
IN THE NAME OF ALLAH, THE MOST BENEFICENTAND THE MOST MERCIFUL

# Rural Infrastructural Development and its Role in Poverty Reduction: Evidence from Pakistan

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# Presentation

* Introduction
* Survey of Literature
* Data and Methodology
* Results and Discussion
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# Introduction

* This study attempts to explore the role of infrastructure in poverty reduction for rural areas of Pakistan and hypothesizes that it has a key role for this purpose.
* In literature this area of research remained under dispute widely. Proponents argue strong positive effects and opponents raise question for resources of poor countries to finance such investments on account of reason that causality actually runs from poverty to infrastructure.
* However, World Bank favors proponents and emphasizes important role of infrastructure for poverty reduction.

# Introduction

* Poverty has substantially been reduced in Pakistan from 40 percent in 1970s to 22 percent in 2005-06.
* For future policy formulation it will be reasonable to find out causes for this reduction and this study hypothesizes rural infrastructural development as a cause in this regard.
* This study will prove helpful not only to present evidence from Pakistan on the issue but also contributes in rural development studies by providing empirical investigation.
* The issue in question is macroeconomic in nature but data limitations in Pakistan lead the analysis towards microeconomic dataset as proxy.

# Introduction

* Data on poverty suggests that overall poverty in Pakistan move side by side with rural poverty. So, it is reasonable to work on rural sector for the issue to be explored.

**OBJECTIVES OF THE STUDY**

* A) To explore the state of rural infrastructural development in Pakistan.
* B) To find out impact of rural infrastructural development on poverty reduction in rural sector of the economy.

# Literature Survey

* **Survey of Literature:**

After having gone through a brief but comprehensive survey of literature following guidelines have been dug out and employed in analysis phase of the study:

* Overall the studies point out strong positive role of infrastructure for growth and poverty reduction.
* Rural sector is the area of concern in studies related to developing countries:

  [Evenson (1986), Binswanger et al (1987, 1989), Looney (1992, 1997), Wanmali and Islam (1997), Khan and Sasaki (2001), , Khandker et al (2006)]

* Where the issue is explored at macroeconomic level, most of the studies utilize time-series data with simultaneous equation model.

# Literature Survey

Whereas at household level, cross-sectional dataset with single equation model is considered through logit estimation technique. One of the study also utilize panel dataset for this purpose.

* For measuring infrastructural services enjoyed by the communities public spending & core infrastructural variables (for secondary and time-series dataset) and accessibility of households and distances from infrastructural services (for primary and cross-sectional datasets) are used.

  [Saith (1981), Ahluwalia (1985), Gaitha (1989), and 'Ravalion and Datt' (1994), Fan et al (2000, 2002, 2003, 2004, 2005, 2006)]

* As earlier mentioned data limitations in this study lead the analysis towards household level, therefore, on the basis of these guidelines acceptable methodologies have been taken into consideration for evaluation purpose.

# Data and Methodology

* This study has two objectives and for each objective a separate dataset is utilized in following two different analyses

a) "Pakistan 2008 MOUZA Statistics" for status of Rural Infrastructural Development in Pakistan

b) "HIES, 2005-06" for impact of Rural Infrastructural Development on Poverty Reduction in Pakistan

# Data and Methodology:
## Status of Rural Infrastructural Development

* For this analysis, dataset titled "Pakistan MOUZA Statistics 2008" is the source. This is secondary dataset provided by Agricultural Census Organization (ACO), Lahore (A subsidiary of Statistics Division, Pakistan).
* 'MOUZA or DEH' is a sampling unit of the survey and is defined on the basis of revenue record of Pakistan
* This dataset is part of series, 1971-1979-1983-1988-1993-1998-2003 & 2008, delivered by ACO for analyzing rural development in Pakistan.
* **Number of Kanungo Circles:** 1485
* **Number of Patwar Circles:** 11298
* **Number of Total MOUZAs:** 47482
* Rural Infrastructural Development is measured by the distance of public infrastructure from MOUZAs because services are not located within the communities. Information , however, describes that in how many MOUZAs service is available within 1 KM, between 1-10 KM, 10-25 KM, 25 to 50 KM and more than 50 KM. This study takes into consideration number of MOUZAS within 10 KM range for constructing an index in this regard.

# Data and Methodology:
## Status of Rural Infrastructural Development

* This study endeavors to construct an index (I) for rural infrastructural development using principal variables i.e.

$$I = \sum_{1}^{m} W_m Z_m$$

* Where $W_m$ ar weights and $Z_m$ are principal variables. Let $X_i$ represent different components of a principal variable and $Y_i$ is measured as:

$$Y_i = \frac{X_i - Min\, X_i}{Max\, X_i - Min\, X_i}$$

* and $Z_m = \sum Y_i /_{i'}$ where m is number of principal variables

* Weights $W_m$ are measured such that:

* $0 < W_m < 1$ and $\sum_1^m W_m = 1,$ with methodology:

* $W_m = \frac{K}{\sqrt{Variance\ Yi}}$ and $K = \left[\sum_1^m \frac{1}{\sqrt{Variance\ Y_i}}\right]^{-1}$ {ensures inverse relationship of $W_m$ and variance}

# Data and Methodology:
## Status of Rural Infrastructural Development

| Principal Variables → | Education | Health | Transport And Communication | Energy | Market | Banking |
|---|---|---|---|---|---|---|
| ←Components | Primary School | Hospital/Dispensary | Metaled Road | Electricity | Livestock Market | Commercial Bank |
| | Middle School | Rural Health Center | Transport | Diesel / Petrol Pump | Grains Market | On-Line Banking |
| | High/Higher Secondary School | Basic Health Unit | Fixed Line Telephone | CNG / LPG | Fruits Market | - |
| | College | Child & Mother Care Centre | Computer/ Internet | - | Vegetables Market | - |
| | Vocational Center | Population Welfare Centre | P.C.O. | - | Govt. Procurement Center | - |
| | - | N.G.O. Dispensary | Post Office | - | Seeds Shop | - |
| | - | Private Doctor [MBBS] | - | - | Fertilizers Shop | - |
| | - | Midwife Facility | - | - | Pesticides Shop | - |
| | - | Veterinary Facility | - | - | - | - |

# Data and Methodology:

## Impact of Rural Infrastructure Development on Poverty Reduction

* Data employed for this analysis is Household Integrated Economic Survey (HIES), 2005-06 which is sub-sample of Pakistan Social & Living Standards Measurement Survey (PSLM), 2005-06. Secondary sampling unit (SSU) in HIES is household and primary sampling unit (PSU) is rural community of household.
* Each PSU includes nearly 16 SSU and PSU is representative of revenue record having a specific 'Revenue Unit No' and known as MOUZA/DEH.
* Three separate questionnaires (male, female and rural community) are used for data collection purpose.
* There are 1109 PSUs of the survey out of which 531 belong to urban and 578 belong to rural areas. During this survey in total 15453 households were interviewed and this study employed observations related to rural areas only.

# Data and Methodology:

## Impact of Rural Infrastructure Development on Poverty Reduction

* The dataset is latest in the sense that it provides information on rural communities which is related to major theme of this study i.e. rural infrastructural development.
* Keeping in view that poverty of a household is a binary response qualitative dependent variable, Logit model technique is befittingly employed for empirical analysis.

### MODEL

* **POVERTY:** Official poverty line of Pakistan for the year 2005-06 equal to Rs. 947.47 is used as threshold against adult equivalent consumption of households. This poverty line could be termed suitable for this analysis on account of two reasons:

# Data and Methodology:

## Impact of Rural Infrastructure Development on Poverty Reduction

a) Validation by World Bank
b) Computed for the same time period as HIES 2005-06

* For independent variables two vectors are included in the study:

a) Household level renowned socio-economic determinants of Poverty.
b) Community level infrastructural variables on the basis of hypothesis of the study.

* Variables, their definitions and relationships with dependent variable are defined as under:

# Data and Methodology:

## Impact of Rural Infrastructure Development on Poverty Reduction

| Variable | Definition | Expected Sign |
|---|---|---|
| **DEPENDENT VARIABLE** | | |
| **POVERTY** | Discrete Response Variable i.e. 1=Poor & 0=Non-Poor | **Dependent** |
| **HOUSEHOLD LEVEL CHARACTERISTICS** | | |
| **HHHG** | Household's Head Gender (1=Male & 0=Female)<br>Hypothesis: If gender is male than less is the chance that household will be poor | **Negative** |
| **HHHE** | Household's Head Education (number of schooling)<br>Hypothesis: Higher the education of household head, less is the chance that household will be poor | **Negative** |
| **HHHA** | Household's Head Age (number of years)<br>Hypothesis: Higher the age of rural household, less is the chance that household will be poor | **Negative** |
| **HHS** | Household Size (number of members)<br>Hypothesis: Higher the size of household, more is the chance that household will be poor | **Positive** |
| **DR** | Dependency Ratio (Dependents/Independents)<br>Hypothesis: Higher the DR, more is the chance that household will be poor | **Positive** |
| **PR** | **Participation Ratio (Workers/Household aged 10 and above)** | **Negative** |

# Data and Methodology:

## Impact of Rural Infrastructure Development on Poverty Reduction

| COMMUNITY LEVEL CHARACTERISTICS | | |
|---|---|---|
| ROAD | Availability of Road to household. A Dummy variable with three attributes i.e. metaled, paved, un-paved | Negative |
| | ROAD1 (1=metaled road, & 0=otherwise) | |
| | ROAD2 (1=paved road, & 0=otherwise) | |
| | ROAD3 (1=unpaved road & 0=otherwise) | |
| ELECT | Availability of Electricity to households (1=yes, 0=no) | Negative |
| GAS | Availability of Gas to households (1=yes, 0=no) | Negative |
| PS | Primary School (number of primary schools accessible to household where he resides) | Negative |
| PHOND | Phone Service Distance in KM from household's residence. | Positive |
| BHUD | Basic Health Unit Distance in KM from household's residence. | Positive |

# Results and Discussion

## Status of Rural Infrastructural Development

| COMPOSITE INDEX OF PRINCIPAL VARIABLES | | | |
|---|---|---|---|
| **Principal Variables** | Weights (Wm) | Average of Components of Principal Variables (Zm) | Wm x Zm |
| **Education** | 0.163338 | 0.49923 | 0.0815431 |
| **Health** | 0.222619 | 0.72619 | 0.1616630 |
| **Transport & Communication** | 0.181420 | 0.52456 | 0.0951652 |
| **Energy** | 0.153936 | 0.55372 | 0.0852374 |
| **Markets** | 0.150841 | 0.37695 | 0.0568592 |
| **Banks** | 0.127846 | 0.5 | 0.0639230 |
| **Sum** | 1 | - | 0.5443910 |

# Results and Discussion

## Impact of Rural Infrastructure Development on Poverty Reduction

***Logit Regression Estimates of Rural Infrastructural Development and Rural Poverty: Evidence from Pakistan***

| | | | |
|---|---|---|---|
| McFadden $R^2$ | 0.148451 | LR Statistic | 1418.4160 |
| | | Probability LR (Statistic) | 0.0000 |
| Number of Observations | | 8480 | |

| Independent Variables | Coefficient | z-Statistic | Probability | Odd |
|---|---|---|---|---|
| C | 0.369631 | 1.905976 | 0.0567 | 1.447 |
| HHS | 0.047657 | 6.621234 | 0.0000 | 1.049 |
| HHHA | -0.024344 | -11.186110 | 0.0000 | 0.976 |
| HHHG | -0.179198 | -1.787296 | 0.0739 | 0.836 |
| HHHE | -0.126490 | -16.794570 | 0.0000 | 0.881 |
| PR | -1.269385 | -9.963761 | 0.0000 | 0.281 |
| DR | 0.468132 | 15.340570 | 0.0000 | 1.597 |

# Results and Discussion

## Impact of Rural Infrastructure Development on Poverty Reduction

***Logit Regression Estimates of Rural Infrastructural Development and Rural Poverty: Evidence from Pakistan***

| Independent Variables | Coefficient | z-Statistic | Probability | Odd |
|---|---|---|---|---|
| ROAD2 | -0.224418 | -2.069476 | 0.0385 | 0.799 |
| ROAD3 | 0.292320 | 3.552242 | 0.0004 | 1.340 |
| ELECT | -0.396249 | -3.786653 | 0.0002 | 0.673 |
| GAS | -0.377397 | -3.304925 | 0.0010 | 0.686 |
| PS | -0.010623 | -1.407971 | 0.1591 | 0.989 |
| BHUD | 0.004883 | 2.818057 | 0.0048 | 1.005 |
| PHOND | 0.000085 | 0.031975 | 0.9745 | 1.000 |

# CONCLUSIONS

* Overall status of rural development in Pakistan could be termed as poor because most of the public services are not available to rural inhabitants in their areas of residence.
* The composite index also shows almost half of the MOUZAs are located at a distance of more than 10 KM from all type of infrastructural services.
* It is also found out that the vectors of household's characteristics and community characteristics have shown significant positive impact on poverty reduction in rural areas of Pakistan (in line with international evidence).
* So far as comparison of household level characteristics and community level characteristics is concerned it could easily be inferred that community level characteristics have secondary role for poverty reduction while household level characteristics have played primary role (contribution of this study).
* Out of rural infrastructural public services, gas and electricity are proved to be comparatively more important for poverty reduction of rural areas in Pakistan.

# Thanks for Patience