.57
MH	14	25	-38	100	-13	40	191	100	0.36	0.61
Orissa	21	54	-22	58	-16	104	433	-30	0.40	1.58
Punjab	20	23	193	-58	-6	-45	29	200	0.52	0.79
Rajasthan	12	5	69	98	-17	-13	499	90	0.21	0.13
U P*	-30	172	243	30	143	26	159	540	0.42	0.36
T N	14	43	239	500	-41	259	214	600	0.72	1.61
W B	146	1	-15	43	-26	517	298	100	-0.12	0.12
UT	3	8	-28	99	-28	-64	7	164	0.35	-0.28
NE-Goa-Sikkim	-21	20	-10	7	-20	-18	261	200	-0.53	0.39
All India Average	25	36	147	125	0	86	174	256	0.09	0.53

*** Undivided.**

Table 3. Income elasticity of demand and Percentage change in consumption of egg, fish, chicken and meat products between 1999-2000 and 2009-10 in India

States	Percentage change in consumption of for egg, fish and meat products								Income elasticity of demand for egg, fish and meat products	
	egg		fish		chicken		meat			
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
AP	110	127	132	201	223	301	92	21	2.08	2.38
Bihar*	145	398	304	278	-9	332	125	44	2.87	6.07
Gujarat	10	17	39	55	108	285	5	55	-0.51	5.17
Haryana	78	23	427	2	273	645	40	5	3.07	4.73
HP	-17	20	-82	163	60	385	-12	105	-0.29	4.35
J and K	45	52	242	814	98	124	-19	40	1.64	7.13
Karnataka	38	77	52	56	256	397	4	10	2.24	4.65
Kerala	30	44	37	44	177	257	27	48	1.74	2.46
MP*	148	534	197	483	811	895	30	205	1.75	5.10
MH	73	48	30	53	279	424	21	42	1.65	2.19
Orissa	59	236	61	117	365	332	10	18	2.45	4.59
Punjab	24	0	1619	20	79	75	-21	-13	1.27	0.88
Rajasthan	80	343	409	427	732	343	41	28	2.58	1.93
U P*	245	387	299	171	705	171	125	-4	1.10	3.11
T N	29	82	54	76	155	314	47	42	3.68	3.72
W B	45	68	72	71	141	142	32	48	3.50	3.50
UT	42	77	108	82	58	95	4	-12	1.23	2.11
NE-Goa- Sikkim	32	54	62	86	136	135	10	37	2.38	2.37
All India Average	68	144	226	381	258	314	31	40	1.91	3.69

*** Undivided Meat: Goat, mutton, beef/buffalo, pork, oyster and other**

Table 3 reveals the elasticity estimate for egg, fish and meat products is positive and elastic. The elasticity estimates of 1.91 and 3.69 were obtained in urban and rural India respectively. The relatively large, positive values estimated for egg, fish and meat products in this study indicate that an increase in income would result in a proportionally greater increase in expenditure on egg, fish and meat products. Only urban Gujarat and Himachal Pradesh recorded negative income elasticity of demand indicating that expenditure on egg, fish and meat products will decrease with increasing income. Rural India saw an average of 220 percent change in the consumption of egg, meat and its by-products. Though most states

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recorded positive growth, HP is the only state that recorded negative growth, while many states recorded positive percentage change in the consumption of egg, meat and its by-products.

Decile class Result: The results from table 4 indicate that expenditure on milk products increased from 5 % to 17 % of food expenditure among the poorest to wealthiest income in rural India. The corresponding milk expenditure in the urban area has increased from 10 % to 18 % respectively. In general, analysis of data confirms Engel's law. There is relatively large difference in the highest and lowest-income income individual's expenditure on milk products. Average monthly per capita expenditure on milk items in rural and urban India are ranging from a low of Rs 15.7 and Rs 35.6 among the poorest individuals to Rs 198.7 and Rs 294.5 among the wealthiest group.

Similarly expenditure on egg, fish and meat products increased from 5 % to 10 % of food expenditure among the poorest to wealthiest income group in rural India. The corresponding expenditure in the urban area has increased from 6 % to 9 % respectively. Expenditure on egg, fish and meat products increased from 5 % to 17 % of food expenditure among the poorest to wealthiest income in rural India. The corresponding milk expenditure in the urban area has increased from 10 % to 18 % respectively. Expenditure in rural and urban India ranging from a low of Rs 14.7 and Rs 21.4 among the poorest individuals to Rs 116.3 and Rs 143.5 among the wealthiest group. Fish prawn accounted for 46 % and 37 % of expenditure among lowest and highest income individuals in rural India. The share of chicken expenditure has increased from 23 % to 27 % from lower decile to higher decile individuals in rural India. But, share of egg items expenditure has decreased from 15 % to 9 % from lowest decile to highest decile individuals in rural India.

Table: 4 Monthly per capita consumption expenditure on milk products, egg, fish, chicken and meat products: Decile class analysis (in Rs)

Items	All India Rural										Average
	Food expenditure- Decile class Expenditure										
	294.00	376.00	428.00	480.00	527.00	574.00	636.00	704.00	827.00	1156.00	600.00
Milk: fluid	15.30	25.40	40.10	49.70	60.50	71.10	84.30	104.70	126.70	183.80	76.20
Baby food, milk powder	0.10	0.20	0.40	0.30	0.70	0.70	0.80	1.20	1.40	2.10	0.80
Curd, ghee, butter	0.20	0.60	0.80	1.90	1.60	2.40	3.20	4.10	6.90	11.70	3.30
Ice cream, others	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.50	1.10	0.30
Milk products: sub-total	**15.70**	**26.40**	**41.40**	**52.10**	**62.90**	**74.30**	**88.40**	**110.20**	**135.40**	**198.70**	**80.50**
Eggs	2.30	3.40	3.30	4.20	4.70	5.70	6.00	5.90	7.70	10.30	5.40
Fish, prawn	6.80	11.40	11.90	13.10	16.60	18.60	19.70	20.20	26.80	43.00	18.80
Chicken	3.30	5.80	7.50	8.50	10.70	12.70	14.00	15.30	20.40	28.30	12.70
Meat: others	0.60	0.80	1.30	1.80	2.10	2.80	3.80	5.00	6.00	8.70	3.30
Egg, fish, chicken, meat: sub-total	**14.70**	**23.90**	**27.90**	**32.80**	**40.20**	**48.30**	**54.80**	**61.30**	**78.80**	**116.30**	**49.90**
Items	All India Urban										Average
	Food expenditure- Decile class Expenditure										
	370.00	490.00	583.00	659.00	741.00	835.00	939.00	1059.00	1285.00	1845.00	881.00
Milk: fluid	33.60	53.80	67.20	88.70	104.50	116.30	139.70	154.30	192.00	244.30	119.40
Baby food, milk powder	0.60	0.80	1.20	1.50	1.20	1.70	2.70	2.70	3.60	3.30	1.90
Curd , ghee, butter	1.30	2.90	3.80	6.70	8.90	12.00	14.50	20.40	27.10	38.60	13.60
Ice cream, others	0.20	0.30	0.50	0.70	0.80	1.10	1.90	2.70	4.00	8.40	2.00
Milk products: sub-total	**35.60**	**57.60**	**72.70**	**97.60**	**115.50**	**131.00**	**158.90**	**180.00**	**226.80**	**294.50**	**137.00**
Eggs	3.20	5.00	6.10	6.60	8.00	8.50	9.30	10.10	10.70	14.10	8.2
Fish, prawn	6.50	10.80	14.20	15.70	14.90	20.70	23.10	22.10	30.00	49.50	20.7
Chicken	4.10	8.30	12.60	15.10	17.50	22.20	23.80	25.10	27.00	36.50	19.2
Meat: others	1.90	2.70	4.30	4.50	5.50	6.20	6.70	8.10	8.80	10.80	6
Egg, fish, chicken, meat: sub-total	**21.40**	**35.10**	**50.10**	**55.30**	**62.40**	**76.20**	**82.90**	**89.90**	**103.10**	**143.40**	**72**

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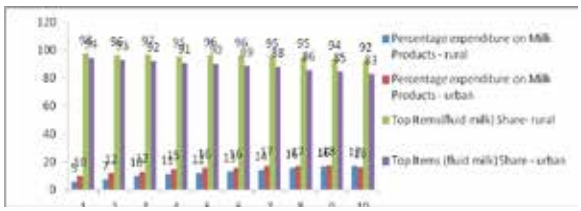
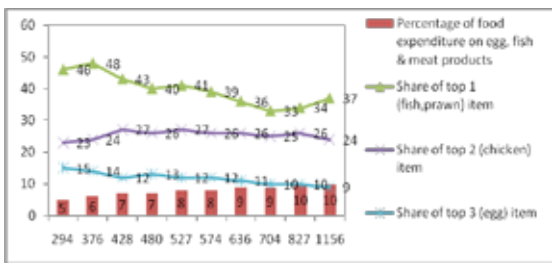
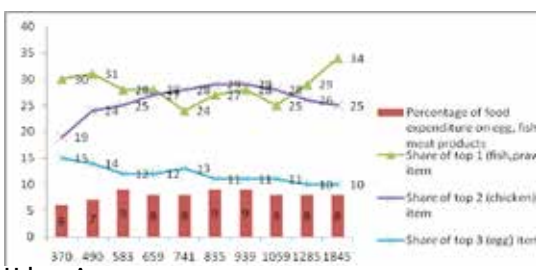


Fig 1 Comparative Monthly Per capita Consumption Ex penditure- Decile class analysis of milk products -



Rural Area



Urban Area

Fig 2. Comparative MPCE – Decile class

It can be observed from table 5 that there is significant and positive correlation between per capita income with milk and cereal products consumption. The relatively large, positive value of 1.65 each estimated for these products in this study indicate that an increase in income would result in a proportionally greater increase in expenditure on milk products and cereal products consumption. The negative correlation between per capita income with food grains and meat consumption suggests that expenditure on these products will decrease with increasing income, but by a less than proportional amount.

These yields an R^2 of 0.99 indicating 99 percent of the variation in the consumption can be explained by per capita income. Similarly, low R^2 indicating the variation in the consumption can be explained by variables other than per capita income.

Table 5: Simple linear regression results of consumption variables with per capita income

Particulars	Intercept	Coefficients	Standard error	t value	R2
food grains total(gms/day)	486.17	-0.42	0.15	-2.87	0.81
cereals total(gms/day)	121.18	1.65	0.09	18.47	0.99
pulses total(gms/day)	35.61	0.01	0.02	0.88	0.28
milk products(gms/day)	121.18	1.65	0.09	18.47	0.99
fish products(gms/day)	4.68	0.04	0.01	3.64	0.87
meat products(gms/day)	3.24	-0.01	0.01	-1.10	0.38
chicken(gms/day)	-2.77	0.08	0.01	10.73	0.98
egg(gms/day)	0.01	0.00	0.00	3.41	0.85

From table 6 it could be seen that there is significant and positive correlation between milk production with milk price and adult female population, which explains positive impact on production. From the significant negative correlation between milk price and feed price, explains negative impact on production. This correlation tend to the multiple regression equation,

Table 6 shows the correlation between different variables influencing milk production. The high correlation between milk production and artificial insemination indicate increased productivity with crossbred animals. There is significant correlation with the adult female population in milk and the milk production where as there is no significant correlation between milk production and goat milk. The high correlation between animal population and price shows the increase in price with demand. It is also to be noted that the milk price is directly correlated with feed price.

Table 6: The correlation between variables

	Milk prodn India	Milk price	Feed price	Artificial Insemination	Cow milk	Buffalo milk	Goat milk
Milk prodn	1.00						
Milk price	0.95	1.00					
Feed price	0.97	0.97	1.00				
Artificial Insemination	0.98	0.96	0.996	1.00			
Cow Milk	1.00	0.96	0.96	0.98	1.00		
Buffalo Milk	0.99	0.94	0.97	0.98	0.98	1.00	
Goat Milk	0.93	0.88	0.82	0.85	0.94	0.89	1.00

Conclusions:

- The results obtained in this research suggest that individuals' animal products consumption is highly influenced by income, cultural and geographical conditions. Animal product consumption pattern for lower and higher income individuals in rural and urban India are highly different. The expenditure share on different animal products in lower income individuals is smaller than higher income ones and vice versa. These differences can also be observed across regions.
- This study has considerable practical significance for food processing industry. It is important for policy and marketing purposes to know whether an observed change in food consumption pattern is being affected by socioeconomic, geographic, price and income changes. There is relatively not much thing policy makers or livestock sector can do to influence socioeconomic, cultural characteristics of the individuals and regions. But education level of consumers and income factors over which policy makers have an influence. Increases in incomes will be the biggest factor influencing per capita animal product consumption in India. Policies on production and productivity can also help in desired changes consumption
- Future research is needed to determine whether or not the level of animal product consumption is associated with the variable attitudes of consumer behavior such as health and belief about animal products. Moreover,

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future research should focus on income and price elasticity of animal products.

- Here an attempt is made to show the relationship between various factors that affecting directly and indirectly in determining the milk price for the last few years.

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