

# **Road Development and Poverty Alleviation: the Case Study of Southern Punjab**

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## **Abstract**

*Present study examines the impact of road infrastructure development on poverty alleviation in rural areas of Southern Punjab. This study used secondary data of Pakistan Social and Living Standard Measurement (PSLM) that was collected in 2008-09 from eleven districts of Southern Punjab. The results of regression analysis reported that the incidence of poverty is higher in remote areas and people have limited access to basic needs. It is clear from the results that the households living in those villages which are near to the main markets can meet the basic needs easily as compare to the villages which are far from the main markets. It is also reported that the households living away from the bus stands have limited mobility and less ability to meet the required basic needs to spend a quality life. Similarly, if basic health units are situated at distant points from the villages, the long distances can limited the access of households to basic health facilities and drag them below the poverty line. Finally, it can be concluded that better road infrastructure can increase social inclusion, improve to economic opportunity and access to basic needs in rural areas of South Punjab. In this context development of road infrastructure, especially rural roads development is a win-win situation for poverty alleviation in Pakistan.*

**Keywords:** Poverty alleviation; Rural areas; Road infrastructure; South Punjab

## **I. Introduction**

A person said to be a poor if he or she hasn't enough economic sources to fulfill basic needs of life like foods, water and shelters. This can be further extended to basic health and educational facilities. According to World Bank definition of poverty (2012), a person is considered extreme/absolute poor if he or she unable to earn 1.90 US dollar per day while moderate poor is someone whose earning less than 3.10 dollars per day. Thus according to this definition, 896 Million (out of 7348 Million) of world population were living under the extreme poverty line in 2012 and 2.1 billion were below the moderate poverty line. Most of these poor are the resident of third world countries of Sub-Saharan Africa (388.7 Million), South Asia (309 Million), East Asia and Pacific (147 Million) and Latin America and Caribbean (44 Million).

Although poverty has decreasing trends (one percent per annum) worldwide yet it stills a very challenging task for the world to get rid from it. Pakistan is also following the same foot print as poverty has been declined from 52 percent in 1981 to 26 percent in 2005. According to the Center for Research on Poverty Reduction and Income Distribution (CRPRID) report, there were 22 percent Pakistani below the poverty line in 2005-06 which have reached 8.3 percent in 2010. Thus During this time span, more than five hundred million inhabitants were able to get rid of poverty. More recently, Infrastructure development like improvement in road networks is considered more effective tool to alleviate poverty in developing economies. Roads have linked the hidden rural areas to urban areas which also have increased the mobility of landless laborers from rural areas to urban area. Therefore the present work is an effort to expose the role of roads to alleviate poverty in rural areas. No doubt innovations in communication has increased the connectivity of the individuals but still roads are the only mean of physical interaction and mobility between rural and urban areas. Therefore, it could be said that the whole skeleton of rural infrastructure development itself depends on roads. Roads ensure the delivery of public and private goods at door step in rural areas; therefore, roads are the key factor which may improve the productivity of rural people and installation of modern infrastructure may help to alleviate poverty in rural areas.

Poverty and road infrastructure have significant relation in most of previous work but it still difficult task to examine the role of roads in the alleviation poverty because poverty has not a precise definition. Therefore, the assessment of poverty is also very challenging. Until that time, different school of thoughts had convoluted poverty on the basis of headcount index, poverty gap index or squared poverty gap index and an attempt had been made to examine it through income or expenditures approaches. Nowadays, no one can deny the multidimensional nature of poverty therefore; this study aims to provide estimates of poverty beyond the income and expenditure dimensions. So, keeping in view the multiple dimensions of poverty, this study is using a more sophisticated approach based on sound principal of distributive analysis. Therefore, promoting the multidimensional approach of poverty measurement in present study is also attuned to the current need of tools for targeting poverty alleviation programs.

Present research work is an attempt to fill the gap in the literature by presenting a multidimensional analysis of poverty based on latest development in poverty measurement. Arim and Vigorito (2007) and Amarante *et al.* (2008) have presented similar analysis for Uruguay, Karishnakumar and Ballon (2008) for Bolivia, Barros *et al.* (2006) for Brazil and Chamussy (2005) for Mexico. In nutshell, the contribution of present research is twofold. On one hand it provides the way to apply multidimensional poverty measures in Pakistan while on other hand, it presents results of South Punjab based on comparable data sources and indicators. The key objectives of present study may be defined as follows:

To analyze status of rural poverty in Southern Punjab. This may be helpful in evaluating the government efforts and policies for poverty alleviation in the region i.e. Southern Punjab. Moreover the present research examines the impact of road development in fulfilment of basic needs and in turn on poverty alleviation among poor in the region i.e. Southern Punjab. The rest of the paper is arranged as follow. The second section provides the review of important studies. Data and methodology is presented in the section 3<sup>rd</sup>. 4<sup>th</sup> section discuss the findings of the study. The concluding remarks are offered in section 5<sup>th</sup>.

## **II. Review of Studies on Road Infrastructure and Poverty**

To systematically analyze the impact of road investment on economic growth, a lot of researchers used a specific production function that includes transportation and road infrastructure among other explanatory variables. Among beginners was Antle (1983) who successfully utilized a Cobb-Douglas production function for 47 developing and 19 developed nations. The researcher employed a unique approach while estimating physical infrastructure as the gross national product from communication industries and transportation per square kilometer of the land area. Resultantly, author explored a potent and positive linkage between the level of infrastructure and gross productivity. Later on, Retner (1983), Ashauer (1989), Binswanger *et al* (1987), Binswanger *et al* (1993), Easterly and Rebelo (1993), and Baffes *et al.* (1993) also brought into light transportation infrastructure as an important factor of production. Retner (1983) also used conventional Cobb-Douglas production function in combination with Cochrane–Orcutt (CORC) iterative and pseudo GLS as comprehensive estimation techniques of least squares. He elaborated a positive effect of infrastructure as a government capital on the productivity of private business firms. Similarly Aschauer (1989) reiterated the findings of Retner (1983) while emphasizing the impacts of public policy on economy. He concluded that physical infrastructure like highways, airports, streets, amenities and utilities such as gas and electricity, mass transit systems, water and sanitation/sewerage had significant role in enhancing productivity of private sector which in turn promote economic growth in economy.

Escobal (2001) highlighted an association of roads and diversification of income in rural areas of Peru. He employed Tobit double-causation estimation to sift different driving forces behind decision making of rural households. He proved that access to public amenities and availability of rural road mainly adjudged the

diversification of income and significantly determines the level of profitability of farm and non-farm activities of the people. These results are in conformity with the findings of Malmberg (1997) he advocated that road investments enhance economic growth and earning levels in both farm and non-farm sectors. Dercon and Krishnan (1998) while investigating the data pertaining to changes in rural poverty of Ethiopia relied on data base of 1989, 1994 and 1995 in order to pinpoint factors effecting these changes. They elaborated that poverty levels of households were determined by human and physical capital and access to roads. They analyzed that household with better access to road were blessed with higher human and physical capital hence bestowed with lower poverty level. They also witnessed a noticeable impact of these factors in reducing incidence of seasonal poverty in rural areas.

Kwon (2001) also assessed the role of road infrastructure in limiting the incidence of poverty in Indonesia. He gathered data pertaining to period from 1976 to 1996 of 25 provinces of Indonesia. He relied upon OLS and an instrumental variable technique for estimation, the study opined that areas with better road availability showed better crops output. Moreover inhabitants of these areas had better access to labor markets and enjoyed diversification in job opportunities. These dwellers were more engaged in non-farming activities and earned more incomes.

Songco (2002) revealed linkage between rural road network and well-being of the households. He conducted a field survey of the central region of Vietnam and found that rural poor get benefit from improvement in low graded rural roads through year around access which resulted into improved mobility, reduction in price of goods, elimination of health hazards due to dusty roads. These benefits not only bring significant change in the life of the poor but also helped local authorities in many ways.

Fan and Kang (2004) evaluated the impact of different quality of roads and different forms of public investments on both poverty reduction and growth. They arrived at the conclusion that per Yuan invested on low quality road raised for more rural and urban poor above the poverty line than do high quality roads.

Lombard and Coetzer (2007) investigated the impact of rural roads investment upon economic growth and socio economic development in Lesotho (Africa). They undertook cost-benefit appraisal while using secondary data pertaining to access to education and health facilities, income, living conditions and location of households in their jurisdiction of study. They arrived at a conclusion that road investments bear fruit in the shape of employment generation in community. Road investment through road construction could potentially generate numerous short term employment opportunities whereas the continuous process of road maintenance could be helpful in creating long term employment opportunities.

Gachassinat *et al.* (2010) while studying the impact of roads on poverty reduction in Cameroon arrived at a very different conclusion as compared to other studies. They appraised that road access has no direct impact on income/expenditure

of households of Cameroon. The impact is rather indirect because it is not the road availability per se that reduces poverty but the new avenues of labor employment opportunities introduced by newly constructed roads in rural areas. They further elaborated that for opening up the rural areas large tarred roads might not be needed. Just appropriate size of roads keeping in view the economic potential of the region should be laid down. According to them, in many African countries, roads are built not for economic reasons but rather for political allegiance and the high risks of embezzlement may render ineffective any well thought road project.

The above mentioned studies throw light on significance of rural roads as a part of pro-poor strategy or as an integral part of poverty reduction mechanism. Contrary to this some researches bring into light the opposite side of the picture. Most of them depicting that rural roads do not necessarily prove to be beneficial for welfare of the poor. However, at the same time quality and nature of roads had not been taken into account which had to biased estimation of this pivotal element of infrastructure. Hence, the present research is an addition in the literature and a step forward to circumvent shortcomings in the results of above mentioned studies and successfully introduced new venues of research in this field.

### III. Data and Methodology

Current study is about the impact of road development and poverty alleviation in southern Punjab region of Pakistan. It is mainly depending on secondary source of data. The data on socio-economic variables are retrieved from 2008-09 survey of Pakistan Social and Living Standard Measurement (PSLM). The sample of 6469 households from eleven districts of Southern Punjab (Vehari, Bahawalnagar, Rajanpur, Bahawalpur, Rahimyar Khan, DG Khan, Khanewal, Muzafarghar, Multan, Lodhran and Layyah) were used to examine the impact of road development on rural poverty.

#### Methodology:

This study applying Binary Logit and Ordinary Least Square (OLS) methods to uncover the relationship between dependent and independent variables as these techniques are extensively used to evaluate the surveyed data. This can be put in plain words as follows:

Doctrine of discrete choice model suggests that econometric technique includes substitutes and mutually special circumstances, being measured as poor or not a poor. Thus, the under observation data is unruffled into two sorts of households. First one includes those households which are measured as poor while second includes individuals who are not poor. For this purpose, study selected \$1.25 per day poverty line as criterion which is the last updated global poverty line (World Bank, 2008). Thus, with the given poverty line criterion, Data samples are divided into two separate groups.

Now suppose that poor household set of variables having probability '  $X$  '.

Then we can mark it as:

$$Prob(Y = 1) = f(\beta X')$$

$$Prob (Y = 0) = 1 - f(\beta X')$$

Now for the logistic distribution, we can write it as:

$$Prob (y = 1) = \frac{(e^{\beta X'})}{1 + e^{\beta X'}} = A(\beta X')$$

Here 'A' is for logistic cumulative distribution function.

Thus we can write probability model as a regression then we have;

$$E\left(\frac{y}{x}\right) = 0 [1 - f(\beta X')] + 1 [f(\beta X')] \\ = [f(\beta X')]$$

To maintain the significant of interpretation and dissimilarity in Logit and simple regression, we have used odds by taking the antilog of different slop of coefficients.

$$P_i = E(Y = 1|X_i) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_i)}} \quad \text{equation} \rightarrow (a)$$

if  $Z_i = \beta_1 + \beta_2 X_i$

We get cumulative logistic distribution function, here Z = Range from  $-\infty$  to  $+\infty$  and  $P_i =$  Range from 0 to 1, Now Equation (a) can be write as

$$P_i = 1/1 + e^{-Z_i} = (e^{-Z_i}/1 + e^{-Z_i}) \\ (1 - P_i) = 1/1 + e^{Z_i} \quad \text{equation} \rightarrow (b)$$

Equation (a) shows  $P_i$  is non-linear in  $\beta$ 's and also in X.

If  $P_i$  is the probability of household being poor and  $(1 - P_i)$  is probability of non-poor then by suing equation (a) and equation (b) we get.

$$P_i/(1 - P_i) = [1 + e^{Z_i}/1 + e^{-Z_i}] = e^{Z_i}, \text{ Now } P_i/(1 - P_i) \text{ is simply the odd or odd ratio}$$

As the value of regressand or Logit  $L_i$  is

$$L_i = \ln [P_i/(1 - P_i)] \text{ therefore taking anti log of } L_i \text{ we get}$$

$$P_i/(1 - P_i) = e^{Z_i} = \mathbf{d} \text{ (For odd)}$$

Here  $Z_i$  the slope of coefficient  $X_i$  ( $i = 1, 2, 3, \dots, n$ )

In order to measure percentage change in regressand variable due to change in explanatory variables we have measured the marginal effect through following technique.

$$\frac{\partial Y_i}{\partial X_i} = \hat{P}_i (1 - \hat{P}_i) \beta_i$$

Here,

$\hat{P}_i =$  Average probability of the success ;  $(1 - \hat{P}_i) =$  Average probability of failure

$\beta_i =$  The logit coefficient

To examine the impact of roads on poverty and its various indicators in South Punjab the following specifications are estimated;

$$Pov = \beta_0 + \beta_1 EDHH + \beta_2 RDHU + \beta_3 RDBS + \beta_4 RDGS + \beta_5 RDMM + \beta_6 RDTP + \beta_7 ASST + e_i \dots \dots \dots \text{Equ (1)}$$

Here per capita income is sued as an alternative measure for poverty and Ordinary Least Square (OLS) method is adopted to estimate the following model.

$$PCI = \theta_0 + \theta_1 EDHH + \theta_2 RDHU + \theta_3 RDBS + \theta_4 RDGS + \theta_5 RDMM + \theta_6 RDTP + \theta_7 ASST + \theta_8 LIVS + e_i \dots \dots \dots \text{Equ (2)}$$

## **Variables and their descriptions:**

### ***Dependent Variables:***

***Poverty (POV):*** International poverty line of USD 1.25 is used to determine the poor and non-poor individuals in a household. Those households who have per capita income lower than poverty line are declared as poor and vice versa.

***Per Capita Income (PCI):*** Per capita income is determined by dividing the monthly income of households with the number of individuals in a household. In present research it is used as an alternative measure to examine poverty because a household with higher per capita income has better ability to fight with poverty and vice versa.

### ***Independent Variables:***

***Wealth in Possession (ASST):*** Wealth of households is determined by taking the sum of financial value of households' assets. For this purpose the financial value of personal agriculture land, monthly rent if the land is rented, livestock in personal possession, sheep and goats in personal possession, animal in possession for transportation, poultry in personal possession, non-agriculture property, residential building in possession and shops or commercial building in personal possession. It is hypothesized that wealth in possession has negative relationship with poverty which means that a household with greater level of wealth in possession has better ability to fight with poverty.

***Education of Household's Head (EDHH):*** In present research, the household head who has minimum level of education i.e. primary education, is considered educated otherwise the household head who has education below primary is declared as uneducated. It is hypothesized that education of household head has negative relationship with poverty. It means that a household head with high education has better ability to fight with poverty.

***Road Distance from Basic Health Units (RDHU):*** Road distance from basic health units to residential areas is measured in kilometers. The road distance from village to basic health unit is used to examine the impact of road to access basic health facilities. It is hypothesized that road distance between the villages and basic health units has positive relationship with poverty which means that a household with greater distance from basic health unit has limited access to basic health facilities and has less physical potential to fight with poverty.

***Road Distance from Boys School (RDBS):*** Road distance from boys' school to residential areas is considered to examine the impact of roads to access male education facilities. It is hypothesized that there exists a negative relationship between road distance from boys' school to the village and poverty. The road distance is measured in kilometers and households with greater distance from boys' school have limited access to education facilities and as a result the localities which

have poor access to education facilities have greater ability to fall below the poverty line.

***Road Distance from Girls School (RDGS):*** In similar fashion the Road distance, in kilometers, from girls' school to residential areas is used to examine the impact of roads to access female education facilities. It is hypothesized that there exists a negative relationship between road distance from girls' school to the village and poverty.

***Road Distance from Retail Market (RDMM):*** Road distance from nearest retail market to residential areas is measured in kilometers and considered to examine the impact of roads access to nearest retail market. It is hypothesized that the distance between villages and nearest retail market has positive relationship with poverty which means that a household with greater distance from the retail market have limited access to goods and services to spend a quality life and has less ability to fight with poverty.

***Road Distance from Bus Stand (RDTP):*** Road distance in kilometers from nearest bus stop to residential areas is considered to examine the access to communication or transport means. It is hypothesized that road distance from bus stands to villages has positive relationship with poverty. In other words, the households living at distant points from main bus stops have limited mobility and livelihood opportunities and as a result more prone to poverty.

***Living Standard (LIVS):*** Living standard of a household is computed by the number of rooms in a house. It is hypothesized that living standard of a household has negative relationship with poverty which means that a household with improved living standard is better off than a household with deprived living standard and has greater ability to fight with poverty.



**IV. Results and Discussion**

*Elementary Data Analysis:*

The district wise demographic characteristics of the households' heads are given in table 1.

**Table 1: Demographic Characteristics of Household of Different District**

|                       | No of Households | Gender         |              | Residential Status |                 | Marital Status |                |             |              |              |
|-----------------------|------------------|----------------|--------------|--------------------|-----------------|----------------|----------------|-------------|--------------|--------------|
|                       |                  | Male           | Female       | Home               | Not Having Home | Divorced       | Married        | Nikah Only  | Unmarried    | Widow        |
| <b>Bahawalnagr</b>    | 670              | 95.58<br>(642) | 4.17<br>(28) | 98.50<br>(660)     | 1.50<br>(10)    | 0.59<br>(4)    | 93.28<br>(625) | 0.14<br>(1) | 1.79<br>(12) | 4.17<br>(28) |
| <b>Bahawalpur</b>     | 672              | 94.79<br>(637) | 5.20<br>(35) | 95.98<br>(645)     | 4.02<br>(27)    | 0.44<br>(3)    | 92.41<br>(621) | 0.14<br>(1) | 2.23<br>(15) | 4.76<br>(32) |
| <b>DG Khan</b>        | 528              | 100<br>(528)   | 0.00<br>(0)  | 96.96<br>(512)     | 3.04<br>(16)    | 0.56<br>(3)    | 94.88<br>(501) | 0.00<br>(0) | 0.75<br>(4)  | 3.78<br>(20) |
| <b>Khanewal</b>       | 624              | 94.55<br>(590) | 5.44<br>(34) | 99.19<br>(619)     | 0.80<br>(5)     | 0.80<br>(5)    | 90.38<br>(564) | 0.00<br>(0) | 1.28<br>(8)  | 2.08<br>(13) |
| <b>Layyah</b>         | 383              | 97.91<br>(375) | 2.08<br>(8)  | 99.73<br>(382)     | 0.26<br>(1)     | 1.04<br>(4)    | 95.03<br>(364) | 0.00<br>(0) | 0.26<br>(1)  | 3.65<br>(14) |
| <b>Lodhran</b>        | 336              | 95.23<br>(320) | 4.76<br>(16) | 98.08<br>(332)     | 1.19<br>(4)     | 0.29<br>(1)    | 90.47<br>(304) | 0.00<br>(0) | 2.08<br>(7)  | 7.14<br>(24) |
| <b>Multan</b>         | 672              | 94.79<br>(637) | 5.20<br>(35) | 97.02<br>(652)     | 2.97<br>(20)    | 0.89<br>(6)    | 93.30<br>(627) | 0.00<br>(0) | 0.59<br>(4)  | 5.20<br>(35) |
| <b>Muzaffargarh</b>   | 624              | 95.67<br>(597) | 4.32<br>(27) | 97.11<br>(606)     | 2.88<br>(18)    | 0.32<br>(2)    | 94.71<br>(591) | 0.00<br>(0) | 0.96<br>(6)  | 4.00<br>(25) |
| <b>Rahim Yar Khan</b> | 864              | 94.09<br>(813) | 5.90<br>(51) | 96.75<br>(836)     | 3.24<br>(28)    | 0.46<br>(4)    | 92.24<br>(797) | 0.00<br>(0) | 3.12<br>(27) | 4.16<br>(36) |
| <b>Rajanpur</b>       | 432              | 99.07<br>(428) | 0.92<br>(4)  | 99.07<br>(428)     | 0.92<br>(4)     | 0.46<br>(2)    | 97.22<br>(420) | 0.00<br>(0) | 1.15<br>(5)  | 1.15<br>(5)  |
| <b>Vehari</b>         | 671              | 94.93<br>(637) | 5.06<br>(34) | 98.21<br>(659)     | 1.78<br>(12)    | 1.04<br>(7)    | 90.90<br>(610) | 0.00<br>(0) | 1.49<br>(10) | 6.55<br>(44) |

**Source:** Author's Calculation based on PSLM 2008-09

It shows that 670 household heads have been taken from Bahawalnagar as sample in which 95.58 percent are male. This suggests that more males are leading their houses than females. Out of this sample, 98.50 percent household heads have their own home. More than 93.28 percent heads of the families are married while only 1.79 percent is unmarried.

Table 2 shows the household heads source of income.

**Table 2: Distribution of HHH with Respect to Income (in Rupees)**

| Distribution of HHH with respect to Income (in Rupees) |      |                |                |                   |                        |                   |                    |
|--|------|----------------|----------------|-------------------|------------------------|-------------------|--------------------|
|  | Head | Employed%      | 50000<br>%     | 50001-100000<br>% | 100001-<br>150000<br>% | above 150000<br>% | not available<br>% |
| <b>Bahawalnagar</b>                                    | 670  | 89.70<br>(601) | 21.19<br>(142) | 17.61<br>(118)    | 5.82<br>(39)           | 7.01<br>(47)      | 38.06<br>(255)     |
| <b>Bahawalpur</b>                                      | 672  | 87.80<br>(590) | 23.51<br>(158) | 12.20<br>(82)     | 2.68<br>(18)           | 6.70<br>(45)      | 42.71<br>(287)     |
| <b>DG Khan</b>   | 528  | 88.64<br>(468) | 13.83<br>(73)  | 13.83<br>(73)     | 7.20<br>(38)           | 10.23<br>(54)     | 43.56<br>(230)     |
| <b>Khanewal</b>  | 624  | 89.74<br>(560) | 8.17<br>(51)   | 14.10<br>(88)     | 5.93<br>(37)           | 9.62<br>(60)      | 51.92<br>(324)     |
| <b>Layyah</b>  | 383  | 91.38<br>(350) | 5.74<br>(22)   | 18.28<br>(70)     | 8.62<br>(33)           | 14.36<br>(55)     | 44.39<br>(170)     |
| <b>Lodhran</b>   | 336  | 87.50<br>(294) | 7.14<br>(24)   | 11.31<br>(38)     | 6.55<br>(22)           | 8.04<br>(27)      | 54.46<br>(183)     |
| <b>Multan</b>  | 672  | 85.71<br>(576) | 6.40<br>(43)   | 9.38<br>(63)      | 4.32<br>(29)           | 5.95<br>(40)      | 59.67<br>(401)     |
| <b>Muzaffargarh</b>                                    | 624  | 87.50<br>(546) | 8.33<br>(52)   | 11.38<br>(71)     | 5.77<br>(36)           | 8.97<br>(56)      | 53.04<br>(331)     |
| <b>Rahim Yar<br/>Khan</b>                              | 864  | 85.76<br>(741) | 18.98<br>(164) | 10.76<br>(93)     | 5.79<br>(50)           | 1.74<br>(15)      | 48.50<br>(419)     |
| <b>Rajanpur</b>  | 432  | 92.36<br>(399) | 13.89<br>(60)  | 26.62<br>(115)    | 14.58<br>(63)          | 9.72<br>(42)      | 27.55<br>(119)     |
| <b>Vehari</b>  | 671  | 84.80<br>(569) | 10.88<br>(73)  | 10.88<br>(73)     | 5.66<br>(38)           | 8.05<br>(54)      | 49.33<br>(331)     |

**Source:** Author's Calculation based on PSLM 2008-09

According to this table, household heads of all the districts have employment rate above 85 percent. Layyah and DG Khan are the two district where their 10 percent or more household heads are able to earn Rs.150000 or above while Rahim Yar Khan touch the bottom line with only 1.74 percent of the total sample are able to attain this category. Nearly 15 percent Household head of District Rajanpur are able to earn between Rs.100000-150000 while rest of the districts are not able to cross even 10 percent. For the ranging from Rs.50001-100000, nearly 27 percent household heads of only Rajanpur District are able to attain this while below the Rs.50000, Bahawalpur district attain highest position with 23.51 percent.

Statistical summary of dependent and independent variables is reported in table 3.

**Table 3: Statistical Summary of Dependent and Independent Variables**

|             | Mean    | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Prob. | Observations |
|-------------|---------|--------|---------|---------|-----------|----------|----------|-------------|-------|--------------|
| <b>POV</b>  | 0.185   | 0.000  | 1.000   | 0.00    | 0.388     | 1.622    | 3.631    | 2944.5      | 0.00  | 6469         |
| <b>EDHH</b> | 0.394   | 0.000  | 1.000   | 0.00    | 0.488     | 0.431    | 1.185    | 1087.4      | 0.00  | 6469         |
| <b>ASST</b> | 1171787 | 445000 | 1.37    | 0.00    | 3276106.1 | 19.24    | 628.9    | 1.06        | 0.00  | 6469         |
| <b>RDHU</b> | 8.753   | 9.000  | 12.00   | 6.00    | 1.511     | 0.301    | 3.018    | 98.416      | 0.00  | 6469         |
| <b>RDBS</b> | 6.242   | 6.000  | 10.00   | 5.00    | 1.382     | 1.248    | 4.093    | 2002.1      | 0.00  | 6469         |
| <b>RDGS</b> | 7.657   | 7.000  | 11.00   | 6.00    | 1.413     | 1.041    | 3.068    | 1169.8      | 0.00  | 6469         |
| <b>RDMM</b> | 9.389   | 9.000  | 13.00   | 7.00    | 1.868     | 0.551    | 1.913    | 644.90      | 0.00  | 6469         |
| <b>RDTP</b> | 5.293   | 5.000  | 9.000   | 3.00    | 1.498     | 1.146    | 3.641    | 1527.1      | 0.00  | 6469         |
| <b>PCI</b>  | 66.08   | 60.00  | 100.00  | 30.00   | 13.16     | 0.368    | 2.559    | 198.43      | 0.00  | 6469         |
| <b>LIVS</b> | 2.025   | 2.000  | 6.000   | 0.00    | 1.569     | 0.317    | 1.977    | 390.68      | 0.00  | 6469         |

Source: Author’s Calculation based on PSLM 2008-09

Statistical summary shows the results of different statistical methods. Poverty mean value is 0.185, RDHU mean value is 8.753. The average value of RDGS, RDMM, RDTP are 7.65, 9.38 and 5.293 respectively. The means value of GBNI is 66.08. EDHH mean value is 0.394 and UBN1 mean value is 2.025. The difference in mean values of all variables represents the adjustment effect in all variables.

**Table 4: Results of Pair-wise Correlation Matrix**

|             | POV   | EDHH   | ASST   | RDHU   | RDBS   | RDGS   | RMMM   | RDTP   | PCI   | LIVS  |
|-------------|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| <b>POV</b>  | 1.00  |        |        |        |        |        |        |        |       |       |
| <b>EDHH</b> | 0.12  | 1.000  |        |        |        |        |        |        |       |       |
| <b>ASST</b> | 0.001 | 0.025  | 1.000  |        |        |        |        |        |       |       |
| <b>RDHU</b> | -0.01 | -0.046 | 0.021  | 1.000  |        |        |        |        |       |       |
| <b>RDBS</b> | 0.004 | -0.044 | 0.035  | 0.748  | 1.000  |        |        |        |       |       |
| <b>RDGS</b> | -0.03 | -0.063 | 0.019  | 0.791  | 0.381  | 1.000  |        |        |       |       |
| <b>RMMM</b> | 0.006 | -0.037 | 0.020  | 0.582  | 0.691  | 0.752  | 1.000  |        |       |       |
| <b>RDTP</b> | 0.005 | -0.037 | 0.018  | 0.755  | 0.733  | 0.688  | 0.550  | 1.000  |       |       |
| <b>PCI</b>  | 0.177 | 0.271  | -0.001 | -0.125 | -0.122 | -0.156 | -0.137 | -0.055 | 1.000 |       |
| <b>LIVS</b> | 0.405 | 0.797  | 0.021  | -0.125 | -0.135 | -0.163 | -0.123 | -0.123 | 0.633 | 1.000 |

**Source:** Author's Calculation based on PSLM 2008-09

Table 4 shows the correlation matrix of all variables. Poverty (POV) is correlated with education of household head (EDHH), assets in possession (ASST), road distance from basic health units (RDHU) and road distance from boys school (RDBS) and shows there is no problem of multicollinearity. Poverty (POV) is also correlated with road distance from market RMMM at 0.006, road distance from bus stand (RDTP) at 0.405, which shows that there is no multicollinearity and the coefficient of correlation values are less than critical values.

### Econometric Analysis

**Table 5: Results of Binary Logit Model**

| Dependent Variable: POV |             |                     |             |                 |  |
|-------------------------|-------------|---------------------|-------------|-----------------|--|
| Variable                | Coefficient | Std. Error          | z-Statistic | Marginal Impact |  |
| C                       | 1.298***    | 0.427               | 3.034       | --              |  |
| EDHH                    | -4.799***   | 1.225               | -3.917      | -0.72368        |  |
| RDHU                    | 0.003       | 0.070               | 0.055       | 0.000452        |  |
| RDBS                    | 0.694***    | 0.108               | 6.426       | 0.104654        |  |
| RDGS                    | 0.544***    | 0.105               | 5.164       | 0.082034        |  |
| RMMM                    | 0.219***    | 0.063               | 3.455       | 0.033025        |  |
| RDTP                    | 0.456***    | 0.057               | 7.896       | 0.068764        |  |
| ASST                    | -1.691      | 1.781               | -0.948      | -0.255010       |  |
| McFadden R-squared      | 0.471       | Prob.(LR statistic) |             | 0.000           |  |
| LR statistic            | 2978.534    | Total Obs.          |             | 6469            |  |

Note: Here (\*\*\*) shows 1 percent level of significance, (\*\*) shows 5 percent level of significance and (\*) shows significance at level of 10 percent

Table 5 shows that the education of households' head (EDHH) has significant and negative impact on poverty in Southern Punjab. More precisely, the results show that one year increase in education of a household head reduces poverty about 4.799 units. This relationship is quite straight forward and showing that a household with educated head has 72 percent higher ability to fight with poverty as

compare to the household with uneducated head in our observed sample if all other factors considered constant. Therefore it can be determined that education in all aspects is one of the major factors of achieving economic development through investment in human capital. Education improves quality of lives, raises the productivity and creativity of people along with the promotion of entrepreneurship and technology. Our findings also show that education has very important role in securing economic and social progress, so it improves income distribution and facilitate in poverty reduction.

Results also show that road distance from basic health unit to residential areas (RDHU) has positive but statistically insignificant impact on poverty. More precisely, one kilometer increase in distance between basic health unit and residential areas rise the level of poverty about 0.003 units. Alternatively according to the results, a household with one kilometer addition in distance from basic health unit has 0.04 percent less ability to fight with poverty.

Results reported that the localities in which the distances of boys and girls schools are greater from the residential areas reflected that the incidence of poverty is also greater as compare to those localities which are situated closer to the education facilities. Moreover, results show that the coefficients of RDBS and RDGS are statistically significant at 1 percent and the values are 0.694 and 0.544 respectively. Which means that one kilometer increase in distance from boys (RDBS) and girls (RDGS) schools lead to 0.69 and 0.54 units increase in poverty respectively. A household with one kilometer addition in distance from boys' school has 10 percent lower ability to fight with poverty if all other factors considered constant. Similarly, if all other factors considered constant, the results show that a household with one kilometer addition in distance from girls' school has 8.2 percent less ability to fight with poverty.

Results reported that road distance from main market to residential areas (RDMM) is statistically significant at 1 percent and has positive relationship with dependent variables i.e. rural poverty. The coefficient of RDMM is 0.219, which means that one kilometer addition in distance from residential areas to main market reflects 0.129 points addition in poverty. The results show that localities which are situated near to the main markets are experiencing lower incidence of poverty, because in those localities, it is convenient for the people to fulfill their basic needs easily as compare to those localities which are living away from the markets. In simple words a household with one additional kilometer distance from main market has 3.3 percent less ability to fight with poverty.

Road distance between residential areas and transportation point (RDTP) also shows positive and statistically significant impact on poverty. The coefficient of RDTP is 0.456, which means one kilometer increase in distance from residential areas to nearest transportation point increases poverty about 0.456 points. Results show that the road distance from bus stand to residential areas have positive and significant impact on poverty. The households which are living in those villages,

which are near to the transportation points increase the mobility of the individuals in search of livelihood and support the people against poverty. More precisely, a household with one kilometer additional distance from main bus stop has 6.8 percent less ability to fight with poverty if all other factors considered constant.

Finally the impact of assets holding of a household on poverty is determined. According to the results, assets in possession (ASST) is negatively correlated with poverty. It infers that one unit increase in assets in possession decreases poverty about 1.691 units. It further shows that a household with one additional score in assets holding has 25 percent higher ability to fight with poverty if all other factors considered constant. The results stated that households with higher assets holding are financially stronger and have better ability to live over the poverty line.

Table 6: Results of Ordinary Least Square

| Dependent Variable: PCI |             | Observations: 6327 |             |       |  |
|-------------------------|-------------|--------------------|-------------|-------|--|
| Variable                | Coefficient | Std. Error         | t-Statistic | Prob. |  |
| C                       | 12.349***   | 0.110              | 111.941     | 0.000 |  |
| EDHH                    | 0.133***    | 0.033              | 3.926       | 0.000 |  |
| RDHU                    | -0.088***   | 0.027              | -3.270      | 0.001 |  |
| RDBS                    | -0.208***   | 0.039              | -5.229      | 0.000 |  |
| RDGS                    | -0.158***   | 0.038              | -4.101      | 0.000 |  |
| RDMM                    | -0.027      | 0.024              | -1.087      | 0.276 |  |
| RDTP                    | -0.022      | 0.021              | -1.053      | 0.292 |  |
| ASST                    | 1.301***    | 0.523              | 2.487       | 0.001 |  |
| LIVS                    | 0.086***    | 0.013              | 6.491       | 0.000 |  |
| R-squared               | 0.328       | Adjusted R-squared | 0.316       |       |  |
| F-statistic             | 198.501     | Prob.(F-statistic) | 0.000       |       |  |

Note: Here (\*\*\*) shows 1 percent level of significance, (\*\*) shows 5 percent level of significance and (\*) shows significance at level of 10 percent

Table 6 shows the impact of various socioeconomic indicators on per capita income of a household. Results show that the coefficient of education of household head (EDHH) is statistically significant at 1 percent and has positive impact on per capita income of a household. The coefficient of education of household head (EDHH) is 0.133 which means that households with educated household heads have higher per capita income as compare to those households which are headed by the uneducated individuals. More precisely, a one year addition in education of a household head will improve per capita income about 0.133 units. Alternatively, the results show that education is an important factor to earn income and to spend a quality life. Indirectly, education is an important factor for poverty alleviation, which improve the financial condition of a household and alternatively strengthen him against poverty.

The coefficient of road distance from health unit to residential areas (RDHU) is -0.088 which is statistically significant at 1 percent and have negative impact on per capita of a household. It means that the households which have poor access to basic health facilities are more expose to poverty and have low per capita income. The results highlighted that good health is a pre requisite to earn a handsome level of income, which can strengthen a household against poverty. Therefore the provision of basic health facilities in rural areas at door steps is a prerequisite to improve the health status of rural households and also support them to earn good and to spend a prosperous life.

Result shows that the coefficient of road distance from boys and girls school to residential areas (RDBS and RDGS) have significant and negative impact on per capita income of a household. According to the results one kilometer addition in distance from boys and girls school decrease per capita income of a household about 0.208 and 0.158 units respectively. The negative impact of road distances of schools from residential areas on per capita income of a household is quite straight forward.

It has been observed that the large distances of basic health units and schools from residential areas restricted the households to get benefits from these basic facilities and bound them to live with poor financial conditions. Because lower education and poor health both have negative and direct influence on the earning ability of a household. Therefore to get benefits from education and health facilities it is essential to contact these facilities with metallic roads. The findings highlighted that the distance between the existing health and education facilities in rural areas cannot be reduced, however the construction of good quality roads is inevitable to increase the mobility and to get maximum benefits from health and education facilities in rural areas and alternatively to support rural households against poverty.

The variables of road distance from main market to residential areas (RDMM) has negative impact on per capita income of household. It shows that the households living away or at distant points from the main markets are experiencing and living with poor economic conditions. Similarly, the variable of road distance from nearest bus stop to residential areas (RDTP) has negative relationship with per capita income of a household. The results highlighted that the households who are residing at distant points from the markets and bus stops have limited livelihoods and lower per capita income and more prone to poverty.

There for the findings highlighted that the construction of metallic roads is inevitable to increase the mobility of households from remote areas to the nearest markets for better earning opportunities, access to basic needs and to uplift their standard of living.

Result shows that assets holding of a household (ASST) has positive and statistically significant impact on per capita income. The results suggested that the households with higher assets holdings have high per capita income and better ability

to fight with poverty. In simple words, a unit increase in assets holding of a household increases per capita income about 1.301 units. Mostly the income of rural households depend on the assets holdings such as; land holding and animal raising. Therefore the results highlighted that the families who have higher possession of such assets also have higher per capita income and better ability to fight with poverty. Similarly the living standard of households is examined by the number of rooms (LIVS) available in a house. The results also depicted that a household with better standard of living has high per capita income, which means that household with improved standard of living has greater ability to fight with poverty. The result shows statistically significant and positive relationship between living standard of a household and per capita income. In short, the improvement in living standard of a household also enhanced per capita income and upswing the ability of a household to fight with poverty.

## V. Conclusion

It is reported that the incidence of poverty is higher in remote areas and people have limited access to basic needs. It is clear from the results that the households living in those villages which are near to the main markets can meet the basic needs easily as compare to the villages which are far from the main markets. It is also reported that the households living away from the bus stands have limited mobility and less ability to meet the required basic needs to spend a quality life. Similarly, the villages where basic health units are situated at distant points limited the access of households to basic health facilities and drag them below the poverty line. The results suggested that the households which are residing away from main markets and bus stands in rural areas have restricted mobility and limited livelihood opportunities. Therefore, such households have limited access to basic needs and declared as poor. Finally, it is concluded that the households who are living in remote areas have limited access to basic needs and high incidence of poverty. Study concludes that Infrastructure development, especially road development can play its role in economic growth but for this purpose, there should be good governance in the country. Its need for the time that adequate expenditure should be made in health and education sector because these two are the main responsible for economic growth and create opportunities for rural people especially of southern Punjab.

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