



RESEARCH PAPER

**Investigating the Connections between Income Poverty and
Multidimensional Poverty: An Evidence From Punjab-MICS Survey
Data**

¹Tanveer Ahmed Naveed* ²Maira Zulifiquar

1. Assistant Professor, Department of Economics, FSS, University of Gujrat, Punjab, Pakistan
2. MPhil Scholar, Department of Economics, FSS, University of Gujrat, Punjab, Pakistan

PAPER INFO	ABSTRACT
Received: March 22, 2022 Accepted: June 27, 2022 Online: June 30, 2022	The key objectives of this study are to measure the multidimensional poverty index by applying the Alkire Foster method on MICS survey data, to explore the determinants of multidimensional poverty, and to investigate the connections between income poverty and multidimensional poverty in Punjab-Pakistan. The logistic regression model is used to investigate the determinants of multidimensional poverty. The results of this study show that about 33 percent of the Punjab's population is multi-dimensionally poor and 14 percent income poor. Over the Province Punjab, there are some districts which experiencing highest multidimensional poverty; such as Rajanpur, Dera Ghazi Khan, Muzaffargarh, Rahimyar Khan, and Bahawalpur. The result of the model shows that income poverty has statistically significant and positive influence on multidimensional poverty. While the household size, land ownership, and household head's education have statistically significant and negative effect on multidimensional poverty. The study suggests that policies should be adopted to increase the income level at the household, an education level (to raise literacy rate), social welfare programs, and employment opportunities, etc. Policies should be designed to increase the physical, social, and economic access of people toward all dimensions of education, health, and standard of living to decrease multidimensional poverty in the Province.
Keywords: Income Poverty, Multidimensional Poverty, Multiple Indicators Cluster Survey, Punjab	
*Corresponding Author: tanveer.ahmed@ uog.edu.pk	

Introduction

The 'Poverty' 'Poverty' is a condition of a community that lacks minimum resources and standard of living. Poverty stuck the poor families to get a proper house, clean water, food, electricity and clothing, and medical treatment. Multidimensional Poverty Index is developed and co-designed and launched by Oxford Poverty and Human Development Initiative (OPHI) and the United Nations and Development Programme (UNDP) and much praised by global development communities. Poverty is a state that belongs to scarce resources as not having basic facilities of life and generally, multidimensional poverty covers the social and economic elements. Globally, about 1.3 billion people are multidimensional poor, about 80 percent of people are deprived of five of the ten indicators used the three measure health, education, and standards in the global (United National Development Program [UNDP], 2016).

It is the inability that people have no choice to meet their opportunities that violate the dignity of humans. This practice discourages the capacity of people to get apart of society matters. Philosophers have investigated poverty more thoroughly than anyone has.

Multidimensional poverty collects the various deprivations which are experienced by poor people in their regular life such as poor facilities of health, lower and sometimes no education facilities, no proper place to live even mud houses, the living standard is very low, dis-employment, poor quality of work, environmentally hazardous living areas, the threat of violence. Globally 1.8 billion people in 1990, 1.4 billion in 2005 and 920 million in 2009 people were lying below the poverty line the poverty line threshold was \$1.25 a day as per international. It can vary across the region and countries (Klugman, 2010).

Global goals like SDG's are much concerned about the sustainable future, which has a strong social dimension in development. In the 21st century, Poverty is the most critical challenge of the global agenda in SDG. SDG goal 1 is reducing poverty that is very highly focused on human development and reducing poverty. On the other hand, there are 107 developing countries in which 5.9 billion people are living and 22% percent are living in multidimensional poverty. Children have a higher rate compared to the others who are living in poverty as half of the multidimensional poor are 644 million under the age of 18. One in the three is poor with in the six. About 558 million (84%) multidimensional poor people are living in Africa and 530 million multidimensional people live in South Asia. 107 million people are 60 and older are multidimensional poor (UNDP, 2020).

Pakistan becomes the 6th highest populated and becomes the 9th largest as the size of the labor force country in the world. The biggest province in Pakistan is Punjab which has 96.55 million people (55% of the population). The male labor force participation rate is 68.83 % percent and the female rate is near 21.5 % percent, which very much low respective men. (HDI, 2017). The rate of female labor force participation is also the lowest in this region (UNDP Report, 2017). On the other side, the overall scenario of Pakistan carrying, economic participation and opportunity is at 143rd in the ranking, Educational attainment laying in 136th rank, Health and survival is at 140th rank; Political empowerment is at 95th rank (HDI, 2017).

A stable and permanent measure is required to measure poverty. For this Alkire-Foster is an appropriate method. This method is firstly introduced by (Sabina Alkire and James Foster). They measure the different types of poverty that a person faces at the same time such as poor quality of education, bad health, and living standard. It analyzes 'who is poor' and constructs the multidimensional index. It identifies the poor household with different indicators and gives equal weights and creating a cutoff. The beneficial part of this method is that it first identifies the poor people and non-poor. People with the help of different indicators. Alkire-Foster method uses the uni-dimensional analysis and uses a proper process to measure poverty such as it first identifies the poor by using the poverty line secondly, cutoff deprivation that a person is deprived or not, and then gives equivalent weights to determine poverty. The fuzzy set method is a classical set theory that is based on the degree of membership that sets the poor and deprived people. A fuzzy set is one of the techniques which measure poverty very systematically. There are also some flaws in this approach as this approach fails to consider that who is poor or who is not. It does not consider the basic elements of poverty such as identity and transfer. Fuzzy set measures can incorporate the ambiguity in the identification of poor people. If there is ambiguity in identifying the poor and non-poor persons then the results may never be considered appropriate (Alkire et al., 2015).

Amartya Sen has used two steps to measure poverty (i) the identification of the poor (ii) Aggregation of the poor of all indicators which identify the poverty. In the first step, identification is based on income cutoff which can be called the poverty line, and examine if the individual has enough level of income or not. The second step includes the process that measures poverty in aggregation and then select the poverty index (Sen, 1976).

This study applies the method for the measurement of multidimensional poverty (Alkire & Foster, 2007). There are some reasons to choose this method firstly, it can easily be implemented and integrate the identify analysis by using dual cutoffs, which identify the deprivation lying in different dimensions. Secondly, it depicts the person who is deprived is consider to poor. Nobel Laureate Amartya-Sen believes that poverty shortage and insufficient income that is unable to meet the basic needs of life rather this deprivation is the lack of basic human capabilities. (Sen, 1992). Multidimensional poverty is the lack of access to basic facilities such as quality of education, inappropriate health facilities, and a low standard of living. This study uses the income cutoff to measure multidimensional poverty. A person is considered poor if his income does not meet his consumption and expenditures (Awan, Waqas, & Aslam, 2011).

The main focus of this study is to measure the multidimensional poverty index by using the Alkire Foster method, to analyze it's the determinants and to investigate either income poor are also multi-dimensionally poor by using MICS survey data. The logistic regression model is used to investigate the determinants of multidimensional poverty.

Literature Review

The journey of poverty in economic terms has started in mid of nineteenth-century when Peter Townsend (Townsend, 1962) summaries the concept of poverty as a summary of the pain and lack of necessary needs, his work is on poverty explores, many other factors that can affect any individual he concludes that it is not only the psychological phenomenon but also including some quantitate measure. Multidimensional poverty becomes the heart of the theoretical, empirical debate of institutions. There is an abundance of research in multidimensional poverty because it focuses on the different dimensions of poverty and identifies who is poor. The people who have a lower level of income and unable to fulfill regular needs. Income poverty and multidimensional poverty are interlinked. Following the literature, in the past few years, a large number of studies for individual countries have been conducted and literature is growing in different dimensions. One of these dimensions is the verification of a positive relationship between income poverty and multidimensional poverty. Anand and Sen (1997) concluded that the living condition of the poor has a vital role in their lives. The traditional way of living is also affected by the lives of the poor because they are not ready to change their merits. In this paper, Amartya Sen. and Anand deeply evaluate the concept of income poverty and other factors, which are interlinked with each other, as income is not the only source to eradicate or decrease poverty. There are different situations as if someone is enjoying good health and live a long life but he is illiterate he is deprived of education. This thing enlightens that only income-based poverty measure does not capture poverty in all its economic and social aspects.

Atkinson (2003) explained that income is a single dimension to measure poverty it only cannot cover multiple deprivations of necessities whereas multidimensional poverty is covered all the aspects of poverty even income should also add to the global multidimensional poverty index. It is argued that multidimensional poverty counts the deprivation of poor people with various approaches like social welfare approach and another approach is suffer deprivation. This study mainly focused on understanding and relation between more than one dimensions.

Haughton and Khandker (2009) examined that one of the groups considered that multidimensional poverty and income poverty focused on the aspects which are not a tradable person or family poverty the non-monetary aspects. Income poverty has a strong impact on multiple deprivations.

Wang, Feng, Xia, and Alkire (2016) by taking that data in 2011 using the Alkire-Foster (AF) method, the study found that income poverty has a strong relation with multidimensional poverty. Inequality of income poverty is creating deprivation. Thus the

poverty relates to both monetary and non-monetary poverty. Increase income and reduce the multidimensional poverty in every dimension but the impact is limited such many other factors are influenced as employment opportunities and consumption. But both poverties are of limited impact.

Alkire and Fang (2019) took panel data is taken Health and Nutrition Survey using the stochastic dominance method. The multidimensional poverty Index is constructing and compare with income poverty found that there is a negative relationship between income poverty and multidimensional poverty. Multidimensional poverty is higher than income poverty. Income poverty is less volatile than multidimensional poverty in developed areas.

Various studies measured multidimensional poverty at the household level. Different studies explained different socio-economic determinants of MPI using different approaches. Studies used primary and secondary data through observations, focus group discussions, and review of documents. Different studies used different methodologies to find a multidimensional poverty index. And, also determined the role of income in our lives and how it helps us to tackle the serious issue of multidimensional poverty at the household level.

Material and Methods

Data and Sampling

This research has used data of Multiple Cluster Indicator Survey (MICS) round five collected from 9 divisions and 36 districts of Punjab-Pakistan. The sample size is about 38,405 households with 98 percent response rate. .

Concept of Multidimensional Poverty Index

Poverty word is not exclaimed to have a minimum amount of wheat and rice for any individual. It is shown that indicates which attributes the person show off their resources in society. This can be described as the deprivation of basics needs and capabilities of life (Siddiqui, 2009). Though poverty is a multi-dimensional problem that contains the different aspects of social, economic and income is not only an important dimension of poverty as there are different other dimensions have importance as life expectancy, literacy, provision of public goods, and security (Thorbecke, 2005). The Multidimensional Poverty Index can be easily used to measure satisfaction towards a life with three dimensions of Health, Education, and Standard of living.

Measurement of Multidimensional Poverty Index: Basic steps

The Multidimensional Poverty Index is the technique to measure deprivation on threshold level by Sabina Alkire and James Foster Thorebeck. It measures the poverty at the individual level of the persons who are deprived and the poverty being measured through the range of deprivation. Multidimensional Poverty Index builds on the global MPI, the main three dimensions such as education, health, and living standards. All the dimensions are given equal weights such as 1/3 education, healthy standard of living, and some indicators are adjusted to the nested weight structure. The multidimensional poverty dimensions and the indicators of country and MPI are set by economic and social aspects. Which create welfare for economic and social stage level protected them from its appropriate law and strategies. All the indicators are selected according to the dimensions total of nine indicators data taken from the Multiple Indicator Cluster Survey (MICS). The methodology of multidimensional poverty is measured by the following are the main steps. While the steps are divided into two groups. The first group specifies the essential or compulsory group to measures poverty and the other group is formed to measure the specific according to the study.

Identification of Units

Step-1 Selection of Unit of Analysis

The first step to measure poverty is the unit of analysis of household or individual. In the measurement of multidimensional poverty, Indicator set the dimensions, indicators, and cutoff. The first step is to the identification of poor and non-poor at the household level. For the unit of analyzing the poor and non-poor at the household level. For the measurement of poverty, it is necessary to choose the dimensions which clarify who is poor the based on capability approach (Sen, 1985).

Step-2 Selection of Dimensions

This is the second step in this step the dimension is choice, which is the important step in which five means of following:

This method is used the data of survey that perceived the necessities of people have in their life. It shows the participation of the value of stakeholders. Through the public consensus MDG's national and regional legitimacy degree is achieved. The assumptions about people which value should be used that is drawn from conventional, traditional, social, ethical, or philosophy. The constraint is taken by the availability of data which is the required characteristics of authentic analysis (Alkire & Yalonetzky, 2010)

Step-3 Selection of Indicators

In this step, the indicators of each dimension are taken based on the accuracy of analysis from the micro data. All indicators have equal importance and necessary for each dimension according to the principal. All the indicators are given to the minimum and maximum range which creates the possibility to easily estimated according to the statistical properties get transparency in the selection of multiple indicators which should not highly correlated.

Step-4 Setting Cutoff

In this step, the first cutoff is settled down in the methodology for each dimension to identify the poverty called deprived and non-deprived to attribute. The setting threshold clarifies the different categories of less poor and extreme poor. If needed then the second cut-off "k" can be applied to every dimension of Multidimensional poverty otherwise other not. The cut-off value is "0" for Non-deprived and "1" for deprived. Through this cut-off, the poor and non-poor people are recognized from each dimension.

Step-5 Apply Poverty Line

This step is considered "Non-poor" and "Poor" person concerning each cut-off and identified the deprived and non-deprived for each indicator in all dimensions (Khan & Saboor, 2014)

Step-6 Count the Number of Deprivations for each Dimension

The number of deprivation for each dimension is collected from the individual or household level. The equal weightage is given to each indicator in all dimensions to get an accurate analysis. General weights are applied and weighted are sum from all household is calculated. There are two methods to given weight, first method is the "Equal weighting system" and the other is the "Nested weighting system" (Foster, 2007). In the equal weighting all the dimensions Education, Health, and Standard of Living are given the equal weights as (1/3, 1/3, 1/3). The second one is the nested weighting method the equal weights are distributed between the income and non-income dimensions. In the nested

weight, the unequal weight equals 1. This study used an equal weight method, which is more accurate.

Step-6.1: Computing the Headcount "H"

The headcount ratio is calculating by the number of poor people by dividing the total number of poor people in the sample. The multidimensional headcount ratio is a useful measure it is very insensitive, as it does not include the poor that are deprived in any additional dimension. The headcount is very insensitive. This analyses the poverty from the dimension in different groups of people so it is the more influential domain of poverty. The headcount ratio (H) shows the proportion of multidimensionality poor in the population:

$$H = \frac{q}{n} \quad (1)$$

Where (q) shows the number of people, who are multidimensionality poor and (n) shows the total population. The (H) is the incidence of poverty which shows the percentage of people who are identified as multidimensionality poor or the poverty headcount.

Step-6.2: Computing Average Poverty "A"

The Average number or Intensity is measured by the number of deprivations that a poor person experiences. The Intensity is measured by adding the total deprivations that every person faces and dividing it by the total number of poor persons. When the multidimensional poor is identified then the deprivation, scores for each indicator are summed to get the household deprivation score.

$$A = \frac{\sum_i^q c_i}{q} \quad (2)$$

Where (A) is the intensity of poverty it shows the proportion of the weighted component indicators on average people are deprived.

Step-6.3: Computing Adjusted Headcount Ratio "M₀"

The Adjusted headcount ratio "M₀" of multidimensional poverty is being measured when the data is binary M₀ is the product of "H" and "A". At the household-level, the deprivation score is (c) greater than 33.3%. The deprivation scores are summed and can be divided by the total number of people. Where (c_i) is the deprivation score ith poor individual experiences? The deprivation score (c_i) of ith of a poor person can be explained as the sum of deprivation in each dimension c_i = c_{i1} + c_{i2} + c_{i3}.

$$M_0 = \frac{1}{n} \sum_{i=1}^n c_i(k) \quad (3)$$

After the identification deprives and non-deprive the adjusted headcount ratio is denoted by M₀ is equal to the average deprivation score, during measuring poverty the focus is to identify the poor that is the censored deprivation score vector is c(k) from c_i(k)=0.

$$M_0 = \frac{q}{n} \times \frac{1}{q} \sum_{i=1}^n c_i(k) = H \times A \quad (4)$$

In the above equation, M₀ expressed the two components the first component is the share of the population who are multidimensional poor or the headcount ratio (H) and the average of deprivation of poor or the intensity of poor. Where q is the number of poor as the certain reduction of M₀ reduction also reduces the H by reducing A. The Alkire-Foster (AF) method is the most appropriate, mature, and widely used method to measure multidimensional poverty. This study has used the AF identification, aggregation method

(2011). Figure 1 shows the Multidimensional Poverty Index measure three dimensions, which are health, education, and standard of living. The indicators are child mortality, year of schooling, cooking fuel assets, and all measures by two factors such as headcount ratio which identifies the percentage of multidimensional poor people, and Intensity of poverty which is an average percentage of poor people.

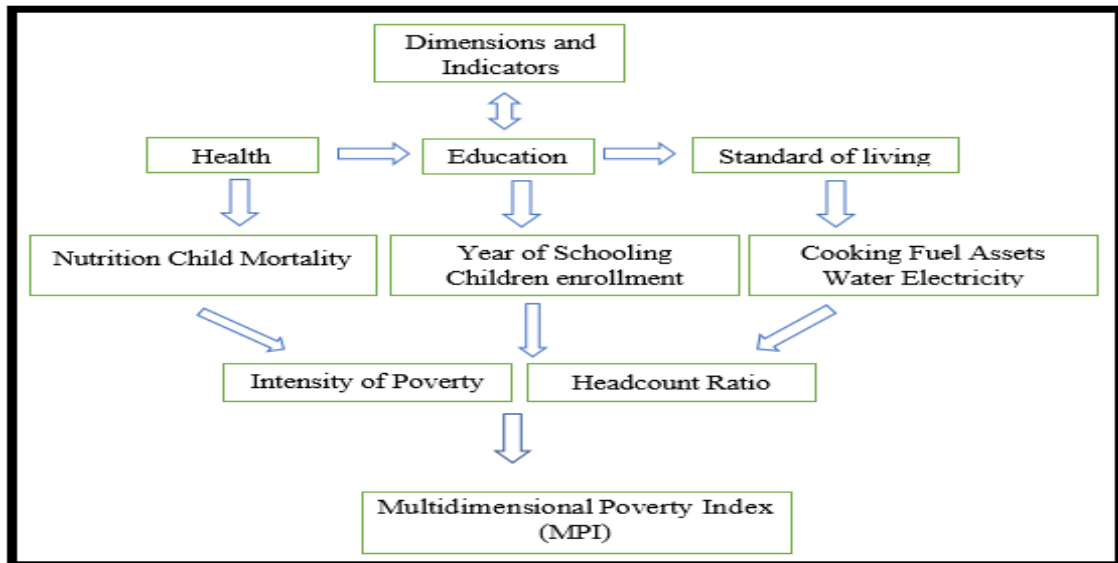


Figure 1 Multidimensional Poverty Index (MPI)

This study measures multidimensional poverty in Punjab by using the Alkire-Foster methodology and investigating the link between multidimensional poverty and income poverty. In equation 4, “A” represents the intensity of poverty as the average percentage of people are deprived. The adjusted headcount ratio a person can categorize as poor by MPI two steps. First, it categorizes the deprived and non-deprived in each indicator by the achievement of the cutoff. The cutoff means the minimum level of achievement of someone in each indicator of MPI. So the cutoff that deals with the deprived of the individual score “1” and those who are not deprived score is “0”. The second step is cutoff using, which would denote as (k). If the value of cutoff is greater than the weight of 1/3 or 33.33% then the person is multidimensional poor. If the household a deprivation score greater than 20 percent but less than 33.3% is considered to be near multidimensional poverty.

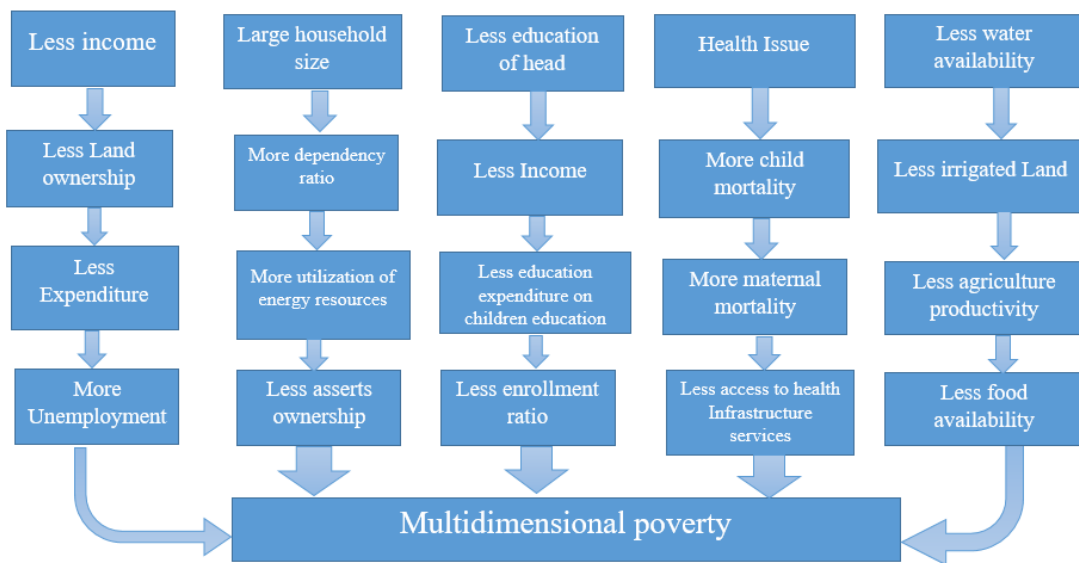


Figure 2 Theoretical framework

Theoretical Links of Explanatory Variables

Income poverty is explained as the deprivation of an individual in which a household has limitations of resources to meet the satisfactory needs of life. So it is also cleared that poverty measurement is the uni-dimensional degree that is also related to the lowness of the income or consumption. It is a very useful act to employ an accumulation of money metric of welfare that shows an individual prefers the conditional on prices and income (Datt & Jlliffe, 1999). This paper reflects the income poverty has a relation with multidimensional poverty through income or consumption deprivation of poor is determined more clearly and easy to measure with the income poverty line (Cheema, 2005)

In this study household expenditure and clarify that is a very reliable tool to measure household income determine to know the deprivation intensity of the household (Rao, 2006). Expenditure measurement is a complicated method of poverty by calculating the number of poor initially and then observe the total number of deprived people. In most studies expenditures are used as the proxy of Income to measure which has a risk to measure poverty in threshold level (Havunga et al, 1989).

Model Specification

This study investigates the multidimensional poverty of Punjab at the household level using the multiple indicator cluster survey. The general equation form of the model is as follow;

$$MPI_i = \alpha_0 + \beta_1 SF_i + \beta_2 EF_i + \beta_3 DF_i + \mu_i \dots\dots\dots \text{General equation (5)}$$

Whereas α_0 = intercept term which indicates the average level of the dependent variable whereas the independent variable is supposed to be zero. β that is the coefficient of determinants that define the specific slope μ this is the stochastic error term or stochastic disturbance term which is an unobservable random variable that may be a negative or positive. Where, i means no of respondents. MPI stands for Multidimensional Poverty Index at the Household level. SF is Social Factors that affect multidimensional poverty at the household level, DF is Demographic Factors that affect the individual multidimensional poverty, and EF stands for Economic Factors that affect the multidimensional poverty of every individual.

According to these variables model of this study is defined as;

$$MPI_i = \ln \left(\frac{pi}{1 - pi} \right) = \beta_0 + \beta_1 Income_i + \beta_2 HS_i + \beta_3 Hgen_i + \beta_4 Hedu_i + \beta_5 land own_i + \beta_6 Hage_i + U_t \dots\dots\dots (6)$$

Demographic variable: HS=household size, Hage= household head age, Hgen= household head gender. Economic variables: income, land ownership, Social variable: Hedu= household head education.

Table 1
Description of Variables and Theoretical Link

Variable name	Variable code	Variable definition	Theoretical link
Dependent variables			
Multidimensional Poverty Index	MPI	It is the multidimensional poverty index that is measured from three dimensions through different questions of poor at the micro-level. The multidimensional poverty on average explained the level of happiness of an individual at a household level.	Wang, X., Feng, H., Xia, Q., & Alkire, S. (2016) Ayala, et al. (2011) Alkire, S., and Fang, Y. (2019)

Independent variable			
Income poverty	Income	Monthly Income poverty is measured through different questions by Income poverty line at household data.	KHAN, A. (2011) Khan, A. U., & Saboor, A. (2011)
Household Size	HHS	The household size gives information about the number of members living in a house.	Anyanwu, J.C. (2014) Olarinde, L.O., et al. (2020)
Head of Household Education level	Hedu	This variable explains the education level of the head of the household so the internal environment can be measured through it.	Rogan, M.(2016) Amao, J.O., Ayantoye, K., and Fanifosi, G.E.(2017)
Household Head Age	Hage	The household age is the variable containing information about the age of males and females at the household level.	Megbowon, E.T. (2018) Anyanwu, J.C.(2014)
Agriculture landholding	Land own	This variable is again measured through agricultural land Ownership at the household level.	Amao,J.O.,Ayantoye,K,and Fanifosi,G.E.(2017)
Gender of Head	Hgen	This is the variable that contains the information about the gender of household head in one house e.g. how many males or females head in a household.	Anyanwu, J.C. (2014) Deutsch,J.,and Silber,J.(2005)

Results and Discussion

The primary objective of this study is to measure the multidimensional poverty at the household level for the region of Punjab, the most populist province of Pakistan. A multidimensional poverty index is calculated on a threshold level. This section is providing descriptive statistics for demographic, economic, and social indicators, this section also presents the exclusive summary of data, tables, and graphs that helps to conclude the results and policymaking. The results are extracted by using the Logistic regression analysis and to ensure the robustness of analysis we have applied various diagnostic tests that validate the results.

Table2
Summary and Descriptive Analysis

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Multidimensional Poverty Index	38405	.3321703	.4709978	0	1
Income Poverty	38405	.1403198	.347323	0	1
Household size	38405	6.418461	2.993866	1	50
Gender of head	38405	1.079781	.2709578	0	1
Age of head	38405	47.66335	13.69508	14	99
Education of Head	38405	1.906002	.8295944	1	3
Locality	38405	1.631194	.4824875	1	2
Agriculture land	38405	.6970186	.4595532	0	1

Descriptive statistics and economics methodology

In this section, the methodology starts with some descriptive statistics of these collected variables from the Multiple Indicator Cluster Survey (MICS) data set, measure the multidimensional poverty, and find its determinants. The above table and outcome explained the descriptive statistics of multidimensional poverty at the household level and

its mean and standard deviation. The minimum and maximum values of multidimensional poverty status fulfill the boundaries which are (0, 1) respectively, which shows how much value was spread out. The mean value of multidimensional poverty Index status .33 and standard deviation .471 stated the deviancy of response from its mean

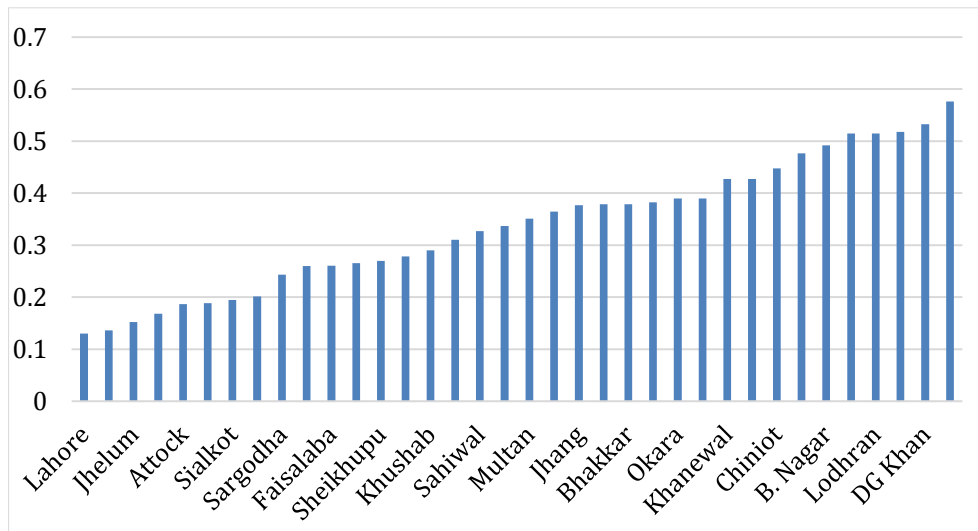


Figure 3 Multidimensional Poverty Index at District Level for Punjab

The figure 3 illustrates the mean value of the Multidimensional Poverty index of women in Punjab, it is easy to observe that almost on average every household is multidimensional poor but the multidimensional poverty index says there are some regional differences in general, the districts (like Rajanpur, D.G. Khan, R.Y. Khan, Lohdarh and M Garh) are showing higher multidimensional poverty index. On the contrary other districts (Lahore, Gujrat, Sialkot, Rawalpindi, etc.) are showing a lower tendency which elaborates the districts belongs to these areas are less multidimensional poverty. These observations drive us to different variables that are influencing the MPI at the household level in the region of Punjab.

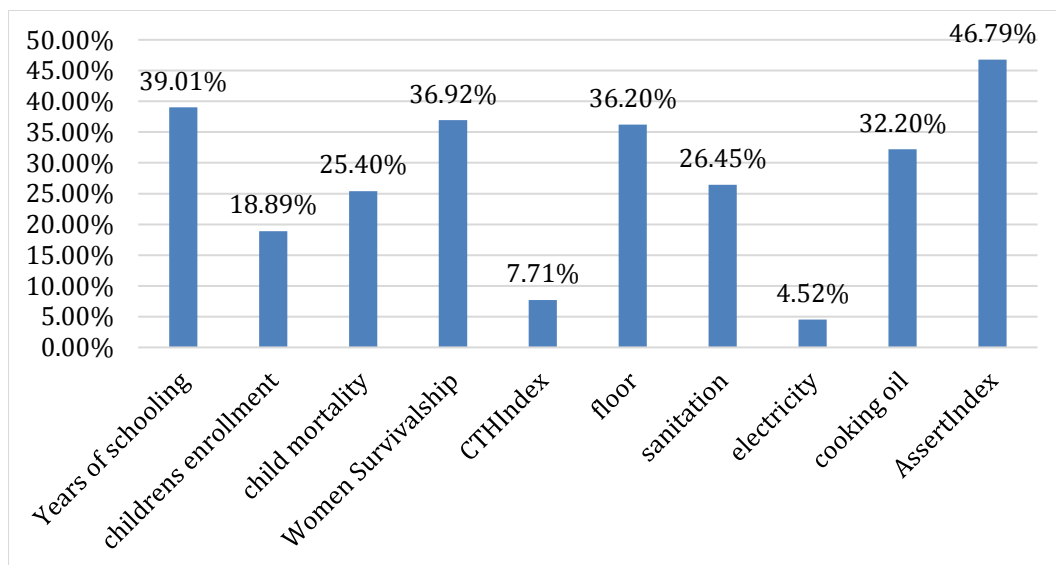


Figure 4 Poverty incidental Rates of Households by Each Dimension

The above Figure shows the poverty incidental rates of the household by each dimension. There are three dimensions are calculated in this study as the first dimension in which two indicators are used to measure the year of schooling about 39 percent of households in Punjab Pakistan are deprived. The Children's enrollment deprivation is about 18.89 percent. The health dimension has three indicators there is 25.40 percent of children are deprived according to child mortality, women survivorship that shows how many women get prenatal health care is about 36.92 percent deprived. The CTH index shows the (cough, TB, Hepatitis) index 7.71 percent household are deprived in Punjab, Floor shows the housing facilities that households are 36.20 percent deprived, sanitation deprivation is 26.45 percent, 4.52 percent households are deprived in electricity, 32.20 percent households are deprived in cooking fuel facilities and 46.79 percent households are deprived in asset index in Punjab Province.

The descriptive statistics of Income poverty, its mean, and deviance from the mean. The minimum and maximum values of the household fulfill the boundaries in response which are (0, 1) that represented how much value was spread out. The consequence showed the mean value of income poverty is .14 and the standard deviation is .3473 stated the deviation from its mean.

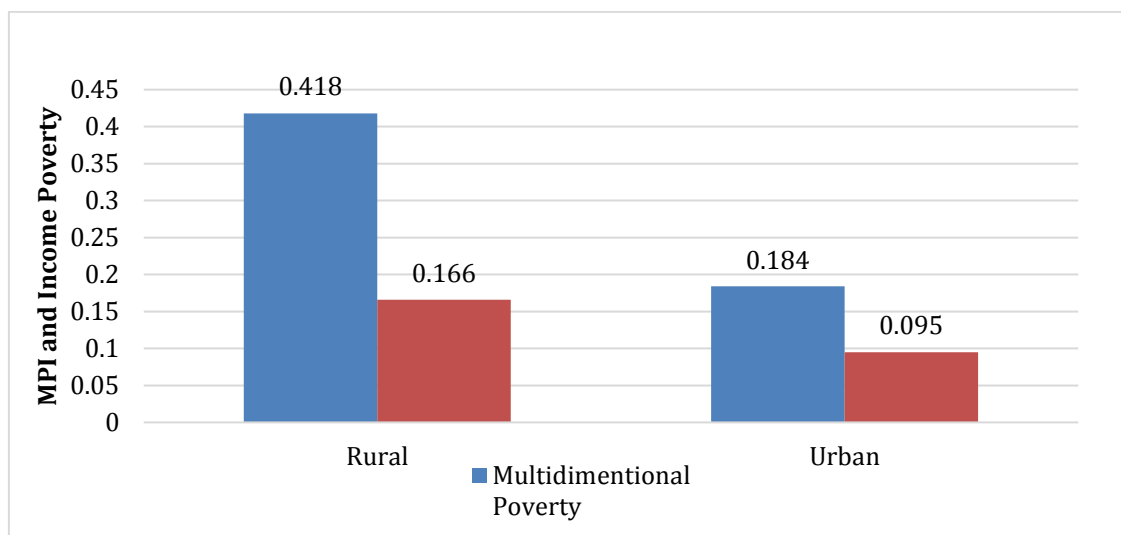


Figure 5 Rural-urban Income and Multidimensional Poverty

The figure 5 presents multidimensional poverty index and income poverty by rural-urban comparison. The above result shows that multidimensional poverty incidence in a rural area is 0.418 and incidence in an urban area is 0.184. And income poverty in urban area is 9 percent, while 17 percent in rural areas of Punjab.

Regression Analysis Results

The result of logistic regression elaborate the household size, Income poverty has a positive and significant relationship with multidimensional poverty, whereas, education level of the head, the gender of the head, age of head, and agricultural landholding negative and significantly related to the multidimensional poverty of the household.

While every single independent variable is describing its relationship and its significance on the dependent variable, the three separate models for the three separate dimensions that are used in this research work being regressed separately to enhance the transparency of our model.

Table 3
Logistic Regression Model

Multidimensional Poverty Index	Odd ratio	Std. Error	Significance	Z
Income Poverty	.683337**	.0549026	0.000	51.97
Household size	.9488671**	.0039363	0.000	-21.65
Gender of head	.5676163**	.0250691	0.000	-12.65
Age of head	.9813336**	.0086240	0.000	-21.44
Education of Head	.4047182**	.006262	0.000	-58.46
Agriculture land	.770553**	.0194758	0.000	-10.31
Constant	10.07923**	.6496466	0.000	35.85

Number of Observation= 38,405
LR chi2(6) = 4639.73
Prob>chi2 = 0.0000
Pseudo R2 = 0.4252

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The regression result shows that there is a positive relationship between income poverty and multidimensional poverty at the household level of Punjab. The result shows that Income poor households are multidimensional poor in Punjab. The income at the household level has importance higher the income level of the household higher the chance of the household being less multidimensional poverty whereas the lower level of income one of the authentic causes to spread multidimensional poverty at the household level. Specifically, the decrease in income was found to be 0.33 times more multidimensional poor.

There is a negative and significant relation between the multidimensional poverty index and household age. The age of the head leads to a decrease in multi-dimensional poverty of the household. Higher the age of head has increased the chance of household being less poor. According to an opinion, multidimensional poverty decrease as the age of head increase as he is become more skillful and earns more money. According to the opposite agreement as at a young age, a person is very energetic and dynamic and he may earn less money. With time experienced increased but his energy level comes downward. As the age of the head increase, the hold becomes less multidimensional poor.

The regression result of the above table shows that there is a negative relationship between education of head and multidimensional poverty of household. The households where family head is with higher education is more likely to fall in non-poor categories of houses. Education increases the opportunities for earning, empower, and make more skillful such as technologies and entrepreneurial skills. Education also a source to increase working efficiency and proficiency. The educated head plays a very efficient role in promoting other members of the household to get qualitative education. The educated head leads to a decrease the multidimensional poverty at the household level.

There is a negative relationship between multidimensional poverty and agricultural landholding in the above regression table. As agricultural land increases the chances of being less poor. As Pakistan is an agricultural country when a household has more land to cultivate major food items the probability of the household being poor is decreased.

Table 4
Multidimensional Poverty and Income Poverty

Multidimensional Poverty	(Non-poor)	Income Poverty (poor)	Total
Non poor	22,677	2,929	25,606

Poor	10,284	2,451	12,735
Total	32,961	5,380	38,341

The table 4 shows that there are about 22,677 households that are non-poor in both multidimensional poverty and Income poverty and 2,929 are multidimensional non-poor but Income poor. The total 25,606 households are Income and multidimensional non-poor. About 10,284 households are multidimensional poor but Income wise not poor. Almost 5,380 households are Income poor and multidimensional poor. There are 12,735 are poor from the 38,381 households poor in Punjab. This relationship shows that Income poor households are multidimensional poor. The relationship between income poverty and multidimensional poverty. Poverty has captured both the monetary and non-monetary aspects of the economy. The rural incident rate of multidimensional poverty index is measured and the results show MPI single is not covered the monetary and non-monetary aspect of poverty income associate with education, health, and standard of living. Income poverty has a positive relation to multidimensional poverty (Wang, X et al., 2016).

The results of association and correlation tests The (MLE) maximum likelihood estimations are more widely used and have much attraction because of logistic regression it has made different results compared to the (OLS) ordinary least square. If the dependent variable is in the binary form then logistic regression is applied. The other point is that the error term is not distributed properly or normally in nature. Maximum likelihood estimation is a very suitable technique for the estimation of a large sample size it is also tried to maximizing the log-likelihood ratio comparative to minimizing the residuals (Meddala, 2007 and Gujrati, 2005). This is the best estimate to measure the logit model and its parameters. Above all correlation, tests show a significant relationship with each other. The Pearson chi-square is a calculated deviation from the saturated model in the statistic. Rather than the p-value has not as much importance as other statics (Hosmer et al., 1997).

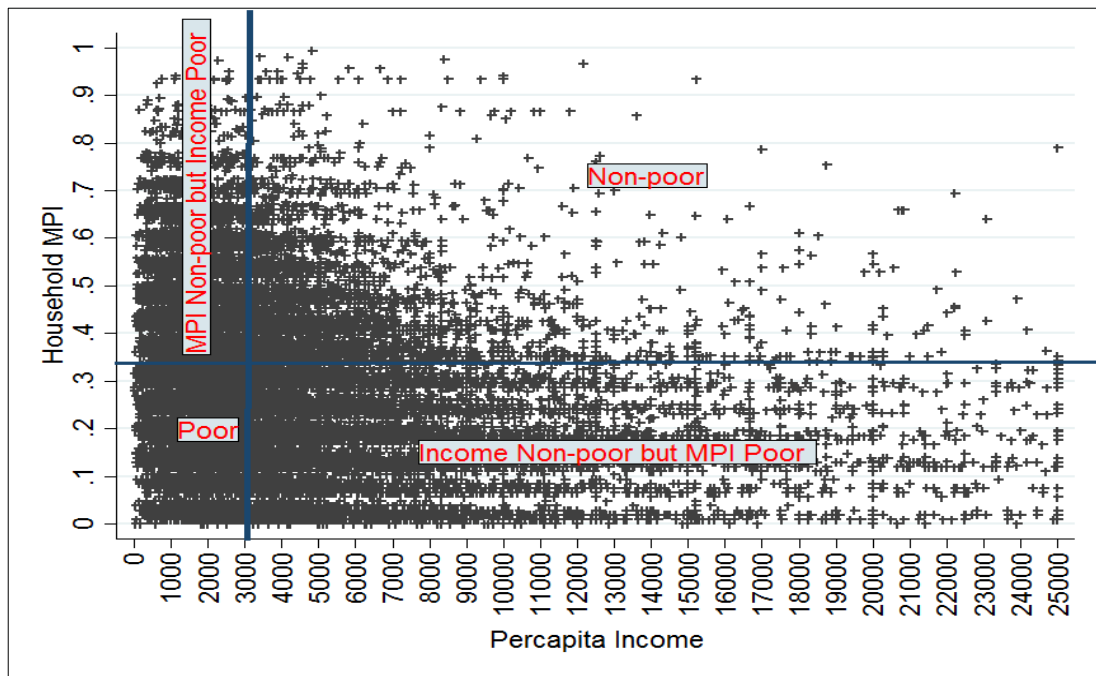


Figure 6 Connections between Income Poverty and Multidimensional Poverty

The figure 6 divides the household into four categories. The first one is Multidimensional and Income non-poor households. The second one is multidimensional non-poor but Income poor. The third one households are both multidimensional and Income non-poor. The fourth one is Income poor but multidimensional non-poor. The above figure shows the relationship between income poor and multidimensional poor.

The statistical analysis of income and multidimensional poverty measurement shows that the coincidence of income poverty and multidimensional poverty. In other words, of the multidimensional poor households are not considered as poor in terms of income poverty. According to the national poverty line, nearly 14 percent of households in multidimensional poverty are not covered by poverty-reduction, but they are in a state of vulnerable or ordinary or extreme multidimensional poverty. The regression results of the logit model shows that an increase in income can significantly reduce the incidence of multidimensional poverty and each dimension of it, but the impact is small. This implies that income-based poverty measurement can hardly reflect the comprehensiveness and complexity of poverty. Therefore, when measuring poverty, we must take into account various dimensions of multidimensional poverty and pay attention to the essential role of income poverty at the same time.

Conclusion

The aim of the study to measure the incidence of Multidimensional poverty at the household level in Punjab Pakistan and empirically investigated the social and economic determinants of MPI at the household level. Data was collected from the Multiple Indicator Cluster Survey (MICS) 2014-15 to measure MPI status in Punjab. Multiple Indicator Cluster Survey (MICS) method is used to measure Multidimensional poverty status. This method used information about the three dimensions of poverty (Health, Education, Standard of living). In a survey of (MICS), data is available about both Multidimensional poverty indicators and income poverty.

The result of this study showed that 33 percent of the Punjab population is multidimensional poor in all the aspects of its dimensions and 14 percent of the population is Income poor. This study clears that multidimensional poor are multidimensional poor in Punjab. The income of the household plays a significant role to improve the economic and physical access of the household toward food. Therefore, an increase in the income of the household is the most important and effective tool to improve the poverty status of the household. Policies should be adopted to increase the income level of the household by different steps such as education (to raise literacy rate), the government should take measure to control the population and increase employment opportunities, etc. education play an important and significant role in improving poverty situation of the country. Because the educated head generally earned more income for the household as compared to the uneducated head. Therefore, education is an important tool for the poverty of the household.

Size of the family play a significant role in the multidimensional poverty status of the household. As multidimensional poverty increase with the increase in the size of the household member or dependency ratio. The population is actually a household size that explains the member living in a household that is again having a positive effect with multidimensional poverty. The reasons can be differing from one to another person (i.e.) people like to live around their family, some like many children. Head education level is also persuading the poverty, as educated head of household can take better and realistic decisions and open the doors to eradicate the poverty and make the bridges to educate their children properly, make them aware from all the aspects, makes happier situation compared to the uneducated head who make the environment more complex. Ownership of assets is also relating to get rid of poverty, as the ownership of assets gives more sense of security on the other side owing more assets means more stability in the economic condition that improves living conditions.

The study suggested that policies should be adopted to increase the income level at the household, an education level (to raise literacy rate), social welfare program, and

employment opportunities, etc. Although, there are many social safety programs and other government efforts implied to decrease multidimensional poverty in Punjab these measures are not solid or permanent solutions to decrease its level in the country. Policies should be designed to increase the physical, social, and economic access of people toward all dimensions of education, health, and standard of living to decrease multidimensional poverty.

References

- Alkire, S., & Foster, J. (2011). Understandings and misunderstandings of multidimensional poverty measurement. *The Journal of Economic Inequality*, 9(2), 289-314.
- Alkire, S., & Fang, Y. (2019). Dynamics of multidimensional poverty and uni-dimensional income poverty: An evidence of stability analysis from China. *Social Indicators Research*, 142(1), 25-64.
- Alkire, S., & Foster, J. (2011). Counting and multidimensional poverty measurement. *Journal of public economics*, 95(7-8), 476-487.
- Atkinson, A. B. (2003). Multidimensional deprivation: contrasting social welfare and counting approaches. *The Journal of Economic Inequality*, 1(1), 51-65.
- Alkire, S., Santos, M. E., Seth, S., & Yalonetzky, G. (2010). *Is the Multidimensional Poverty Index robust to different weights?*, Oxford University Press, UK
- Ayala, L., Jurado, A., & Pérez-Mayo, J. (2011). Income poverty and multidimensional deprivation: Lessons from cross-regional analysis. *Review of income and wealth*, 57(1), 40-60.
- Anyanwu, J. C. (2014). Marital status, household size and poverty in Nigeria: evidence from the 2009/2010 survey data. *African Development Review*, 26(1), 118-137.
- Awan, M. S., & Aslam, M. A. (2011). Multidimensional poverty in Pakistan: case of Punjab province. *Journal of Economics and Behavioral Studies*, 3(2), 133-144.
- Kemal, A. R. (2003). Poverty in Pakistan; Trends and Causes, Towards, Pro-poor Growth Policies. In *Symposium 7th March*, UNDP.
- Khan, A. U., Saboor, A., Hussain, A., Sadiq, S., & Mohsin, A. Q. (2014). Investigating multidimensional poverty across the regions in the Sindh province of Pakistan. *Social indicators research*, 119, 515-532.
- Poverty across the regions in the Sindh province of Pakistan. *Social Indicators Research*, 119(2), 515-532.
- Awan, M. S., Waqas, M., & Aslam, M. A. (2015). Multidimensional measurement of poverty in Pakistan: provincial analysis. *Nóesis: Revista de Ciencias Sociales Humanidades*, 24(48), 55-72.
- Ayala, L., Jurado, A., & Pérez-Mayo, J. (2011). Income poverty and multidimensional deprivation: Lessons from cross-regional analysis. *Review of income and wealth*, 57(1), 40-60.
- Bank, W. (2002). *Pakistan Poverty Assessment. Poverty in Pakistan, Vulnerabilities, Social Gaps, and Rural Dynamics*. South Asia Region.
- Bourguignon, F., & Chakravarty, S. R. (2002). *Multi-dimensional poverty orderings*. Delta.
- Bronfman, J. (2014). *Beyond income: A study of multidimensional poverty in Chile*. Munich University.

- Burchi, F., Rippin, N., & Montenegro, C. (2018). *From income poverty to multidimensional poverty: An international comparison* (No. 174). Working Paper.
- Cheema, I. A. (2005). *Revisiting the poverty line 2001–02. Centre for Research on Poverty Reduction and Income Distribution Islamabad*. Pakistan. Discussion Paper Series 2.
- Deutsch, J., & Silber, J. (2005). Measuring multidimensional poverty: An empirical comparison of various approaches. *Review of Income and wealth*, 51(1), 145-174.
- Miller, F. (2018). *Developing a multi-dimensional well-being framework for higher education: evidence from South Africa* (Doctoral dissertation, University of Southampton).
- Foster, J. E. (2007). *A report on Mexican multidimensional poverty measurement*. Oxford Poverty & Human Development Initiative (OPHI)
- Fanifosi, G. E., & Amao, J. O. (2000). Analysis of the determinants food insecurity and poverty status among farming households in Osun State, Nigeria. *Journal Of Advances In Agriculture*, 5(3), 729-739.
- HAMEED, G. (2015). *Multidimensional Impact Of Ajk Community Development Program: An Empirical Analysis* (Doctoral dissertation, Pir Mahal Ali Sha Arid Agriculture University Rawalpindi, Pakistan).
- Human Development Index*. (2017). UNDP.
- Khan, A. U., Saboor, A., Hussain, A., Sadiq, S., & Mohsin, A. Q. (2014). Investigating multidimensional poverty across the regions in the Sindh province of Pakistan. *Social Indicators Research*, 119(2), 515-532.
- Khan, M., Saboor, A., Rizwan, M., & Ahmad, T. (2020). An empirical analysis of monetary and multidimensional poverty: evidence from a household survey in Pakistan. *Asia Pacific Journal of Social Work and Development*, 30(2), 106-121.
- Kochendorfer-Lucius, G., & Pleskovic, B. (Eds.). (2009). *Spatial Disparities and Development Policy: Berlin Workshop Series 2009*. The World Bank.
- Saleem, H., Shabbir, M. S., & Khan, B. (2019). Re-examining multidimensional poverty in Pakistan: a new assessment of regional variations. *Global Business Review*, 0972150919844412.
- Schellnhuber, H. J., Block, A., Cassel-Gintz, M., Kropp, J., Lammell, G., Lass, W. ... & Petschel-Held, G. (1997). Syndromes of global change. *GAIA-Ecological Perspectives for Science and Society*, 6(1), 18-33.
- Kakwani, N. (2003). *Issues in setting absolute poverty lines*. Asian Development Bank.
- Megbowon, E. T. (2018). Multidimensional poverty analysis of urban and rural households in South Africa. *Studia Universitatis Babes-Bolyai Oeconomica*, 63(1), 3-19.
- Mohanty, S. (2011). Multidimensional poverty and the state of child health in India. *Asia Research Centre* [No. 30]. Working Paper.
- Khan, A. U., Saboor, A., Ali, I., Malik, W. S., & Mahmood, K. (2016). Urbanization of multidimensional poverty: empirical evidences from Pakistan. *Quality & quantity*, 50(1), 439-469.

- NSER, National Socio-Economic Register of Pakistan (2018-19). *The population of Pakistan: An Analysis of NSER 2018-19*. NSER
- Olarinde, L. O., Abass, A. B., Abdoulaye, T., Adepoju, A. A., Fanifosi, E. G., Adio, M. O., & Wasiu, A. (2020). Estimating Multidimensional Poverty Among Cassava Producers in Nigeria: Patterns and Socioeconomic Determinants. *Sustainability*, *12*(13), 5366.
- Ray, A. (2006). A class of decomposable poverty measures with public transfers. *SSRN* 713762.
- Sen, A. K. (1990). *Development as capability expansion*. The Community Development Reader.
- Sen, A. (1976). Poverty: An Ordinal Approach to Measurement, *Econometrics*, *44* (2), 219-231.
- Suppa, N. (2018). Towards a multidimensional poverty index for Germany. *Empirica*, *45*(4), 655-683.
- Kingdon, G. G., & Knight, J. (2006). Subjective well-being poverty vs. income poverty and capabilities poverty? *The Journal of Development Studies*, *42*(7), 1199-1224.
- UNDP (2016). *Multidimensional Poverty in Pakistan*. UNDP
- UNDP (2019). *Global multidimensional poverty index 2019: illuminating inequalities*. UNDP
- Wang, X., Feng, H., Xia, Q., & Alkire, S. (2016). On the relationship between income poverty and multidimensional poverty in China. *OPHI Working Papers*, (101).
- World Bank. (2017). *World Bank Staff Estimates Based on Age/Sex Distributions of United Nations Population Division's World Population Prospects: 2019 Revision*.