

# MEASURING THE MULTIDIMENSIONAL POVERTY: A CASE STUDY OF DISTRICT SARGODHA

By

**Ansar Abbas<sup>1</sup>, Dr.Masooq Sarwar Awan<sup>2</sup>, Muhammad Waqas<sup>3</sup> and Ayesha Ashraf<sup>4</sup>**

**Department of Economics, University of Sargodha, Pakistan**

[jaferiansar@gmail.com](mailto:jaferiansar@gmail.com)

## Abstract

*The present study focuses on the analysis of multidimensional poverty through quantitative and qualitative approach for district Sargodha, Punjab, Pakistan. By using Alkire and Foster, (2007) technique the study used three dimensions and ten global indicators to measure the Global Multidimensional Poverty Index for Sargodha. Year of schooling and child school attendance are the indicators used to assess the dimension of education. Nutrition and child mortality are the indicators for the dimension of health while electricity, sanitation, drinking water, flooring, cooking fuel, and asset ownership are indicators of living standard. Focus Group discussions and case study has been done in order to analyze the poverty qualitatively and to make evidence-based policy. The study surveyed 200 households from district Sargodha by adopting probability proportional to size technique of sampling. The multidimensional poverty index for Sargodha is found to be 0.186 showing that 18.6 percent population is multidimensional poor. For urban it is recorded at 0.26 and 0.112 for rural settlement. Education contributes 39 percent to overall poverty which is higher amongst the rest of the dimensions. The indicators for health are improved in rural settlement than urban and almost 75 percent population is deprived in a sanitation facility. Based on findings MPI should be used for the efficient allocation of scarce resources. There should be different policies for different geographical regions. Provision of quality education and improved health facilities are the key factors to eradicate poverty in the future.*

---

<sup>1</sup> M.Phil. Scholar/Research Associate, Department of Economics, University of Sargodha, Pakistan.

<sup>2</sup> Professor of Economics, Director, Noon Business School, University of Sargodha

<sup>3</sup> Assistant Professor, Department of Economics, University of Sargodha, Pakistan.

<sup>4</sup> M.Phil. Scholar, Department of Economics, University of Sargodha, Pakistan.

## **1. Introduction:**

In 2002, the United Nations (UN) Millennium declaration has been adopted by the UN, they presented eight goals named Millennium Development Goals (MDGs). At that time, there were 191 UN member states, 22 international organization committed to achieving MDGs by 2015. The UN set eight goals to achieve world development. In 1990 approximately, half of the population were lived under \$ 1.25 in developing countries and this percentage has been dropped to 14 percent in 2015(The Millennium Development Goals Report, 2015).According to Transition from MDGs to SDGs Report, (2015),In many countries, most of Millennium Development Goals (MDGs) were not achieved, significant progress means that the world we are living today is improved when the MDGs were adopted. In 1990 approximately, 58 percent of the population lived in the low-income country and this percentage dropped to 41 percent in 2000 and became 12 percent in 2013. The heterogeneity in the outcome of MDGs at the country level translates differences at regions. At one end, East Asia and Pacific region have achieved all goals and on the other end, sub- Saharan Africa is off target on most of the goals of MDGs. The South Asia and sub-Saharan Africa regions have started the improvement in most required goals. They have made significant progress on MDG related to health which the whole world is struggling to achieve. The significant accomplishment has been observed in South Asia and sub-Saharan. The 17 SDGs- with the motto “Leave No One Behind” have replaced the Millennium Development Goals (MDGs) and provided the blueprint for strategic plans of government, international institutions, and donor agencies. The aim of Sustainable Development Goals is to end poverty and hunger for all, promote health and well-being for all, to ensure the availability of water for all and to ensure energy for all. SDGs have 169 targets to achieve 17 goals. There are some social protection and development programs in every developing country. The key objective of these programs is to identify the most deprived group of the population and to make them non- deprived through suitable policy for the betterment of any economy. Sachs (2008) has calculated the total cost to end extreme poverty in 20 years according to him the total yearly cost required for it is \$175billion and this represents less than one percent of the combined income of the richest countries in the world.

## **1.1 Transformation of Uni-dimensional to Multidimensional Measure**

According to the capability approach presented by Sen (1976) poverty is not a deprivation of income it is also deprivation of health, education, and other capabilities. After the capability approach presented by Sen (1976) the attention of many economists and policy makers moved toward multidimensional poverty approach and they raise the demand for data. The justification of adopting multidimensional poverty is that it is better than income indicator because a deficit in income leads to ambiguous estimates of poverty (von Maltzahn and Durrheim 2008). Education, health, social exclusion and insecurity of a person is often weakly correlated with expenditure or Income (Appleton 1996). This weak correlation depicted that adding more dimensions will provide a true picture of poverty (Calvo and Dercon 2005) Multidimensional Poverty Index (MPI) was developed by Alkire and Foster, (2007). For researcher every dimension of poverty is important so equal weights are assigned to every indicator. It covered three dimensions of well-being i.e Health, Education and Living standard. Multidimensional poverty is more suitable for a policy maker to allocate scarce resources to achieve maximum output. The general objective of this study is to estimate the Global Multidimensional Poverty Index and analyze poverty through a qualitative approach by applying Alkire and Foster, (2007), a method for District Sargodha. The specific objective is to measure multidimensional poverty at the regional level. Section 2 will explain the literature review, Data and methodology will be explained in section 3. Section 4 will cover the results of the study while last section 5 will explain the conclusion and policy recommendation.

## **2. Literature Review:**

After the consequences of the disadvantages of traditional measure of poverty, Cerioli and Zani (1990) gave the proposal of fuzzy approach for the first time. According to the fuzzy approach, the values of poverty function lies between 1 and 0. The poor person has value 1 while the non- poor person has value 0 in a fuzzy approach. The partially poor person has assigned intermediate values between 1 and 0. This poverty function has applied on Italian region afterward the new index was proposed that was the generalized form of uni-dimensional indices but new index also has the issue of arbitrary values.

Cheli and Lemmi (1995) have proposed a new approach named as Totally Fuzzy and Relative (TFR) after fuzzy to estimate the multidimensional poverty. This method is very helpful and useful to examine the multidimensional poverty because it avoids random values for poverty

threshold. In this approach, there were various problems like the problem of aggregation, comparison, and interpretation issue. This approach used arbitrary aggregation that was a problem.

Many researchers, authors, and institutions have started to develop an instrument to estimate the multidimensional poverty after the capability approach proposed by Amartya Sen. As we all know that now the world moves toward Sustainable Development Goals (SDGs) the new 2030 agenda. In Millennium Development Goals (MDGs) there were 8 goals and the deadline to achieve them were 2015 and after 2015 on 25-27 September 2015 UN proposed 17 goals called SDGs and the Deadline for them is 2030. Multidimensional poverty gained more importance after MDGs and SDGs. The main objective of the research is to develop a clear and logical framework to estimate the multidimensional poverty that has based on Uni-dimensional measurement methods and can be employed in long run to other dimensions to check poverty.

Böhnke and Delhey (1999) worked for Germany and Britain for the estimation of multidimensional poverty. For the measurement of multidimensional poverty in Britain and Germany, researchers used the survey of Breadline Britain for the year 1990 and German welfare for the year 1998. The findings illustrated that there was the more unequal distribution of income in Britain as compared to Germany. The living standard of Germany is high than in Britain.

Jamal, Khan, Toor, Amir, (2003) utilized the Population and Housing Census 1998 and made the analysis for Pakistan to measure the multidimensional poverty. For analysis, this research used five different aspects which were education, residential housing services, congestion, employment and housing quality for analysis. The study has used the Human development index for analysis purpose that was presented by UNDP. The result has shown that there were 18 million highly deprived people were living in Punjab. In Sindh, they were 9 million and for Baluchistan, they were 6 million. 9 million highly deprived people were also lived in NWFP. Furthermore, 1 percent to 2 percent people from low-level deprivation were residing in NWFP and Baluchistan and 7 to 13 million peoples living in low-level deprivation were residing in Sindh and Punjab. There was more deprivation in NWFP and Baluchistan than Sindh and Punjab.

Mehta and Shah (2003) made research on India at the district level for 15 states and measured multidimensional poverty. India Rural Development Report (IRDR), 1999 and Planning Commission Report 2000 was used for data purpose. This study used five dimensions to measure multidimensional poverty. Dimension was income, education, health, infrastructure, and

agriculture productivity. The result illustrated that seven districts were most deprived and out of these seven, six belonged to four high-income states. Infant mortality and literacy rate were considered major contributor in multidimensional poverty.

Alkire and Foster (2007) have developed a technique to estimate the multidimensional poverty. This methodology is very flexible for the selection of dimensions and indicators according to your country. In proposed methodology three dimensions i-e Education, Health, Living standard very used. Equal weight was assigned to all indicator. This methodology developed an Index known as Multidimensional Poverty Index (MPI). This methodology is very easy to understand and very helpful to compare results. Many researchers used this methodology to estimated multidimensional poverty.

Batana (2008) used the Alkire and Foster methodology for Sub-Saharan countries to evaluate the multidimensional poverty. This study checked the robustness of different poverty cut-off. In this study, four dimensions were used to estimate MPI. The dimensions were health, education, empowerment, and assets. Equal weights were assigned to each dimension and indicator. The finding of the study was compared with the Human Development Index (HDI). The results showed that education (schooling) has more contribution to overall poverty than any other dimension. The study also estimated MPI for urban and rural separately. The result found that MPI is higher in the rural region than urban region.

Jamal and Haroon (2009) by utilizing the HIES data set measured the headcount ratio, poverty gap and squared poverty gap for Pakistan. Human poverty, poor housing, physical household assets and income poverty were the particular aspects of this research. The result has shown that 54 percent of the population were multidimensional poor in 2004-2005. The extent of multidimensional poverty was higher in rural areas as compared to urban areas. In urban areas, there was 21 percent of poor were multidimensional poor and 69 were in rural areas for the time period mention above.

Naveed and Islam (2010) have measured the multidimensional poverty for Benazir Poverty Score (BPS) and investigated the Benazir Income Support Program (BISP). The study used (Alkire and Foster 2007) methodology for measuring the multidimensional poverty. The multidimensional were estimated at the national level, provincial and district level. The data for the following study has dram from Research Consortium of Educational Outcomes and Poverty (RECOUP) household

survey 2005-06. The study has used three dimensions. The indicators to analyze these dimensions were as follow, Education, Health, consumption, child status, livelihood, housing, electricity, assets, landholding, sanitation, cooking fuel and access to safe drinking water. The result illustrated that the probability of being poor of the urban household was 0.28 times lesser than rural. The probability of being poor for Punjab resident was less than for the resident of KPK.

Awan, Waqas and Aslam (2011) has used the Multiple Indicator Cluster Survey (MICS) and estimated multidimensional poverty in Punjab at the district level. The study selected education, expenditure, water, land, assets, sanitation, electricity and housing in the analysis. The study has applied Alkire and Foster (2007) for estimations. The result illustrated that least deprived district of Punjab was Jhelum, Lahore, Rawalpindi, Sialkot, and Gujranwala. The most deprived cities were Rajanpur, Kasur, Okara, Rahimyar Khan, and Muzaffargarh.

Masooq, waqas, and Aslam (2012) estimated the multidimensional poverty in case of Pakistan by employing Pakistan Social and Living Standard Measurement (PSLM) survey of 2005-06. The study used a counting technique of Alkire and Foster (2007). The dimensions to measure poverty were expenditures, Education, Water, land, assets, sanitation, electricity, empowerment and housing. According to the finding of this study, there was 22.8 percent of people were declared multidimensional poor. Multidimensional poverty was high in the rural region than urban 26.8 percent in the rural region and 11.3 percent in the urban region.

Battiston, Cruces, Lugo, and Santos, (2013) employed (Alkire and Foster 2007) methodology in Latin American countries from the year 1992 to 2006 and measured multidimensional poverty. In this study, six dimensions were used for analysis. The dimensions were child school attendance, water, shelter, income, sanitation, and education of the household head. Equal weights were assigned to each dimension. The results found that poor sanitation and education of household head are major contributors in overall poverty estimates in all countries of Latin American. The poverty rates were high in the rural region than urban.

Alkire and Foster (2013) have used the National Health Interview Survey data set and analyzed multidimensional poverty for America. This research categorized the population into four major groups on the basis of ethnicity Hispanic, White, African-American and others. Four aspects were used in this study which is health insurance income, self-reported health, year of schooling and their cut-offs were poor health, lack of health insurance, income less than poverty line and

lack of high school diploma respectively. The result showed that the contribution of income poverty of African-American was 29 percent, poor health of white was 26 percent, lack of health insurance of Hispanic was 30 percent and lack of year of schooling of Hispanic was 35 percent in overall multidimensional poverty. This study also measured multidimensional poverty for Indonesia. The dimensions for well-being were expenditure, Body Mass Index (BMI), year of schooling, drinking water and sanitation. The cut-off for these dimensions was expenditure less than 150,000 rupiahs, BMI less than 18.5 kg/m<sup>2</sup>, year of schooling less than 5 years, no access to clean drinking water, no access to a latrine. The results illustrated that 17 percent population were deprived in dimensions and 83 percent were deprived in two dimensions.

Angulo, Díaz and Pardo, (2013) estimated multidimensional poverty for Colombia by using Colombia Living Standards Measurement Surveys (LSMS). The study used a survey of two time periods in their analysis i-e 1997 and 2010 and made a comparison in poverty rates. The study used five dimensions as follow Household education, the dimension of childhood and youth conditions, Employment, Health, Access to public utilities and living conditions with equal weights. The study employed (Alkire and Foster 2007) technique to find Colombia Multidimensional Poverty Index (CMPI). The result showed that poverty has been decreased by 50 percent between 1997 and 2010. Multidimensional poverty declined in urban as well as in the rural region between 1997 and 2010 in Colombia but regional imbalances remain.

Sial, Noreen, and Awan (2015) estimated the multidimensional poverty, inequality and pro-poor growth for Pakistan. The study used PSLM 2005-06 and PSLM 2010-11 for analysis. The study applied Alkire and Foster (2007) technique for the estimation of MPI. The study used four dimensions which are as follow education, expenditure, health, living standard. Equal weights are given to each dimension. According to the result, there was 51 percent people were multidimensional deprived and 49 percent were non-deprived in 2005-06. In 2010-11, poverty has declined by 15 percent. There were 35.86 percent people are multidimensional poor in 2010-11 and 64.14 percent people declared non-poor. The contribution of education and living standard is greater in 2010-11 than 2005-06 because the population has been increased, the decline in the quality of water and inequality in education.

Suppa (2016) compared the monetary poverty with multidimensional poverty for Germany. The study used the German Socio-Economic Panel (SEOP) of 2007 and 2012 to

calculate the multidimensional index. The study applied (Alkire and Foster, 2007) counting technique. The result illustrated that there is declined in multidimensional poverty in Germany and results also suggested that an increased in individual income which leads to decrease in multidimensional poverty.

Leu, Chen, and Chen (2016) measured the child deprivation and social exclusion in Taiwan. The study used the House-hold Living Conditions (HLC) survey conducted in 2014. The study used a fuzzy set theory (1990) to measure deprivation, perceived necessity and social exclusion. The fuzzy approaches helped to measure multidimensional poverty and contribution of each dimension in overall poverty. The results showed that two-thirds of respondent identified that all items are necessary. Housing, medical care, and clothing dimensions were declared the highest perceived necessity. The highest deprivation and exclusion faced by the child were in the dimension of the environment, recreation, and education. The result also found that family income and family type of child were significantly related to the degree of perceived necessity, level of deprivation and exclusion. Family with large numbers of children faced a higher level of deprivation.

### **3. Data and Methodology**

The study used primary data set to estimate multidimensional poverty. The study target district Sargodha, 11<sup>th</sup> most populous District of Pakistan (Census, Pakistan Bureau of Statistics, 2017). Sargodha district has seven tehsils with total 161 union councils. In the first stage of sampling, the study selected two tehsils of district i-e Sargodha and Shahpur. In the second stage, the study used one urban union council and one rural union council from each district. Union council number 89 and union council 155 represents rural settlement while union council number 20 and union council number 157 representing urban settlement. The study interviewed 50 households of each settlement of each tehsil by random selection by using questionnaire. The overall sample of the study is 200 households.

#### **3.1. Empirical Methodology**

The study has used Multidimensional proposed by Alkire and Foster, (2007) for measuring the multidimensional poverty.

Consider any society in which households are denoted by  $N$  households whereas dimensions are denoted by  $D$ . Let  $X$  represent  $N \times D$  matrices and  $X \in X$  represents an achievement matrix of a society  $a_{nd}$  representing the achievement of  $n^{\text{th}}$  household in the  $d^{\text{th}}$  for all  $d = 1, \dots, D$  and  $n = 1, \dots, N$ . The row vector and column vector are representing  $X_n = (x_{n1}, \dots, x_{nD})$  and  $X_{.d} = (x_{1d}, \dots, x_{Nd})$  respectively. The  $X_n$  is representing all the achievement faced by  $n$  household in  $D^{\text{th}}$  dimensions whereas  $X_{.d}$  denotes the single dimension of poverty achieves by  $N$ - households. For the development of deprivation matrix  $g^0$ ,  $D$ -dimensional deprivation cut-off vector ( $z$ ) whereas  $z$  is the deprivation cut-off. The deprivation matrix  $g^0$  consists of only two values 0 and 1.

$$g_{nd}^0 = \begin{cases} 1 & \text{if } x_{nd} < z_d \\ 0 & \text{if } x_{nd} \geq z_d \end{cases}$$

If  $g_{nd}^0$  is equal to 1 the household is deprived and for 0, the household is declared as non-poor. Now from deprivation matrix,  $g^0$  column vector  $C$  is constructed by adding all the dimensions faced by  $n^{\text{th}}$  household. If the dimension is cardinal in  $X$ , then normalized gap matrix  $g^1$  is constructed whereas

$$g_{nd}^1 = \begin{cases} \frac{z_d - x_{nd}}{z_d} & \text{if } x_{nd} < z_d \\ 0 & \text{otherwise} \end{cases}$$

The  $g_{nd}^1 \in [0, 1]$  for all  $N$ -households and all  $D$ -dimensions, where each element of  $g_{nd}^1$  represents the extend of deprivation experienced by  $N^{\text{th}}$  -household in  $D^{\text{th}}$  – dimensions. The generalized gap matrix is denoted by  $g^\alpha$ , whereas “ $\alpha$ ” represent the normalized gap.

Now we are able to measure the multidimensional poverty proposed by (Alkire and Foster, 2007). The first stage of multidimensional poverty is to identify who is poor. There are two approaches for the identification of the poor, union approach and an intersection approach. In union approach, if any household is deprived in a single dimension then that household would be declared poor while in intersection approach the household would be considered poor if the household is deprived in all dimensions used in the analysis. Alkire and Foster (2007) proposed a multidimensional approach according to which a household is considered poor if the household is at least  $K$  dimensions where  $K = 1, \dots, D$ .

For the identification of poor ( $\rho_k$ ), a household would be considered poor if  $\rho_k(x_n, z) = 1$  where  $c_n \geq k$  and for  $\rho_k(x_n, z) = 0$ , the household is considered non-poor when  $c_n < k$ . The household is multidimensional poor if the household is deprived in K number of dimensions. In union approach the value of K will be equal to 1 while in intersection approach the value of K would be equal to D. A censored matrix  $g^0(k)$  is obtained from  $g^0$  by replacing the  $n^{\text{th}}$  row with zero when  $\rho_k(x_n, z) = 0$ . An analogous matrix  $g^\alpha(k)$  is developed for  $\alpha > 0$ , with  $n^{\text{th}}$  element of  $g_{nd}^\alpha(k) = g_{nd}^\alpha$  if  $\rho_k(x_n, z) = 1$ , and  $g_{nd}^\alpha(k) = 0$  if  $\rho_k(x_n, z) = 0$ .

According to the identification method proposed by Alkire and Foster (2007). The first step is to identify the percentage of individuals who are multidimensional poor that is called headcount ratio (H) which is defined as the  $H = Q/N$  whereas Q is the number of households who are declared as poor and N is the total population. This measure is completely intensive to intensity and distribution of poverty suggested by Watts (1967) and Sen (1976) while measuring the uni-dimensional poverty and it does not follow the properties of monotonicity and transfer. This problem is being addressed by Alkire and Foster, (2007) as follow, for any poor household, if household become deprived in an additional dimension in which household was not deprived previously does not affect the H. finally the headcount ratio (H) is not flexible enough for the decomposition of dimensions which is used for the purpose of policy making.

In order to decrease the limitation of multidimensional headcount ratio, an adjusted Foster Greer Throbecke (FGT) measure has been used which is defined by  $M_\alpha(X; z) = \mu(g^\alpha(k))$  for  $\alpha \geq 0$ . For  $\alpha = 0$  the measure known as Adjusted Head Count ratio which is denoted by  $M_0 = \mu(g^0(k)) = HA$  defined as the number of the population who are declared poor divided by the total population. When  $\alpha = 1$  the measure would be called adjusted poverty gap represented by  $M_1 = \mu(g^1(k)) = HAG$  which is defined as the sum of normalized gaps of the poor ( $g^1(k)$ ) divided by the highest possible sum of normalized gaps and if the value of  $\alpha$  is equal 2 the adjusted FGT measure become Adjusted Squared Poverty Gap, denoted by  $M_2 = \mu(g^2(k)) = HAS$  which is a sum of squared normalized gap of poor ( $g^2(k)$ ) divided by the normalized gap (ND) of total population.

Multidimensional Poverty Index (MPI) is the product of multidimensional headcount (H) which is known as the incidence of poverty and intensity of poverty (A).

$$\mathbf{MPI = H * A}$$

Whereas

**H: Incidence of Poverty**, the percentage of people who are identified as Multidimensional Poor

**A: Intensity of Poverty**, the average percentage of dimensions which are faced by poor

The poverty can be decomposed into population subgroups. For example the achievements matrices  $X_1$  and  $X_2$  of population size  $N_1$  and  $N_2$  respectively. The overall poverty can be measured by

$$M(X_1, X_2; z) = \frac{N_1}{N} M(X_1; z) + \frac{N_2}{N} M(X_2; z)$$

Atkinson and Bourguignon (1982) and Boland and Proschan (1988) both found the same level of poverty by interchanging the one achievement matrix with another which is an evidence that multidimensional poverty index is neutral to inter-dimensional interaction. The achievement of each household in each dimension is not related to the achievement in other dimensions in this measure (Bourguignon and Chakravarty 2003).

### 3.1.1 Weighting

The most important challenge in measuring the multidimensional dimensional poverty is that how to assign weights to different dimensions before the identification of poor and aggregation. The dimensional importance and policy priority is depending upon the weights of dimensions. Till now, mostly the weights assigned to different dimensions are equally weighted. To assign equal weights to each dimension is basically an arbitrary and normative weighting system that is considered an appropriate method but not in all cases (A.B Atkinson et al. 2003). In some cases, some dimensions of poverty are more important than others so we moved toward from equal weights to unequal weights.

### 3.2. Dimensions, Indicators, and cut-offs

The study used ten global indicators for three dimensions of poverty. Year of schooling and Child school attendance are the indicators of Education while child mortality and nutritional status are representing Health dimension. For the standard of living, the indicators are floor type, drinking water facility, cooking fuel, electricity, and sanitation and asset ownership. The cutoff of these indicator has been shown in Table 3.1 in Appendix A.

### 3.2.1 Weights

For the measurement of multidimensional poverty, equal weights have been assigned to each dimension and indicators within each dimension.

## 4. Results and Discussion

This session explains the multidimensional poverty index of District Sargodha and comparison of poverty estimates at the regional level. Table 4.1 illustrates the headcount ratio (H), Intensity of Poverty (A) and Multidimensional poverty index (Mo) for district Sargodha.

Table 4.1

### *Multidimensional Poverty Index for Sargodha*

<b>Sargodha</b>	<b>Coefficient</b>	<b>Standard error</b>	<b>(95% confidence interval)</b>	
<b>Headcount ratio(H)</b>	0.425	0.035	0.356	0.494
<b>Intensity(A)</b>	0.437	0.012	0.414	0.461
<b>MPI(M0)</b>	0.186	0.016	0.154	0.217

*Source:* Authors Own Calculation

From the Table 4.1, it is shown that about 18.6 percent people are multidimensional poor which is according to UNDP report on Multidimensional poverty 2016 that is 16.4 percent. The difference is due to the difference in indicators and sampling size. Multidimensional poverty index is the product of headcount ratio and intensity of poverty. Headcount ratio showed that 42.5 percent of people are multidimensional poor (k=3) in district Sargodha. The intensity of poverty (A) means that these 42.5 percent poor are deprived in 43.7 percent dimensions on average. All the coefficients are significant at 5 % and lie within the confidence interval (95 %). According to results, 18.6 percent population is multidimensionally deprived while the rest of the population is considered non-deprived that is 81.4 percent.

Figure 4.1 shown in Appendix B illustrates the contribution of each dimension to overall Multidimensional Poverty Index (MPI). This study used three dimensions of MPI that are education, health and living standard. Education contributes about 39 percent to overall poverty

while the contribution of health is less than education. Health contributes 28 percent to overall poverty. The contribution of living standard is more than health but less than education that is 33 percent. In the education dimension, there are two indicators year of schooling and school attendance. Nutrition and child mortality are the representative of the health dimension. Six indicators including electricity, cooking fuel, floor type, drinking water, sanitation, assets are the indicators for the living standard. Figure 5.3 illustrates the percentage of contribution of every indicator to overall poverty. Year of schooling contributes higher than all other indicators that are 32.3 percent. School attendance contributes by 6.7 percent. In the health dimension, child mortality contributes 2.7 percent while nutrition contributes 25.2 percent that is the second highest contributes after a year of schooling. In living standard, the drinking facility contributes zero percent to over all poverty showing that no one is deprived of this indicator shown in figure 4.3. The contribution of electricity is almost negligible that is 0.7 percent. The contribution of sanitation is 10.6 percent to over all poverty. The contribution of floor type, cooking fuel and assets are 7.3, 7 and 7.5 percent respectively. Figure 4.2 is shown in Appendix B represents the percentage of household that is deprived of different indicators of poverty. It has been observed in a diagram below that sanitation is considered at its alarming stage because almost 75 percent of the household are deprived. In the year of schooling and school attendance, the percentages of deprivation are 48.5 and 7.5 respectively. 52.5 percent household is deprived of nutrition and only four percent are poor in child mortality meaning that they are the victim of facing the death of any child in the last five years. In electricity, 2.5 percent household are as shown in figure 5.4. According to the data set, 69.5 percent household have a natural type of floor and 31 percent of the household are not using cooking fuel according to a threshold. In assets ownership, 32 percent of the household are deprived and no one is deprived in a facility of drinking water. In electricity, 2.5 percent household are deprived and rest of percentage are non-deprived.

Table 4.2 represents the headcount ratio (H), Intensity of poverty (A) and Multidimensional poverty index (Mo) for district Sargodha with different cutoff along with standard errors.

Table 4.2

*Multidimensional Poverty with Different cut-offs (k)*

<b>K</b>	<b>H</b>	<b>Standard error</b>	<b>A</b>	<b>Standard error</b>	<b>M0</b>	<b>Standard error</b>
<b>1</b>	0.855	0.025	0.324	0.011	0.277	0.012
<b>2</b>	0.690	0.033	0.364	0.011	0.251	0.014
<b>3</b>	<b>0.425</b>	<b>0.035</b>	<b>0.437</b>	<b>0.012</b>	<b>0.186</b>	<b>0.016</b>
<b>4</b>	0.175	0.027	0.548	0.015	0.096	0.015
<b>5</b>	0.135	0.024	0.578	0.015	0.078	0.014
<b>6</b>	0.035	0.013	0.698	0.019	0.024	0.009
<b>7</b>	0.020	0.010	0.736	0.012	0.015	0.007

*Source:* Authors Own Calculation

From the table 4.2, it has been observed that as values of 'k' increases the M0 decreases. For k=1 meaning that if a household is deprived in a single indicator out of total indicators used to measure poverty, he would be poor that is why poverty is high at this cutoff. At k=1 almost 85.5 percent population is deprived and 27.7 percent population is multidimensional poor. As the value of increases head count ratio (H0) decreases and intensity of poverty (A) increases by minor value up to k=6 then decreases, M0 also decreases. For k=7 only 1.5 percent population is multidimensional poor. For all values of "k" head count ratio, intensity (A) and M0 all are significant at 5% level of significance.

## **4.2 Urban-Rural Comparison**

The study also estimated the multidimensional poverty for urban settlement as well as for rural settlement. The urban-rural comparison will be included in this section. Figure 4.3 is shown in Appendix B represent the Percentages of deprived and non-deprived for both settlements i-e urban and rural. The deprivation percentage is higher in the rural settlement as compare to urban settlement. In the urban settlement, 11.2 percent population is multidimensional poor while it is 26 percent in rural settlement and 88.8 percent are non-deprived in urban settlement and 74 percent are in a rural settlement. Figure 4.4 is shown in Appendix B illustrates the percentage of every dimension to overall multidimensional poverty for urban as well as for rural settlement. In the urban settlement, the contribution of education to overall poverty is 42 percent while it is 38% in a rural settlement. Education includes the year of schooling and school attendance. The health status is improved in rural settlement than urban. In urban health contributes 39 percent to overall multidimensional poverty while the contribution of the same dimension is 23 percent in a rural settlement. The health dimension includes nutritional status and child mortality. The contribution of living standard to overall poverty is higher for rural settlement than urban settlement in rural it is 39 percent while in urban it is 19 percent. The dimension of the living standard includes cooking fuel, electricity, assets ownership, drinking water, sanitation, and floor.

## **5. Conclusion and Policy Recommendation**

The present study was accompanied to analyze the multidimensional poverty for district Sargodha through qualitative and quantitative approach. In quantitative, Alkire and Foster (2007) methodology have been used to measure GMPI. For the development of GMPI, the study used three dimensions and ten indicators. Year of schooling and school attendance are the indicators used to analyze dimension of education, child mortality and nutrition are the indicators of health while the indicator for the dimension of the living standard is the type of floor, electricity, cooking fuel, sanitation facility, assets ownership and source of drinking water. In qualitative approach two focus group discussion has been conducted, one from the urban settlement and the other one from the rural settlement. A case study is also developed by following the methodology of OPHI to strengthen the quantitative results. In qualitative analysis, the results of Focus Group Discussions

(FGDs) revealed that lack of facility of sanitation, poor quality of education and unemployment are the severe problems of rural settlement of district Sargodha. To solve these problems they suggested that there should be different policies settlements and government of Pakistan should not follow the single medicine for all diseases there should be equal access of opportunities to all mean they are demanding inclusive growth rather than economic growth. Based on empirical results, the study suggested the following policies.

- Poverty is high in rural areas than in urban areas so there should be different policies for different settlement.
- Rural settlements are most deprived in education, asset ownership, and sanitation so proper measures should be taken into account to improve the sanitation facilities while considering the policy for rural settlements.
- Multidimensional poverty index should be considered to allocate the resources to reduce poverty.
- The government should improve the quality of education in public sector schools so that parents should feel them at ease to send their kids to public sector schools.
- Awareness seminars should be conducted by government periodically regarding nutritional intake and dietary requirements.

## References

- Alkire, S. and J. Foster (2007). "Counting and multidimensional poverty measurement." *Journal of public economics* **95**(7): 476-487.
- Alkire, S. and J. Foster (2013). "Evaluating dimensional and distributional contributions to multidimensional poverty." Paper presented at *CORD*, March 2012, and University of Oxford, November 2012, and Southern Economic Association, November 2013.
- Alkire, S., et al. (2016). "Multidimensional Poverty Index 2016: Brief methodological note and results." *OPHI briefing* **42**: 2.
- Angulo, R.,Díaz, Y.,Pardo.R., (2013). *Multidimensional poverty in Colombia, 1997-2010*, Institute for Social and Economic Research.
- Appleton, S. (1996). "Women-headed households and household welfare: An empirical deconstruction for Uganda." *World Development* **24**(12): 1811-1827.
- Atkinson, A. B. and F. Bourguignon (1982). "The comparison of multi-dimensioned distributions of economic status." *The Review of Economic Studies* **49**(2): 183-201.
- Awan, M. S.,Waqas,M.,Aslam,M.A. (2011)"Multidimensional poverty in Pakistan: case of Punjab province."
- Batana, Y. (2008). "Multidimensional measurement of poverty in Sub-Saharan Africa."
- Battiston, D.,Cruces, G.,Lugo, M.A.,Santos, M.E. (2013). "Income and beyond: Multidimensional poverty in six Latin American countries." *Social Indicators Research* **112**(2): 291-314.
- Böhnke, P. and J. Delhey (1999). "Poverty in a multidimensional perspective: Great Britain and Germany in comparison."
- Boland, P. J. and F. Proschan (1988). "Multivariate arrangement increasing functions with applications in probability and statistics." *Journal of Multivariate Analysis* **25**(2): 286-298.
- Bourguignon, F. and S. R. Chakravarty (2003). "The measurement of multidimensional poverty." *The Journal of Economic Inequality* **1**(1): 25-49.
- Ceroli, A. and S. Zani (1990). *A fuzzy approach to the measurement of poverty. Income and wealth distribution, inequality and poverty*, Springer: 272-284.

- Cheli, B. and A. Lemmi (1995). "A 'totally' fuzzy and relative approach to the multidimensional analysis of poverty." *Economic notes* **24**: 115-134.
- Government of Pakistan. (2017). *6th Population Census*, Pakistan Bureau Statistics, Islamabad, Pakistan. Retrieved from [http://www.pbscensus.gov.pk/district\\_wise\\_census\\_results\\_census\\_2017.pdf](http://www.pbscensus.gov.pk/district_wise_census_results_census_2017.pdf)
- Jamal, H. (2009). Estimation of multidimensional poverty in Pakistan, Social Policy and Development Centre.
- Jamal, H., Khan, A.H., Toor, I.A., Amir, N. (2003). "Mapping the spatial deprivation of Pakistan." *The Pakistan Development Review*: 91-111.
- Leu, C.-H., Chen, K.H., Chen, H.H. (2016). "A multidimensional approach to child poverty in Taiwan." *Children and Youth Services Review* **66**: 35-44
- Masood, S. A., Waqas, M., Amir, M.A. (2012). "Multidimensional Measurement of Poverty in Pakistan."
- Mehta, A. K. and A. Shah (2003). "Chronic poverty in India: Incidence, causes and policies." *World Development* **31**(3): 491-511.
- Ministry of Finance, Government of Pakistan. (2015). *Pakistan Economic Survey* (Chapter 15). Retrieved from [http://www.finance.gov.pk/survey/chapters\\_15/15\\_Social\\_Safety.pdf](http://www.finance.gov.pk/survey/chapters_15/15_Social_Safety.pdf)
- Naveed, A. and T. Islam (2010). "Estimating multidimensional poverty and identifying the poor in Pakistan: An alternative approach." Research Consortium on Educational Outcomes and Poverty (RECOUP), Cambridge.
- Sachs, J. (2008). "The end of poverty: economic possibilities for our time." *European Journal of Dental Education* **12**: 17-21.
- Sen, A. (1976). "Poverty: an ordinal approach to measurement." *Econometrica: Journal of the Econometric Society*: 219-231.
- Sial, M. H., Noreen, A., Awan, R., U. (2015). "Measuring multidimensional poverty and inequality in Pakistan." *The Pakistan Development Review* **54**(4 Part I &): 685-698.
- Suppa, N. (2016). "Comparing monetary and multidimensional poverty in Germany." *OPHI Working Papers*(103): 1-29.

Von Maltzahn, R. and K. Durrheim (2008). "Is poverty multidimensional? A comparison of income and asset based measures in five Southern African countries." *Social Indicators Research* **86**(1): 149-162.

Watts, H. W. (1967). "The iso-prop index: an approach to the determination of differential poverty income thresholds." *Journal of Human Resources*: 3-18.

## APPENDIX A

Figure 4.2

*Dimensions, Indicators, and Cutoffs*

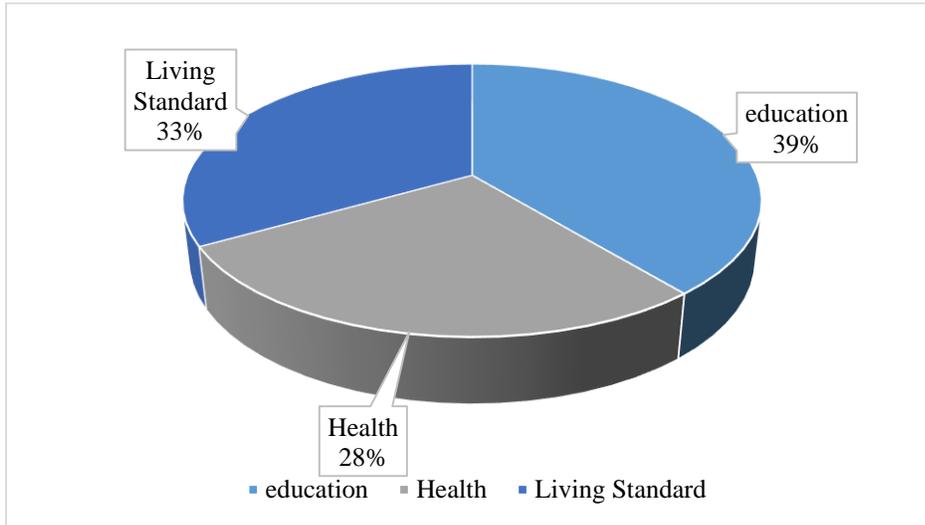
<b>Dimensions</b>	<b>Indicators</b>	<b>Deprived</b>	<b>Weights</b>
<b>Education</b>	<b>Years of Schooling</b>	If any member of household aged 10 years or older has not completed five years of schooling.	1/6
	<b>Child School Attendance</b>	If any school-aged child* of household is currently not attending school up to the age at which he/she would complete class 8. *(UNESCO 4-14)	1/6
<b>Health</b>	<b>Child Mortality</b>	If any child has died in the family during the last five years (2012-17).	1/6
	<b>Nutrition</b>	If any adult member aged less than 70 years of household is undernourished if their Body Mass Index (BMI) is less than 18.5m/kg <sup>2</sup> or any child is malnourished if the z-score of weight for age is below minus two standard deviations from the median of the reference point	1/6
<b>Living Standard</b>	<b>Electricity</b>	If it does not have the facility of electricity or if any household are using shared electricity connection	1/18
	<b>Improved Sanitation</b>	If the sanitation facility of household is not improved according to MGDs guidelines or if it is improved but sanitation (toilet facility) is shared with other household	1/18
	<b>Improved Drinking Water</b>	If household does not have access to facility of safe drinking water or if location of drinking water is more than 30 minutes round trip from home	1/18
	<b>Flooring</b>	If the household has natural floor i-e sand, clay	1/18
	<b>Cooking Fuel</b>	If the household used animal dung, wood or charcoal for the purpose of cooking.	1/18
	<b>Assets ownership</b>	If household does not own more than one radio, TV, telephone, bicycle, motorbike or refrigerator and does not own a car or truck..	1/18

*Source:* (Alkire, Jindra et al. 2016)

## APPENDIX B

Figure 4.1

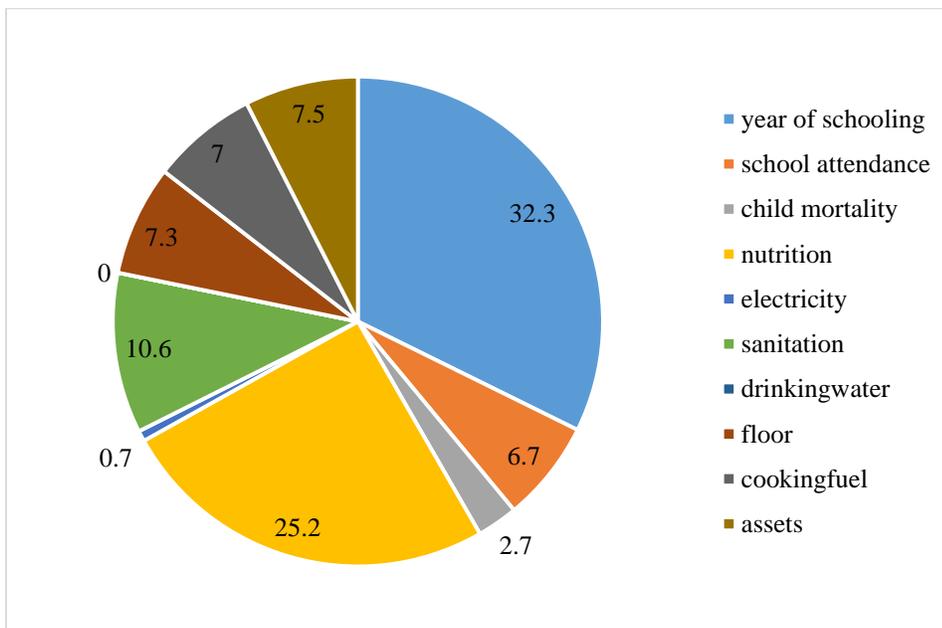
*Contribution of each Dimension to overall Poverty*



Source: Authors Own Calculation

Figure 4.2

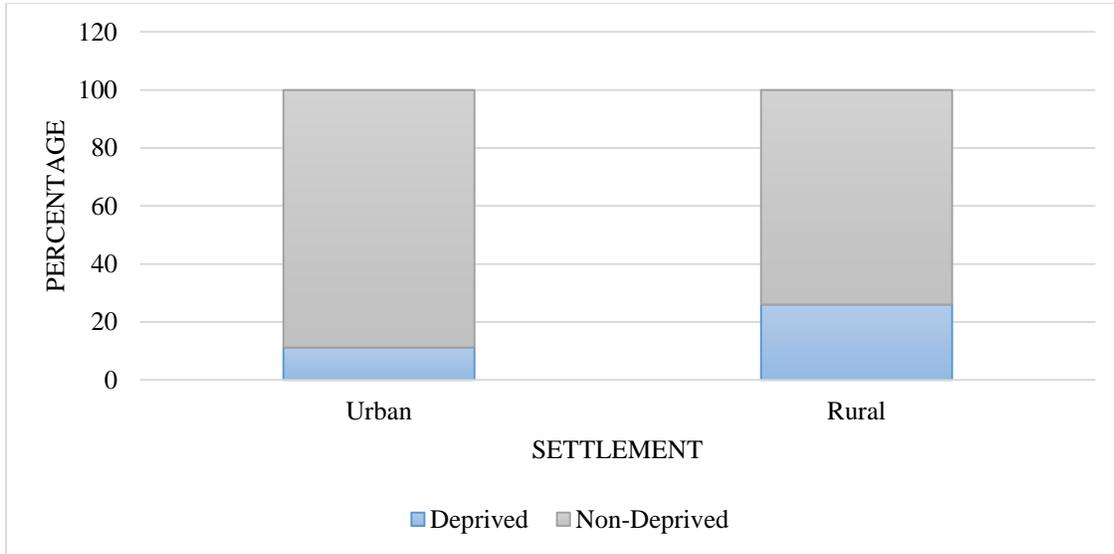
*Contribution of each indicator to Overall Poverty*



Source: Authors Own Calculation

Figure 4.3

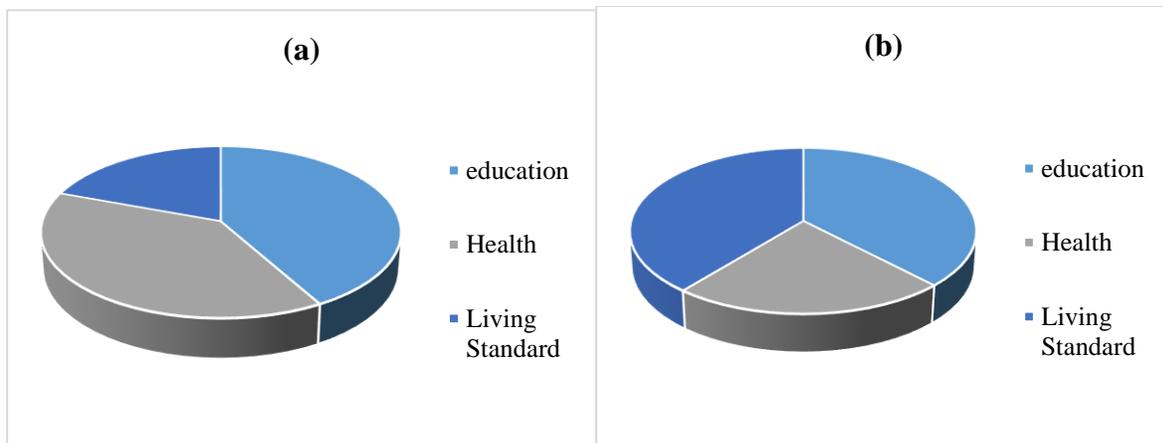
*Comparison of Multidimensional Poverty at Regional Level*



Source: Authors Own Calculation

Figure 4.4

*Percentage share of each Dimension in Overall Poverty at Regional Level*



Source: Authors Own Calculation