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# Characteristics of Poverty in Pakistan

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**Abstract**

Poverty is a multidimensional conception and usually it is defined by focusing narrowly on income poverty or broadly by including lack of access to opportunities for raising standards of living. Strategies aimed at poverty reduction need to identify factors that are strongly associated with poverty and agreeable to modification by policy. This study uses integrated Household Survey (2009-10) data collected by Federal Bureau of Statistics Pakistan to examine probable determinants of poverty status, employing Bivariate models. In general, this study tries to seek in depth knowledge of the key factors like demographic factors and human capital variables that account for poverty differentials in Pakistan. The demographic variables show significant impact on poverty status of the household, especially dependency ratio, sex of the head of the household, family type and household size. These all are found to be of supreme important in defining poverty. The educational attainment of the head of the household is also found to be very important factor that is associated with poverty. If policy makers target the education of head of household in order to get rid of this evil vicious circle of poverty then it might be establish more effective, powerful and sustainable tool.

**Keywords**; Poverty Status, Demographic Variables, Human Capital Variables, Poverty Differentials

## 1. Introduction

Poverty refers to either lack of command over commodities in general or inability to obtain a specific type of consumption (food, clothing, housing etc.) deemed essential to constitute a reasonable standard of living in a society. Living standard is not determined by income and consumption alone, but non-economic aspects such as life expectancy, mortality, access to clean drinking water, education, health, sanitation, electricity and security are also important measures of well being. Critical variables that contribute to improve living standards are health facilities, drinking water, sanitation facilities, and availability of public utilities etc.

In developing countries nutrition and health is common problem which get severity in case of poverty. This situation provokes a vicious circle of low productivity, low wages, malnutrition, ill-health and low working capacity. The interaction between poor health and working conditions and poverty determines a distinctive morbidity-mortality pattern among poor community, which is due to the combination of malnutrition.

The eradication of poverty has been a subject of debate in world for decades, yet it was in recent years that seriousness of the situation was realized globally and specific efforts were taken in this direction. In the same way reducing poverty has the remained main objective of the policy makers in Pakistan. The living conditions of Pakistan's poor and poverty alleviation have gained more importance since the adoption of Millennium Development goals (MDGs). The existing work on poverty in Pakistan shows that a large number of efforts have been made to estimate the rate of poverty in Pakistan during the last two decades. However, this study is not concerned with the measurement of poverty rather this focuses on the dynamics and determinants of poverty which categorize the entire population into different classes/bands like non-poor, transitory poor and extremely poor. It employs bivariate logit model using Pakistan Household Integrated Survey (2009-10) conducted by Federal Bureau of Statistics Pakistan to identify the factors like demographic factors and human capital variables, which strongly effect the household or individual's likelihood of entering or exiting poverty status.

Overall, this study aims to examine the impact of key factors related to population and household environment that account for poverty differentials in Pakistan.

 

## 2. Review of Literature

The review of different studies in which poverty nexus is explored with different perspectives is presented in the subsequent section. In general, these studies have used different methodologies, including ordinary least squares regression where the dependent variable is continuous, logistic regression where the dependent variable is binary and quantile regression where the dependent variable is income.

The effects of different economic and demographic variables on the probability of a household being in poverty in Costa Rica was analayzed by Rodriguez and Smith (1994)they used a logistic regression model to estimate. The authors found that the probability of being in poverty is higher, the lower the level of education and the higher the child dependency ratio, as well as for families living in rural areas.

There is considerable evidence of a strong negative correlation between household size and consumption (or income) per person in developing countries. The poor devote a high share of their income to goods such as food, tap water, cooking utensils, firewood and housing etc. Ravallion and Lanjouw (1995) test the robustness of the relationship between poverty and household size using Pakistan Integrated Household Survey (PIHS) and results confirm the negative relationship between household size and poverty, as the size of household increases the probability of being poor will increase.

McCulloch and Baulch (1998) have investigated poverty dynamics in rural Pakistan using a unique five-year panel data set from the second half of the 1980s. Their results confirm that while the incidence of income poverty in the panel is high, with between one-fifth and one-third of households in any year having incomes below the poverty line, turnover amongst the poor is also rapid. Conventional poverty status (Logit) regressions show that the probability of a household being in poverty is increased by its household size, the dependency ratio and district of residence but decreased by secondary education, land, the value of livestock and other assets owned. The age and sex of the household head together with basic education did not, however, alter a household's poverty status. This study also investigates which household characteristics and geographic variables were associated with the probabilities of entering or exiting poverty using a partial likelihood proportional hazards model. Household size was found to increase the probability of entering poverty and decrease the probability of exiting poverty. This effect is consistent with the effect of this variable in standard poverty status regressions. However, neither the dependency ratio not district dummies, which were important in the poverty status regressions, have much impact on the probability of entry and exit from poverty.

The DOGEV is an attractive model from the class of discrete choice models for modeling determinants of poverty across poverty categories (absolute poor, moderate poor) which was applied by Fissuh and Harris (2005) for micro level data from Eritrea Household Income and Expenditure Survey 1996-97 to examine the determinants of poverty in Eritrea.Household size defined by adult equivalent units has a significant negative effect on the welfare status of a household. The size of the effect of household size on poverty is not the same across the categories. Age of household head was not found to be significant in linear terms in all poverty outcomes. However, the coefficient of age squared was found to be negative and significant in the moderate poor category only. Even though education is negatively correlated with poverty, basic education does not suffice. This indicates that education is not sufficient condition to escape from poverty but there are other factors, which affect poverty of a household in conjunction with education. The coefficient of schooling is higher (absolute terms) in the absolute poor category than in the other categories. The probability of a household being non-poor is a concave function of the number of employed persons per household. Besides, regional unemployment rate was found to be positively associated with poverty.

The determinants of poverty in Uganda by using logistic regression model was examined by Adebua, et al (2002).This study shows that household with better educated heads are less likely to be poor and large households are more likely to be poor. This confirms that the larger the household size, the poorer the household is. This is because the large number of household members would likely be children who are unproductive and yet they take a big proportion of household income in terms of schooling requirement, medical attention, food and clothing.

The studies reviewed above has analyzed the different determinants of poverty applying different methodologies A review of the existing work on poverty shows that a large number of attempts have been made to estimate the

 

incidence of poverty all over the world during the last two decades. However, in this study we focused on the dynamics and determinants of poverty which categorize the entire population into different classes/bands like non-poor, transitory poor and extremely poor, we are interested to estimate the effect of demographic and human capital variables on the bands of poor; this is novelty of the study.

## 3. Plan of Study

Modeling poverty is art which changes shape having same meaning. There are basically two approaches in modeling determinants of poverty.[1] The first approach[2] is based on the regression of consumption expenditure per adult equivalent against potential explanatory variables.

The second approach is to model poverty by employing a discrete choice model. The practice of discrete choice models in the analysis of determinants of poverty has been popular approach. The discrete choice model has a number of attractive features in comparison to the regression approach. The regression approach unlike the discrete choice models does not give probabilistic estimates for the classification of the sample into different poverty categories. In a sense we cannot make probability statements about the effect of the variables on the poverty status of our economic agents.

The discrete choice analysis proceeds by employing BinaryLogit or Probit model to estimate the probability of a household being poor conditional upon some characteristics. In some cases the households are divided into more than two categories and then employ multinomial Logit model or Ordered Logit model is used to identify the factors which affect the probability a household being poor conditional upon a set of characteristics.

The approach we will follow intends to investigate the determinants affecting the probability of being non-poor, transitory poor or extreme poor. In this study we will use the Bivariate logit model.

### 3.1 Bivariate Logit Model

We assumed that the probability of being in a particular poverty category is determined by an underlying response variable that captures the true economic status of an individual. In the case of a binary poverty status (i.e., being poor or non-poor), let the underlying response variable $Y^*$ be defined by the regression relationship.

$$y_i^* = \sum X_i' \beta' + u_i \qquad \text{..... (1)}$$

Where $\beta' = [\beta_1, \beta_2, ....., \beta_k]$ and $X_i' = [1, X_{i2}, X_{i3}, ....., X_{ik}]$

In equation (1) $Y^*$ is a latent variable and defined as

Y =1 if y* >0 and
Y= 0 otherwise ..... (2)

From equation (1) and equation (2) we can derive the following expressions.

$$\Pr ob(y_i = 1) = \Pr ob\left(u_i > -\sum x_i \beta\right)$$

$$= 1 - F\left(-\sum x_i \beta\right) \qquad \text{..... (3)}$$

[1] See Harris and Fissuh (2005)
[2] This approach works by regressing consumption expenditure (in log terms) on the household, community and common characteristics which are supposed to determine household welfare, for example Glewwe (1990), Muller (1999) and Canagarajah and Portner (2003). This approach rests on a heroic assumption that higher expenditure implies higher utility and vice versa.

Where F is the cumulative distribution function for $u_i$ and

$$\Pr ob(y_i = 0) = F(-\sum x_i \beta)$$

The likelihood function can be given by,

$$L = \prod_{y_i=0} \left[ F\left( -\sum X_i' \beta \right) \right] \prod_{y_i=1} \left[ 1 - F\left( -\sum X_i' \beta \right) \right] \quad \text{..... (4a)}$$

This can be written as

$$L = \prod_{y_i=1} \left[ F\left( -\sum X_i' \beta \right) \right]^{1-y_i} \left[ 1 - F\left( -\sum X_i' \beta \right) \right]^{y_i} \quad \text{..... (4b)}$$

The functional form imposed on F in equation (4) depends on the assumption made about $u_i$ in equation (1). The cumulative normal and logistic distributions are very close to each other. Thus using one or other will basically lead to some results (Maddala1983).

We have specified the logit model for this study by assuming a logistic cumulative distribution of $u_i$ in F (in equation (4a) and (4b)). The relevant logistic expressions are,

$$1 - F\left( -\sum X_i' \beta \right) = \frac{e^{\sum X_i' \beta}}{1 + e^{\sum X_i' \beta}} \quad \text{..... (5a)}$$

$$F\left( -\sum X_i' \beta \right) = \frac{1}{1 + e^{\sum X_i' \beta}} \quad \text{.....(5b)}$$

$X_i$ are the characteristics of the households/individuals and $\beta_i$ the coefficients for the respective variable in the logit regression.

Having estimated equation (4) with Maximum Likelihood (ML) technique equation (5a) basically gives us the probability of being poor (prob (Yi=1)) and equation (5b) the probability of being non-poor (prob ( $X_i$ =0))

### 3.2 Ordered logit Model

Assuming three poverty categories (1, 2 and 3 and associated probabilities P1, P2 and P3), an individual would fall in category 3 if $u < \beta' x$ , in category 2 if $\beta' x < u < \beta' x + \alpha$ and in category 1 if $u > \beta' x + \alpha$ where $\alpha > 0$ and *u* is the error term in the underlining response model (see Equation 1). These relationships may be given by.

$$P_3 = F(\hat{a} x_i')$$

$$P_2 = F(\hat{a} x_i' + \alpha) - F(\hat{a} x_i') \quad \text{.....(6)}$$

$$P_1 = 1 - F(\hat{a} x_i' + \alpha)$$

Where the distribution F is logistic in the ordered logit model. This can easily be generalized for *m* categories (see Maddala 1983). Assuming the underlying response model is given by

$$y_i = \hat{a} x_i' + u_i \quad \text{..... (7)}$$

We can define a set of ordinal variables as:

$Z_{ij} = 1$ If $y_i$ falls in the jth category

$Z_{ij} = 0$ Otherwise (i=1, 2,…., n; j=1,2,…,m)

$$prob(Z_{ij} = 1) = \Phi(\alpha_j - \beta' x_i) - \Phi(\alpha_{j-1} - \beta' x_i) \quad \text{.... (8)}$$

 

Where $\Phi$ is the cumulative logistic distribution and the $\alpha_j^{'}s$ are the equivalents of the $\alpha s$ in equation (6). The likelihood and log-likelihood functions for the model can be given by equations (9) and (10) respectively, as:

$$L = \prod_{i=1}^{n}\prod_{j=1}^{m}[\Phi(\alpha_j - \beta^{'}x_i) - \Phi(\alpha_{j-1} - \beta^{'}x_i)]^{Z_{ij}} \quad \text{…….. (9)}$$

$$L^{*} = \log L = \sum_{i=1}^{n}\sum_{j=1}^{k} Z_{ij} \log \Phi[(\alpha_j - \beta^{'}x_i) - \Phi(\alpha_{j-1} - \beta^{'}x_i)] \quad \text{……. (10)}$$

Equation (10) can be maximized in the usual way, and can be solved iteratively by numerical methods, to yield maximum likelihood estimates of the model (see Maddala 1983).

### 3.3 Data Sources

The analysis in this study is based on micro data taken from the Pakistan Integrated Household Survey (PIHS 2009-10) Household Integrated Survey (HIES 2009-10). These household surveys is conducted by the Federal Bureau of Statistics provide comprehensive information about household consumption expenditure, income and different socio-economic indicators that are essential for poverty analysis. The sample size of these household surveys is substantial enough to allow representative estimates. The total sample considered here comprises of 15000 households.

#### 3.1.2 Construction of Variables

This study uses consumption as a welfare and poverty status indicator instead of Income because consumption measures welfare achievement and exhibit less seasonal variability moreover people willingly mention their consumption pattern rather than income. This study defines poor as population living on less than $1.25 a day at 2005 international prices. That is 1.25US dollar per day= Rs 3375 per capita per month is required to get out of poverty line. The headcount ratio, i.e. proportion of poor households among total households is used as a measure of poverty. We categorized dependent variable into three mutually exclusive categories. We assume that a typical household belongs to one of three mutually exclusive categories.

**Table 1**
**Definitions of Dependent Variable**

| Variable | Definition |
|---|---|
| **Dependent variable** | |
| *1-Extremely poor* | 1. Extremely poor households are that whose per capita per month expenditure are less than 0.5 of poverty line. |
| *2-Transitory poor* | 2-Transitory poor households are those who's per capita per month expenditure lies between the "0.75 of line. |
| *3-Non-poor* | 3-Non-poor households are that whose per capita per month expenditure is above the poverty line. |

 

**Table 2**
**Definition of Explanatory Variables**

| *VARIABLE* | **DEFINITION** |
|---|---|
| Age of head of household | Age of head of household is measured in complete years and is treated as a continuous variable. |
| Female–male ratio. | To see the impact of gender composition in a household on poverty status, the total number of females to total number of males in a household is treated as female-male ratio and it is used a continuous variable in the model. |
| Dependency ratio. | The dependency ratio is defined as the ratio of number of members (<18 years and >64 years) to household size and treated as continuous variable. |
| Family type. | The family type is entered in to the model as a binary variable, representing nuclear and joint family. Nuclear family consists of parents and unmarried children. |
| Household size. | The sum of household members in a household is called household size and it is treated as a continuous variable. |
| Sex of head of household. | The sex of household head has been taken as a binary variable as, HH_SEX =1, if head of the household is male=0, otherwise |
| Head work or not: | To see the role of household head's work in effecting poverty status, we use the head's work as a binary variable.<br>HH_WRK= 1, if household head does any work for wages. =0, otherwise. |
| Educational status of head**:** | EDU2 = 1, if household head has primary education.<br>= 0, otherwise.<br>EDU3 = 1, if household head has higher secondary education.<br>= 0, otherwise.<br>EDU4 = 1, if household head has college education.<br>= 0, otherwise.<br>EDU5 = 1, if household head has higher education.<br>= 0, otherwise.<br>The base category for these variables will be no formal education of the household head. |

## 4. Empirical Findings

### *4.1 Bivariate Logit Model*

In this model the dependent variable is categorized as poor and non-poor and the model is estimated by using Maximum Likelihood technique. Result in Table 3 is for Bivariate logit model where poverty is dependent variable.

 

**Table 3**
**Dependent Variable is Poverty**

| *Variable* | **Marginal Effects** | |
|---|---|---|
| ***Demographic variables*** | | |
| Sex of head of household | -0.1500* | (0.00) |
| Age of head of household | -0.0060* | (0.00) |
| Household size | 0.0533* | (0.00) |
| Female-male ratio | 0.0099** | (0.09) |
| Family type | -0.0901* | (0.00) |
| Dependency ratio | 0.1900* | (0.00) |
| ***Human capital & Work Status Variables*** | | |
| Education of household head; 1-5 years | -0.0417* | (0.00) |
| Education of household head; 6-10 years | -0.0750* | (0.00) |
| Education of household head; 11-14 years | -0.1299* | (0.00) |
| Education of household head; 16 years or above (AB) | -0.1456* | (0.00) |
| Head work for income | -0.0455* | (0.00) |
| Log likelihood<br>Number of observations | -6302.6913<br>15000 | |

*Probabilities of Critical Values at 1%, 5%, 10% are indicated significance by *, **, *** respectively*

All the demographic variables are highly significant and show vital impact on poverty. The results indicate that the **age of the head of household** reduces the probability of the household being poor and it is significant at 1% level of significance. In the literature higher age is correlated with higher productivity and hence impacts poverty status negatively. Our results also validate this assertion.

Regarding the effect of **household size**, estimates indicate that larger household size indicates 5% more likely to be qualifying poor and this variable is significant at 1% level of significance. This shows that larger household size enhance the poverty status of a household. This is a general finding in the poverty literature (see for instance Lanjouw and Ravallion1995).

The estimated coefficient of the **sex of the head of household** shows that there is 15% more likelihood to be non-poor if the head of household is male and it is significant at 1% level of significance.

The variable "**dependency ratio"** shows that there is a positive correlation between poverty status and dependency ratio. The estimated coefficient shows that there is 19% more likelihood to be poor for 1% more dependency. It confirms that the higher the dependency ratio, lower will be the welfare of the household via the lower per capita income.

The variable '**family type**" is significant at 1% level of significance and indicate that nuclear families are 9% more likely to be non-poor, as compared to those households which have joint family system. This shows that in nuclear families due to lower dependency ratio and less time requirement for other household activities, women can spare more time to participate in earning activities, especially with their male counterparts. The estimated coefficient of "**female-male ratio"** shows that household with higher female-male ratio are more likely to be poor and it is significant at 5% level of significance. This confirms the fact that female's members in Pakistan are mostly constrained by their customs, social and religious norms from work outside the household and attitudes towards participation might also discouraging.

Human capital is measured by the education level of the household head and work status is measured by the household head's work for income. Estimation shows that schooling of the head of household has a significant effect on poverty status. The education variable appears to be key variable since the coefficients of all the dummy variables representing various education levels of household head are statistically significant at 1% level of significance.The estimated coefficient of these variables indicates the increase in the probability of being non-poor due to having the corresponding level of education. Thus for example household in which household head's education level is 1-5 years of schooling, the probability of being non-poor is 4% higher than in the household in which household heads are illiterate. This increment in probability goes to 7%, 13% and 15% point if household head has 6-10, 11-14 and 16 years or above education level respectively. The variable "head work " indicate that the household where the head work for income are 5% more likely to be non- poor as compared to those household where the head don't work and it is significant at 1% level of significance.

### 4.2 Ordered Poverty Status

We have ordered the sample into three mutually exclusive categories: non-poor (category0), transitory poor (category1) and extremely poor (category2), with household in category 2 being most affected by poverty. The estimated coefficients and marginal effects are given in Table-4

**Table 4**

**Dependent Variable is Poverty**

| | Transitory Poor (Marginal Effects) | Extremely poor (Marginal Effects) |
|---|---|---|
| ***Demographic variables*** | | |
| Sex of head of household | -0.0092* (0.00) | -0.0076* (0.00) |
| Age of head of household | -0.1598* (0.02) | -0.1323* (0.01) |
| Household size | 0.0457 * (0.00) | 0.0669* (0.00) |
| Female-male ratio | 0.0222 * (0.00) | 0.0331* (0.01) |
| Family type | -0.0555 * (0.02) | -0.029* (0.00) |
| Dependency ratio | 0.1999 * (0.00) | 0.1789* (0.00) |
| **Human Capital & Work Status Variables** | | |
| Education of household head; 1-5 years | -0.0521* (0.00) | -0.0097* (0.00) |
| Education of household head; 6-10 years | -0.0792 * (0.00) | -0.0177* (0.03) |
| Education of household head; 11-14 years | -0.1012* (0.01) | -0.0282* (0.00) |
| Education of household head; 16 years-AB | -0.1152 * (0.02) | -0.0310* (0.00) |
| Head work for income | -0.0340* (0.00) | -0.0110* (0.00) |
| Log likelihood | -9750.7113 | -8798.6612 |
| Number of observations | 15000 | |

*Probabilities of Critical Values at 1%, 5%, 10% are indicated significance by *, **, *** respectively.*

In general, it is interesting to note that those factors that are important in the Bivariate model are still important in the ordered logit model. More importantly, results show clearly the dynamics of poverty on different categories.

Results show that almost all the variables are statistically significant at 1%level of significance. Regarding the effect of **household size**, estimate indicates that higher household size decreases the probability of being non-poor, if other things remain constant. Result indicate that with larger household size there is 4%and 6% less probability being non-poor, which fall in transitory poor and extremely poor categories respectively. **Dependency ratio** has negative effect on the poverty status of the household. Results show that the dependency ratio reduces the probability of those households to be non-poor by 19% and 17%, which lies in transitory poor and extremely poor respectively. The variable female-male ratio has same impact on poverty status as dependency ratio and household size, but its effect is

 

less than for above variables. As estimation shows that there is 2% and 3%less likelihood to be non-poor for the households, which belongs to transitory poor and extremely poor category.

The male sex of the **household head** has significant impact on different poverty categories. The estimated results show that it raises the probability of being non-poor for households by 15% and 13% which lie in the transitory poor and extremely poor respectively. Though the **age of the head** is significant but it impact on different poverty categories are very minor. Family type shows reasonable effect on poverty status of the household in different poverty categories. The estimated results shows that nuclear families increase the probability of households to be non-poor as compared to joint families by 5% and 3% for those household which belong to transitory poor and extremely poor categories respectively.

The effect of **years of schooling** completed by the head of household on poverty status is found to be non-uniform across different poverty categories. This may suggest that education impacts poverty status differently in these categories and result shows that in general education is more important for transitory poor group. Results show that having primary level, higher secondary level, college level and university level of education increase the probability of being non-poor by 3%,6%,10%,12% and 1%,2%,3%,3% to those household head which have no education level in transitory poor and extremely poor categories respectively.

The estimated coefficient of **head work** indicates that the households where the head work for income increase the probability of being non-poor as compared to those households where the head don't work for income by 3% and 1% in transitory poor and extremely poor category respectively.

**Conclusion**

The objective of this study is to measure and analyze the demographic and Human Capital variables effects on poverty discrepancy in Pakistan.All the demographic variables show significant impact on poverty status of the household, specially dependency ratio, sex of the head of the household, family type and household size are found to be of paramount importance in reducing poverty particularly in transitory poor category.Our results are also in keeping with generally accepted theory. Having a large household is generally correlated with poverty status. This is because the larger the number of household member would likely to be children, who take a big proportion of household income in terms of school requirements, medical attention, food and clothing. While a high dependency ratio decreases earning potential in relation to needs and therefore increase the risk of poverty (Lipton 1983).The educational attainment of the head of the household is found to be the most important factor that is associated with poverty. Lack of education is a factor that accounts for a higher probability of being poor. Thus promotion of education is a central factor in addressing problems of transitory and extreme poverty. This indicate that education is vital for boosting the productivity of the human factor and making people more aware of opportunities for earning a living and there is generalized evidence in household surveys and censuses that education is positively correlated with earnings [Schultz (1988); Psacharopoulous (1985); Blaug (1976)]. Higher earnings in turn are associated to lower poverty levels.The headwork for income variable also shows significant impact on poverty status of household.Based on our results, the following policy implications are derived from this study which are expected to contribute to the poverty reduction strategy being pursued by Pakistan:

- The educational attainment of the head of the household is found to be most important factor associated with poverty. Thus promotion of education is central in addressing problems of transitory and extreme poverty.

- Relating to the above point, the importance of female education in poverty reduction should be noted. We have found that female- headed household are more likely to be poor than household of which the head is a male and that female education plays a key role in reducing poverty. Thus promoting female education should be an important element of poverty reduction polices. Because there is evidence that female education and fertility are negatively correlated, such policies have an impact on household size and dependency ratios, which are important determinants of poverty. Thus investing in female education would indeed be productivity enhancing and poverty reducing.

 

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