

Economic Proxies, Household Consumption and Health Estimates

AKANKSHA SRIVASTAVA, SANJAY K MOHANTY

While the official estimates of poverty in India are derived from the consumption expenditure data, economic proxies are increasingly used to explain the differentials in health and healthcare utilisation in population-based surveys. Using data from the World Health Survey, India, 2003, covering a nationally representative sample of 10,750 households and 9,994 adults, this paper examines the extent of agreement of monthly per capita consumption expenditure and economic proxies (combined with the wealth index) with the differentials in health estimates according to two alternative measures. It finds that economic differentials in health and healthcare utilisation based on economic proxies are not similar to those of direct measures. There is an urgent need to integrate an abridged version of the consumption expenditure schedule in population-based health surveys. The results also indicate that the extent of agreement of the MPCE with the wealth index is weak. Only 31% of households are classified in the same quintile of MPCE and wealth index and the health estimates are sensitive to these two measures.

The main objective of this paper is to understand the extent of agreement of consumption expenditure and economic proxies and resulting differentials in health estimates in India. The exercise is conceptualised primarily because of the following reasons: First, the official measures of poverty and inequality in India are derived from the consumption expenditure data collected by the National Sample Survey Organisation (NSSO) on a regular basis. Second, the economic proxies are increasingly being used to explain the economic differentials and inequality in health and healthcare utilisation in small- and large-scale population-based surveys including the Demographic and Health Surveys (DHS). Two of the large-scale population-based health surveys in the country, namely, the National and Family Health Surveys (NFHS) and the Reproductive and Child Health (RCH) Survey also use the economic proxies in explaining the economic inequality in population and health parameters. Third, the extent of agreement of direct economic measures such as income or consumption expenditure and economic proxies has not been explored, in a large and heterogeneous country like India.

Household income and consumption expenditure are two direct monetary measures used in assessing the economic well-being of a population. However, consumption expenditure is preferred to income as it reflects long-term economic status of the household, particularly in low income countries (Friedman 1957). Besides, in developing countries, income estimates are under-reported, drawn from multiple sources and vary across seasons. Though the consumption expenditure data are collected in many developing countries including India, the process is time-consuming, expensive and needs adjustment for household size, composition and for price level. Owing to these difficulties, the economic proxies (consumer durables, housing quality and household amenities) are collected to measure the economic status of the households in both small- and large-scale population-based surveys. These economic proxies are combined to a composite index, referred as wealth index or standard of living index and used to describe the economic differentials and inequalities in health outcome, healthcare utilisation and other related variables (Rutstein and Johnson 2004).

The wealth index as a proxy of consumption expenditure is a subject of intense debate and discussion, though its utility in predicting differentials in health outcome and healthcare utilisation has been established. It is argued that the asset-based index (wealth index) is reflexive of long-run household wealth and fails to take into account the short-run or temporary interruption of the households, tends to have an urban bias and does not identify

Akanksha Srivastava (akankshaleo@gmail.com) is a research scholar at the International Institute for Population Sciences, Mumbai.

Sanjay K Mohanty (sanjaytips@yahoo.co.in) is with the Department of Fertility Studies, International Institute for Population Sciences, Mumbai.

the poorest of the poor (Rustein 2008). However, if the interest is based on the current resources available to the household, then an index based on assets may not be an appropriate measure.

A number of studies have demonstrated wealth index as a good proxy of long-term economic status (Filmer and Pritchett 2001; Sahn and Stifel 2003; Vyas and Kumaranayake 2006). Studies also described the wealth index, as a weak predictor of consumption expenditure (Montgomery et al 2000; Lindleow 2006; Howe et al 2008). An asset-based index can be a good proxy for wealth, but provides poor measure of inequality (McKenzie 2005). The magnitudes of health inequalities are also sensitive to the choice of asset items included in the construction of composite index and the regional variations (Houweling et al 2003; Mishra and Dilip 2008).

Collecting consumption expenditure data is not new in India. The NSSO has been collecting data on consumption expenditure on a regular basis for over four decades. Along with other information, it collects detailed information on food and non-food items in a reference period. According to the 61st round of its survey (2004-05), the monthly per capita consumption expenditure (MPCE) of Rs 539 for urban and Rs 356 for rural India were used as the cut-off point for the poverty line in the country (Planning Commission 2007). Besides estimating poverty, the MPCE is largely used as a key economic variable in explaining the economic differentials in educational attainment, unemployment, healthcare, etc. However, there are limited information on economic proxies and health parameters in any particular round of the survey. On the other hand, the NFHS like any other DHS collects periodic information on fertility, mortality, contraception, reproductive and child health, HIV/AIDS, etc, in its various rounds (IIPS and Macro International 1995, 2000 and 2007).

There were substantial improvements in the coverage of topics and methodology in subsequent rounds of NFHS in India. For example, the NFHS-3 for the first time interviewed men, unmarried girls, provided HIV/AIDS estimates, etc. On the other hand, though the number of questions on economic proxies has increased from 27 in NFHS-1, to 32 in NFHS-2, and 38 in NFHS-3, there has been no attempt to collect data on consumption expenditure in any of the rounds. As information from these survey is widely used cutting across the disciplines; among planners and policymakers, researchers, academia, non-governmental organisations and national and international donors, it is necessary to understand the extent of agreement of consumption expenditure and economic proxies and resultant differentials in health estimates for evidence-based planning. Moreover, in the Indian context, little is known on the extent of agreement of economic proxies and consumption expenditure.

Data: The present study utilises data from World Health Survey (WHS), India conducted in the country in 2003, through a population-based survey. The WHS is a multi-country study conducted in more than 72 countries using standardised questionnaires and multistage stratified random cluster sampling. A total of 10,750 households and 9,994 adults (18 years and above) were successfully interviewed in the six states of India, namely, Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal.

The states were selected to represent the country on the basis of their geographical location and the level of development. The objectives of the survey were to provide estimates on health expenditure, insurance, health resources, health state, risk factors, morbidity prevalence, and health system responsiveness to inpatient and outpatient care (IIPS and WHO 2006).

The survey comprises two schedules, namely, a household schedule and an individual schedule. The household schedule provides information on housing characteristics, consumer durables, consumption expenditure, etc. The household consumption expenditure for food items were collected with a reference period of one month, while the non-food items were collected with a reference period of one month and one year (Section 0800). Information on 20 economic proxies (Section 0700), named as permanent income, was also collected from the households.

From each selected household, only one adult member (aged 18 years and above) was selected for the individual schedule. The individual schedule contains information on socio-demographic characteristics, health state descriptions, health state valuations, risk factors, mortality, coverage, health system responsiveness, health goals, etc. In case the household had any child of five year of age, information on childcare for last surviving child under five year of age was also collected. The present study uses the individual file, as it contains information on economic proxies, household consumption and the health estimates. The study is limited to India and no state-specific analysis has been carried out.

Methods: The study uses the descriptive statistics, bivariate analyses, the correlation and regression, the principal component analysis (PCA) and the kappa statistics. Descriptive statistics such as the mean and coefficient of variation of MPCE is computed by housing characteristics and consumer durables. Coefficient of variation, defined as standard deviation divided by mean, is computed to examine the variability in the estimates. Misclassifications between MPCE and wealth quintile are used as the measure of agreement. The ordinary least square (OLS) regression is used to understand the relationship of consumption expenditure and wealth index. The PCA is used separately for rural and urban areas, to derive a composite wealth index. Kappa statistics is used to compare the agreement of consumption expenditure and wealth index. The kappa ranges from +1 (perfect agreement) via 0 (no agreement) to -1 (complete disagreement). The differentials in health and healthcare estimates are examined with respect to MPCE and wealth quintiles.

Results: Results are presented in four sections, namely, (1) validation of MPCE and mean MPCE by economic proxies, (2) construction of wealth index using PCA, (3) MPCE and wealth index, and (4) health estimates by MPCE and wealth quintile.

1 Validation of MPCE and Mean MPCE by Economic Proxies

Ke Xu et al (2007) had examined the reliability and consistency of expenditure data collected in the WHS of 50 countries (India was not included). They found that the Intra Class Coefficient (ICC) was above 0.6 for many countries and the household

expenditure data were reliable. In this section, we have compared the estimates of MPCE (derived using WHS data) with that of NSSO estimates, to understand the reliability of consumption expenditure data.

It may be mentioned that the consumption expenditure data collected by NSSO are used extensively for formulating policies and programmes including the estimates of poverty in India. We have derived the MPCE by dividing the total household expenditure with the total number of household members. The mean MPCE for rural India is estimated at Rs 558 and that of urban India is Rs 1,027. This has been compared with the NSSO estimate of MPCE for India (Rs 554 for rural and Rs 1,022 for urban), for the year 2003 (NSSO 2005). The estimated mean MPCE from the two independent surveys are close suggesting that the household expenditure data collected in WHS are reliable.

The distribution of MPCE showed that 29% of the households had MPCE of less than Rs 333, 18% had MPCE between Rs 334 and Rs 475, 19% had MPCE between Rs 476 and Rs 667, 18% had MPCE between Rs 668 and Rs 1,034 and only 16% households had MPCE of Rs 1,035 or more. We also found that like any other consumption expenditure data, the distribution of MPCE in WHS was affected by extreme observations and did not show the normal distribution. About 2% households had MPCE of less than Rs 100 and only 0.6% had MPCE of more than Rs 5,000. In further analyses, we recoded those households with MPCE of Rs 5,000 and above as Rs 5,000 and those with less than Rs 100 as Rs 100.

We also validated the mean MPCE by educational level and religion of the head of household (Table 1). The mean MPCE varied

Table 1: Mean MPCE and Coefficient of Variation (CV) by Educational Level and Religion of Head of the Household in India (2003)

Educational Level and Religion of Head of the Household	MPCE (in Rs) and CV								
	Total			Rural			Urban		
	Mean	CV	N	Mean	CV	N	Mean	CV	N
Educational level									
No formal schooling	501	88	2,496	484	90	2,166	610	77	330
Less than primary	592	96	1,360	521	99	1,083	855	76	277
Primary completed	653	79	2,318	567	76	1,613	846	73	705
Secondary completed	851	77	1,162	672	77	673	1,092	67	489
High school completed	924	91	491	663	89	268	1,233	79	223
College completed	1,281	80	498	818	96	200	1,623	65	298
Postgraduation completed	1,266	80	195	847	66	104	1,883	63	91
Religion									
Hindu	699	93	7,074	559	89	5,127	1,074	79	1,947
Muslim	603	84	982	537	83	671	741	80	311
Others	726	94	678	582	88	463	1,027	85	215

Source: World Health Survey (2006).

directly with the educational level of the head of the household, both in urban and rural areas. For example, the mean MPCE of household heads with no formal education was Rs 501 compared to Rs 592 with less than primary, Rs 653 with primary completed, Rs 924 with high school completed and Rs 1,266 for those with postgraduation and above. The pattern was similar in rural and urban areas. The coefficient of variation varied from 77 to 96 indicating the extent of heterogeneity even among the educational subgroup. The findings are in expected direction as education and consumption expenditure is positively correlated. The differentials in MPCE by religion show that it is the lowest among Muslims (Rs 603) followed by the Hindus (Rs 699). From the above, it may be said that the MPCE derived from WHS are reliable.

We further examined the differentials in mean MPCE by economic proxies and place of residence. In general, it is found that, wealthier households tend to have a higher MPCE. The differentials in MPCE are observed for all consumer durables, irrespective of place of residence, except that of bicycle (Table 2). For example,

Table 2: Mean MPCE and CV by Consumer Durables of Households in India (2003)

Consumer Durables	MPCE (in Rs)								
	Total			Rural			Urban		
	Mean	CV	N	Mean	CV	N	Mean	CV	N
Moped/scooter/motorcycle									
No	560	89	5,159	498	86	4,086	789	83	1,073
Yes	850	88	3,554	650	87	2,161	1,192	75	1,393
Television									
No	507	83	5,018	486	82	4,384	672	81	634
Yes	896	86	3,689	693	88	1,857	1,125	77	1,832
Sewing machine									
No	649	95.1	6,979	525	87	5,232	1,023	82	1,747
Yes	832	84.1	1,720	697	86	1,002	1,040	76	718
Telephone									
No	582	86	7,402	520	87	5,698	796	75	1,704
Yes	1,193	77	1,305	859	76	547	1,468	69	758
Cellular telephone									
No	658	89	8,411	552	87	6,166	951	78	2,245
Yes	1,557	75	275	1,002	101	69	1,785	65	206
Refrigerator									
No	578	84	7,628	531	85	6,004	757	74	1,624
Yes	1,401	70	1,074	1,099	78	232	1,500	66	842
Washing machine									
No	651	89	8,413	554	88	6,200	925	77	2,213
Yes	1,739	67	296	1,038	88	46	1,899	60	250
Computer									
No	669	90	8,493	556	87	6,169	973	78	2,324
Yes	1,547	81	196	822	120	61	1,921	63	135
Car									
No	633	89	7,394	530	87	5,396	910	77	1,998
Yes	1,243	83	375	865	76	200	1,739	70	175
Bicycle									
No	715	94	3,720	543	83	2,625	1,122	80	1,095
Yes	675	92	5,000	567	91	3,630	963	79	1,370
Chair									
No	506	86	3,612	471	85	3,052	713	78	560
Yes	816	90	4,655	635	88	2,808	1,109	78	1,847
Tables									
No	536	84	4,376	490	84	3,533	735	76	843
Yes	844	90	3,835	638	90	2,297	1,169	77	1,538
Clock									
No	391	79	1,563	386	81	1,427	439	62	136
Yes	740	90	7,163	596	87	4,829	1,054	79	2,334
Bucket									
No	416	81	558	391	685	466	539	75	92
Yes	706	92	8,167	569	88	5,789	1,043	80	2,378

Source: World Health Survey (2006).

the mean MPCE of a household owning a two-wheeler is Rs 850 compared to Rs 560 for those who do not have a two-wheeler. Similarly, the mean MPCE of those households owning a television is Rs 896, compared to Rs 507 for those who do not have a television. The differentials do not valid for a bicycle, probably because, the bicycle is being replaced by automobiles, particularly in urban areas, and it is largely used by the poor for their livelihood in rural areas.

The differentials in MPCE are also large with respect to housing quality and household amenities (Table 3, p 58). Households

Table 3: Mean MPCE and CV by Housing Characteristics in India (2003)

Housing Characteristics	MPCE (in Rs)								
	Total			Rural			Urban		
	Mean	CV	N	Mean	CV	N	Mean	CV	N
Electricity									
No	453	81	2,723	446	81	2,563	571	78	160
Yes	790	89	5,809	627	86	3,513	1,056	79	2,296
Type of floor									
Earth floor	483	84	4,206	478	85	3,859	538	66	347
Hard floor	872	85	4,399	679	85	2,312	1,102	77	2,087
Type of wall ¹									
Natural	390	82	694	383	84	637	483	59	57
Rudimentary	477	84	2,815	466	87	2,509	561	64	306
Finished	853	86	4,627	663	84	2,632	1,121	76	1,995
Persons per room									
More than 5	588	86	1,362	469	87	988	889	67	374
3-4 persons	588	95	2,124	410	86	1,577	772	84	547
1-2 person	761	91	5,143	617	87	3,601	1,099	80	1,542
Source of drinking water ²									
Mainly improved	931	88	2,644	635	86	1,309	1,239	75	1,335
Reasonably improved	578	86	4,919	530	89	3,888	763	73	1,031
Not improved	552	84	978	550	84	935	590	65	43
Sanitation facility									
Flush toilet	996	81	2,891	754	88	975	1,134	75	1,916
Pit toilet	613	86	835	578	84	685	778	86	150
No facility	505	84	4,889	505	84	4,519	507	81	370
Type of fuel ³									
Biogas	1,138	74	2,196	605	71	903	1,249	71	1,532
Biomass	524	84	6,415	511	86	5,512	901	76	664

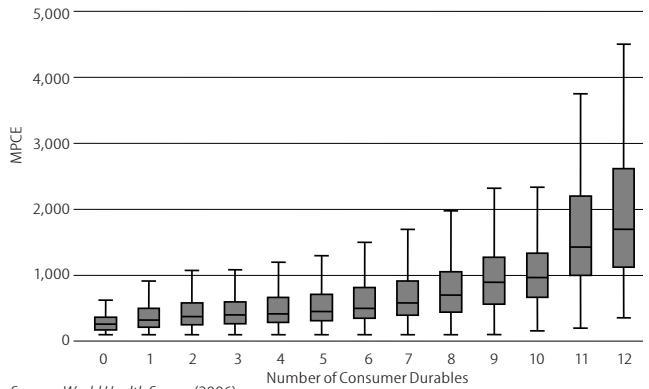
(1): Natural wall includes thatch, rudimentary wall includes plastic sheet, mud and finished wall includes cement, brick, stone and wood.
 (2): Mainly improved includes water through house connection, tanker-truck, vendor; reasonably improved includes public standpipe, protected tube well or bore well, protected dug well; Not improved water includes pond water, springs and rainwater.
 (3): Biogas includes cooking gas, electricity; biomass includes coal, charcoal, wood, agriculture, animal dung, shrub/grasses.
 Source: Same as Table 1.

with better housing characteristics and housing amenities have a higher MPCE. For example, those households living in a house made up with hard floor have a mean MPCE of Rs 872 compared to Rs 483 for earth floor. Similarly households, with a flush toilet have a mean MPCE of Rs 996, which was about twice than those without any toilet facility. Households with electricity have a mean MPCE of Rs 790 compared to Rs 453 for households without electricity. The patterns are similar for rural and urban areas. The chi-square test shows that the differences are significant for all the variables.

MPCE and the Number of Consumer Durables: We further attempted to understand the differentials in mean MPCE by the number of consumer durables. Table 4 shows the mean MPCE by the number of consumer durables owned by a household. A total of 14 consumer durables, namely, chair, table, bicycle, clock, bucket, washing machine for clothes, washing machine for dishes, refrigerator, telephone, cellular telephone, television, computer and sewing machine, moped/scooter/motorcycle are included in the analysis. The mean MPCE varies directly with the number of consumer durables owned by the households (Figure 1). For households not owning any

consumer durable, the mean MPCE was Rs 301 compared to Rs 389 with one consumer durable, Rs 475 with two consumer durables and 1,299 with nine and more consumer durables. The mean MPCE was substantially higher among urban compared to rural households for the same number of consumer durables. However, the coefficient of variation was higher in rural than in urban areas for most of the durables.

Figure 1: Mean MPCE by Number of Consumer Durables of Households in India (2003, in Rs)



Source: World Health Survey (2006).

2 Construction of Wealth Index Using PCA

To understand the extent of agreement of composite index of economic proxies with consumption expenditure, a wealth index is computed using the PCA, separately for rural and urban areas. The PCA works best when the distribution of variables varies across the households, and assets that are unequally distributed are given more weightage (McKenzie 2005). The variable with a positive score is associated with a higher economic status, and that with a negative score is associated with a lower economic status. Before using the PCA, the distribution of all consumer durables and housing characteristics was checked and variables were made dichotomous (0 or 1). In case of variables having more than two categories, separate variables were constructed for each category. For example, the source of drinking water was placed in three categories, namely, mainly improved, reasonably improved and not improved. The mainly improved sources include piped water to house, tanker-truck and vendor, while the reasonably improved sources include public standpipe, protected tube well or bore well, protected dug well, while all other sources such as pond water, springs and rainwater are classified as not improved sources. Thus, three variables are created for the source of drinking water. We have included most of the variables except that of car due to higher missing values and animal drawn cart for urban areas, due to its low use.

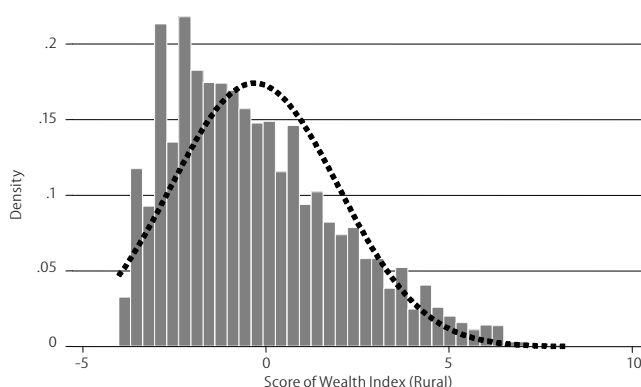
Table 5 (p 59) describes the mean, standard deviation and factor score for each variable included in the PCA. All the factor scores are in the expected direction, both for rural and urban areas. For example, the factor score of a rural household living in a house with a natural wall was -0.12 compared to -0.19 for rudimentary wall and 0.25 with a finished wall. Usually, the

Table 4: Mean and Coefficient of Variation of MPCE by Number of Consumer Durables in India (2003)

Consumer Durables	Mean MPCE (in Rs)			Coefficient of Variation		
	Total	Rural	Urban	Total	Rural	Urban
0	301	297	324	64	65	59
1	389	386	425	81	83	49
2	475	462	595	88	85	98
3	493	470	649	79	80	65
4	535	499	692	74	75	64
5	610	534	857	91	83	90
6	646	583	789	71	74	62
7	730	637	889	79	90	63
8	895	740	1064	80	82	74
9+	1299	974	1482	76	83	70

Source: See Table 1.

Figure 2(a): Distribution of Wealth Index in Rural India (2003)



Source: World Health Survey (2006).

houses with natural wall are of lower quality and those with finished wall are of higher quality. Similarly, in urban areas, households with no toilet facility had a score of -0.25, while that with a pit toilet had a score of -0.09 and flush toilet had a score of 0.27. Similar differentials are observed for other variables. The first principal component explained 19.11% variation in rural and 22.19% in urban areas. The first eigenvalue of first component for rural India was 5.54, and that of the second component was 2.21. Similarly, the eigenvalue for the first component of urban India was 6.21, and that of the second component was 2.21.

Table 5: Mean, Standard Deviation and Factor Score of Variables Used in Computation of Wealth Index in India (2003)

Variables	Rural			Urban		
	Mean	Standard Deviation	Factor Score	Mean	Standard Deviation	Factor Score
Chair	0.520	0.500	0.284	0.805	0.396	0.238
Table	0.437	0.496	0.276	0.693	0.461	0.240
Electricity	0.619	0.486	0.219	0.950	0.217	0.166
Bicycle	0.656	0.475	0.095	0.613	0.487	0.054
Clock	0.822	0.383	0.200	0.956	0.206	0.184
Bucket	0.935	0.246	0.103	0.971	0.167	0.115
Washing machine	0.008	0.089	0.089	0.122	0.327	0.166
Refrigerator	0.048	0.215	0.204	0.383	0.486	0.257
Telephone	0.113	0.316	0.229	0.362	0.481	0.227
Cellular telephone	0.015	0.122	0.080	0.103	0.304	0.127
Television	0.367	0.482	0.280	0.800	0.400	0.239
Computer	0.012	0.107	0.058	0.066	0.249	0.115
Sewing machine	0.196	0.397	0.196	0.340	0.474	0.136
Moped/scooter/motorcycle	0.398	0.490	0.214	0.606	0.489	0.206
Animal drawn cart	0.141	0.348	0.030	***	***	***
Type of floor	0.371	0.483	0.244	0.868	0.339	0.226
Natural wall	0.104	0.305	-0.116	0.017	0.131	-0.129
Rudimentary wall	0.396	0.489	-0.187	0.120	0.325	-0.196
Finished wall	0.500	0.500	0.254	0.862	0.345	0.234
Mainly improved water	0.232	0.422	0.159	0.583	0.493	0.225
Reasonably improved water	0.621	0.485	-0.095	0.400	0.490	-0.205
Not improved water	0.147	0.354	-0.059	0.016	0.127	-0.081
Flush toilet	0.183	0.386	0.256	0.812	0.390	0.270
Pit toilet	0.118	0.323	0.049	0.056	0.231	-0.089
No toilet facility	0.699	0.459	-0.250	0.131	0.338	-0.251
Type of fuel	0.131	0.337	0.252	0.686	0.464	0.292
2 and less persons per room	0.584	0.493	0.177	0.643	0.479	0.123
3-4 persons per room	0.264	0.441	-0.100	0.212	0.409	-0.092
More than 5	0.152	0.359	-0.120	0.144	0.352	-0.060

*** Animal drawn cart not used for urban areas.

Source: See Table 1.

Figure 2(b): Distribution of Wealth Index in Urban India (2003)



The alpha reliability test indicates the value of 0.82 for rural and 0.86 for urban areas indicating that the estimates are reliable. The distribution of wealth index is examined to assess the extent of clumping and truncation (Figures 2(a) and 2(b)). Clumping, a situation, whereby a large proportion of households have the same score is present, in both rural and urban areas. Similarly, truncation, a situation, where the score is distributed in a smaller range, appears to be minimal.

3 MPCE and Wealth Index

Based on the composite index, separate wealth quintiles are constructed for rural and urban India. On classifying the distribution of MPCE quintile by wealth quintile, it is found that 39% of the households in the first quintile of MPCE also fall in the first quintile of the wealth index, while 61% are misclassified. If we consider the first quintile of MPCE as the poor, then 39% households in India are consumption and asset poor, whereas 61% are consumption poor but not asset poor. Similarly, 45% households classified under the richest quintile of MPCE are also in the richest quintile of wealth index. Further, we computed the absolute differences of MPCE and wealth quintile and classified into three categories (Table 7, p 60).

- (1) The first category indicates that the households are classified in the same quintile of MPCE and wealth index, that is, zero difference in MPCE and wealth quintile.
- (2) The second category indicates that the households are moving to adjacent quintiles (the absolute differences between the MPCE and wealth quintile is one).
- (3) The third category indicates that the households are moving to farthest quintiles (the absolute differences between MPCE and wealth quintile is two or more).

Based on the classification, we have found that only 31% of the households are in the same quintile of MPCE and wealth index, while 37% are in adjacent quintile and 31% are in farthest quintile. These differentials are higher in rural than in urban areas. It indicates that the majority of the households classified in the MPCE quintile are different in the wealth quintile and vice versa. To know the statistical significance of the agreement, the correlation coefficient, regression analysis and kappa statistics are computed. The Spearman's rank order correlation coefficient of the MPCE and wealth index is 0.44; 0.37 for rural and 0.60 for urban areas. The kappa statistics, measuring the extent of agreement, is

0.15; 0.11 for rural and 0.21 for urban areas. This means, there is some agreement of the wealth index and MPCE, but the agreement is not strong. Further, an ordinary least square (OLS) regression was attempted with the consumption expenditure as the dependent variable and the wealth index as the independent variable. The result of OLS shows a R² value of 0.13, indicating 13%

diseases, oral and vision care and two of the commonly used maternal healthcare indicators, namely, the antenatal care (ANC) of mothers and medical assistance at deliveries. Also, the self-evaluation of health state by respondent is examined. The rationale is to understand the extent of differentials in these estimates by MPCE and wealth quintiles.

Table 6: Per Cent Distribution of MPCE Quintile by Wealth Quintile in India (2003)

Wealth Quintile	MPCE Quintile														
	Total					Rural					Urban				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1	38.9	26.2	19.4	12.5	7	34.6	27.4	22.6	15.1	8.6	48.8	23.5	12	6.7	2.8
2	27.7	26.7	23.7	16.1	9.4	26.8	26.5	22.3	17.7	11.3	29.8	27.3	27.1	12.4	4.5
3	18.6	21.2	23.4	22.3	16.2	21.1	21	23	22.8	17.2	12.8	21.8	24.3	21.1	13.7
4	9.5	15.5	16.6	24.6	22.9	10.6	14.9	14.3	21.2	22.2	6.9	16.9	22	32.4	24.8
5	5.3	10.3	16.9	24.5	44.5	6.9	10.2	17.9	23.3	40.7	1.8	10.5	14.6	27.4	54.3
Total per cent	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
N	1,496	1,486	1,478	1,487	1,331	1,036	1,035	1,027	1,030	955	460	452	452	457	376

Source: See Table 1.

variation is being explained in the model. It is 0.11 for rural and 0.22 for urban India. This indicates that the economic proxies do not contain much information on consumption.

Howe et al (2008) using the Malawi integrated household survey data questioned the appropriateness of wealth index as a proxy for consumption expenditure. The kappa statistics of wealth index with per capita consumption expenditure was 0.11, while it was 0.09 with per adult consumption expenditure (Howe et al 2008). On the similar exercise, Filmer and Pritchett (2001) found the Spearman's rank correlation of consumption expenditure (adjusted for household size) and asset index of 0.64 for Nepal, 0.56 for Indonesia and 0.43 for Pakistan. The Spearman's rank correlation of wealth index and consumption expenditure was 0.37 in Mozambique (Sahn and Stifel 2003). Similarly, the cross-country studies (Ghana, Guatemala, Jamaica, Pakistan, Peru and Tanzania) have showed that, when the consumption expenditure is regressed with standards of living, the R² value is low, ranging from a low of 0.01 to 0.23 (Montgomery et al 2000). From the above results it is suggestive that the relationship of consumption expenditure and wealth index is weak in India and corroborate with finding of other studies.

4 Health Estimates by Wealth and MPCE Quintile

This section examines the differentials in the estimates of health, healthcare utilisation and self-assessment of health state by MPCE and wealth quintiles of the households. It analyses the need (diagnosed) and coverage (treatment) of a set of non-communicable

Table 7: Differences in MPCE and Wealth Quintile, Correlation Coefficient and Kappa Statistics of MPCE and Wealth Index in India (2003)

	Total	Rural	Urban
Classification of MPCE and wealth quintile			
Percentage remained in same quintile (absolute difference of MPCE and wealth quintile)	31.4	29.0	36.9
Percentage moved to adjacent quintile (absolute difference of MPCE and wealth quintile is one)	37.3	36.2	40.0
Percentage moved to farthest quintile (absolute difference between MPCE and wealth quintile is two or more)	31.3	34.8	23.1
Spearman's rank correlation of wealth index and MPCE	0.44	0.37	0.60
Kappa statistics of wealth index and MPCE			
Statistic	0.15	0.11	0.21
Agreement (%)	31.6	29.3	37.0

Source: See Table 1.

(a) Non-communicable Diseases: The non-communicable diseases considered are arthritics, asthma, angina and depression (Table 8), usually chronic in nature. The reference period for all these four morbidities and treatment seeking behaviour is any time in the life (ever). The need and coverage of these

Table 8: Percentage of Adults Ever Suffered (Need) and Treated (Coverage) for Arthritis, Angina, Asthma and Depression by MPCE and Wealth Quintile in India (2003)

Non-Communicable Diseases	Wealth Quintile					MPCE Quintile					Total	
	1	2	3	4	5	1	2	3	4	5		
Arthritis												
Need	23.5	24.8	22.3	20.8	18.8	19.3	21.8	23.2	22.3	25.3	21.3	
Coverage	51.0	63.6	65.7	61.3	66.1	53.8	59.0	65.7	63.3	64.2	60.8	
Angina												
Need	8.4	11.3	10.4	8.3	8.9	8.2	8.6	7.8	11.2	12.7	9.2	
Coverage	61.9	67.4	69.9	81.3	80.8	58.5	70.5	69.9	72.9	79.9	71.3	
Asthma												
Need	7.1	6.7	5.4	6.1	5.4	5.9	7.2	6.8	5.4	6.8	6.4	
Coverage	68.9	71.2	65.9	79.7	82.4	67.2	71.0	72.7	79.0	68.2	72.0	
Depression												
Need	12.2	13.8	12.8	14.5	10.8	8.6	11.0	11.8	16.2	18.9	12.7	
Coverage	13.1	10.2	16.6	14.3	19.7	15.0	17.6	10.8	14.1	17.4	15.1	

NB: Reference period is lifetime.

Source: See Table 1.

morbidities differs largely by MPCE and wealth quintile. The prevalence of arthritis in first quintile of wealth index was 24% compared to 19% in first quintile of MPCE. Similarly, the prevalence of arthritis in fifth quintile of wealth index was 19% compared to 25% in fifth quintile of MPCE. With respect to coverage (treatment seeking), the differentials by MPCE and wealth quintiles were in a relatively small range (less than 3%). The need and coverage of angina and asthma did not show any specific pattern, either with MPCE or wealth quintile. For example, the estimate of asthma was 7% in first wealth quintile, 5% in third wealth quintile and 6% in fourth wealth quintile. However, the differences in coverage were higher in the fifth quintile of wealth index and MPCE (14%), indicating significant differences under two methods.

The differences were quite large with respect to depression. The depression varied directly with the MPCE quintile, while it did not show any pattern with wealth quintile. The prevalence of depression was 9% in first quintile, 11% in second quintile, 12% in third quintile, 16% in fourth quintile and 19% in fifth quintile of

MPCE. Such a large difference in the estimate suggests that caution be exercised in choosing the variables for quantifying the economic status of the household.

(b) Oral and Vision Care: During the survey information on problems with mouth and/teeth and treatment sought was asked with a reference period of last 12 months. The differentials in these estimates did not vary much by wealth or MPCE quintile (Table 9). The estimate of oral care in the wealth quintile varies between 27% and 31%, while in the MPCE quintile, it varies

Table 9: Percentage of Adults Ever Suffered (Need) and Treated (Coverage) for Oral and Vision Care by MPCE and Wealth Quintile in India (2003)

	Wealth Quintile					MPCE Quintile					Total
	1	2	3	4	5	1	2	3	4	5	
Oral care											
Problem with mouth /teeth (last 12 months)	30.6	30.0	28.3	28.7	27.0	27.9	28.7	28.0	29.1	33.2	28.6
Received any treatment	40.9	39.6	47.8	56.2	63.6	40.4	45.4	44.6	48.0	57.1	48.6
Vision care*											
Last time eyes examined											
Never	58.0	53.2	49.4	33.7	30.8	56.5	51.8	45.7	44.6	28.0	45.5
In last two years	17.1	22.1	21.1	28.2	33.7	21.2	19.8	20.9	22.2	37.1	24.2
In last five years	24.9	24.7	29.5	38.1	35.5	22.3	28.5	33.4	33.2	34.9	30.4
Cataract diagnosed (in last five years)	47.2	44.8	39.7	36.9	34.0	34.3	38.8	37.8	45.4	39.2	39.7
Had eye surgery to remove cataract (last five years)	29.8	34.5	29.5	39.2	33.3	28.9	27.7	36.1	37.3	41.1	33.4

* For aged 60+.

between 28% and 33%. With respect to treatment sought, the estimates range between 40% and 64% in wealth quintile compared to 40-57% in MPCE quintile. The question on vision care was canvassed only to those aged 60 years and above. About half of the elderly never had any eye checkup/test, compared to one-fourth who had an eye test during two years and one-third within three to five years preceding the survey. In general, eye testing/check up within two years varies directly with the economic status, whether measured by wealth or MPCE quintile. For example, 17% of the elderly belonging to the lowest wealth quintile had their eye tested within two years compared to 34% in the fifth wealth quintile.

Though the pattern is similar with respect to MPCE and wealth quintile, there are significant differences in the estimates. However, the diagnosis of cataract varies inversely with the wealth quintile, but does not show a similar pattern with the MPCE quintile. On the other hand, surgery to remove cataract varies directly with the MPCE quintile (except for the second quintile); from 29% in first to 41% in fifth MPCE quintile.

(c) Maternal Healthcare Utilisation: We further examined the differentials in maternal healthcare utilisation by MPCE and wealth quintiles. During the surveys, questions on at least one antenatal visit to health centre and place of delivery were asked to mothers aged 18-49 years, who had delivered during the five years preceding the survey. Accordingly, two indicators, namely, any ANC visit during pregnancy and the medical assistance at delivery by MPCE and wealth quintile are shown in

Table 10. The ANC visit is grouped into three, namely, no visit, partial (visit of 1-2 times) and full (three or more visit). The estimate of no ANC was 46% to women belonging to first quintile of wealth index compared to 50% in first quintile of MPCE. Similarly, at least three ANC visits were estimated at 33% in first quintile of wealth index compared to 31% in first quintile of MPCE. Similar differences were observed in other quintiles also. The differential in estimate within each quintile varies from 1% in third quintile to 4% in the fifth quintile. A similar pattern is noticed with respect to medical assistance at deliveries. In general, it is observed that the antenatal and natal care vary directly with wealth or MPCE quintile.

(d) Childcare: During the survey, the questions on the timing of last episode of sickness of child (with fever, diarrhoea or any other illness), treatment sought and place of treatment was collected for the youngest child of five year of age. We have examined the differentials in these estimates by MPCE and wealth quintile. The episode of last sickness is categorised into three; (1) did not fall sick, (2) was sick in the last three months, and (3) was sick in last 3-12 months (Table 11).

About 24% children did not fall sick, 59% were sick in last three months and 16% were sick in last 3-12 months. These estimates differ significantly by MPCE and wealth quintile. While the estimate of any sickness in last 12 months varies between 72% and 76% by wealth quintile, it varies between 70% and 89% by MPCE quintiles. Among those who fell sick, any form of treatment

Table 10: Estimates of Antenatal and Natal Care (in %) by MPCE and Wealth Quintile in India (2003)

ANC/Natal Services	Wealth Quintile					MPCE Quintile					Total
	1	2	3	4	5	1	2	3	4	5	
ANC visits											
No ANC	45.8	39.2	31.7	27.3	19.1	49.6	35.6	33.2	26.0	22.3	37.4
Partial ANC	21.0	20.3	22.9	20.7	10.9	19.0	22.9	23.3	17.5	15.6	19.3
Full ANC	33.2	40.5	45.4	52.1	7	31.4	41.6	43.4	56.6	62.1	43.3
Place of delivery											
Hospital	22.1	33.3	33.0	54.2	66.9	22.6	30.6	35.6	53.6	57.4	36.3
Home	77.9	66.7	67.0	45.8	33.1	77.5	69.5	64.4	46.4	42.6	63.7
Delivery attended by trained professional	40.6	44.6	54.6	65.4	81.1	39.5	49.0	54.9	69.6	75.5	54.5

Source: See Table 1.

Table 11: Percentage of Children Aged Less than Five Years Experiencing Sickness, Treatment Sought and Place of Treatment by MPCE and Wealth Quintile in India (2003)

Health State Description	Wealth Quintile					MPCE Quintile					Total
	1	2	3	4	5	1	2	3	4	5	
Episode of last sickness*											
Less than three months	59.4	58.5	56.5	59.7	62.3	55.1	58.6	62.7	62.2	67.8	59.3
More than three months	16.3	16.2	15.9	14.9	12.2	14.8	16.6	14.8	14.8	10.8	15.3
Never	24.3	25.3	27.6	25.4	25.5	30.2	24.8	22.5	23.0	21.4	25.4
Treatment for illness	91.9	91.2	92.6	91.3	93.9	90.8	91.5	91.7	92.8	95.9	92.4
Place of treatment											
Government operated	25.2	18.7	18.4	16.0	19.0	23.0	24.6	24.6	22.2	20.9	21.7
Private	74.9	81.3	81.6	84.0	81.0	77.0	75.4	75.4	77.8	79.1	78.3

* When was the last time child was sick with fever, diarrhoea and any other illness.

was quite high; more than 90% under any alternate estimates. However, for among those treated in a hospital, the estimate also varied by source of treatment.

(e) Overall Health Status: We further explored the self-reported overall health status of the adults in five-point scale, namely, very good, good, moderate, bad and very bad, on the day of the survey. The perception on own health (very good/good) varies directly with the economic status, whether measured by MPCE or wealth quintile. However, the differential in self-rating of own health varies largely by MPCE and wealth quintiles. For example,

Table 12: Percentage of Adults on Their Overall Health Status by MPCE and Wealth Quintile in India (2003)

Health State Description	Wealth Quintile					MPCE Quintile					Total
	1	2	3	4	5	1	2	3	4	5	
Very good	20.8	20.3	23.4	25.9	30.2	24.8	22.7	22.6	20.2	18.7	23.8
Good	34.3	34.6	37.5	35.8	37.1	35.0	36.6	37.4	36.0	36.7	35.4
Moderate	26.5	28.4	25.9	25.7	23.0	25.0	25.0	25.7	28.4	29.1	25.8
Bad	16.1	15.1	11.1	11.5	8.8	13.4	13.4	11.9	13.8	13.3	13.0
Very bad	2.4	1.7	2.2	1.0	0.9	1.9	2.3	2.4	1.6	2.2	2.0

9% adults in fifth quintile of the wealth index reported that their health was bad, compared to 13% in fifth quintile of MPCE. Similar differentials are found for other quintiles also (Table 12).

5 Conclusions

In the absence of direct economic measures such as household income or consumption, economic proxies are increasingly used in explaining the economic differentials in health and healthcare utilisation for evidence-based planning in many developing countries. In the Indian context, though there have been periodic and systematic efforts in obtaining consumption expenditure data by NSSO over the last four decades but in the population-based health surveys. The National Family and Health Survey and the Reproductive and Child Health Survey, in their various rounds, use economic proxies in explaining the economic differentials in the demographic and health variables at national and sub-national level. Estimates from these surveys are extensively used for evidenced-based planning of the country. However, the economic proxies measured by the wealth index are a subject of an intense debate within and outside the country. While some studies have shown the wealth index as a good proxy of long-term economic status, others have outlined it as a weak predictor of consumption expenditure. The correlation coefficient of wealth index and consumption expenditure vary in a large range across the countries. In Indian context, there is no study that had explored the extent of agreement of consumption expenditure with the wealth index. While the NSSO provides information on consumption expenditure, it gives little information on economic proxies. The WHS, a part of multicountry study, used the standardised questionnaire in more than 70 countries. It collected consumption expenditure data along with economic proxies, health and healthcare utilisation, health expenditure, etc. Unlike the NSSO, the WHS used a short module of consumption expenditure. The WHS has provided an inbuilt retest mechanism to check the reliability of data and found reliable (IPS and WHO 2006). Also, the estimates of MPCE derived from WHS are close to that of NSSO indicating the reliability of data in WHS. While the official

estimates of poverty and inequality in India are derived from the consumption expenditure data, economic differentials in the demographic and health estimates use the economic proxies. In this context, this paper attempts to examine the extent of agreement of economic proxies with consumption expenditure in India. The differentials in health and healthcare estimates to economic measures such as household consumption expenditure and the wealth quintile are explored.

The findings of the study suggest that the MPCE varies directly with the consumer durables, housing characteristics and housing quality, both in rural and urban areas. In general, the MPCE increases with the number of consumer durables possessed by the households. However, the bivariate differentials are not supported by further statistical test. The Spearman's rank correlation of MPCE and wealth index was 0.4, while the kappa statistics was 0.15. The result of ordinary regression analysis suggested that only 13% variation in consumption expenditure is being explained by wealth index. However, the agreement was relatively higher in urban than in rural areas. When ranked by MPCE and wealth quintile independently, the misclassification was more than an agreement. Only 31% households were in same quintile of MPCE and wealth index while 37% moved to adjacent quintile and 31% moved to farther quintile (absolute difference of two or more) indicating the weak agreement of consumption expenditure and economic proxies.

These finding are in similar line with some other studies such as Malawi and Mozambique. We have further compared the health estimates measured by non-communicable diseases and their treatment seeking, oral and vision care, child and maternal care and own assessment of health by MPCE and wealth quintile. The estimates of two non-communicable diseases, namely, arthritis and depression vary largely by MPCE and wealth quintile, while it is lower for angina and asthma. The differences in oral and vision care are of varying degree under both methods. The two of the maternal care indicators, namely, the ANC and medical assistance at delivery also differ in varying degree by MPCE and wealth quintiles. The differences are larger with respect to child morbidities in last 12 months and self-assessment of own health.

When classified by wealth status, one in three rated their health as very good compared to one in five under the same quintile of MPCE (fifth quintile). Thus, there are differences in the health estimates under the two alternative methods at varying degree and the health estimates are sensitive to the economic measures.

As the interest is to measure the differential in current economic status, researchers and policymakers should incorporate the direct measures as much as possible to reflect true economic inequalities. We do not recommend the detailed version of consumption expenditure as used in NSSO owing to time and cost, but urge to use an abridged version as used in WHS or other similar surveys. Moreover, collecting consumption expenditure data is not new in India. While, the NFHS in its successive round expanded to include more difficult domain such as domestic violence, sexual behaviour, HIV/AIDS, etc, an addition of a small consumption module may not increase the cost and time substantially. Rather,

it will help to understand the multidimensional nature of poverty and inequalities and its linkage with health and healthcare more precisely. Information on direct economic measures is essential as that of caste, religion and educational level of households in framing evidence-based policies.

We found that the abridged versions of consumption module used in WHS are reliable and close to the estimates of NSSO. However, the agreement of MPCE and economic proxies are not strong. The general notion that the asset poor (rich) are consumption

poor (rich) does not hold good in a large, populous and heterogeneous country like India. Further, the health estimates are sensitive to the economic measures; differ by consumption expenditure and economic proxies. This calls for integrating a smaller module of consumption expenditure in the population-based health surveys for explaining the true economic differentials in health and healthcare utilisation of the population. Otherwise, using the economic proxies for evidence-based planning may be misleading.

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