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SPILOVER EFFECTS OF POPULATION AGGLOMERATION AND POVERTY REDUCTION IN PUNJAB

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Abstract

The basic Islamic sources reveal that Islam abominates poverty and gives a favorable structure to reduce it. The population growth, rural urban migration and poverty are the debateable issues particularly in the developing Islamic world. This paper investigates the spillover effects of population agglomeration on poverty in the Punjab. The data has been obtained from the Multiple Indicator Cluster Survey (MICS) for the year 2011 which is conducted by the Punjab Bureau of Statistics (2011). First, this study measures the poverty rate in different districts of Punjab. Secondly, this study used Logistic regression to examine the impact of population agglomeration, household head characteristics and demographic variables on poverty. The results show that regional disparity exist among different districts of Punjab in terms of poverty. Moreover, spillover effects of population concentration on average help to reduce poverty. The results show that education, wealth status of household head, gender of household head, household heads that are living in urban areas, occupation (working manually) and household heads who are living Gujranwala are less likely to being poor in Punjab, Pakistan. While the family size and marital statuses (married) are more likely to being poor. On the other hand, the variables age, age squared, Bahawalpur and Sargodha have no impact in determining poverty. Overall, the study suggest that due to population concentration, business activities of a particular district reduces poverty.

Keywords: Agglomeration; Agglomeration Economies; Gender Disparity; Poverty; Punjab

1. Introduction

The agglomeration economies are the benefits reaped due to the concentration of population, business activities, and firms in close proximity to one another (O'Sullivan, 2003). In the literature of economic geography, agglomeration economies also refer as urbanization economies (Henderson; 1988, Henderson; 2003 and Duranton and Puga 2004). The literature suggests that the positive effects of agglomeration economies generate employment opportunities and job creation in both developed and developing countries that help to reduce household poverty (Ayyagari *et al.*, 2011). By contrast, different studies suggest that the negative effects of agglomeration also exist that might not help to reduce poverty as over-congestion increases the labor supply, environment pollution, unemployment, and crime rate both in developed and developing countries (Henderson; 2003 and ANDE, 2012).

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Therefore, agglomeration economies do not necessarily lead to reduce poverty. On the other hands, the fundamental Islamic readings suggests that poverty can be eliminated by the giving *zakah* to poors. The concentration of people give rise to the business activities which increases employments level to thereby welfare of the general public. The poverty can be eliminated in the developing Islamic world if beneficiaries of such business activities give *zakah* to poor according to the framework provided by the Islam.

The high population growth and poverty are two salient facts of many Islamic developing nations like Pakistan. Both create severe difficulties in the growth of per capita income and development process. Besides, these factors are interrelated. A decent comprehension of their causes and of the way of their relationship is imperative for making a decision that could promote the development process and per capita income in the developing nations. Along these lines, the present study is aimed to research the relationship between agglomeration economies and poverty.

The World Bank (2004) stated that poverty is associated with inadequate health, lack of education, deficient nutrition, child labor, and lack of access to water supply, insufficient social relations, landlessness, insecurity, low self-esteem, and powerlessness. An individual is said to be poor if it lives on less than US-\$2 a day. Extreme poverty is referred to such living conditions in which a person is earning less than US-\$1 per day. In Pakistan, the poverty line is defined based on a calorie that is taken as per income consumption on food and non-food items to support food consumption per month, which yields 2350 calories by an adult per day (Pakistan Economic Survey, 2013-2014). However, there is evidence that growing income may cause to reduce poverty. The World Bank identifies absolute poverty by poverty line according to a per-capita income threshold level.

Among others, concentration of various business activities is one of the main factors for economic development. Since economic development can lead to poverty reduction, therefore, agglomeration economies can have significant impact on households' wellbeing and poverty alliviation (Demery and Squire, 1996). Some benefits reaped out of business clusters; it could be considered that it may lead to an increase in the productivity of labor by channels like knowledge spillover, labor matching, sharing intermediate input, and labor pooling. Industrial clusters is playing an integral role in creating new jobs and generating income for poor economies. Clustering has made collaboration of people with different levels of education and formal training more manageable by providing them a forum to work as a team. Firms working together make the industry more strong with collective actions that foster the welfare of developing countries, and they further widen their social and economic development goals.

This study examines the nature of poverty in the different districts of Punjab. The specific objectives of this study are to analyze the impact of agglomeration on household poverty, to evaluate the effect of household head's gender, education, and geographical factors on household poverty in Punjab. A thorough understanding of agglomeration and local households characteristics is much of importance when formulating policy interventions to imrove household wellbeing and reduce poverty. To the best of knowledge, this area of research concerning the relationship between agglomeration and household poverty has rather been ignored earlier in Pakistan. The present will fill in this gap in the literature.

2. Literature Review

Previous studies examined the impact of education, gender, health, per capita income, and the other the socio-economic factors on household poverty. However, there is limited

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literature that explored the relationship between agglomeration economies and poverty (see i.e., Lanjouw and Lanjouw 1995, Martinez *et al.*, 2009 and Christiaensen and Todo 2014). Therefore, the present study divided the literature review into two sections. Firstly, it reviews those studies which are closely related to the relationship between poverty and agglomeration economies (urbanization). Secondly, it considers those studies which investigate the determinants of poverty.

2.1 Poverty and Agglomeration

Agglomeration economies can have both positive and negative effects on the socio-economic variables of the developed as well as developing countries. It has a positive impact on poverty by generating employment opportunities and high wages. Christiaensen and Todo (2014) studied the nature of structural transformation (agricultural to manufacturing and service sectors), and the concentration of workers (migration from rural to urban areas) help to reduce household poverty. They found that migration from out of the agricultural sector to the rural nonfarm economy and the secondary town is associated with alleviating poverty. The study by Lanjouw and Lanjouw (1995) also showed the positive impact of rural nonfarm activities on poverty reduction and growth. Some studies suggested that there is a need for more land for industrial clusters (Tuyen, 2014). So the loss of land for building industries results in the loss of agricultural income, which causes to increase poverty. On the other hand, it is suggested that industries or firms generate employment opportunities and improve the welfare of local people. Johnson (2002) found that nearly 100 million new jobs were created by the agglomeration of firms in the urban areas of China during 1985-2002.

Martinez *et al.*, (2009) analyzed the impact of urbanization on poverty for the various countries in the world and found a U-shaped relationship between these variables. They argued that urbanization reduces poverty but at much later stages.

Christiaensen and Todo (2014) argued that during the development process, nations move from the agriculture sector to urbanization. However, structural transformation and urbanization patterns vary significantly. Few countries encourage migration from agriculture to non-farm activities and others experiencing fast agglomeration in urban sectors. They utilized cross-country panel data for developing countries for the period 1980-2004. They found that structural transformation from the agriculture sector to non-farm economic activities significantly reduce poverty than agglomeration in urban areas. This implies that the agglomeration of the population in urban setup deserves more consideration by the policymakers while endeavoring poverty reduction.

Nguyen *et al.* (2013) utilized panel data for Vietnam, gathered from various household surveys, and examined the impact of agglomeration on consumption and per capita income. They found that one percent expansion in urbanization increases per capita income by 0.54 percent and 0.39 percent raise in per capita consumption of households. Also, one percent expansion in urbanization leads to decrease the household poverty level by 0.17 percent.

According to Lewis theory the underdeveloped economy consist of two sectors. One is rural agricultural sector which is overpopulated, fixed capital and variable input labor, having surplus labor with zero marginal productivity. And other is urban industrial sector with high productivity of labor. The aim of the model is transfers of labor and enhances the output growth and employment level which is based on the industrial investment and capital accumulation. It is assumed that if the wage rate in industrial sector is 30 percent higher than agricultural sector. So it causes to shift the labor from agricultural sector to industrial sector without any loss. Now the

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increase in labor leads to increase the productivity of labor and hence increases output. The profit rises of the industrial sector and goes to reinvest in the business (Todaro and Smith; 2003).

Many countries experience a process of industrialization which requires migration from rural to urban areas and mobility of labor from low productive sectors (agricultural) to high productive sectors (industries) [Fang and Dewen (2003), Christiaensen and Todo (2014), Todaro and Smith (2003)]. They found that main reason of migration is differences in income. The larger the income gap among formal and informal sectors, the larger the flow of people to leave the rural sector for the urban sector either formal or informal sectors. The author did not only study the effects of income disparities on migration alone but also investigated the differences in market structures between rural and urban areas and among different regions such as eastern, central and western. Fang and Dewen (2003) studies the spatial pattern and large scale migration in China. The population survey data during 1990-2000 was used for empirical analysis. The empirical results showed that job environment, the employment opportunities and accessibility in urban areas become more important factors in determining decision regarding migration.

2.2 Other Determinants of Poverty

Different studies investigated the impact of gender inequality, household income, household size, geographical zones and education on poverty. Most of the studies used household survey data either on rural areas (Gustafsson and Li 2004; Wu *et al.*, 2008; Hashmi *et al.*, 2008), urban areas (Nguyen *et al.*, 2013), regional level (Chen and Wang, 2015) and country level (Shapiro and Tambashe, 2001; Mukherjee and Benson, 2003; Gounder and Xing, 2012).

The previous studies used different methodologies for analyzing the determinants of poverty. Some authors utilized hierarchical generalized linear models while others used more sophisticated probit or logit models. For instance, Chen and Wang (2015) studies the determinants of poverty in Taiwan at family and regional level by using 2006 survey data of 13,640 households from 23 cities and counties (regions). They used hierarchical generalized linear models and found that female headed, old adults, families with more children and dependency ratio, income inequality, low job quality and greater spatial mismatch have significant impact on increase poverty level. Moreover, families with education attainment, service to manufacturing ratio and more earners have negative relationship with poverty. The relationship between household heads (younger than 30 years) and poverty is unclear while married and widowed families are less poor than unmarried families.

Mukherjee and Benson (2003) study the determinants of poverty in Malawi by using primary data on 12,960 households over period of 1997-1998. The authors used regression analysis to measure the impact of determinants of poverty. The simulation results show that high level of education especially for female heads and transformation of labor from agricultural sector into trade and services sector have significant impact on reducing poverty in Malawi.

Nguyen *et al.*, (2013) examined the determinants of urban poverty in two largest cities (Hanoi and Ho Chi Minh) of Vietnam. They used regression analysis and survey data sets in 2009. They find that Hanoi (17.4%) has high rates of poverty than Ho Chi Minh (12.5%). Also the poor households have low quality of house condition especially the unavailability of tap water, fewer assets, lower education and unskilled work than non poor households.

Shete (2010) examine the magnitude and determinants of rural poverty in Zeghe Peninsula. The author used Foster-Greer-Thorbeck measure and identifies that 32.8% of people live below the poverty line. The author used questionnaire survey data from 200 households and apply logit model. It is observe that land holding size, land for coffee production, participation of

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households in contractual farming, trading, and beekeeping and fishing activities decreased the chances of households to be poor. While high rate of dependency ratio and households who are working in firewood-selling activities are have more chances to being poor.

Geda *et al.*, (2005) investigate the determinants of poverty in Kenya. The household survey data in 1994 is used in the study. The study used both binomial and polychotomous logit models. The study shows that poverty in Kenya is strongly associated with level of education, size of household, working in agricultural sector and residential area. The results show that poverty rate is high in rural areas as compared to urban areas. Education has positive impacts to reducing poverty especially for female household headed because female have more chances to being poor as compared to men. Because educated female and fertility are negatively correlated, so it may have impact on household size. Moreover, the people who are engaged in agricultural sectors are poor as compare to who are working in other economic activities.

Alkire and Roche (2011) study the breadth and components of child poverty in Bangladesh. They used data over the period of 1997 to 2007 from four rounds of Demographic Health Survey. The result shows that child poverty should not assess only according to the incidence of poverty but also the intensity of poverty.

Salahuddin and Zaman (2012) studies trends of poverty in Pakistan by using Alkire and Foster methodology using data set 2006-2007 for the four provinces of Pakistan. They find that Punjab is the least poor, Sindh is the second lowest poor, KPK is the third and Balochistan is the poorest province of Pakistan.

Although a rich literature is available on determinants of poverty but a few studies are conducted in separate analysis of agglomeration especially for Pakistan. To the best of knowledge, this area of research concerning the relationship between agglomeration and household poverty has rather been ignored earlier in Pakistan. Therefore, the study is expected to contribute to the literature by examining the impact of agglomeration on poverty alleviation.

3. Theoretical Foundation and Methodology

The theoretical framework helps us to develop the hypotheses regarding the each variable taken into the consideration. The econometric model is used to analyze the impact of agglomeration, household characteristics and geographical areas. The first Alkire and Foster methodology is used to measure the deprivation among poor people in the different districts of Punjab. There are many studies which used the multidimensional poverty index to measure poverty. [see i.e. Tsui (2002), Dewilde (2007), Ayala *et al.*, (2011), Alkire and Foster (2011), Alkire and Jose (2011), Salahuddin and Zaman (2012) and Guedes *et al.*, (2012), Iqbal *et al.* (2020)]. Secondly, logit model is used to measure the impact of agglomeration, household characteristics and geographical area (divisions) on poverty.

3.1 Logit Model

The aim of the study is to measure the determinants of poverty. This study uses logistic regression to measure the impact of agglomeration, gender, size, age, wealth index, education, occupation of household head and geographical factors on poverty in Punjab. The dependent variable in the model is dichotomous, taking a value of one if household is poor and zero if the household is non-poor. In such cases where dependent variable is in the form of dummy variable, binary choice model should be considered. There are different studies which used binary choice model to determine the impact of gender, education and geographical factors on poverty. Studies

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of Nguyen *et al.*, (2013), Hashmi *et al.*, (2008) and Dudek and Lisicka (2013) used logistic regression to measure the determinants of poverty. The main idea behind the analysis is to find the relationship between the probabilities of being poor with respect to explanatory variables. Greene (2000) assumes following binary choice model:

$$P_i = P_i(Y_i = 1) = F(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki}) \quad (1)$$

P_i = probability, $i = 1, 2, \dots, n$,

F = a cumulative distribution function (CDF),

β_j = parameters, $j = 0, 1, 2, \dots, k$,

X_{ji} = value of explanatory variable X_j for i -th household,

k = number of explanatory variables,

In logit model the probability of being poor is determined as:

$$Prob(Y = 1 | x) = \frac{e^{-x_i^T \beta}}{1 + e^{-x_i^T \beta}} \quad (2)$$

And the probability of being non poor is defined as:

$$Prob(Y = 0 | x) = \frac{1}{1 + e^{-x_i^T \beta}} \quad (3)$$

where

$$X_i^T \beta = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} \quad (4)$$

$$\frac{\partial P(y_i=1|x_i)}{\partial x_i} = \beta_j \left(A(x_i^T \beta) \cdot 1 - A(x_i^T \beta) \right) = \beta_i \cdot P_i \cdot 1 - P_i \quad (5)$$

Here A shows the logistic cumulative distribution function.

In logit model, the explanatory variables are interpreted as in the form of odd ratio. The odd ratio is defined as the probability of occurrence of an event to the probability of failure.

Hence odds are equal to $e^{-x_i^T \beta}$, because

$$\frac{P_i}{1-P_i} = \frac{e^{-x_i^T \beta} / 1 + e^{-x_i^T \beta}}{1 / 1 + e^{-x_i^T \beta}} = e^{-x_i^T \beta} \quad (6)$$

In case of interaction term, the odd ratio is defined as:

$$odd\ Ratio = \frac{odds\ for\ (x_1+1)}{odds\ for\ (x_1)} = exp(\beta_1 + \beta_3 x_{2i}) \quad (7)$$

The empirical estimation of present study has two objectives. First, is to analyze the impact of agglomeration on household poverty in Punjab. Second, is to analyze the impact of gender,

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education and geographical regions on household poverty in Punjab. Keeping in view the existing literature, this study has developed following econometric model:

$$Y_i = \beta_0 + \beta_1 Aggl_i + \beta_2 Age_i + \beta_3 Age_i^2 + \beta_4 WI_i + \beta_5 MSt_i + \beta_6 Gend_i + \beta_7 Size_i + \beta_8 Edu_i + \beta_9 Area_i + \beta_{10} BP_i + \beta_{11} FB_i + \beta_{12} Guj_i + \beta_{13} Lhr_i + \beta_{14} Mult_i + \beta_{15} RWP_i + \beta_{16} SHW_i + \beta_{17} SRG_i + \beta_{18} Occup_i + U_i \quad (8)$$

where, $Aggl_i$ is agglomeration measures by the total population in thousand persons at district wise. Age_i is the age of household head, Age_i^2 is age squared of household head, WI_i is wealth index which is taken as quintiles, MSt_i is marital Status representing by dummy variable (1 for if household head if married and 0 for if household is widowed, separated or divorced). Gen_i is gender of household head representing by dummy variable (1 for male and 0 otherwise), $Size_i$ is number of family members in a house. Edu_i is education at secondary level (1 for secondary and 0 for others). $Area_i$ is urban and rural area representing by dummy variable (1 for urban areas and 0 otherwise). BP_i is Bahawalpur division, FB_i is Faisalabad division, Guj_i is Gujranwala division, Lhr_i is Lahore division, $Mult_i$ is Multan division, RWP_i is Rawalpindi division, SHW_i is Sahiwal division and SRG_i is Sargodha division (all divisions representing by dummy variable, 1 for respective division and 0 otherwise). $Occup_i$ is denoted occupation status of household, representing by dummy variable 1 for household head who are working manually and 0 for those who are working else and U_i is used error term which is independent from all independent variables.

3.2 Data

In this study, the agglomeration economies are measured by the total population at district wise. The data for population collected from the Punjab Development Statistics (2011). The data for gender of household head, age of household head, educational attainment of household head, household size and geographical location of household head and wealth index gathered from the Multiple Indicator Cluster Survey (MICS) for the year 2011 which is conducted by the Punjab Bureau of Statistics.

4. Results

The study analyzed poverty as function of different selected variables which are described in previous section. First this study measures the poverty rate at district wise by AFM (2011). Then logistic regression is used to analyze the determinants of poverty such as agglomeration, household head characteristics and geographical factors.

Based on the above identification method (within dimension cutoffs and across dimension cut-off) Alkire and Foster measures poverty rate known as headcount ration in which the percentage of individuals are multidimensionality deprived in different dimensions. Analogous to single dimension, headcount ratio is used for multiple dimensions defined as $H=Q/N$, where “ Q ” is the number of people who are deprived in certain dimension and “ N ” is the total number of people in sample size. In this study, the sample size is 95238. Headcount ratio is simple to compute and estimable and also can be applied on ordinal data. It does not satisfy the properties of dimensional monotonicity and decomposability. In simple words, it means that it does not taking into account a person who is considered as poor in an additional dimension but not deprived before. In contrast with headcount ratio, Alkire and Foster used adjusted headcount ratio i.e. $M_o=AH$. It is the product between the share of average destitute across the poor (A) and the persons who are multidimensional poor (H). Therefore, adjusted

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headcount ratio is better measure as compared to traditional headcount ratio because it comprises information on both incidences and intensity of poverty.

Table 1: Multidimensional Poverty Measures in Punjab

Poverty cutoffs (k)	Headcount ratio (H=Q/N)	Average deprivation share (A=M ₀ /H)	Adjusted headcount ratio (M ₀ = H×A)
2	0.6712	0.40	0.2685
3	0.4298	0.60	0.2578
4	0.0703	0.80	0.0562
5	0.00001	1.00	0.00001

The first column of the table 1, reports the poverty cutoffs which show the number of dimensions in which an individual is deprived must be considered as poor. The poverty cutoff ($k=2$) is used to showing the broadest picture of deprivation. Second column of table 1 shows the number of individuals who are deprived in certain dimension. Thirds column of table 1 reports the average share of deprivations across poor. The last column of table 1 reports the adjusted headcount ratio. The second poverty cutoff ($M_0 = 0.2685$) indicates that about 27 percent of people in Punjab are deprived in two out of five dimensions. The headcount ratio at ($k=2$) is 0.6712 which shows that about 67 percent of people are deprived in certain dimension. Average deprivation (A) is $0.2685/0.6712=0.40$; it indicates that 40 percent of people are being poor in all dimensions on average. The third column shows the average depth of poverty in Punjab; at $k=5$ the 0.001 percent of population is poor with 100 percent average share of deprivation in all dimensions. According to union approach ($k=2$) when two out of five dimensions are considered then about 67 percent of population in Punjab is poor. However, when intersection approach is taking into account only 0.001 percent of population is extremely poor in all dimensions. It shows that there are few people who are extremely deprived in all dimensions.

4.1 District and Division – Poverty Calculations

This section explains the poverty rate in different district of Punjab. It further explains the number of dimensions in which people are deprived by using MPI. The identification of people who are poor is measured by AFM and then MPI is calculated at poverty cutoff $k = 3$.

The AFM is utilized to measure the MPI in 36 districts of Punjab, Pakistan for the year 2011. Based on the MPI, it is observed that poverty rate is high in Rajanpur, Layyah, Bhakkar, Muzaffargarh and Khushab and is low in Lahore and Gujranwala districts of Punjab, Pakistan (Table 2). Overall results show that people are multidimensionality poor with poor living standard (either with a *kaccha* house or no electricity and gas), poor water and sanitation (no access to safe drinking water and no proper toilet facilities), poor air quality (unsuitable cooking fuels), or no asset holdings (fridge, TV, washing machine, Car etc) and no education (less than primary). Most of the poor people are living in the Kachi Abadi and use water from canal to fulfilling their basic requirements. Drainage system is also very poor and causes bad impacts on health. There is need to upgrade the system of water and toilet facilities to improve the health of people. Along these problems, educational institutions are limited both at undergraduate and postgraduate level. Therefore, people move away to other cities for higher education. There is need to improve the education system and quality of education by providing free education, trained teaching staff. The more educated people have better job opportunities. So, it will reduce

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poverty. It is such a malicious that Islam's Prophet has looked for Allah's shelter from its grip (Sadeq 1997).

“O Lord, I seek your refuge from infidelity (kufr), poverty and destitution (faqr), and I seek your refuge from paucity (qillah) and humiliation (dhillah).”(Nasai, al-Sunan, Kitab al-Isti'adha)

Table 2: Multidimensional Poverty Index in Districts (K=3)

Districts	Q	N	H=Q/N	A	M=H*A
Bahawalpur	2309	3957	0.5835	0.60	0.3501
B.Nagar	1825	2772	0.6583	0.60	0.3950
Rahimyarkhan	2155	3681	0.5854	0.60	0.3512
D.G.Khan	1138	1724	0.6600	0.60	0.3960
Layyah	1435	1964	0.7306	0.60	0.4383
Muzaffargarh	2130	2959	0.7198	0.60	0.4319
Rajanpur	1439	1751	0.8218	0.60	0.4930
Faisalabad	1852	6046	0.3063	0.60	0.1837
Chiniot	946	1618	0.5846	0.60	0.3508
Jhang	1881	2764	0.6805	0.60	0.4083
T.T.Singh	643	1990	0.3231	0.60	0.1938
Gujranwala	732	4676	0.1565	0.60	0.0939
Gujrat	582	2488	0.2339	0.60	0.1403
Hafizabad	540	1216	0.4440	0.60	0.2664
M.Bahaudin	802	1639	0.4893	0.60	0.2935
Narowal	928	2244	0.4135	0.60	0.2481
Sialkot	733	3286	0.2230	0.60	0.1338
Lahore	285	4632	0.0615	0.60	0.0369
Kasur	1104	2845	0.3880	0.60	0.2328
N.Sahib	898	2199	0.4083	0.60	0.2450
Sheikhupura	772	2807	0.2750	0.60	0.1650
Multan	1167	3722	0.3135	0.60	0.1881
Khanewal	034	2863	0.3611	0.60	0.2166
Lodhran	830	1672	0.4964	0.60	0.2978
Vehari	959	2462	0.3895	0.60	0.2337
Sahiwal	714	1847	0.3865	0.60	0.2319
Pakpattan	838	1696	0.4941	0.60	0.2964
Okara	1050	2520	0.4166	0.60	0.25
Rawalpindi	1590	4230	0.3758	0.60	0.2255
Attock	726	2464	0.2946	0.60	0.1767
Chakwal	716	2065	0.3467	0.60	0.2080
Jehlum	721	1993	0.3617	0.60	0.2170
Sargodha	2075	3479	0.5964	0.60	0.3578
Bhakkar	1469	2017	0.7283	0.60	0.4369
Khushab	1071	1547	0.6923	0.60	0.4153
Mianwali	847	1403	0.6037	0.60	0.3622

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4.2 Logistic Regression Analysis

The aim of the study is to analyze the determinants of poverty. The main idea behind the analysis is to find the relationship between the probabilities of being poor with respect to explanatory variables. This study uses logistic regression to see the impact of agglomeration, gender, size, age, wealth index, education, occupation of household head and geographical factors on poverty in Punjab. The data collected from MICS survey which contains sample size of 102,545 individuals out of which 95238 are household heads. The dependent variable in the model is dichotomous, taking a value of one if household is poor and zero if the household is non-poor. In such cases where dependent variable is in the form of dummy variable, binary choice model is considered. There are different studies which used binary choice model to determine the impact of gender, education and geographical factors on poverty. Studies of Nguyen *et al.*, (2012), Hashmi *et al.*, (2008) and Dudek and Lisicka (2013) used logistic regression to measure the determinants of poverty. The Table 3 depicts the outcomes of binary logit model that distinguish socioeconomic status of household's head with chances of being poor in Punjab, Pakistan.

The results show that agglomeration of people has inverse relation with poverty. The increased concentration of people leads to enhance overall, business activities that creates employment opportunities and hence reduces poverty. On average one thousand increases in population creates changes to get out from poverty of about 3145 people. Agglomeration enhances the labor skills and knowledge, and productivity in certain region or area that causes to increase the living standard and wellbeing of people.

The studies by Christiaensen and Todo (2014), Giang *et al.*, (2015), Patridge and Rickman (2008), Mukherjee and Benson (2003) and Gangopadhyay (2014) also found the same results in their respective studies. The estimated coefficients of age and age squared both are insignificant which implies that age factor does not play imperative role in determination the poverty of household head in Punjab Province.

The negative relation between wealth index and poverty indicates that as household heads have strong financial status, there will be fewer chances to being poor. When wealth increases, the people have more modern agricultural and industrial technologies. They have better education and health facilities. That leads to increase economic growth and reduces poverty. Gounder and Xing (2012) indicate in their study that all income quartile households (i.e. lowest to highest) get benefit from additional skills through formal education. While the households with lowest income quartile get more benefit from formal education.

The calculated coefficient of marital status indicates positive association between married household heads and poverty. The results show that married household heads are about 88 percent more likely to being poor as compared to households whose heads are widowed, separated or divorced. Most of the married people are poor due to the fact that most of the women in Pakistan are housewives and depends on their husbands. Their children also depend on them. This may increase dependency ratio. The expenditures are not meet with income of household head so they remain poor.

Further, the results show that male household head are about 91 percent less likely to being poor. The coefficient of gender is significant at 10 percent level of significance. There is negative association between male head and poverty. It means that most of the household heads are male and they are less likely to being poor when compared with female household head. In Pakistan, most of the household heads are male and they are responsible to meet expenditures of

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their families. Men have more potential to work than women. So, as they work, it reduces the chances to being poor. Geda *et al.*, (2005) also found the same result in their study.

Table 3: Logit Estimates of determinants of poverty

Variables	Estimated Parameter	Odds ratio	P value	Marginal Effect
CONSTANT	3.2482	25.7455	0.000	----
AGGLOMERATION	-0.00018*	0.9998	0.000	3145.033
AGE	0.0064	1.0065	0.210	47.14832
AGE ²	-0.00002	0.9999	0.564	2419.08
WEALTH INDEX	-3.1800*	0.0416	0.000	3.3600
MARITAL STATUS	0.2562*	1.2920	0.000	0.8758
GENDER	-0.0744**	0.9283	0.099	0.9124
SIZE	0.05216*	1.0535	0.000	6.2960
EDUCATION	-0.4017*	0.6692	0.000	0.1323
AREA	-1.4587*	0.2325	0.000	0.4029
BAHAWALPUR	0.0421	1.0430	0.519	0.1093
FAISALABAD	-0.3771*	0.6858	0.000	0.1304
GUJRANWALA	-0.6936*	0.4998	0.000	0.1633
LAHORE	-0.8748*	0.4175	0.000	0.1310
MULTAN	-0.8862*	0.4122	0.000	0.1125
RAWALPINDI	-1.1439*	0.3186	0.000	0.1129
SAHIWAL	-0.9235*	0.3971	0.000	0.0637
SARGODHA	-0.03065	0.9698	0.656	0.0887
OCCUPATION	-0.5035*	0.6044	0.000	0.2632
Number of obs.	= 95238			
Pseudo R ²	= 0.6055			
Log likelihood	= -23794.339			
LR Chi ² (18)	= 73032.86			

Note: *indicates significance level at one percent, **indicates significance level at five percent and *** indicates significance level at ten percent.

The households with greater family size are about 6 percent more likely to being poor. Larger the family sizes lower the standard of living. Because in most of the cases large families may cause to increases the dependency ratio, inequality and poverty. Family size influences household wellbeing. Mostly, in Pakistan, people with larger family sizes are illiterate due to the lack of resources and educational attainment facilities. These are the main reasons to remain poor. The study by Hashmi *et al.*, (2008) shows that as family size increases, it causes to increase poverty.

Household head's education also affects the poverty. For this objective, present study used education level of household heads at secondary level. The estimated marginal effect of education variable from logistic regression indicates that those household heads with having education till secondary level are 13 percent less likely to being poor in comparison to those

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household heads who are not educated at all. The empirical results suggest that there is negative relationship between education of household heads and poverty in Punjab. The study by Chen and Wang (2015), Mukherjee and Benson (2003), Hashmi *et al.*, (2008) and Gounder and Xing (2012) show the positive impacts of education into reducing poverty. Because, more the educated persons in the economy, more the chances to employment and earn income to survive. Study by Dudek and Lisicka (2013) shows that secondary education may cause to reduced poverty. Some studies find evidence to support the existence of positive impact of higher level of education, especially for women to reduce poverty (Shapiro and Tambashe, 2001; Mukherjee and Benson, 2003). Further the Study by Dudek and Lisicka (2013) shows that tertiary education may cause to reduce poverty. Because education not only improves the skills to improve living standard but also generate productivity gains for getting jobs.

Turning to the estimated effect of regional variable on poverty, the results show that there are 40 percent chances that household heads who are living in urban areas are less likely to being poor than those household heads who are living in rural areas. This implies that people in urban areas are less deprived and have better education, medical services and jobs opportunities as compare to rural areas. These results are consistent with the study by Geda *et al.*, (2005). Bogale *et al.* (2005) show that 40 percent of rural population lives below the poverty line in Ethiopia. Dudek and Lisicka (2013) show that household that are living in rural areas are more likely to being poor when compared with households who are living in urban areas. Many rural areas have fewer facilities of resource endowments, education, jobs and assets. Therefore, there are more chances to get poor in rural areas as compared to urban areas.

To capture the impact of geographical areas on poverty the present study takes nine divisions of Punjab in the logit regression. D.G khan division is taken as reference category. The results indicate that the household heads in Faisalabad division of Punjab are about 13 percent less likely to being poor than D.G khan. In Gujranwala the household heads are 16 percent less likely to being poor than D.G Khan. The household heads in Lahore are about 13 percent less likely to being poor than those household heads who are living in D.G Khan. The household heads in Multan, Rawalpindi and Sahiwal divisions are about 11, 11 and 6 percent less likely to being poor than household heads of D.G Khan respectively. Overall, the results show that most of the household heads in Gujranwala division are less likely to being poor. The reason is that Gujranwala is one of the most industrialized divisions as compare to others. This fact enhances financial conditions for the people of Gujranwala. This is consistent with the earlier discussion that those household heads with better financial status are less likely to being poor. These results are contradicted with the study of Dudek and Lisicka (2013) shows that household who are residing in big cities or medium towns in central region are more likely to being poor. On the other hand, the estimated coefficients of Bahawalpur and Sargodha divisions are insignificant which means that they do not play a role in determine the poverty of household head in Punjab.

The household heads who are working manually are 26 percent less likely to being poor as compare to those who are working in other professions (government employee, private employee, self employee, employee others etc). Shete (2010) examines that participation of households in contractual farming, trading, and beekeeping and fishing activities decreased the chances of households to be poor. While households who are working in firewood-selling activities are have more chances to be poor.

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5. Conclusion and Policy Implications

The study examines the determinants of poverty such as agglomeration, education, gender, household characteristics and geographical areas by using logit model. It is found that agglomeration in different districts of Punjab plays a vital role in reducing poverty. The results further indicate that household heads having socioeconomic and demographic characteristics such as gender (male), education, areas (urban area), occupation (working manually) and wealth index (financial status) are less likely to be poor in Punjab, Pakistan. To measure the impact of geographical areas, the findings suggest that Gujranwala is one of the least poor divisions in Punjab. On the other hand, the marital status (married) and large family sizes have positive relationships with poverty. Moreover, the coefficients of age, age squared, Bahawalpur and Sargodha are insignificant.

There is no doubt that poverty is an evil, therefore, efforts should be made for its elimination especially following the guidelines provided by Islam. Islam gives a favourable structure for poverty reduction. Islamic Countries like Pakistan are hard hit by the issue of poverty. The primary explanation behind such an issue is the non-adherence to Islamic practices to decrease poverty.

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