

# Factors Affecting Consumption Expenditure in Ethiopia: The Case of Amhara National Regional State (ANRS)

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## ABSTARCT

**Background:** The studies on consumption expenditure are important as it is related to poverty. Households with lowest total expenditure, a greater proportion of percentage expenditure spent on basic needs such as food and housing, then this results the household being more resources constrained (poorer) as a result.

**Objective:** The study attempts to analyze the impact of demographic and socioeconomic characteristic of households on consumption expenditure in the Amhara National Region State (Ethiopia) using the latest Household Consumption Expenditure Survey (HCES) 2015/16.

**Methods:** The study applied quantile regression model to identify determinants of consumption expenditure by considering per capita consumption expenditure as a dependent variable. We analyzed conditional consumption expenditure on OLS and at 7 selected quantiles: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 0.95 which will be denoted by  $Q_{05}$ ,  $Q_{10}$ , ..., and  $Q_{95}$ . The quantile effect of categorical variables is calculated based on Kennedy (1981) approach.

**Results:** Households those own residential house, were headed by educated persons and whose household heads were employed (generating income) expends more. On the other hand, households headed by females expends less. Based on marital status unmarried household heads consumption expenditure is less than households who are married (or living together) at all quantiles except at the 95<sup>th</sup> quantile, while unmarried consumption expenditure is more than widowed, and divorced (or separated) at 90<sup>th</sup> & 95<sup>th</sup> quantile and 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup> & 95<sup>th</sup> quantile respectively.

**Keywords--** Consumption Expenditure, Quantile Regression, Amhara Region, Ethiopia

**Acronyms:-** Central Statistical Agency (CSA), -Federal Democratic Republic of Ethiopia (FDRE), -National Planning Commission (NPC), -Ministry of Finance and Economic Development (MoFED), -House hold (Income) Consumption Expenditure (H(I)CE), -Non Governmental Organization (NGO) -Welfare Monitoring Survey (WMS), -Development Planning and Research Directorate (DPRD), -Amhara National Regional State (ANRS), -Organization for Economic Co-operation and Development (OECD), Ordinary Least Square (OLS).

## I. INTRODUCTION

The studies on consumption expenditure are important as it is related to poverty. Consumption expenditure depends on income, level of education, time use, size and pattern of assets, information, social barriers, the household-decision-making and upbringing globalization, technology advancement ... etc. (Moret alVol.5, Issue 2.Ensuring food security in Sub-Saharan Africa(SSA) remaining challenge, and will continue to be so in coming decades. It is widely documented that the poorer and more vulnerable a household, the larger the share of household income spent on food.

The Amhara National Regional State (ANRS) is one of the nine regional states of the FDRE. According to the central statistical agency of Ethiopia (CSA, 2013), based on the 2007 Census, the projected total population of the Amhara region in June 2017 is 21,134,988 (22.4percent of the Country) of which 17,453,000 (82.6 percent) lives in the rural areas with its livelihood mainly depends on agriculture and related activities, whereas 3,682,000 (17.4%) lives in urban areas. Food expenditure accounted 50% of the total household expenditure. In the region, households in urban centers spent 44% on food, while households in the rural areas spent 55.82%. Based on the CSA (2016), 33% of the rural households used drinking water from unprotected wells/springs and 11% used river/lake/pond. In he region, the food & non-alcoholic expenditure comprises 60.89% for quantile 1(lowest quantile) while it comprises 43.04% for the 5<sup>th</sup> quantile(upper quantile).The study was designed to see the factor those affects household consumption expenditure in the region by qunatile level to compare the result by quantile level.

## II. LITERATURE REVIEW

Based on the HICE 1995/96, 1999/00, 2004/05 and 2011/12 surveys conducted by the CSA, the Development Planning and Research Directorate of the Ministry of Finance and Economic development has

prepared “Ethiopia’s progress Towards Poverty: An interim Report on Poverty Analysis study (2010/11)” report. The report provided the status and trends of National, Rural, Urban and Regional level poverty incidence, gap and severity as well as income inequality measured by Gini Coefficient. MoFED, 2012. The finding of MoFED shows that the Gini Coefficient of the country in 2010/11 is 0.298. Nebebe, 2016 applied Inequality indices (Deciles, ratio, Gini coefficient, General Entropy index), Ordinary Least Square approach and Quintile regression to analyze determinants of income inequality for South Wollo Zone in a period of November to December 2014. The finding shows that per adult the consumption expenditure inequality is very high at the top of the distribution followed by the bottom adult equivalent consumption distribution.

Caglayan and Astar, 2012 applied Quantile regression method to identify the determinants of household consumption expenditure in Turkey Urban, Rural areas and country level. But they did not consider residential housing ownership of the household. In addition they didn’t include the result of OLS on their research paper. Their findings show that age increases the consumption expenditure at country and urban areas.

Akekere and Yousuo, 2012 had investigated the impact of change in gross domestic product (income) on private consumption expenditure in Nigeria in a period of 1981 to 2010. The result showed that the existence of a positive significant impact of Gross Domestic Product (income) on Private Consumption Expenditure.

Gounder, 2012 had analyzed factors that affect household consumption and poverty. Barigozzi et al., 2009 investigated statistical properties of household consumption-expenditure budget share distributions.

Lewis, 2014 studied the relationship between personal well-being and household income and expenditure. The result shows that the distribution of income across society, source of income and spending affect life satisfaction.

### III. METHODOLOGY

#### 3.1 Data and Variables

The CSA of FDRE conducts Household (Income) Consumption and Expenditure (H(I)CE) survey every five years, most recently in 2015/6. The surveys conducted are in the years since 1995/96 1999/2000, 2004/05 and 2010/11, 2015/16 CSA, January 2018. Based on the survey, the CSA has prepared statistical table Reports at Country and Regional levels. Secondary data from Ethiopian Household Consumption Expenditure (HCE) and Welfare Monitoring Surveys (WMS) conducted by Central Statistical Agency during 2015/16 is used for this study. In order to get some variables we merged the HCE and WMS survey data. The data includes 4681 households after removing the missing observations. The dependent variable in the analysis is the total consumption expenditure. The most commonly used relationship between the dependent and independent variables are linear, semi logarithmic, logarithmic and working-lester models. Here we applied semi logarithmic model, i.e., the logarithm of the dependent variable (consumption expenditure) is taken. The independent variables included in the model are presented in table 1. In our study multiple linear quantile regression is applied to identify factors that affect household expenditure. Introduction of quantile regression is presented in sub-section 2.2 below.

The variables included in the study are classified and coded as follows:

Table 1: Description of Explanatory Variables

Variables	Short names	Description
Gender of house hold head	GEN	1 if Male, otherwise 0
According to OECD scale, the Equivalent HHSIZE, the sum of the household Adult equivalence of household members.	HS	Ranges from 0.1-1.14 depends on gender and age of the HH member
Income generating	IG	1 if yes, Otherwise 0
Household type	HT	HTS=1, if single, others=0 HTN=1, if nuclear, others=0 HEX=1, if extended, others=0 HHOt=1, if other type, others=0
Marital Status of Household head	MS	MSS=1, if s/he is single, others=0 MSM=1, if s/he is married, others=0 MSW=1, if s/he is widowed, others=0 MSDS=1, if s/he is divorced/separated, Others=0
Place of Residence	PR	PR=1, if urban, others (rural)=0
Education level of head of the household	ED	EDI=1 if illiterate, others=0

		EDP=1 if primary, others=0 EDS=1 if secondary, others=0 EDCer=1 if certificate, others=0 EDDeg=1 if First degree and above, others=0
Age of head of the house hold	AGE	Age of the house hold head
Housing status	HS	HSEwn=1, if owned, others=0 HSEmp=1, if from employer/free of charge/ subsidized/rented, others=0 HSRel =1, if from relatives/free of charge or subsidized/, others=0 HSGov=1, if rented from gov't/other, others=0 HSKeb =1, if rented from kebele, others=0 HSRel=1, if rented from relatives, others=0 HSRNGO=1, if rented from other NGO, others=0 HSNRel =1, if rented from non-relatives, others=0 Can't included on the above options=1, others=0

**3.2 Quantile Regression**

Quantile regression was introduced by Koenker and Basset (1978) for the purpose of complementing ordinary regression. In ordinary regression what is modeled is the conditional mean of a random variable Y given some vector of explanatory variables

$x = (1; x_1; x_2; \dots; x_k)$  whereas in quantile regression what is modeled are quantiles of the conditional distribution of Y given x: The reported reasons for the introduction of quantile regression are that:

- 1) It is robust to the violation of the usual ordinary regression model assumptions and outliers, and
- 2) It enables capturing informative trends in the tails of the conditional distribution of Y given x.

**Linear quantile regression:-**A linear regression model for the  $\tau^{th}$  quantile can be written as:

$$Q_\tau(Y_i/X_i) = X_i\beta_\tau + \varepsilon_i, i = 1, 2, \dots, n$$

where  $\tau \in (0,1)$ ,  $x_i = (1, x_{1i}, x_{2i}, \dots, x_{ki}) \in x$  is the design;  $\beta_\tau = (\beta_{0\tau}, \beta_{1\tau}, \dots, \beta_{k\tau})'$  is a vector of the parameters for the  $\tau^{th}$  quantile;  $\varepsilon_i$  has probability density and cumulative distribution functions  $f_i$  and  $F_i$  respectively, and  $F_i^{-1}(\tau)=0$ .

**Estimation:-** Given (x, y) the linear quantile model can be estimated by quantile regression estimates the linear conditional quantile function ,

$$Q(\tau/X = x) = x'\beta(\tau), \text{ by solving}$$

$$\hat{\beta}(\tau) = \arg \min_B \sum \tau |y - x'\beta| + (1 - \tau) |y - x'\beta|$$

for any quantile  $\tau \in (0,1)$ . The quantity  $\hat{\beta}(\tau)$  is called the  $\theta^{th}$  regression quantile. The absolute deviation of residual  $|y - x'\beta|$  is weighted by  $\tau$  if  $|y - x'\beta|$  is positive and by  $(1 - \tau)$  if negative. The minimization problem can be solved by using Linear Programming methods (Koenker and Basset(1978), Koenker (2000)).

**IV. RESULTS AND DISCUSSION**

To determine factors those affect household consumption expenditure, a multiple linear quantile regression is applied.

The estimated quantile regression is:

$$Q_\tau(Y_i/X_i) = X_i\beta_\tau + \varepsilon_{\tau i}$$

Where Y is the logarithm of total consumption expenditure, X is the vector of independent variables,  $\tau$  is the vectors of coefficients of the independent variables. We analyzed conditional consumption expenditure on OLS and at 7 selected quantiles: 0.05, 0.10, 0.25, 0.50, 0.75, 0.90, and 0.95 which will be denoted by  $Q_{0.05}, Q_{0.10}, \dots,$  and  $Q_{0.95}$ . The quantile effect of categorical variables is calculated based on Kennedy (1981) approach.

Based on the result of table 2 all coefficients are significant. As expected generating income, education level and own house have positive effect on consumption expenditure. Place of residence (region variable) is found statistically significant for all quantiles. It shows that the consumption expenditure of rural residents is higher than the urban residents in all quantiles. Accordingly OECD equivalent scale, 1 unit increase in the household size significantly and positively raises the consumption expenditure. For instance for the 75<sup>th</sup> quantile, household size increases consumption expenditure by 6.1 percent.

Consumption is less for single family than households who have nuclear, extended and other at all quantiles. For instance the consumption expenditure of nuclear family is more than a single family at all quantiles. The lower is at 50<sup>th</sup> quantile while the upper is at 90<sup>th</sup> quantile. The respective percentage is 3 and 16 percent.

Male headed households' consumption expenditure is more than female headed households at the 75<sup>th}, 90<sup>th}</sup> and 95<sup>th}</sup> quantile by 2.6 percent, 3.2 percent and 5 percent respectively. Urban residents' consumption expenditure is less than Rural residents in all quantiles ranging from 21 up to 26 percent.</sup>

The finding shows that consumption expenditure of households headed by educated is more than illiterate household heads in the region. House hold heads who have completed primary education, secondary education and who

have certificate and first degree and above have more consumption expenditure than who are illiterate. For instance for the 50<sup>th</sup> quantile household head who has first degree and above expends 32% more of the illiterate one.

Table 2: Results of Quantile Regression

Explanatory Variables	OLS	Q05	Q10	Q25	Q50	Q75	Q90	Q95
Constant	4.0641*** (0.0229)	3.7781*** (0.0499)	3.8038* (0.0358)	3.9283*** (0.0283)	4.0619* (0.0275)	4.1632*** (0.0256)	4.2827* (0.0354)	4.3796*** (0.0606)
HS	0.0554*** (0.0021)	0.0483*** (0.0051)	0.0478* (0.0033)	0.0509*** (0.0027)	0.0553* (0.0023)	0.0612*** (0.0024)	0.0584* (0.0026)	0.0520*** (0.0052)
IG	0.0606*** (0.0153)	0.0868*** (0.0326)	0.0891* (0.0227)	0.0881*** (0.0191)	0.0682* (0.0207)	0.0581** (0.0173)	0.0327 (0.0232)	0.0312 (0.0419)
HTN	0.0542*** (0.0118)	0.0577** (0.0274)	0.0535* (0.0198)	0.0472** (0.0150)	0.0318** (0.0124)	0.0474*** (0.0132)	0.0914* (0.0180)	0.1479*** (0.0324)
HTE	0.0682*** (0.0113)	0.0764*** (0.0261)	0.0630* (0.0192)	0.0615*** (0.0146)	0.0538* (0.0120)	0.0553*** (0.0124)	0.1054* (0.0179)	0.1504*** 0.0299
HTOt	0.1556*** (0.0159)	0.1249** (0.0369)	0.1242* (0.0250)	0.1394*** (0.0202)	0.1420* (0.0153)	0.1459*** (0.0178)	0.2029* (0.0288)	0.2707*** (0.0418)
GEN	0.0107 (0.0094)	-0.0235 (0.0182)	-0.0208*** (0.0112)	-0.0014 (0.0115)	-0.0055 (0.0099)	0.0260** (0.0110)	0.0316** (0.0135)	0.0489* (0.0294)
MSM	0.0534*** (0.0127)	0.0577** (0.0274)	0.0968* (0.0129)	0.0712*** (0.0159)	0.0684* (0.0140)	0.0427*** (0.0144)	0.0240 (0.0198)	-0.0069 (0.0381)
MSW	0.0037 (0.0154)	0.0764*** (0.0261)	0.0137 (0.0200)	0.0142 (0.0191)	0.0109 (0.0181)	0.0124 (0.0172)	-0.0254 (0.0233)	-0.0445 (0.0410)
MSDS	0.00338 (0.0141)	0.1249** (0.0369)	0.0284*** (0.0166)	0.0023 (0.0173)	-0.0043 (0.0158)	-0.0026 (0.0158)	-0.0015 (0.0225)	-0.0065 (0.038)
PR	-0.2441*** (0.0079)	-0.2546*** (0.0167)	-0.2406* (0.0106)	-0.2304*** (0.0097)	-0.2275* (0.0081)	-0.2381*** (0.0090)	-0.2599* (0.0140)	-0.2982*** (0.0224)
EDP	0.0589*** (0.0078)	0.0627*** (0.0171)	0.0728* (0.0109)	0.0601*** (0.0097)	0.0566* (0.0077)	0.0630*** (0.0088)	0.0704* (0.0130)	0.0623** (0.0215)
EDS	0.1177*** (0.0101)	0.0985*** (0.0214)	0.1127* (0.0147)	0.0832*** (0.0125)	0.1177* (0.0125)	0.1246*** (0.0115)	0.1604* (0.0176)	0.1394*** (0.0267)
EDCert	0.2101*** (0.0133)	0.2369*** (0.0300)	0.2410* (0.0254)	0.2259*** (0.0166)	0.2166* (0.0115)	0.2099*** (0.0152)	0.1969* (0.0231)	0.1686*** (0.0355)

EDDeg	0.2678*** (0.0191)	0.3232*** (0.0415)	0.3219* (0.0126)	0.2846*** (0.0238)	0.2744* (0.0138)	0.2618*** (0.0215)	0.2257* (0.0179)	0.2030*** 0.0508
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Table 2 (Cont.): Results of Quantile Regression

AGE	-0.0004 (0.0002)	-0.0001*** (0.0005)	-0.0003 (0.0003)	-0.0004 (0.0003)	-0.0004*** (0.0002)	-0.0005** (0.0003)	-0.0003 (0.0004)	-0.0001 (0.0006)
HSEmep	-0.0443 (0.0307)	-0.0780 (0.0672)	-0.0783 (0.0490)	-0.0363 (0.0387)	-0.0424 (0.0319)	-0.0218 (0.0348)	0.0225 (0.0192)	0.0178 (0.0811)
HSRel	-0.0503** (0.0162)	-0.0690* (0.0355)	-0.0661* (0.0223)	-0.0479** (0.0202)	-0.0727* (0.0120)	-0.0649*** (0.0185)	-0.0334 (0.0431)	-0.0200 (0.0434)
HSGov	-0.1561*** (0.0405)	-0.3504*** (0.0842)	-0.1026*** (0.4260)	-0.1227** (0.0502)	-0.1541* (0.0136)	-0.1143** (0.0456)	-0.1406* (0.0411)	-0.2298** (0.1026)
HKeb	-0.1935*** (0.0126)	-0.2755*** (0.0270)	-0.2584* (0.0201)	-0.2304*** (0.0155)	-0.1874* (0.0185)	-0.1507*** (0.0144)	-0.1486* (0.0330)	-0.1324*** (0.0359)
HSNRel	-0.0968*** (0.0095)	-0.1154*** (0.0221)	-0.0992* (0.0118)	-0.0942*** (0.0117)	-0.0959* (0.0097)	-0.0916*** (0.0107)	-0.0871* (0.0171)	-0.0911*** (0.0258)
HSNGO	-0.1020* (0.0540)	-0.2180*** (0.0328)	-0.1617* (0.0297)	-0.1046 (0.0638)	-0.0632 (0.0564)	-0.0540 (0.0579)	-0.1055* (0.0200)	0.1371** (0.0394)
HSRel	-0.0933*** (0.0284)	-0.0986* (0.0581)	-0.1360* (0.0120)	-0.1307*** (0.0354)	-0.1297* (0.0263)	-0.0796** (0.0324)	0.0187 (0.0915)	0.0198 (0.0707)
HSNone	-0.0842** (0.0422)	0.0211*** (0.0901)	0.0054*** (0.0293)	-0.0862* (0.0501)	-0.0995* (0.0131)	-0.0662 (0.0457)	-0.1686* (0.0159)	-0.2840** (0.1115)
Pseudo R <sup>2</sup>	0.46	0.31	0.30	0.28	0.28	0.28	0.263	0.25

\*, \*\*, \*\*\* indicate significance at the level 1%, 5% and 10%, respectively (ii) Numbers in parentheses are standard errors. (iii) numbers of observations=4681.

According to housing status, households who have their own residential houses have more consumption expenditure than households who have got houses from employer, relatives, and who rented houses from government, NGO, kebele, relatives, and non-relatives, and others. Households who have given a house from government and households who rented from relatives have more consumption expenditure than house holds who have

their own house at the 90<sup>th</sup> and 95<sup>th</sup> quantile. At the 95<sup>th</sup> quantile households who rented from NGO have more consumption expenditure than who own a house.

Theoretically the relationship between consumption expenditure and age is positive and significant but in our study the result shows negative relationship for all quantiles and significant at the 5<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> quantiles.

## V. CONCLUSION

This study attempted to see the relationship between the consumption expenditure and selected socioeconomic and demographic factors in the ANRS. The result shows that socioeconomic and demographic factors play a significant role in determining consumption expenditure. In our study generating income is a categorical variable. The income component was not captured in the CSA 2015/16 survey. According to Kennedy (1981) approach, it is observed that households who generate income have higher consumption expenditure at upper quantile. Single family has less consumption expenditure as compared to nuclear and extended family. Based on marital status unmarried household heads consumption expenditure is less than households who are married (or living together) at all quantiles except at the 95<sup>th</sup> quantile, while unmarried consumption expenditure is more than widowed, and divorced (or separated) at 90<sup>th</sup> & 95<sup>th</sup> quantile and 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup> & 95<sup>th</sup> quantile respectively. Consumption expenditure of households who don't have their own residential house is less than households who have their own house.

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