

Household Age Composition and Household Expenditure for Food and Healthcare in India

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Abstract

This study aims to shed light on the changing pattern of household healthcare and food expenditure in the context of changing household age composition in India over time. Findings indicate that per capita expenditure has increased significantly both for food and healthcare during 1993-2010. With respect to the food and healthcare expenditure of household, the share of consumption by children under 15 years has declined over time, while that by adults of 15-59 years and elderly above 60 years has increased substantially during the same period.

Key words: household, age composition, healthcare expenditure, food expenditure.

I. Introduction

An important manifestation of declining fertility and mortality improvement is the age structure transition because age determines the need for specific goods and services. In many countries demographic transition is accompanied with rapid urbanization, rural to urban migration and economic growth. The accompanying socio-cultural orientation has further resulted in changes in household size and age composition. The inherent influence of age on the various aspects of an individual's life has tremendous implication for healthcare and food expenditure. Household age composition also determines the pattern of intra-household allocation of expenditure. It is suggested that in any study of consumer behaviour, factors like education, age, region, occupation, etc., should be included in the demand function (Iyengar, 1967). With the change in age distribution, consumption of goods and services is also changing which has a significant impact on a nation's economic growth (Gerbens, Nohebel & Krol, 2010; Kiymaz, Akbulut & Demir, 2006; Musila & Belasi, 2004). Keeping the foregoing issues in view, this paper makes an attempt to shed light on changing pattern of healthcare and food expenditure in India between 1993 and 2009-10. An important accompanying objective is to examine the change in the food and healthcare expenditure pattern with the change in the age distribution of the population over time. The study is pertinent in Indian context in view of the fact that an average household size has declined over time, the traditional extended joint family system is making way for nuclear families and the composition of the population is gradually changing.

II. Review of literature

Analysing Norwegian quarterly time series data, Erlandsen and Nymoen (2008) found that changes in the age distribution of population have significant and life-cycle consistent effects on aggregate consumption. According to Brown and Deaton (1972), family composition is considered the most important variable influencing family expenditures for goods and services. Wagner and Hanna (1983) used expenditure data of the 1972-1973 Consumer Expenditure Survey (CES) in U.S. to test the effect of family life cycle variables on expenditure and concluded that family composition significantly affects its expenditure pattern. The influence of age on consumption has

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been studied by Wharton School (University of Pennsylvania, USA, 1960) and the study indicates that age has a significant influence on the expenditure of a number of commodities. Fair and Dominguez (1991) from a survey in the USA found that prime-age people consume less relative to their income than persons in other age groups. Demery and Duck (2006) used family expenditure survey, an annual cross-sectional survey of around 7,000 UK households, to analyse the association between consumption behaviour and age structure of households for 30 consecutive calendar years (1969-1993) and concluded that household data exaggerate savings rates of young adults and the elderly whilst under-estimating those of 45 to 60 year olds, and individual saving rates follow more closely the 'hump shape' of the life-cycle model, although the savings rates of the elderly remain positive for some ages.

Lin (1978) demonstrated the linkage between the changing consumption levels and pattern of commodities consumption with economic and demographic factors using Phillipines household survey, 1961. The study has shown that household size, rural to urban migration and household budget as the most important factors in explaining changing consumption levels accounting for about 72 to 79 per cent of incremental food expenditure and about 61-64 per cent of incremental non-food expenditure. Huang and Raunika (1978) studied the effect of variation in household age sex composition on food expenditure and concluded that food expenditure among the youngest children was substantially lower than those of the adults. Rogers and Green (1978) using 1972-74 consumer expenditure survey in America enumerated how overall food expenditures have changed and identified the relationships between such expenditures and selected socio-economic factors. Their study concludes that per capita food expenditures increase as the head of the family grows older till the age of 65 years and there is a strong negative relationship between family size and per capita expenditures on all types of food consumption. In another study in India, Gupta (1973) found that in the rural and urban areas of Tamil Nadu and Uttar Pradesh, households with young members especially were spending the maximum amount on non-food items than the households with middle aged and old aged members. From these comparisons, the author observed that the influence of the age composition of household members on consumer behaviour was different for various items of consumption in the four regions of the two states. It was also found that there are important differences in the consumption of food grains and clothing in these regions.

Seshamani and Gray (2002) in a multi-country study have assessed the extent to which changes in population growth, demographic shift and age pattern contribute to changing health expenditure. Dormont, Grignon and Hubber (2006) used micro data of 1992 and 2000 for France to justify that individual healthcare expenditure is an increasing function of age. Utilising data from the 1987 National Medical Expenditure Survey (NMES) and the Medical Expenditure Panel Survey, 1996 (MEPS), Selden and Banthin (2003) found that healthcare expenditure is high and is a burden among the old people. As regards the association between age composition and healthcare expenditure, Lubitz and Riley (1993) have found that healthcare costs for persons in their last year of life reach a maximum at about the age of 70 years and fall thereafter. Fuchs (1984) for the first time pointed out that the healthcare utilization or costs of persons in their last year of life is higher than the average healthcare cost and increase rapidly with age. Wildman (2003) used panel data estimation to explore the most important contributors to socio-economic health inequalities in Great Britain and found that age and financial status are major determinants of ill health and both factors make a major contribution to income related inequality in health. Ladusingh and Anamika (2013) too have found higher inpatient care costs of decedents than that of survivors in India.

In addition to the trends in the composition of household expenditure over time, analysing expenditure differences on the basis of household characteristics of Australia, Productivity Commission (2012) has found that an ageing population is likely to result in increased consumption of goods and services favoured by the older age groups. They have also shown that medical care, health expenses and share of food are increasing for the elderly. Using the Health and Retirement Study (HRS) data, Banerjee (2012) has analysed the change in the pattern of expenditure of the American elderly and found that health related expenses are the largest component in the budget of older Americans and constitute the only component which steadily

increases with age. Mirel and Carper (2014) have analysed the Medical Expenditure Panel Survey Household (MEPS-HC) and Medical Provider Components (MEPS-MPC) data on the U.S. civilian non-institutionalized population for the years 2001, 2006 and 2011. They have found that the average annual expenditure per elderly person was about \$1,000 higher in 2011 than 2001. Newhouse (1992) assesses the relative importance of ageing in the increase in health expenditures per capita from 1940 to 1990 in the United States. He finds that ageing, in the sense of an increasing proportion of population in the 65-plus age group, holding constant age-specific health expenditures, explained 2 per cent of the increase in per capita health spending during this period, a result confirmed by Cutler (1995). Using the consumption expenditure data, National Sample Survey (NSS), 2009-10, Mohanty, Chauhan, Mazumdar and Srivastava (2013) have tested the hypothesis that the monthly per capita household health spending of the elderly households is significantly higher than that of the non-elderly households in India and concluded that the monthly per capita health spending of the elderly households is 3.8 times higher than that of the non-elderly households.

In India, considerable change in socio-economic and consumer behaviour is taking place which has a strong impact on consumerism. The attitude of Indian consumers has undergone a major transformation over the last few decades. They are changing their consumption pattern powered by growing income levels. From the foregoing review of literature, it is noted that sporadic attempts were made to find the changing pattern of household expenditure on healthcare and food in India and available studies were far from complete. The present study is an attempt to fill this research gap and provide empirical evidence on the extent of change in healthcare and food expenditure with the change in household age composition.

III. Data and methods

Data

To reflect the effect of change in household age composition on consumption, particularly on food and healthcare, the 49th (1993) and the 66th (2009-10) rounds of National Sample Survey Organization (NSSO) are used for this study. The first covered nationally representative sample of 29,995 households and 149,826 individuals and the corresponding figures for the second survey are 100,855 households and 468,551 individuals. In both the surveys from each sampled household, expenditure on food items and non-food items was collected for the last thirty days. The food items include cereals, cereal substitutes, pulses and pulse products, milk and milk products, edible oil, meat, egg, fish, vegetables, fresh and dry fruits, sugar, salt, spices and beverages. Items of expenditure on institutional healthcare include medicine, X-Ray, ECG, pathological tests, doctor's/surgeon's fees, hospital and nursing home charges and other medical expenses as well as non-institutional healthcare expenditure which were collected for a reference period of 30 days. Further, for each sample household member, details of age, sex, marital status, caste, educational level and occupation were also collected. The designs adopted in both the rounds of NSSO surveys were multi-stratified sampling and were comparable.

Methods

Expenditure data for the year 1993 is first adjusted to the price of 2009-10 using consumer price index. Descriptive statistics, bivariate analysis and diagrammatic representations are used to describe the pattern of food and health expenditure. Household expenditure on food is first allocated to household members by age using regression approach. As for the allocation of household health expenditure to individual members by age, a cubic polynomial regression is adopted. Linear regression analysis is adopted to examine the association between the predictor variables, and food and health expenditure.

A multivariate decomposition analysis by Sobel (1983) is used to study whether the shift in demographic composition has made significant contribution to overall change in expenditure.

The decomposition procedure applied is based on the linear models estimated for the two surveys.

The equation for healthcare expenditure is:

$$\begin{aligned} & E(\ln(\text{Health Expenditure}))_{2009-10} - E(\ln(\text{Health Expenditure}))_{1993} \\ &= (\alpha_{2009-10} - \alpha_{1993}) + \sum E(x_{ij})_{1993} (\beta_{ij_{2009-10}} - \beta_{ij_{1993}}) \\ &+ \sum \beta_{ij_{1993}} (E(x_{ij})_{2009-10} - E(x_{ij})_{1993}) + \sum (E(x_{ij})_{2009-10} - E(x_{ij})_{1993}) (\beta_{ij_{2009-10}} - \beta_{ij_{1993}}) \end{aligned}$$

The equation for food expenditure is:

$$\begin{aligned} & E(\ln(\text{Food Expenditure}))_{2009-10} - E(\ln(\text{Food Expenditure}))_{1993} \\ &= (\alpha_{2009-10} - \alpha_{1993}) + \sum E(x_{ij})_{1993} (\beta_{ij_{2009-10}} - \beta_{ij_{1993}}) \\ &+ \sum \beta_{ij_{1993}} (E(x_{ij})_{2009-10} - E(x_{ij})_{1993}) + \sum (E(x_{ij})_{2009-10} - E(x_{ij})_{1993}) (\beta_{ij_{2009-10}} - \beta_{ij_{1993}}) \end{aligned}$$

Where α_{1993} is the regression constant in $NSSO_{1993}$

$\alpha_{2009-10}$ is the regression constant in $NSSO_{2009-10}$

$E(x_{ij})_{1993}$ is the mean of jth category in ith covariate in $NSSO_{1993}$

$E(x_{ij})_{2009-10}$ is the mean of jth category in ith covariate in $NSSO_{2009-10}$

$\beta_{ij_{1993}}$ is the coefficient of jth category of the ith covariate in $NSSO_{1993}$

$\beta_{ij_{2009-10}}$ is the coefficient of jth category of the ith covariate in $NSSO_{2009-10}$

This procedure gives three components, namely, rate, composition and interaction. Rate reflects the differences in regression coefficients and intercept, composition component indicates the proportion of overall change attributable to the variation in the means of the covariates and interaction alludes to the covariation between the means and the coefficients in the two time periods.

Secondly, **log variance** analysis is adopted to assess the change in household expenditure between age groups over time. An attraction of the log variance as a measure of inequality is that it can be directly decomposed into the shares of the log variance attributable to various household characteristics that may affect expenditure (Fisher, 1930). The log variance (lv) measures the average squared deviation of a household's logarithmic expenditure ($\ln(y_i)$) from the population's mean logarithmic expenditure.

$$lv = [1/n] \sum_{i=1}^n (\ln(y_i) - \ln(\bar{y}))^2 f y_i$$

where, $\ln(\bar{y})$ refers to the mean log expenditure of all n households. The deviations of the individual from the population log mean are also squared in the log variance. According to Fisher (1930) analysis, variance methods are also motivated by the normality distribution to develop test of statistical significance.

IV. Results

Spending on food for the period 1993 was ₹12 lakh and has increased to ₹55.4 lakh in 2009-10. Likewise, healthcare expenditure has increased from ₹1.8 Lakh to ₹6.5 lakh over time. It shows that healthcare spending is increasing faster than food expenditure. Spending on food in India among the population for the period 1993 & 2009-10 indicates that 15 per cent of all personal food spending in 1993 (₹1.7 lakh) was on behalf of just 1 per cent of the population (Figure 1), 5 per cent of the population with the highest spending was responsible for more than 30 per cent of the spending (₹4.4 lakh). The spending for the period 2009-10 on behalf of 1 per cent population has increased by 1 per cent (₹7.6 lakh) and for the top 5 per cent the spending has increased by 3.8 per cent (Figure 2). At the other end of the spectrum, half of the population with the lowest spending accounted for 9 per cent for both the periods. Spending for healthcare services is highly concentrated among a small proportion of people with very high use for the period 1993. More than 20 per cent (₹ 32.6 thousand) of all personal healthcare spending in 1993

was on behalf of just 1 per cent of population (Figure 3). However, the latest data indicate that 23 per cent (₹1.4 lakh) of all personal healthcare spending was on behalf of the 1 per cent of population (Figure 4). The health spending has become slightly less concentrated over time as high spending has spread to a broader swatch of the population. For instance, whereas 41 per cent of the total health spending was concentrated among the top 5 per cent in 1993, this group accounted for almost half of the spending in 2009-10 (₹2.9 lakh).

It is clear that per capita spending among the highest users is substantial. For instance, the average food expenditure for each of the people for top 1 per cent of spenders is more than ₹400 in 1993 (Figure 5). The top 5 per cent spenders were responsible for ₹4.4 lakh in expenditure or nearly ₹230 per person. In contrast, mean monthly spending for the bottom half of the distribution is just ₹6 per person totalling only ₹1.1 lakh for the entire group. However, for the period 2009-10, spending on food per person for top 1 per cent spenders has increased by twice (₹800) than 1993. For the top 5 per cent spenders the per capita monthly spending has increased by ₹158. The mean monthly per capita spending for the bottom half of the distribution is ₹11 totalling only ₹5.2 lakh for the entire group while the total expenditure is ₹55.4 lakh. Per capita monthly health expenditure for top 1 per cent spenders is ₹615 (Figure 6) with a total spending of ₹32.6 thousand for the group. The top 5 per cent spenders were responsible for ₹73.2 thousand in expenditure which accounts for 40.6 per cent spending of the total expenditure. The mean monthly spending for the bottom half of the distribution is just ₹5 per person totalling only ₹13.4 thousand for the entire group. The latest data indicate that mean monthly health spending per person for top 1 per cent spenders has increased thrice (₹1734) than 1993. The top 5 per cent spenders were responsible for ₹2.9 lakh in expenditure or ₹841 per person. Health expenditure for the bottom half of the distribution for 2009-10 is 5 per cent (₹30.9 thousand) of the total spending which decreased by 2 per cent overtime.

It is apparent from Table 1 that the average monthly per capita expenditure on food items has increased over time, where the expenditure was ₹153 per person in 1993 has increased to ₹268 in 2009-10. For item wise expenditure, the monthly per capita expenditure on cereals, pulses and pulse products, milk and milk products, meat, egg, fish, vegetables and beverages has considerably increased. Per person there is an increase of ₹389 in cereals, ₹77 on pulses and pulse products, ₹136 in milk and milk products, ₹110 and ₹238 in nonveg items and vegetables, and ₹266 in beverages from 1993 to 2009-10 is observed. Similarly, per capita expenditure on most of the health items except family planning appliances has substantially increased over time. Expenditure on medicine has increased from ₹195 to ₹490, for all the medical tests the expenditure has doubled over time, Doctor's fees have increased from ₹81 to ₹217 and a substantial increase from ₹480 to ₹2354 per person for hospital and nursing home charges over time is observed. It is evident from the table that out of the total expenditure in 1993, 87.2 per cent and 12.8 per cent are spent on food and health items respectively. Expenditure on food has decreased by 18.7 per cent over time and the share of health expenditure has increased to 31.54 per cent. As a result, per cent spent on each food items has decreased and health items have increased over time. For instance, out of the total expenditure for the period 1993, expenditure on medicine, X-ray, ECG, pathological test, etc., Doctor's/surgeon's fee, and Hospital & nursing home charges were 10.58, 0.05, 1.57 and 0.28 per cent respectively. Whereas, expenditure on medicine has increased by 11 per cent over time, per cent spent on X-ray, ECG, pathological test, etc., Doctor's/surgeon's fee, and Hospital & nursing home charges for the period 2009-10 has increased to 2.41, 3.70 and 3.37 per cent correspondingly.

Change in the age composition of population over time is shown in Figure 7, which depicts that the child population has declined from 1993 to 2009-10. However, there is a substantial increase in the percentage of adult and elderly population over time.

Figure 1. Cumulative distribution of personal food spending, India, 1993

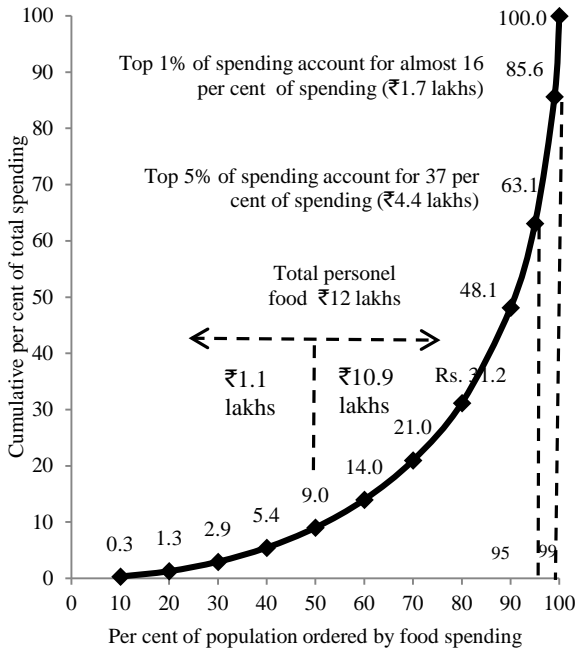


Figure 2. Cumulative distribution of personal food spending, India, 2009-10

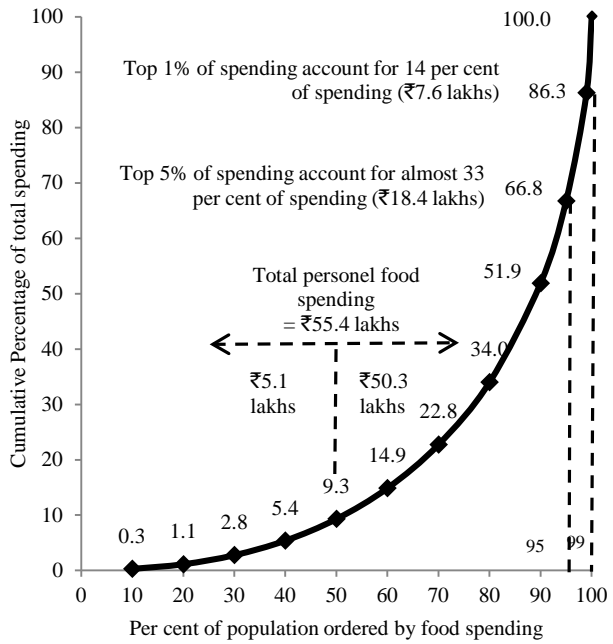


Figure 3. Cumulative distribution of personal healthcare spending, India, 1993

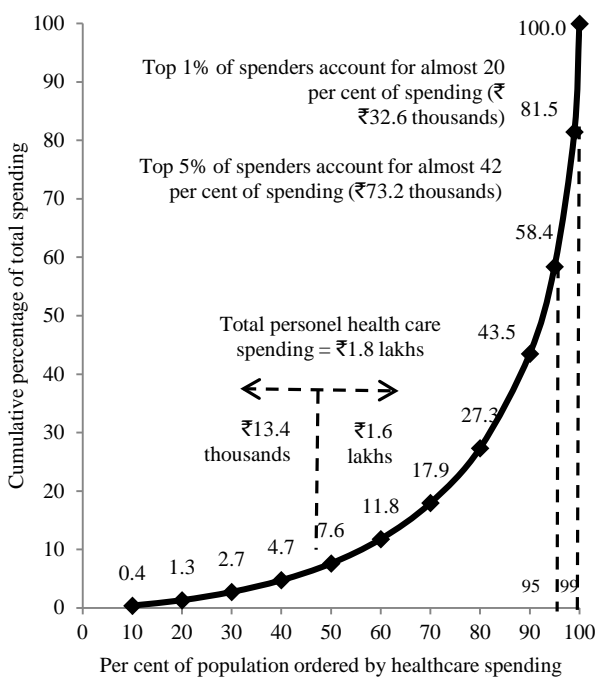


Figure 4. Cumulative distribution of personal healthcare spending, India, 2009-10

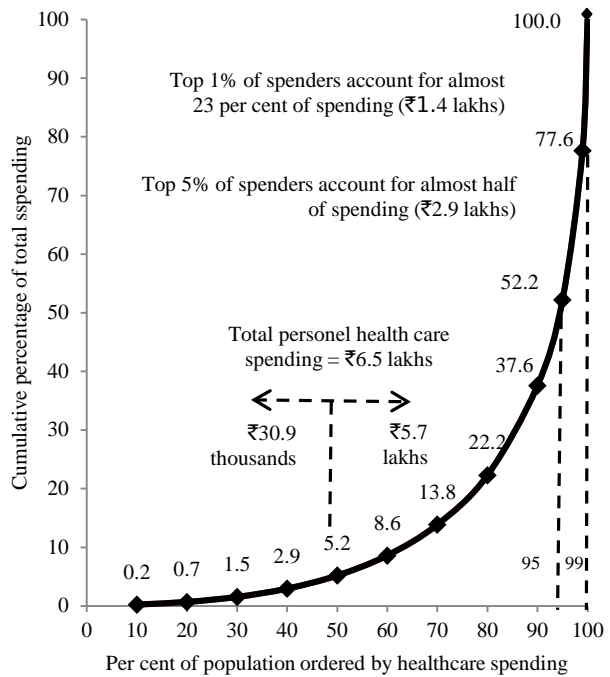


Figure 5. Mean percapita food spending by spending groups, India, 1993 & 2009-10

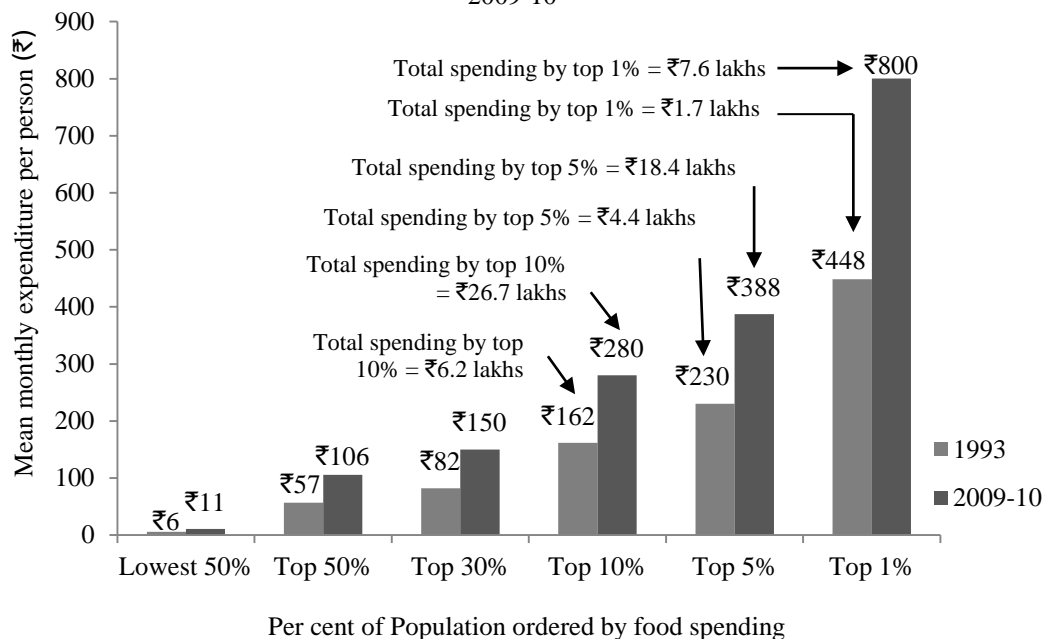


Figure 6. Mean percapita health spending by spending groups, India, 1993 & 2009-10

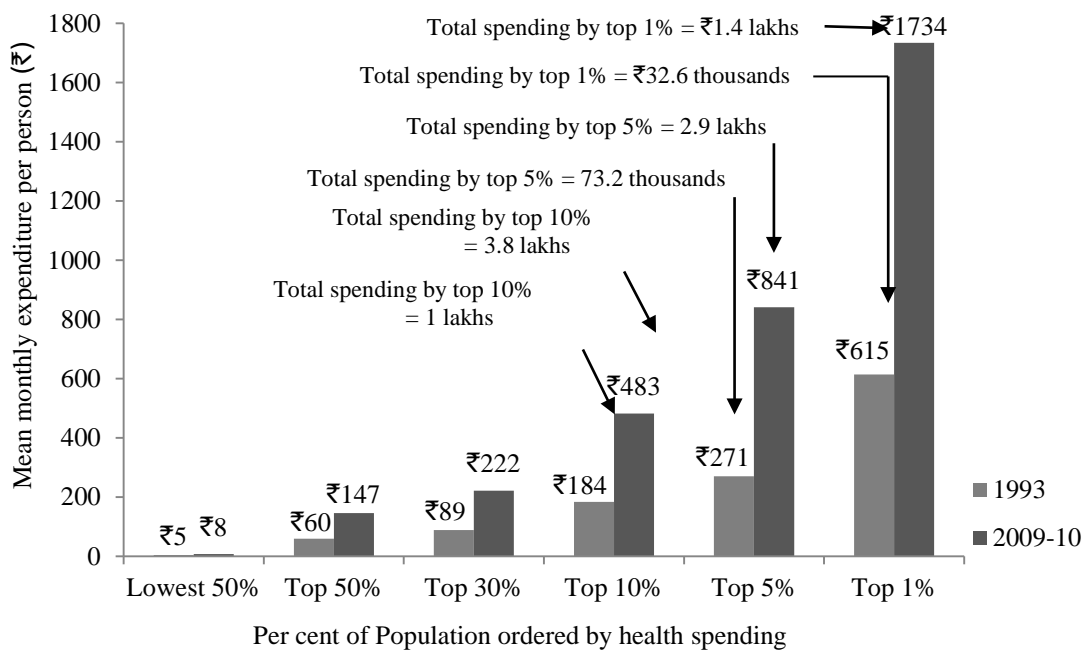


Table 1: Average monthly per capita household expenditure on food & health items in India for 1993 & 2009-10

All age group	Average monthly per capita household expenditure on food & health items (₹)		Distribution of expenditure on household food and health items	
	1993	2009-10	1993	2009-10
Food items				
Cereals	359	748	29.21	18.15
Cereal substitutes	35	45	0.35	0.08
Pulses and pulse products	106	183	4.43	4.17
Milk and milk products	399	535	12.89	10.49
Edible oil	153	178	6.77	4.31
Meat, egg, fish	235	345	5.94	5.49
Vegetables	72	310	7.72	7.21
Fruits (fresh)	90	98	2.39	1.93
Fruits (dry)	59	64	0.40	0.46
Sugar	95	118	3.60	2.76
Salt	6	11	0.27	0.27
Spices	78	102	3.41	2.35
Beverages	141	406	9.83	10.78
All food	153	268	87.20	68.46
Medicine	195	490	10.58	21.17
Family planning appliances	285	37	0.08	0.04
X-ray, ECG, pathological test, etc.	330	681	0.05	2.41
Doctor's/surgeon's fee	81	217	1.57	3.70
Hospital & nursing home charges	480	2354	0.28	3.37
Other medical expenses	211	223	0.23	0.85
All health	169	384	12.80	31.54
Total	322	652	100	100

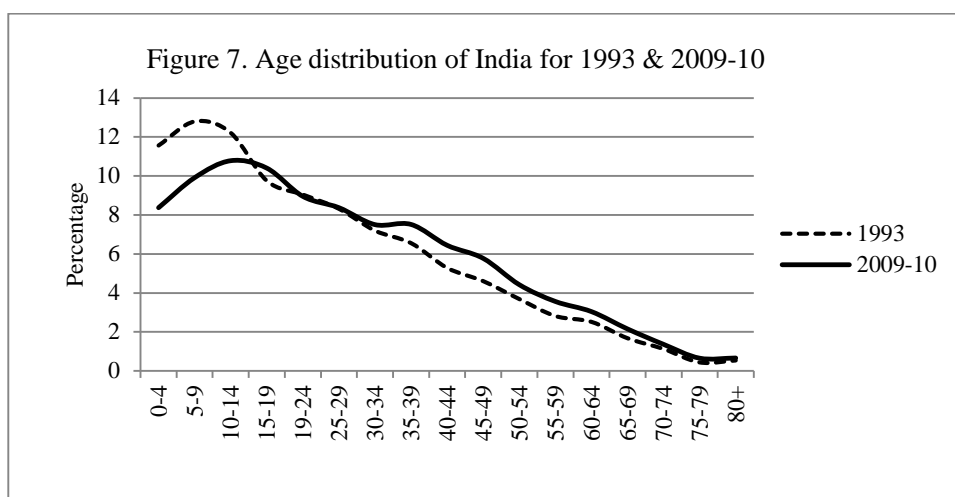


Table 2: Age wise distribution of household expenditure on food and health items at two points of time (1993 & 2009-10)

	1993			2009-10		
	0-14	15-59	60 & above	0-14	15-59	60 & above
Population (%)	36.6	57.2	6.3	29.1	63.0	7.9
Food items						
Cereals	33.5	59.3	7.1	18.6	73.8	7.6
Cereal substitutes	5.1	88.3	6.6	13.0	75.5	11.5
Pulses and pulse products	22.1	69.8	8.2	9.7	79.9	10.5
Milk and milk products	13.4	73.6	13.0	6.0	83.3	10.8
Edible oil	4.1	81.6	14.3	13.9	77.6	8.5
Meat, egg, fish	20.5	73.8	5.7	0.3	91.1	8.6
Vegetables	9.1	86.2	4.7	10.6	81.1	8.3
Fruits	12.8	75.6	11.6	0.4	85.2	14.4
Sugar	16.5	75.2	8.3	14.3	75.8	9.9
Salt	21.1	73.2	5.7	16.2	74.7	9.1
Spices	4.7	87.3	8.1	9.3	81.8	8.8
Beverages	11.7	83.6	4.7	3.8	90.9	5.3
All food	16.3	76.0	7.7	10.5	81.0	8.6
Health items						
Medicine	23.6	59.2	17.2	8.8	60.2	31.0
X-ray, ECG, pathological test, etc.	15.2	83.3	1.5	7.8	73.2	19.0
Doctor's/surgeon's fee	76.3	11.9	11.8	9.0	69.5	21.5
Hospital & nursing home charges	1.4	66.2	32.4	8.7	39.9	51.4
Other medical expenses	0.4	46.2	53.4	1.2	85.8	13.0
All health	34.9	57.2	8.0	9.4	80.5	10.1

The change in household food and health expenditure by age of the individuals between the period 1993 and 2009-10 is shown in Table 2. As the percentage of child population has declined and there is an increase in the percentage of adult and elderly population, the distribution of food and health expenditure among them has changed accordingly over time. Food expenditure among children declined from 16.3 to 10.5 per cent from 1993 to 2009-10 while for adults and elderly it increased over time by 5 and 1 per cent. A significant decrease of 26 per cent in the health expenditure among children is perceived for the period 2009-10 as compared with 1993. Nevertheless, for the adults the expenditure increased from 57.2 to 80.5 per cent and for elderly 8 to 10.1 per cent over time. With change in the pattern of food expenditure, a major change in the health expenditure pattern is observed from the table. The pattern of food and health expenditure has changed with the change in age composition. For most of the food items, per cent spent on children has declined and for adults and elderly has increased over time. However, for all the health items per cent spent on elderly over time has increased substantially. Per cent spent on medicine for elderly was 17.2 per cent, although it has increased by 14 per cent in 2009-10. Expenditure on several tests has increased from 1.5 to 19 per cent from 1993 to 2009-10. Doctor's fee and hospital charges among elderly have increased by 10 and 19 per cent correspondingly overtime.

Table 3: Result of linear regression analysis for food and healthcare expenditure in India, 1993 & 2009-10

Dependent variables	Log of food expenditure		Log of healthcare expenditure	
	B (unstandardised coefficient)		B (unstandardised coefficient)	
Background characteristics	1993	2009-10	1993	2009-10
Age				
0-14				
15-59	-0.133	0.826***	-0.169***	0.718***
60 & above	-0.308	0.583***	0.498***	0.841***
Sex				
Male				
Female	-0.109*	-0.039***	-0.129***	-0.086***
Sector				
Rural				
Urban	0.117***	-0.001***	0.013	0.187***
Marital status				
Never married				
Currently married	0.251***	0.441***	0.933***	0.362***
Widowed	0.118	0.432***	0.897***	0.489***
Divorced/separated	-0.182	0.508***	1.266***	0.277**
Education				
Illiterate				
Literate	0.087*	-0.028**	-0.087*	-0.049***
Caste				
ST				
SC	-0.048	0.052***	-0.010	0.096***
Others	-0.005	0.036***	0.077	0.159***
Household size	0.345***	-0.013***	-0.039***	-0.007***
MPCE quintiles				
Lowest				
Second	0.340***	0.201***	0.426***	0.527***
Middle	0.449***	0.417***	0.398***	0.875***
Fourth	0.594***	0.617***	0.793***	1.297***
Highest	0.805***	0.893***	1.292***	1.778***
Health expenditure	-0.002	-0.001*		
Food expenditure			0.001	0.003
Constant	2.628	1.191	0.975	1.327

Note: *** P<0.01, ** p<0.05 and * p<0.10.

The result of linear regression analysis reveals that many of the predictor variables are statistically significantly associated with food expenditure (Table 3). In 1993 adults and elderly spend 0.133 and 0.178 units more on food as compared with children. However, in the latest data it is found that the age of individuals is highly significant with respect to food expenditure. Adults and elderly spend more on food as compared with children and this might be because of the change in age distribution, i.e., the percentage of children has declined over time. In both the surveys spending on food among females is less than males. Spending on food in urban areas is 0.117 units more compared with rural areas for 1993, but there is a decrease of 0.001 units in urban areas for 2009-10. People in urban areas spend more on non-food items. Likewise, educated persons spend 0.087 units more on food items than uneducated in the old data, but in the latest data educated persons spend 0.028 units less compared with educated persons and it is highly significant (p<0.01). Household size has a significant association (p<0.01) with food expenditure in both the surveys, although it is positively associated with expenditure in 1993 and negatively associated in 2009-10. In the old survey, the increase in household size spending on food is by 0.345 units, while in the latest survey as the household size increases expenditure on food decreases by 0.013 units. Health expenditure is negatively associated with food expenditure in both the periods. The

plausible explanation may be a family or an individual if spends more on health the other expenditures will automatically be less.

On the other hand, if we look into the association of health expenditure with the predictor variables, almost all the variables are strongly associated with it. Healthcare expenditure on adults is 0.169 units less and on elderly it is 0.498 units more as compared with children in 1993. Expenditure among adults and elderly is 0.718 and 0.841 units respectively more than the children and highly significant ($p < 0.01$) in 2009-10. Spending on healthcare in the latest survey is more among adults and elderly because distribution among them has substantially increased over time. In both the surveys spending on health among females is less than males. In urban areas it is more than rural areas in 1993 and 2009-10 for the reason that urban people have more exposure and facilities of healthcare than their rural counterpart. Educational qualification is significantly and negatively associated with healthcare expenditure. Literates spend 0.087 and 0.049 units less on healthcare compared with illiterates in both sets of data because they are more aware about hygiene and take precautions against disease. Association between household size and healthcare spending is significant ($p < 0.01$) but negative in 1993 and has not changed over time. With the increase in household size, healthcare spending has decreased by 0.039 and 0.007 units respectively in 1993 and 2009-10. The more the household members, less the expenditure on health. However, monthly per capita expenditure is significantly and positively associated with healthcare spending. It is to be noticed that healthcare spending has a significant association with food expenditure, but food expenditure has no significant effect on healthcare spending.

4.1 Result of Decomposition Analysis

The results of multivariate decomposition analysis are presented in Tables 4 and 5 in terms of magnitude and direction of change associated with the covariates included in the study, namely, age, sex, sector, marital status, caste, education, household size and monthly per capita expenditure. Change in the direction of rates shows a declining trend among different sub-groups with respect to the respective reference categories. In the case of both health and food expenditure for age and sex the sign of rate is positive. It means food and health expenditure is increasing with the increase of age, and the expenditure among females is more than males. For food expenditure the sign of rate is negative for sector which means that food expenditure has decreased in urban areas compared with rural areas. However, in the case of health expenditure, the sign of rate is positive for the sector which indicates that health expenditure in urban areas is more than rural areas. Spending on food among literates has decreased and on health has increased than illiterates over time. With the increase in monthly per capita expenditure, spending on food is becoming less, while the healthcare spending has increased with increase in monthly per capita expenditure. Change in the composition referred to structural change in the population. Again the result depicts whether the shift in socio-economic and demographic composition has made a significant contribution to overall change in food and health expenditure. The table reveals that with an increase in the composition of population, the overall health and food expenditure increases. With a compositional change in age, i.e., with an increase in the proportion of population, food expenditure decreased and health expenditure increased from 1993 to 2009-10. However, the shift of female population indicates a decline in food and healthcare spending. Improvement in urban population has also made a significant impact on food as well as health expenditure. Shift in the proportion of education and marital status of individuals has made significant impact on food and health expenditure, i.e., shift in the proportion of educated persons contribute to less healthcare spending, though the same group increased food spending over time.

Table 4: Decomposition of change in food expenditure in India, 1993 & 2009-10

Background characteristics	Food expenditure		
	Rate	Composition	Interaction
Age	0.1920	-0.0380	0.1819
Sex	0.0008	-0.0210	0.0134
Sector	-0.0064	0.0175	-0.0177
Household size	-0.0187	0.0520	-0.0540
Caste	0.0075	-0.0080	0.0213
Marital status	0.1322	0.0164	0.1265
Education	-0.0065	0.0126	-0.0166
Monthly per capita expenditure	-0.0013	0.3101	-0.0123
Health expenditure	0.0001	-0.0003	0.0003
Total	0.2998	0.3414	0.2428

Table 5: Decomposition of change in healthcare expenditure in India, 1993 & 2009-10

Background characteristics	Healthcare Expenditure		
	Rate	Composition	Interaction
Age	0.0464	0.0380	0.1529
Sex	0.0016	-0.0171	0.0058
Sector	0.0055	0.0018	0.0245
Household size	0.0012	-0.0051	0.0042
Caste	0.0071	0.0087	0.0242
Marital status	-0.0799	0.3387	-0.2122
Education	0.0014	-0.0121	0.0053
Monthly per capita expenditure	0.0599	0.3875	0.2048
Food expenditure	0.0000	0.0006	0.0001
Total	0.0431	0.7410	0.2096

Tables 6 and 7 decompose the log variance of food and health expenditure per individual for the two surveys where the first column reports the percentage of population in each age group. The next two columns report the mean log expenditure and variance of expenditure within the age group. Columns (4) and (5) show the share of the overall log variance that is accounted for by the within age cohort log variance weighted by the population share, and the between age cohort and overall mean log expenditure, squared and weighted by the population share. The sum of the figures in columns (4) and (5) add up to the log variance for all ages combined at the top of column (3). Several common regularities in expenditure inequality across age groups can be seen from the Tables.

For the period 1993 the relative inequality in food expenditure is 1.77 for adults, and 1.65 and 1.64 for children and elderly respectively (Table 6). In 2009-10 the relative inequality in food expenditure for children and elderly was 1.72 and increased to 1.86 for adults. The scenario in 2009-10 is different from 1993, where the difference between the relative inequality among children and adults is .14; and among children and elderly .03 which was .12 and .01 respectively in 1993 and the difference may be due to a change in composition of population. In both the surveys the between age group component contributes a relatively smaller share to overall log variance (col. 5). The within age group variance component (col. 4) becomes more substantial for middle aged persons. This indicates that elderly population has no significant contribution in increasing food expenditure among them. The relative inequality in health expenditure among elderly has increased from 1.36 to 1.76 over the time (Table 7). The difference between the relative inequality among children and elderly is .31 which was .01 in 1993. As the age composition of population in India has shifted toward the older ages, the log variance of health expenditure may have thus tended to increase. The actual increase of 29 per cent in the log variance of the individuals' expenditure between 1993 and 2007-08 from 1.8494 to 2.7710

occurred due to a change in distribution, holding constant the within and between cohort components of inequality at their initial level. Increase in log variance of health expenditure per individual from 1993 to 2007-08 is thus due to the changing age composition.

Table 6. Decomposition of log variance of household food expenditure per person by age weighted by number of persons in household, India (1993 & 2009-10)

	1993					2009-10				
	Per cent of population	Mean Log Food Expenditure	Variance Log Food Expenditure	Contribution of Group to Log Variance		Per cent of Population	Mean Log Food Expenditure	Variance Log Food Expenditure	Contribution of Group to Log Variance	
				Within	Between				Within	Between
(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	
All ages	100	1.734	1.9711	-	-	100.00	3.160	2.1221	-	-
0-14	36.55	1.070	1.6457	0.6015	0.1610	29.09	2.290	1.7238	0.5015	0.2198
15-59	57.2	2.122	1.7710	1.0130	0.0861	63.01	3.533	1.8583	1.1709	0.0877
60 & above	6.25	2.063	1.6424	0.1027	0.0067	7.90	3.439	1.7235	0.1362	0.0062

Notes: Column (4) = Col. (3)* Col. (1)/100.

Column (5) = [Col. (2) – (Col. (2 for all ages)) **2]*Col. (1)/100.

Table 7. Decomposition of log variance of household healthcare expenditure per person by age weighted by number of persons in household, India (1993 & 2009-10)

	1993					2009-10				
	Per cent of population	Mean Log Food Expenditure	Variance Log Food Expenditure	Contribution of Group to Log Variance		Per cent of Population	Mean Log Food Expenditure	Variance Log Food Expenditure	Contribution of Group to Log Variance	
				Within	Between				Within	Between
(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	
All ages	100	1.700	1.8494	-	-	100.00	3.017	2.6193	-	-
0-14	36.55	1.204	1.3466	0.4922	0.0898	29.09	2.155	1.4498	0.4217	0.2162
15-59	57.2	1.868	1.9009	1.0873	0.0162	63.01	3.369	2.7360	1.7239	0.0778
60 & above	6.25	2.822	1.3620	0.0851	0.0787	7.90	3.735	1.7579	0.1389	0.0407

Notes: Column (4) = Col. (3)* Col. (1)/100.

Column (5) = [Col. (2) – (Col. (2 for all ages)) **2]*Col. (1)/100.

5. Summary and Conclusion

When we talk about changing pattern of health and food expenditure, the result shows that expenditure on food over time increased from ₹12 lakh to ₹55 lakh with the increase in monthly per capita spending, but the per cent spent on food declined from 87.2 per cent to 68.4 per cent. However, for the top 1 per cent and 5 per cent spenders, per cent spent on food has declined from 1993 to 2009-10. Spending on healthcare substantially increased over time from ₹1.8 lakh to ₹6.5 lakh with a significant increase in overall (12.8 to 31.5 per cent) and monthly per capita spending. Percentage of healthcare expenditure on top 1 per cent spenders has increased from the previous survey to the current survey and the top 5 per cent spenders in 2009-10 spent almost half of the total health expenditure, whereas the spending in 1993 was 42 per cent. While we look into item-wise spending on food and health items, monthly per capita spending increased for all items, but percentage of expenditure on food items decreased and health items increased over time. The age distribution over time also changed with a decline in child population and significant increase in adult and elderly population. The findings reveal that with the change in age composition the food and healthcare expenditure pattern also changed. When we test the association between age and other predictor variables with food and healthcare expenditure to see the change in association over time, we find that in 1993 spending on food was more among children as compared with adults and elderly, even as in 2009-10 the expenditure was more among adults and elderly, which clearly indicates that the change was due to the change in age distribution. Likewise, in the old survey healthcare spending among adults was less than the children, although in the latest survey spending on both the adults and elderly was more compared with children. The result from decomposition analysis show that the change in expenditure pattern with the change in age distribution reveals that with the shift in composition of population, the overall food and health expenditure increased

from 1993 to 2009-10. With the increase in age composition the food expenditure decreased where health expenditure increased with the shift in age composition. From log variance analysis it is clear that spending on health increased with the shift in age composition, particularly for elderly population.

Most of India's health programmes and policies focus on issues like population stabilisation, maternal and child health and disease control. However, the demographic transition resulting in increasing adult and older population gives a prelude to a new set of medical, social and economic problems that could arise if timely initiative in this direction is not taken by the programme managers and policy makers. Most elderly being economically dependent, the cost of treatment is often a burden on the household. Hence, there is a need for expansion of social and community services for older persons, and enhancement in their accessibility and use by making them client oriented and user friendly. Looking at the scenario, the Government should implement programmes addressing healthcare facilities and improving the social status of the adults and elderly.

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