

Education Infrastructure, Literacy and Food Security Matrix in Pakistani Punjab: A District Level Analysis

**Hafiz Zahid Mahmood¹, Muhammad Khan², Muhammad Iftikhar ul Husnain³
& Sana Iftikhar⁴**

Abstract

Hunger and education are top listed in the millennium development goals and their significance cannot be ignored to achieve high living standards and economic development of the nations. Illiteracy has been termed as economic backwardness which is major cause of conflicts (Do and Iyer, 2009) leading to immobility of the people due to dread and resultantly cause food insecurity amongst them. Ample education infrastructure, definitely, helps to promote Literacy rate which is one of the key component of Human Development indicators. Unfortunately, Pakistan ranks 141 out of 158 countries in Human Development Index over the globe (Kugelman and Hathaway, 2010) due to its low education spending which is just 2.1 percent of its GDP share (Government of Pakistan, 2010). Moreover, education is one of the key determinant of poverty in Pakistan and 10 million people of this country were added to inadequate food intake in just two years from 2006-2008 (Kugelman and Hathaway, 2010). The current study has been devised to observe the relationships between education infrastructure, literacy rate and food security in thirty four districts of the Punjab province of Pakistan. Crossectional data were extracted from two different sources i.e. Punjab Development Statistics (Government of Punjab 2009) and Food Insecurity in Pakistan (SDC, SDPI and WFP, 2009). Semi log econometric model was rendered to study the relationships between independent (i.e number of boys and girls schools, separately, population per primary and Middle school, separately, and number of adult literates in the area) and a dependent variable (i.e. food insecurity). The econometric model delineated positive relationships between boys and girls school infrastructure, population per primary and Middle school with food insecure population at district level. However, the trends exhibited by adult literates and food insecurity were found negative as per expectations and witnessed by literature. As per results of the study it is recommended that provincial and district governments must make some structural changes in the education systems by focusing on schools infrastructure to increase literacy rates to achieve targets of food security.

¹ Assistant Professor, COMSATS Institute of Information Technology, Lahore, Pakistan.
Email: drhafizzahid@ciitlahore.edu.pk

² Assistant Professor, COMSATS Institute of Information Technology, Lahore, Pakistan.
Email: mkhan_490@yahoo.com

³ Associate Professor, Department of Management Sciences, COMSATS Institute of Information Technology, Islamabad, Pakistan. Email: iftikharhusnain@yahoo.com

⁴ Research Associate, Department of Management Sciences, COMSATS Institute of Information Technology, Lahore, Pakistan. Email: sanaiftikhar@ciitlahore.edu.pk

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1. Introduction

Elimination of hunger and provision of education are top listed in the Millennium Development Goals (MDGs), as high living standards are directly linked with these two factors. Enormous efforts have been registered by pyramids of global, regional and local organizations teaming up with developing nations to get rid of these bottlenecksto economicdevelopment. Consequently, manycountries are near to achieve MDG by enrolling their maximum school going children in primary schools. According to World Bank (2010), 90 percent of primary school age children of more than 60 countries have been enrolled in schools and in this way number of children out of school has been reduced from 115 million in 2002 to 72 million in 2007, despite their growing populations. The primary school completion rate for developing countries, middle income countries and low income countries reached 86 percent, 93 percent and 65 percent in 2007, respectively. However, despite significant progress towards the 2nd MDG, there are still 31.5 and 41 million children out of primary schools in South Asia and Sub-Saharan Africa. Therefore, a lot of efforts requireachieving the millennium targets concerning primary education.

As far as poverty is concerned, people living below poverty line account for 95 % population of the whole developing world. However, according to the estimates of the World Bank, the number of poor fell from 1.3 billion to 900 million from 2005 to 2010. As per projections results of the study, the number of poor will fall to less than 600 million after 2015 which is absolutely in accordance with 1st MDG.

But, unfortunately, current financial crises may cause hurdles in attaining these valuable targets (Chandy and Gertz, 2011).

In Pakistan, the share of food insecure population increased from 23 to 28 percent intaking less than 1700 calories compared to 2350 calories from 2005 to 2008. However, share of population increased from 23-24 percent by intaking 1700-2100 calories in the same period. Aggregating both aforementioned figures the overall 52 percent population of Pakistan was found food insecure (Kugelman and Hathaway, 2010). Although a number of safety nets have been introduced by the government including Pakistan Bait ul Mal which disbursed Rs 2.7 billion to 1.438 million beneficiaries in 2009, Rs 1.65 Billion to 1.11 million beneficiaries in 2010 and Rs 2 billion in 2011 (Ahmad and Farooq, 2010).

Zakat and Usher programme implemented by Ministry of Foreign Affairs and Benazir Income Support Programme has disbursed Rs 46 Billion in 2009-10 and Rs 50 billion were allocated for 2010-11 under this scheme (Ibid). In addition many other programs have been launched to combat poverty and food insecurity with the support of WFP, WHO, UNICEF and UNESCO. But all these programmes could not produce considerable results in the absence of education and literacy programme.

According to Food and Agriculture Organization and World Food Programme (2010), lower literacy results into high level of undernourishment. Moreover, they are with the opinion that investment in basic education helps, considerably, in reducing food insecurity and undernourishment by enhancing the farm productivity of small and subsistence farmers. As expressed in Human Development Report of South Asia (1998) "According to the World Bank, a farmer having four years of education is 9 percent more productive than his counterparts with zero education". In a cross country analysis Burchi (2006) studied the relationship between education, human development and food security. He found that 100 percent increase in younger children attendance at school can reduce about 22 percent food insecurity, but this relationship was observed only for basic education but not for higher education. World Food Programme and Food and Agriculture Organization (2010) observed negative relationship between Global Hunger Index and education along with many other indicators.

Although access and availability of food are two major indicators of food security but combination of energy and nutrients are also important factors to get appropriate caloric requirement. In this regard, literacy and female education play pivotal role, while lack of knowledge may result into caloric deficiency despite the availability and access to ample food (Kugelman and Hathaway, 2010). Emphasis on women education may alleviate undernourishment in the societies. A primary pass woman is instrumental to reduce undernourishment 3 times as compared to increments in income by 10 percent (Alderman and Garcia 1993).

Noble Laurites Theodore Schultz and Gary Becker theorize that education helps people to earn higher wages in the labor markets. Moreover, labor productivity can be increased by investing in human capital via schooling. It is also argued that higher productivity of workers is a result of greater stock of human capital and is also an outcome of higher wages in the market (HDRSA, 1998).

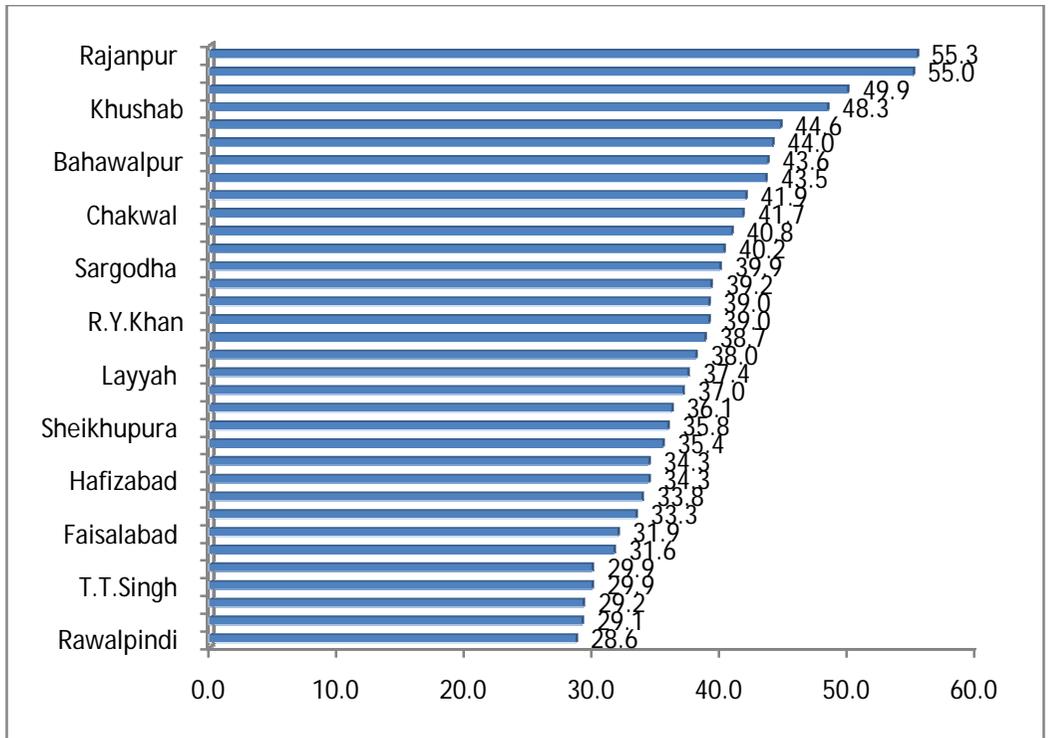
Schultz (1988) and Becker (1993) also supported the facts concerning investment in human capital through schooling which leads to attain higher wages and greater level of productivity in the market. Empirical evidence from Bangladesh strongly supported the hypothesis by investigating salary differences of high school educated women which had been found 7 times higher than the salaries of women with no education (World Bank 1993). In case of Pakistan, it was observed that with 10 percent increase in male literacy causes 2.7 percent rise in farm productivity while 10 percent enhancement in any other input augments half the level of output as compared to education (Rosegrant and Evenson 1993).

Surprisingly, educated neighbors have also positive impacts on the work efficiency compared to illiterate neighbors. This kind of observation was undertaken by Foster and Rosenzweig (1995) in India. They observed 4 percent higher profitability rate of the farmers having no schooling if their neighbors had primary school education completed as compared to illiterate ones. Investment in human capital not only helps to increase wages, profits and productivities but also fosters different rate of return in case of several numbers of years spent in the educational institutions. In a World Bank (1994) study, it was explored that Nepalese people received 100 percent return on investment on primary education, 29.1 and 15 percent on lower secondary and secondary education, and 2.17 percent return on Bachelors education, respectively. In the same study, It was also delineated that rate of return had been far higher in case of girls education as compared to boys.

The review of literature proved that investment in human capital promotes productivity, augments wages and fosters rate of return at different levels. That is why it is quite evident and can be easily understood that these developments would definitely lead to reduce poverty and suppress undernourishment and promote food security in the population. Moreover, education and literacy can also work as engine of economic growth which ultimately results into better living standards, higher level of employments, and better wealth distribution in the countries. It is evident from Human Development Report of South Asia (1998), Japan and East Asian economic growth is liable to physical and human capital. It is perceived that 60 to 90 percent of their growth owe to physical and human capital. Several different factors contributed in the growth of East Asian economies but consensus lies on basic education in these countries.

Illiteracy has been termed as economic backwardness which is major cause of conflicts (Do and Iyer, 2009) leading to immobility of the people due to dread and, consequently, cause food insecurity amongst them. Ample education infrastructure, definitely, helps to promote literacy rate which is one the key component of Human Development indicators. Unfortunately, Pakistan ranks 141 out of 158 countries in Human Development Index over the globe (Kugelman and Hathaway, 2010) due to its low education spending which is just 2.1 percent of its GDP share (Government of Pakistan, 2010a). According to World Bank (2009), public expenditure on education in India, Bangladesh, Maldives, Nepal and Iran were 3.3, 2.6, 8.3, 3.2 and 5.2 percent of their GDP, respectively, which had been higher than Pakistan in any way. Moreover, education is one of the key determinant of poverty in Pakistan and 10 million people were added to inadequate food intake in just two years from 2006-2008 (Kugelman and Hathaway, 2010). The literacy rate in 10 years and above population in the first decade of the 21st century has progressed from 45 to 57 percent in Pakistan while literacy figures has improved from 55-59 percent in the province of Punjab (Government of Pakistan, 2010). As caloric definition of poverty which is 2350/capita were improved from 22.3 percent to 26.1 percent from 1991 to 2005-06 (Ibid). As current empirical work is all about Punjab so it would be beyond the scope of the study to give such detail at the national levels.

Punjab is one of the major provinces with almost 50 percent of GDP contribution in every sector of the economy. The province contributes 62.2 % of Community and social services, 61.3 % of whole sale and retail trade, 57 % of agriculture and 58.2% of industrial value added in the national gross product of the country (Government of Punjab 2007). Moreover, this province shares 63 percent population of the country which is an overwhelming number to affect country's policies as well as public sector decisions to make tangible outcomes within the borders. Due to lion's share of the Punjab province in the economy of the country and prevailing population share over rest of the other regions in the country, it has been decided to observe the education and food security relationships in all of the districts of the Punjab province. Punjab is comprised of 34 districts in total which are distributed in central, southern, and northern Punjab. All of the districts have been taken into account to achieve the objectives of the study. The objectives of the study are as follows:

Figure.1 Food Insecure Population in districts of Pakistani Punjab(%)

Source: By author on the basis of data taken from SDC, WFP and SDPI (2009)

2. Objectives

- 1- To observe the relationships between boys and girls school infrastructure and food insecurity at district level in the province of Punjab.
- 2- To quantify the trends between the population per primary school and food insecurity at district level.
- 3- To explore the relationships between population per Middle schools and food insecurity at district level.
- 4- To gauge the impact of adult literacy rate on food insecurity by using district level data of Punjab province.

3. Materials and Methods

To achieve the objectives of the study, cross-sectional data were extracted from two different sources i.e. Punjab Development Statistics (Government of Punjab, 2009) and Food Insecurity in Pakistan (SDC, SDPI and WFP, 2009). Different independent variables (i.e. number of boys schools, number of girls schools, population per primary school, population per middle school and adults literates in the districts) and a dependent variable (i.e. % food insecure population) were selected from all 34 districts of the Punjab province. Initially, data about several other variables were also collected from the subjected data sources but due to multi-collinearity problems a number of variables of interest had to be dropped which might have produced biased results if incorporated. Due to the type and trends of available data, Semi log econometric model was employed to achieve the best results of the study. In this regard, statistical Package for Social Sciences (SPSS-17) was utilized for data analysis purposes. Several regressions were run using enter, hierarchical, forward and backward methods but following best econometric model was selected to express the results and relationships between variables of interests.

$$y = \beta_0 + \ln \beta_1 X_1 + \ln \beta_2 X_2 + \ln \beta_3 X_3 + \ln \beta_4 X_4 + \beta_5 X_5 + \mu$$

Where,

y = percentage of food insecure population in all of the 34 districts of the Punjab province

X_1 = Boys Infrastructure (i.e. number of Primary, Middle, secondary and higher secondary schools in all of the 34 districts of the Punjab province)

X_2 = Girls Infrastructure (i.e. number of Primary, Middle, secondary and higher secondary schools in all of the 34 districts of the Punjab province)

X_3 = Population of each district per Primary school in all of the 34 districts of the province

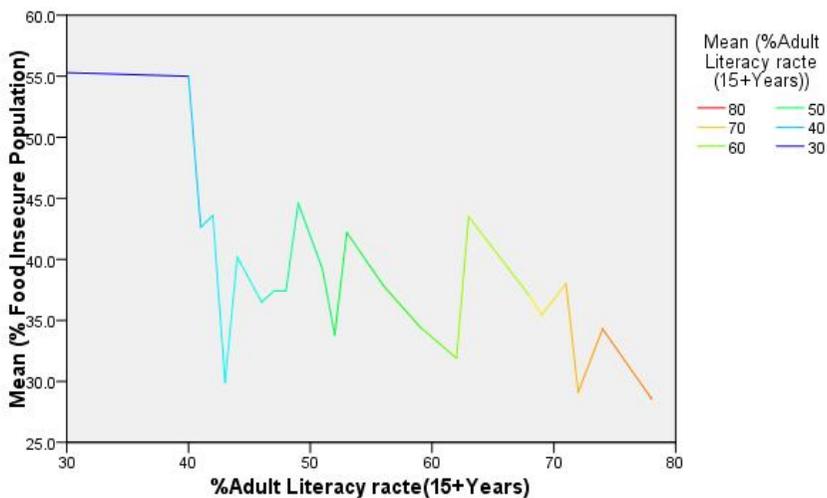
X_4 = Population of each district per Middle schools in all of the 34 districts of the province

X_5 = Number of Adult literate in all of the 34 districts of the Punjab province

4. Results and Discussion

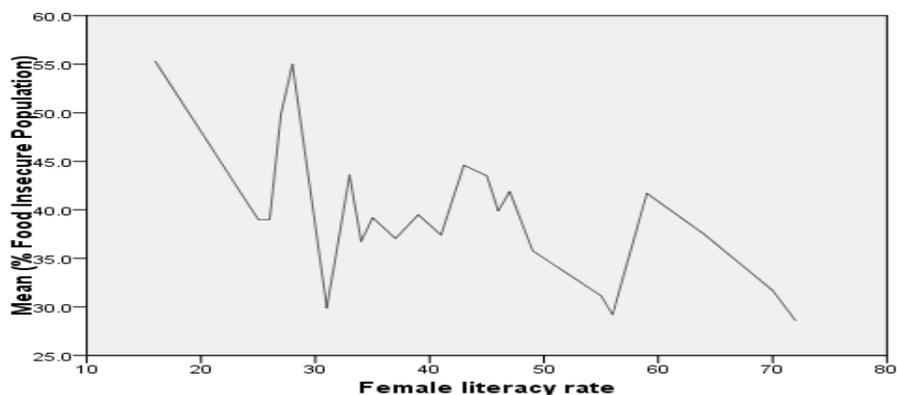
Data analysis was finalized by making sure that a) assumptions of the regression were satisfactorily fulfilled b) variables showing multicollinearity problem were dropped and c) the dropped variables from the model had been selected to draw interactive graphs. A keen look (Figure-2) on the relationship between female literacy rate and corresponding food insecure population (FIP) in the districts of the Punjab province expresses a negative relationship confirming results of many other studies quoted in the literature review. Moreover, relationship between adult literacy rates and food insecure population (Figure-1) was also found negative confirming once again the findings of the previous studies (WFP and FAO, 2010) which means there is a positive relationship between food security and literacy rates. Furthermore, figure-3 corroborates negative relationship between overall population of the districts of the Punjab province and their corresponding food insecure population which is according to the expectations.

Figure-1: Relationship between Food Insecure Population and Adult Literacy Rate



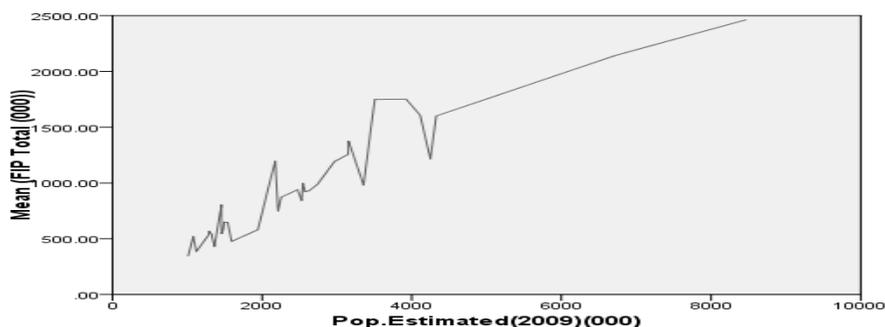
Source: by author

Figure-2: Relationship between Food Insecure Population and Female Literacy Rate



Source: by author

Figure-3: Relationship between Food Insecure Population and Population



Source: by author

As far as econometric modelling results are concerned, table-1 exhibit the statistical relationships and trends of relationships between dependent (% food insecure population) and independent variables (i.e. natural log of number of boys schools, natural log of number of girls schools, natural log of population per primary schools, natural log of population per middle schools and Natural log of number of literates of the districts). It is evident from the table that econometric model is highly significant at less than 1 percent which is also confirmed by the high F value (84.102). Moreover, the econometric model expressed some surprising results delineating positive relationship between boys and girls schools infrastructure.

However, positive relationship between dependent variable and population per Primary and Middle schools were found (+ve) as per expectations in the districts of the Punjab province. Furthermore, literacy rates were found as negatively related with food insecure populations of the districts which is, absolutely, in line with the literature and as per expectations of the authors of this study. Moreover, these all results are being endorsed by their significance levels .i.e. less than 1 %. The results of the infrastructure incorporated in the model

Table-1: Results of Econometric Model

Model	β	P – Value
(Constant)	-.254	0.724
Ln-BoysInfra	.661	0.000
LN-GirlsInfra	.714	0.000
Ln-Population per Primary School	.867	0.000
Ln-Popualtion per Middle School	.416	0.000
Ln-Number of Adult Literates/district (15+ Years)	-.404	0.005
R ² : 0.94 F: 84.102 a. Dependent Variable: % Food Insecure Population in the districts of Punjab		

exclaim that with the increase in boys and girls school infrastructure foster food insecurity in the area under study. However, positive relationship between the infrastructure and food insecurity might be due the following facts that a) majority of the population in Pakistan including Punjab province is residing in rural areas and a paramount numbers of remote area schools are ghost schools which are being worsley operated and maintained by the public sector authorities b) political involvement in the teachers appointment results into high level of absenteeism on behalf of the teachers and they just attend the school in first week of the every moth to draw their salaries.

As far as the relationship of population per primary and middle schools with the food insecurity is concerned , those might be explained as c) the rise in population per school against primary and middle school, overwhelmingly, increases food insecurity, which is quite logical outcome of the model.

Rise in population per school depicts the least interest of policy makers in increasing the literacy amongst its people. Moreover, it is also expected that high poverty rates may have compelled parents to send their children to work when they don't find space for education due to less schools in their area. It is, noteworthy here, that as per best knowledge of the authors none of the researchers has worked on such kind of indicators (i.e. population per school) and this findings might be a good addition in the existing development literature.

However, the trends exhibited by adult literates and food insecurity were found negative as per expectations and witnessed by literature. Moreover, the relationship between food insecurity and adult literacy is in-line with the view of Malik (2011) and World Food Programme and Food and Agriculture organization (2010). The table-1 shows that one percent increase in adult literacy rate will reduce food insecurity by 0.4 percent in the districts of the Punjab province.

5. Conclusions

It is concluded from the results of the study that literacy rate have positive relationship with food security and, conversely, it is negative one with food insecure population. It was also found that food security level of the population increases with the rise in literacy level of the population. However, the inverse relationships between infrastructure and food security was explored which was against the expectations of the author and did not support by the literature. However, relationships of population of the district per school were found positive with the food insecure population or conversely we may say found negative with food security which was as per expectations.

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