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Research Paper

Health Related Engel Function of Scheduled Caste and Scheduled Tribe Community of North Twenty Four District of West Bengal, India

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ABSTRACT: **-** The less access to health care facility basically nutrition deficiency and lack of treatment is generally high among the Scheduled Caste and Scheduled Tribe households compare to General Category of people. In this paper I seek to examine the health related Engel function of the Scheduled Caste and Scheduled Tribe Communities of North Twenty Four Parganas District of West Bengal in India. The results revealed that the evidence of deprivation of access to health care facilities varies across different social groups. It is a fact that the SC and ST deprived in respect of health but there is found an evidence of deprivation of General Category of households.

Keywords: **-** Health, Engel function, Scheduled Caste, Scheduled Tribe, Annual Family Expenditure, West Bengal.

I. INTRODUCTION

Engel functions are frequently used in estimating income elasticity of demand and denote the relationship between quantity demanded and the level of income being named after the Garman Statistician Robert Engel. Such income-demand relationship is frequently estimated in empirical demand estimation. However, to overcome the problem of availability of appropriate and reliable income data, the income Engel function may be replaced by or supplemented with an estimation of Engel expenditure function which expresses as expenditure on a particular item of consumption as a function of total expenditure. The health related expenditure version of the Engel which is the suggested by Allen and Bowley is as follows.

$X_i = a\ THAFE_i^b e^{ui}$ ..... (1)
Where, i= 1, 2, 3.
Where, X_i = Total Health related Annual Family Expenditure of i-th Health Related Items
Let, X1=THAFEP = Total Health Related Annual Family Expenditure on Protein Related Items
X2 =THAFEM= Total Health Related Annual Family Expenditure on Medicines and
X3=THAFECC= Total Health Related Annual Family Expenditure on consultancy and clinical tests
And, THAFE= Total Health Related Annual Expenditure
In the present study I have attempted an estimation of health related Engel function by taking the different categories of observed annual health expenditure by a household as a proxy of ex-post demand for health. For the purpose of estimation we will take the log linear version of the Engel function to get directly the '**Engel Expenditure Elasticity'** which is basically the estimated slope coefficient **'b'** of equation (1).
It is important to note that there are so many literatures in the in the income elasticity of demand which is explained by Engel function but I did not found any available literature regarding health related Engel function in the field of economics of health.

II. OBJECTIVE OF THIS ARTICLE

The main objective of this article is to estimate the different types of health related Engle elasticity which is stated earlier. Three types of Engle elasticises namely, elasticity of total health related annual family

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expenditure on consultancy with health personnel as well as clinical test, total health related annual family expenditure on medicine and total health related expenditure on protein would have been estimated. It indicates the proportional change in particular health related expenditure due to proportional change in total health related annual family expenditure.

III. DATA AND METHODOLOGY

I shall now describe the framework for selecting the community development blocks, villages and the ultimate sample household units in my study. To the end, three stage stratified sampling technique has been used. The selection procedure in the case of each community development blocks have taken up below.

Selection of Community Development Blocks

At stage I of the design of sampling and survey a total of 22 community development blocks are considered from the district of North 24 Parganas. Since our primary objective includes a focus on access to health relative to the levels of development, at stage II I have ranked the 10 initially selected blocks according to their human development index (HDI) profile once again in ascending order from the data of District Human Development of North twenty Four Parganas District (2010) of West Bengal in India.

At stage III of the selection of blocks, the 10 Blocks chosen initially according to the above method have been further arranged in ascending order in terms of composite health index (CHI). The data sources for CHI remains the same as in case of HDI. Having the community development blocks so arranged, I have finally selected the top 3 and bottom 3 of the ranked blocks. Finally, six selected community development blocks selected by us in the North Twenty Four Parganas district of West Bengal. The rest of the five villages are Beriya Chack from Bagdha Community Development Block, Tunighata from Habra I Community Development Block, Bagu from Rajarhat Community Development Block, Phulbari Abad from Minakha Community Development Block and Bholakhali from Sandeshkhali I Community Development Block.

Selection of Villages

Given the community Development Block wise distribution of villages in the selected blocks I have prepared an exhaustive list of villages having fifty percent or more of scheduled Caste (SC) population and 25 percent or more of Scheduled Tribe (ST) by 2001 census profile. Out of these I have chosen six village one each from the blocks. At the time of selection of villages a specific consideration was kept in mind to cover a certain section of general castes households which was possible only by choosing one of the already selected blocks in favour a general caste (GEN) dominated village. This was done by randomly selecting the Sandeskhali II community development Block from where a general caste dominated village was selected purposively for the remaining selection of the villages, the villages having the SC-ST concentration out of the village having more than 50 percent of SC and 25 percent of ST population in each of the rest of the community development blocks, were chosen.

Selection of Households

In order to draw the ultimate sample from the universe of households constituted from the selected villages, a simple random sampling technique without replacement is found suitable. It is important to note that the primary survey was conducted in 2013-14 throughout one year. Our sample size constitutes 352 Scheduled Caste households, 64 Scheduled Tribe households and 178 General Caste Households.

I will estimate Econometric models representing by equation (1) by applying Ordinary Least Square (OLS) method.

IV. DEFINITION OF THE VARIABLES

Total Annual Family Expenditure on Health

The total annual family expenditure on health in my study consists of three items, namely consultancy fees of doctors and clinical test for prognosis, secondly, cost of purchasing medicines and nutrition related expenses such as purchasing some protein related foods like meat, fish, milk, egg etc. The aggregate expenditure of these three health related expenses is the sum total annual expenditure on health. There may be other direct and indirect cost of treatment like transport cost, loss of income of ailing persons, interest cost of fund borrowed for treatment, payment for loss of earning or attending persons. But we have taken first three types of cost in our study of North 24 Parganas, District of West Bengal. Not only this, these first three types of expenditure are essential for any serious patients but the other direct or indirect costs may or may not be essential for all patients.

Health Expenditure of Protein Related Items

The health related expenditure of protein is defined as the total annual expenditure on the consumption of protein related food items like fish, meat, egg and milk. It may vary among different social groups. In rural area SC -ST are generally poorer than that of general category of people. Therefore SC - ST are much less likely to spend on protein related food than that spent by general category of people.

Health related Expenditure on Medicines

The health related expenditure on medicines is defined as the total cost of purchasing medicines from drug market. It is natural that if there is not any member suffering from any disease of a particular family the cost of purchasing medicines is equal to zero.

Health related Expenditure on Consultancy and Clinical Tests

The health related expenditure on consultancy and clinical test is defined as the total expenditure of a particular household on consultancy and clinical test as per advice by doctor.

V. RESULTS AND DISCUSSIONS

In order to gain inside into the nature of health demand among different groups of households that is, Scheduled Caste, Scheduled Tribe and General Category of households I have taken total health related annual family expenditure on consultancy and clinical test (THAFECC) as a major component of ex-post demand for health and medical services. Next in order to estimate the elasticity of total health related annual family expenditure on protein related food (THAFEP) with respect to total health related annual expenditure (THAFE) its different components. I have attempted an estimation of log liner Engel function taking the expenditure version of such function. The THAFEM considered separately in three different regression models. The Engel elasticity co-efficient estimated on the basic of thee health related Engel functions though regressions output are reported in appendix for each of the social groups considered independently.

Engel Function Estimate for the SC Group of Households

Of the three Engel function estimates the goodness- of- fit are found to the highest for THAFEP – THAFE relationship (0.6299) followed by almost identical values of R-squared for THAFECC-THAFE and THAFEM-THAFE relationship.

The elasticity coefficients are found to be highly significant with observed t-value being more than satisfactory. Within these the elasticity of THAFECC with respect to THAFE is found to the highest being greater than unity (1.31). Similarly the demand for THAFEM is also observed to be highly elastic (1.15). However the demand for THAFEP is found to be inelastic being less than unity (0.7082).

Estimate for the ST group of households

It is found that for ST group of households the elasticity of THAFECC, THAFEP and THAFEM with respect to PCTHE are greater than one. The results revealed that all three regressions have satisfactory goodness-of-fit with regression coefficients are statistically significant at high level.

Engel Function for GEN Category of Households

For the GEN category broadly speaking the entire elasticity coefficient are found to be below the earlier social groups of SC and ST. Also the goodness- of- fit of the Engel function regression is found to be relatively poor compared to other two categories excepting for the THAFEP – THAFE relationship. The elasticities of both THAFEP and THAFEM are found below unity while the demand for THAFCC is almost unitary on the whole it is observed that the demand for protein related food items is inelastic for all social groups which reflects that the households are constrains to effort nutritional foods. This reflects a relatively lower demand marked based health services by the GEN category of household reflecting indirectly a better provisioning for health through preventive measures and care by such households.

VI. CONCLUSION

It is clear from our analysis that there are various disparities in health related Engle elasticises among social groups that is among Scheduled Caste, Scheduled Tribe and GEN caste of the households. The health related elasticises in respect of THAFCC is found to be unity for all social groups but it is highest in case of ST households. Whereas the health related Engel elasticity's in respect to THAFEP is inelastic for all social groups considered by me and this value is found to highest in case of GEN household. Therefore GEN category of household consumes more and more protein related food items compare to SC and ST group of households. Finally in respect of Engel elasticity of THAFEM the SC and ST are in better position relative to general

category of households. Hence deprivation of health varies across social group and it is not a fact that only SC and ST groups are suffered, there is also an evidence of deprivation of GEN category of households.

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Appendix

Table- 1: The Estimate of Health Related Engel Function for SCs Categories Households

```
. reg  lnthafecc lnthafe,robust

Linear regression                               Number of obs =     352
                                                F(  1,   350) =  108.84
                                                Prob > F      =  0.0000
                                                R-squared     =  0.4129
                                                Root MSE      =  .83664

------------------------------------------------------------------------------
             |               Robust
  lnthafecc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    lnthafe |   1.309871   .1255559    10.43   0.000     1.062932    1.55681
      _cons |  -5.762251   1.174603    -4.91   0.000    -8.07242   -3.452082
------------------------------------------------------------------------------
```

```
. reg  lnthafep lnthafe,robust

Linear regression                               Number of obs =     352
                                                F(  1,   350) =  179.91
                                                Prob > F      =  0.0000
                                                R-squared     =  0.6299
                                                Root MSE      =  .29043

------------------------------------------------------------------------------
             |               Robust
    lnthafep |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnthafe |    .708274   .0528046    13.41   0.000     .6044197    .8121283
       _cons |   2.413709   .4924745     4.90   0.000     1.445128    3.382291
------------------------------------------------------------------------------

. reg  lnthafem lnthafe,robust

Linear regression                               Number of obs =     352
                                                F(  1,   350) =  126.23
                                                Prob > F      =  0.0000
                                                R-squared     =  0.4101
                                                Root MSE      =  .74011

------------------------------------------------------------------------------
             |               Robust
    lnthafem |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnthafe |   1.153483   .1026656    11.24   0.000     .9515636    1.355402
       _cons |  -3.375627   .9605667    -3.51   0.000    -5.264836   -1.486418
------------------------------------------------------------------------------
```

Table- 2: The Estimate of Health Related Engel Function for STs Categories Households

```
. reg lnthafecc lnthafe

      Source |       SS       df       MS              Number of obs =      64
-------------+------------------------------           F(  1,    62) =   75.70
       Model |  37.7444816     1  37.7444816            Prob > F      =  0.0000
    Residual |  30.9150302    62   .49862952           R-squared     =  0.5497
-------------+------------------------------           Adj R-squared =  0.5425
       Total |  68.6595118    63  1.08983352           Root MSE      =  .70614

------------------------------------------------------------------------------
    lnthafecc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
     lnthafe |    1.797381   .2065867     8.70   0.000      1.38442    2.210341
       _cons |   -10.04398   1.982212    -5.07   0.000    -14.00637   -6.081597
------------------------------------------------------------------------------

. reg lnthafep lnthafe

      Source |       SS       df       MS              Number of obs =      64
-------------+------------------------------           F(  1,    62) =   21.64
       Model |  1.9994907     1   1.9994907            Prob > F      =  0.0000
    Residual |  5.72828477    62   .09239169           R-squared     =  0.2587
-------------+------------------------------           Adj R-squared =  0.2468
       Total |  7.72777548    63  .122663103           Root MSE      =  .30396

------------------------------------------------------------------------------
    lnthafep |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
     lnthafe |   .4136881   .0889262     4.65   0.000     .2359271     .591449
       _cons |   5.113454   .8532523     5.99   0.000     3.407827    6.819081
------------------------------------------------------------------------------

. reg lnthafem lnthafe

      Source |       SS       df       MS              Number of obs =      64
-------------+------------------------------           F(  1,    62) =   76.93
       Model |  31.8789646     1  31.8789646            Prob > F      =  0.0000
    Residual |  25.6914812    62  .414378729           R-squared     =  0.5537
-------------+------------------------------           Adj R-squared =  0.5465
       Total |  57.5704458    63    .9138166           Root MSE      =  .64372

------------------------------------------------------------------------------
    lnthafem |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
     lnthafe |    1.65183   .1883268     8.77   0.000      1.27537    2.02829
       _cons |  -7.901011   1.807007    -4.37   0.000    -11.51317   -4.288856
------------------------------------------------------------------------------

.
```

Table- 3: The Estimate of Health Related Engel Function for General Categories Households

```
Linear regression                               Number of obs =     178
                                                F(  1,   176) =  224.78
                                                Prob > F      =  0.0000
                                                R-squared     =  0.8593
                                                Root MSE      =  .17779

------------------------------------------------------------------------------
             |               Robust
    lnthafep |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnthafe |   .9146652   .0610074    14.99   0.000     .7942649    1.035065
       _cons |   .6459089   .5556726     1.16   0.247    -.4507301    1.742548
------------------------------------------------------------------------------
```

```
. reg  lnthafem lnthafe,robust

Linear regression                               Number of obs =     178
                                                F(  1,   176) =   21.90
                                                Prob > F      =  0.0000
                                                R-squared     =  0.1824
                                                Root MSE      =  .81404

------------------------------------------------------------------------------
             |               Robust
    lnthafem |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnthafe |   .8006616   .1711028     4.68   0.000     .4629843    1.138339
       _cons |   .1466499   1.573335     0.09   0.926     -2.95838     3.25168
------------------------------------------------------------------------------
```

```
. reg  lnthafecc lnthafe,robust

Linear regression                               Number of obs =     178
                                                F(  1,   176) =   25.73
                                                Prob > F      =  0.0000
                                                R-squared     =  0.2479
                                                Root MSE      =  .90041

------------------------------------------------------------------------------
             |               Robust
   lnthafecc |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     lnthafe |   1.076393   .2121859     5.07   0.000     .6576371     1.49515
       _cons |  -3.148719   1.944941    -1.62   0.107    -6.987128    .6896899
------------------------------------------------------------------------------
```