Multidimensional Poverty in Pakistan: A Regional Analysis

*[1]**Bilal Ahmed**
[2]**Masood Sarwar Awan**
[3]**Safana Shaheen**

[1]Lecturer in Economics, University of Sargodha, Sargodha, Pakistan, Department of Economics, University of Sargodha, Sargodha, Pakistan.

[2]Professor in Economics / Pro Vice Chancellor, University of Sargodha, Sargodha, Pakistan., Department of Economics, University of Sargodha, Sargodha, Pakistan.

[3]Professor in Economics, Government Graduate College for Women, Chandni Chowk, Sargodh, Pakistan. Department of Economics, Government Graduate College for Women, Chandni Chowk, Sargodh, Pakistan.

[1]bilal.ahmed@uos.edu.pk, [2]masood.sarwar@uos.edu.pk, [3]safanashaheen40@gmail.com

Abstract

Study in hand argues for the multidimensional measurement of poverty in Pakistan. In this regard the study calculates multidimensional poverty indices on the basis of variables that are supposed to reflect persistent deprivations, especially, in the context of Millennium Development Goals (MDGs); eight out of twelve indicators are directly related to MDGs. The study employs Alkire and Foster Measure (2007) on 15512 households in Pakistan by using Pakistan Social & Living Standards Measurement (PSLM) Survey. This study supports the argument that poverty in Pakistan is predominantly a rural phenomenon as 70.68% households, residing in rural areas of Pakistan, are victims of multidimensional poverty as compared to 38.07% in urban areas. Furthermore, various regions of the country like provinces as rural and urban have been ranked, by an appropriate measure of deprivation, from higher to lower level of deprivations as follows: 1-Rural Baluchistan, 2-Rural Sindh, 3-Rural Punjab, 4-Rural KPK, 5-Urban Baluchistan, 6- Urban Punjab, 7-Urban KPK, 8-Urban Sindh. The study also investigates relationship between traditional unidimensional (income) poverty and multidimensional poverty. It contrasts the results obtained by using a multidimensional measurement of poverty with those of the official poverty line. On the basis of findings, the prime policy implication of the study is to take into account exclusion of a high proportion of abject poor in Social Protection Programs. Additionally, targeting poverty on geographical basis, instead of the whole population, is appealing for the reason that it is relatively easy to deal with.

Keywords: Multidimensional Poverty Index (MPI); Capability Approach; Alkire and Foster Method; Dual Cutoff Approach; Poverty Profiles.

Introduction

In consequence of budget constraints on public spending, it has become the key objective that scarce monetary resources must be exhausted efficiently, and with the maximum incidence as well as impact on the deprived. One of the key objectives of Pakistan development planning, since it came into being, has been to get rid of poverty and hence to improve the lives of those battered by deprivations and sufferings. The goal is important itself and also in turn strengthens social, political, and economic outcomes. Although this objective has remained invariable, the mechanisms for addressing it have evolved. It can be stated that much of the current, and wide-ranging, dissatisfaction with poverty alleviation strategies is because of a failure to make a clear choice of definition of poverty.

Grounds behind defining the poverty, obviously, are measurement and sound analysis of poverty that always have been a core issue of development economics. Traditionally results derived from a low level of income or consumption has been widely used in poverty research for the welfare and well-being of individuals. Numerous researches have been carried out on this issue. In Pakistan the conventional measures and analysis of poverty has relied upon only single information variable, usually the income or consumption. However recent contributions to existing literature on poverty measurement have pointed out some serious theoretical and methodological limitations of approaches to estimate and examine the extent of poverty exclusively in terms of financial deprivation.

It is not worthless to say that poverty is multidimensional and it is beyond the deprivations in income merely. According to Wall (2006), poverty is and ethical concept, not a statistical one. Inherent in the term *poverty*, when applied to human beings, is the notion of a life situation that should not exist. Amartya Sen aptly sums up many dimensions of poverty as lack of *capability* —capability to overcome violence, hunger, ignorance, illness, physical hardship, injustice and voicelessness. The World Bank has argued that poverty often lies in the absence of opportunity, empowerment and security, and not just the absence of food on the table. A single indicator can never capture the complications of development hence a multidimensional exercise is essential to understand the complex phenomenon of poverty for the wellbeing of individuals.

For these reasons, usually, indices are estimated by aggregating achievements regarding various indicators. Though measurement and aggregation of multiple deprivations at household level is a difficult task, however equally in developed and under developed countries a multidimensional measurement of poverty has been adopted. Based upon Sen's capability approach that sees poverty as the lack of multiple freedoms that individuals value and have reason to value [*Alkire 2007*], and the limitations of monetary approaches to measure poverty, this study argues for the use of a multidimensional measurement of poverty in Pakistan.

In Pakistan, along with population size for the first time, more than 10% weights in current NFC award are given to the poverty. Also different social protection programs, like Benazir Income Support Program (BISP) and Wasila-E-Rozgar Scheme etc, are designed to facilitate deprived and get rid of poverty. The current policy of Asian Development Bank (ADB) also put emphasis on poverty alleviation as the major concern of Pakistan's development. Moreover commitment on achievements of the Millennium Development Goals (MDGs) and the implementation of Poverty Reduction Strategy Papers (PRSP) approach by the Government of Pakistan, like other developing countries, shows the significance and need of poverty alleviation in development efforts. All the poverty reduction strategies and safety-net programs that seek to improve the quality of basic needs and thus the wellbeing of people,

obviously, demands a sound analysis and measurement of poverty as these programs have clearly acknowledged reaching the poor as their prime objective.

This study will provide policy makers the province-wise deprivation indices based on the Pakistan Social & Living Standards Measurement (PSLM) Survey 2007-08. Probable intention of this investigation is to identify the deprived areas, take decisions on the regional priorities, target available resources, and to understand the association between availability of resources, and poverty reduction. The work will also help to minimize the limitations in determining the provincial and regional awards that have a hunger of a provincial and regional database of deprivation indices that are though available in Pakistan now, but cannot be relied due to some methodological flaws.

The plan of the study is as follows: Section 2 briefly reviews the empirical evolution of poverty concept from a traditional unidimensional measure to multidimensional one. Section 3 explains the data and methodology used in this study. Selected dimensions ahd their cutoffs have been explained in section4 while the empirical results and findings of the paper are discussed briefly in Section 5. Finally, conclusion and some policy recommendations on the basis of empirical findings are given in Section 6. All the related tables and graphs in the study are relegated to Appendix I and II.

Review of Literatures

The most vital development in the field of economics is the measurement and analysis of poverty as the persistent questions concerning poverty and poverty reduction concepts are continuously discussed by the scholars and governments as well. Emerging, in the nineteenth century, from very simple household surveys to the multipart models of research designs of today, to incorporate new dimensions and indicators of poverty, the literature has covered a long way to the development of scientific and systematic approaches to understand and tackle the fret of poverty. Though, the persuasive work of Amartya Sen, different poverty reduction strategies in several countries, and the Millennium Development Goals (MDGs) all captured the attention towards the multiple deprivations suffered by many of the deprived people, but the main idea behind all this, definitely evolved from the work of Charles Booth (1887).

Charles Booth (1840-1916) was first ever writer in the history of poverty whose work was published (Charles Booth, 1887). This inquiry, even at the present time, is considered amongst the most complete and precise social surveys of London. General Francis Asasa Walker, a well known body of the American Economics in the nineteenth century, would be the first to write paper about poverty for educational reasons, and not for just social or political inspiration (Francis Walker, 1897). In 1901, Benjamin Rowntree and Dadabhayi Naoroji, two authors contributed in the ongoing work concerning poverty (Naoroji, 1901). Benjamin Rowntree, was indulged in discussing the poverty on scientific basis (Rowntree, 1901). For more than 50 years, after the Rowntree, poverty would not be a core issue.

Poverty would come up again to the scientific discussion with Peter Townsend. Townsend would create the first paper that is specifically devoted to measuring poverty (Peter Townsend, 1954). Nonetheless, the "rediscovery" of poverty would really begin with a series of American empirical studies in the 1960s. Harrington's "The Other America" (Edward Harrington, 1962) would be a first significant book on the issue. Two years after "The Other America", W. Anderson wrote another major work about the poverty in America (Anderson, 1964). Another American empirical work would come up in 1964, but this with a focus on social mobility (Stephan Thernstrom, 1964).

Even though poverty is one of the most recognizable and lasting conditions known to humankind, it is a very complex concept to comprehend. Some researchers perceive this

complexity as an adaptation to the condition of poverty, while others interpret it as a reaction to the strain of being poor. In 1965, Mollie Orshansky, from the U. S. Division of Research and Statistics, wrote a fundamental article in which, besides giving continuation to the American empirical studies of the "rediscovery of poverty era", she tackled directly the poverty concept and poverty line issues (Mollie Orshansky, 1965). In another article - published two years before (Orshansky, 1963) – she described the evolution towards the desirable definition of equivalent incomes at a poverty level for different family types. Orshansky (and Rowntree) made use of what would later be called the absolute poverty line approach (Orshansky, 1969). With Peter Townsend, in the 1970s, the relative approach - in opposition to the absolutist one - would take a substantial impact (Townsend, 1973). But his major contribution would come 6 years later, with his Survey (Townsend, 1979).

Poverty was basically absent on the World Bank's documents until the late 1960's. Its President in September 1973, McNamara, at the annual general meetings in Nairobi, articulated the concept of absolute poverty. In March 1975 he implicitly defined it as "a condition of life so degrading as to insult human dignity". In June of the same year, the World Bank published the book "The Assault on World Poverty" (World Bank, 1975). The more scientific approach of poverty would not be very significant in the World Bank until the 1990s. In 1990, distinguishing the concepts of inequality and poverty, the World Bank (1990) remembers that "Minimum inequality may coexist with maximum poverty".

Amartya Sen has several important articles and books on the Economics of Poverty. His first fundamental articles are about the measurement of poverty. In one of them, "Issues in the Measurement of Poverty" (Sen, 1979), it is argued that the measurement of poverty should be seen primarily as a descriptive exercise, instead of an ethical one as it is often. It aggregates the poverty characteristics into one overall measure; shows intuitively how the "axiomatization" of the aggregation exercise leads to a poverty measure that is a function of the head-count ratio, the income-gap ratio and the Gini coefficient, and how the axioms used for deriving this poverty measure can be varied. Another Sen's fundamental article on this subject is "Poor, Relatively Speaking" (Sen, 1983). Alternatively to the relative and, above all, absolute approaches, the subjective poverty line approach came up in the 1970s. It puts the perception of income adequacy of the population in focus. Thus the approach does not ask the respondents whether or not they consider themselves to be poor.

Different survey questions have been used to find the respondent's opinion on income adequacy. For example, Robert Kilpatrick (1973), and Dubnoff (1985). In the 1990s a new approach of the poverty measurement starts to be considered as an alternative: the fuzzy approach. The fundamental novelty of this theory consists on the admittance that there are sets in which there are not only elements that verify the dichotomy "it belongs or it does not belong" to the set. The first structured proposal of the fuzzy approach arose in Italy (Cerioli and Zani, 1990). A few years afterwards, a totally fuzzy and relative (TFR) approach was proposed by Chelli and Lemmi (1995). This approach has the advantage of being a very helpful instrument in the analysis of poverty in a multidimensional perspective, avoiding arbitrary values for the thresholds. However, TFR indices raise aggregation, comparison and interpretation problems, once that its values have not an inherent meaning. Another disadvantage is the arbitrariness of the weighting used in the aggregation of the information supplied by the diverse indicators.

The Martin Ravallion's (1996) work about measuring and modeling poverty may be considered the last essential one on the Economics of Poverty of the twentieth-century. Ravallion

discusses what can be learned from a regression of poverty, the links between income poverty and human development, poverty dynamics and the economic geography of poverty.

Drawing on the capability approach advanced by Amartya Sen and others, a number of authors and institutions have begun to develop methods of comparing multidimensional poverty and deprivation. The concept of multidimensional poverty has risen to prominence among researchers and policymakers. The compelling writings of Amartya Sen, participatory poverty exercises in many countries, and the Millennium Goals (MDGs) all draw attention to the multiple deprivations suffered by many of the poor and the interconnections among these deprivations. A key task for research has been to develop a coherent framework for measuring multidimensional poverty that builds on the techniques developed to measure unidimensional (monetary) poverty and that can be applied to data on other dimensions of poverty.

In July 2010, the Oxford Poverty and Human Development Initiative (OPHI) of Oxford University and the Human Development Report Office of the United Nations Development Program (UNDP) launched a new poverty measure, Alkire and Foster Measure (AFM), which gives a "multidimensional" picture of people living in poverty which its creators say, could help target development resources more effectively.

Data and Methodology

Data

The study uses Pakistan Social & Living Standards Measurement (PSLM) Survey (2007-08) for the sake of estimating Multidimensional Poverty in Pakistan. This survey contains sample of 15512 households comprising 1113 sample village/enumeration blocks. A two-stage stratified sample design has been adopted for this survey.

Methodology

The study has employed Multidimensional Poverty Index for the measurement and analysis of poverty proposed by Alkire and Foster (2007). Understanding the following notations will be helpful to provide an outline of the measure.

Consider a society with N households[1] and D dimensions. Let X denote the set of all $N \times D$ matrices and $X \in X$ represents an achievement matrix of a society[2], where x_{nd} is the achievement of the nth household in the dth dimensions for all $d = 1, ..., D$ and $n = 1, ..., N$. The nth row and the dth column of X are denoted by $x_{n\bullet} = (xn1, ..., xnD)$ and $x_{\bullet d} = (x_{1d}, ..., x_{Nd})$. The row vector $x_{n\bullet}$ summarizes the achievements of household n in D dimensions; whereas, the column vector $x_{\bullet d}$ represents the distribution of achievements in the dth dimension across N households. We denote the D-dimensional deprivation cut-off vector by z where the deprivation cut-off for the dth dimension is indicated by z_d.

Corresponding to any $X \in X$, a $N \times D$ dimensional deprivation matrix g^0 is constructed, where the nd^{th} element is denoted by g_{nd}^0. Any element of g^0 can take only two values as follows:

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

In other words, the nd^{th} entry of the matrix is equal to one when the nth household is deprived in the dth dimension and is equal to zero when the household is not deprived. From matrix g^0,

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[1] In this paper, the focus is on households rather than individuals as the unit of analysis in order to parallel the BPL methodology; it is of course possible to focus instead upon individuals.
[2] They could be nations, states, or any geographic region.

we construct an N-dimensional column vector C of deprivation counts such that the nth element $c_n = |g_n^0|$ represents the number of deprivations suffered by the nth household. If the dimensionsare cardinal in X, then we construct a normalized gap matrix g^1, where the nd^{th} element is:

$$g_{nd}^1 = \begin{cases} (z_d - x_{nd})/z_d \ if \ < z_d \\ 0 \qquad otherwise \ f \end{cases}$$

By construction, $g_{nd}^1 \in [0, 1]$ for all n and all d, and each element gives the extent of deprivation experienced by the n^{th}household in the dth dimension. The generalized gap matrix is denoted by g^α, with $\alpha > 0$. The nd^{th}element of $g^\alpha$is denoted byg_{nd}^α, which is the normalised poverty gap raised to the power α.

Now, we are in a position to provide an outline of the class of multidimensional poverty measure proposed by Alkire and Foster (2007). The first stage of multidimensional poverty measurement is to identify the poor. Most existing poverty measures identify the poor either by the union approach or by the intersection approach. According to the union approach, a household is identified as poor if the household is deprived in at least one dimension. On the other hand, a household is identified as poor according to the intersection approach if the household is deprived in all dimensions. If dimensions are equally weighted[3], the multidimensional approach proposed by Alkire and Foster identifies a household as poor if the household is deprived in at least k dimensions where $k = 1, ..., D$.

Let us define the identification method ρ_k such that $\rho_k(x_{n\bullet}, z) = 1$ if $c_n \geq k$, and $\rho_k(x_{n\bullet}, z) = 0$ if $c_n < k$. This implies that a household is identified as multidimensionally poor if the household is deprived in at least k number of dimensions. Note that for $k = 1$, the identification criterion is equivalent to the union approach; whereas, the identification criterion is the same as the intersection approach for $k = D$. The set of multidimensional poor, according to this identification criterion, is defined by $Z_k = \{n : \rho_k(x_{n\bullet}, z) = 1\}$. A censored matrix $g^0(k)$ is obtained from g^0 by replacing the nth row with a vector of zeros whenever $\rho_k(x_{n\bullet}, z) = 0$. An analogous matrix $g^\alpha(k)$ is obtained for $\alpha > 0$, with the nd^{th}element $g_{nd}^\alpha(k) = g_{nd}^\alpha$if $\rho_k(x_{n\bullet}, z) = 1$, and $g_{nd}^\alpha(k) = 0$ if $\rho_k(x_{n\bullet}, z) = 0$.

Based on this identification method, Alkire and Foster define the following poverty measures: The first natural measure is the percentage of individuals who are multidimensionally poor. Analogous to the single-dimensional headcount ratio, the multidimensional headcount ratio is defined by $H(X; z) = Q/N$, where Q is the number of individuals in set Z_k. This measure has the advantages of being easily comprehensible and estimable. Moreover, this measure can be applied using ordinal data. Unfortunately, it is completely insensitive to the intensity and distribution of poverty, as first noticed by Watts (1969) and Sen (1976) in the single-dimensional context. It also fails to satisfy the properties of transfer and monotonicity. Moreover, in the multidimensional context, it violates dimensional monotonicity. Alkire and Foster describe this problem as follows: if a household already identified as poor becomes deprived in an additional dimension in which the household was not previously deprived, H does not change. Finally, this measure is not flexible to dimensional decomposition, which is often useful for policy recommendation.

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[3] Equal weights are presented first for simplicity; we discuss general weights below.

To overcome the limitations of the multidimensional headcount ratio, Alkire and Foster propose the class of dimension-adjusted FGT measures, defined by $M_\alpha(X; z) = \mu(g^\alpha(k))$ for $\alpha \geq 0$. For $\alpha = 0$, the class of measures yields Adjusted Headcount Ratio, defined by $M_0 = \mu(g^0(k)) = HA$. The adjusted headcount ratio is the total number of deprivations experienced by all poor households divided by the maximum number of deprivations that could possibly be experienced by all households and is formulated by $|c(k)|/ND$. It can also be expressed as a product between the percentage of multidimensional poor (H) and the average deprivation share across the poor given by $A = |c(k)|/QD$. In other words, A provides the fraction of possible dimensions D in which the average multidimensionally poor household is deprived. In this way, M_0 summarizes information on both the incidence of poverty and the average extent of a multidimensional poor household's deprivation. This measure is as easy to compute as H and can be calculated with ordinal data, but it is indeed superior to H since it satisfies the property of dimensional monotonicity described above.

When some data are cardinal, the class of dimension-adjusted FGT measures also yields the Adjusted Poverty Gap, given by $M_1 = \mu(g1(k)) = HAG$, which is the sum of the normalized gaps of the poor ($|g1(k)|$) divided by the highest possible sum of normalized gaps (ND). It can also be expressed as the product between the percentages of multidimensional poor households (H), the average deprivation share across the poor (A) and the average poverty gap (G), where $G = |g^1(k)|/|g^0(k)|$. The M_1, summarizes information on the incidence of poverty, the average range of deprivations and the average depth of deprivations of the poor. It satisfies not only dimensional monotonicity, but also monotonicity: if an individual becomes more deprived in any dimension in which they are already deprived, M_1 will increase.

Finally, for $\alpha = 2$, the class of measures yields the Adjusted Squared Poverty Gap, defined by $M_2 = \mu(g^2(k)) = HAS$, which is the sum of the squared normalised gaps of the poor ($|g^2(k)|$) divided by the highest possible number of normalized gaps (ND). It can also be expressed as the product between the percentage of multidimensionally poor (H), the average deprivation share across the poor (A) and the average severity of deprivations (S), which is given by $S = |g^2(k)|/|g^0(k)|$. The M_2, summarizes information on the incidence of poverty and the average range and severity of deprivations of the poor. If a poor household becomes more deprived in a certain dimension, M_2 will increase more the larger the initial level of deprivation was for this individual in this dimension. This measure satisfies both types of monotonicity principles, transfer, and is sensitive to the inequality among the poor as it emphasizes the deprivations of the poorest.

All members of the M_α family are decomposable by population subgroups. Given two separate achievement matrices X_1 and X_2, with population size of N_1 and N_2, respectively, the overall poverty level for $N = N_1 + N_2$ individuals is obtained by:

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

Clearly, this can be extended to any number of subgroups. All members of the $M_\alpha(X; z)$ family can be broken down into dimensional subgroups as $M_\alpha(X; z) = \sum_{d=1}^{D} \mu(g_{*d}^\alpha(k))/D$, where g_{*d}^α is the dth column of the censored matrix $g^\alpha(k)$. It is a very convenient break-down property; $\mu(g_{*d}^\alpha(k))/M(X;z)$ can be interpreted as the post-identification contribution of the dth dimension to overall multidimensional poverty.

The M_α family of measures is neutral to inter-dimensional interaction. If one achievement matrix is obtained from another achievement matrix by an association decreasing

rearrangement among the poor (see also Atkinson and Bourguignon 1982, Boland and Proschan 1988, and Tsui 1999, 2002), both of them yield the same level of poverty. The additive form enables the family of measures to evaluate the achievement of each household in each dimension unrelated to the achievements in the other dimensions. In this sense, the M_α family of measures is analogous to the first group of measures of Bourguignon and Chakravarty (2003).

Weighting

Apart from identification and aggregation, another important challenge in multidimensional poverty measurement is how to weight different dimensions. The weights implicitly indicate the dimensional importance and/or policy priority. In the analysis, until now, the dimensions were presented as if they were equally weighted. Equal weighting is an arbitrary and normative weighting system that is appropriate in some, but not all, situations (A.B. Atkinson et al. 2002). In many other cases, some dimensions are believed to be more important than others, hence are to receive a relatively higher weight. Thus, we move from equal weights to unequal weights. Fortunately, the M_α family can be easily extended to a more generalized form that considers unequal weighting structures.

Let w be a D-dimensional row vector with the dth element being equal to w_d, which is the weight associated with the dth dimension such that $|w| = D$. We define the $N \times D$ dimensional matrix $g^\alpha(w_d)$ with the nd^{th} element being equal to g_{nd}^α that takes two values as follows:

$$g_{nd}^\alpha(w_d) = \begin{cases} w_d\big((z_d - x_{nd})/z_d\big)^\alpha & if \ x_{nd} < z_d \\ 0 & otherwise \end{cases}$$

The weighted column vector C of deprivation counts can be obtained with the nth element being equal to $c_n = |g_{nd}^\alpha|$; cn varies between 1 and D. In this situation, the dimensional cut-off for the identification step is real number k, such that $0 < k \leq D$, instead of k being a positive integer. When $k = min\{w_d\}$, the criterion is nothing but the union approach, whereas, $k = D$ yields the intersection approach. Also note that if $w_d = 1$ for all d then the weighting structure turns out to be the equal weighting structure. After the multidimensionally poor are identified, the identification method is denoted by ρ_k such that $\rho_k(x_{n*}, z; w_d) = 1$ when $c_n \geq k$, and $\rho_k(x_{n*}, z; w_d) = 0$ when $c_n < k$. Finally, a censored matrix $g^0(k, w_d)$ is obtained from $g^0(w_d)$ by replacing the nth row with a vector of zeros whenever $\rho_k(x_{n*}, z) = 0$. An analogous matrix $g^\alpha(k, w_d)$ is obtained for $\alpha > 0$, with the nd^{th} element $g_{nd}^\alpha(k, w_d) = g_{nd}^\alpha(w_d)$ if $\rho_k(x_{n*}, z; w_d) = 1$, while $g_{nd}^\alpha(k, w_d) = 0$ if $\rho_k(x_{n*}, z; w_d) = 0$. The class of dimension-adjusted FGT measures is defined by $M_\alpha(X; z; w_d) = \mu(k; w_d))$ for $\alpha \geq 0$.

Selected Dimensions and Their Cut-Offs

Theoretical framework of the study is based upon Capability Approach, presented by Amratya Sen (1986). According to this approach poverty is not mere deprivation of income rather a deprivation of capabilities. For appropriate measurement of these deprivations, selection of dimensions is as important as choice of an appropriate methodology for data analysis. There are discrepancies among proponents of capability approach regarding selection of suitable dimensions. Nussbaum, on one hand, provides a universal list of capabilities (Nussbaum, 2000). While Sen, on the other hand, argues for general discussions and public reasoning while selecting the valuable dimensions and choosing appropriate weights for them (Sen,

2004). Alkire comes across researchers justifying their selection of indicators on the basis of up to five criteria (Alkire, 2007). These are:

1. Availability and Adequacy of data
2. Theoretical frameworks
3. Public Discussions
4. Deliberative participations
5. Empirical analysis.

Up to some extent of deviations different studies, on multidimensional measurement of poverty based upon capability approach, use matching indicators like in Africa (Batana, 2008), Bhutan (Santos and Ura, 2008), India (Alklire and Seth, 2009), and Latin America (Battistion et al., 2009) etc. According to point of view regarding human development, a poverty indicator must be significant and eventually measurable at the individual, household, or community level. It must allow a ranking of these demographic units as more or less poor. Based upon the availability of nationwide data in relation to MDGs, four main dimensions of MPI comprising twelve indicators have been included in the current study. Eight out of twelve indicators are directly related to MDGs. However MPI is flexible enough to include more dimensions as well. The selected dimensions along with their comprising indicators are as follows:

Education

Education is a fundamental capability for the development of individuals, and hence the nations. Education enables the individuals to play their roles in socio-economic and political development. To achieve universal primary education is the 2nd goal of MDGs that developing countries including Pakistan strive to achieve by 2015. However, Pakistan lags far behind attaining the MDGs regarding universal primary education. Hence it is significant to trace out the areas with greatest incidence of education poor so that some constructive measures can be taken to meet targets set by MDGs regarding education. Keeping in view the MDGs, the dimension of education has been broken up into two indicators; Enrollment in primary education, and Completion of primary education.

Health

Similar to education, health is a vital factor in the process of welfare and wellbeing of individuals. That's why key focus in the MDGs, along with other dimensions, has been put on health; three out of eight goals cover different aspects of health. These are: Reduce child mortality, improve maternal health, and combat HIV/AIDS, malaria and other diseases. The health status of individuals is responsible for achievement of several valuable capabilities (Ariana and Naveed, 2009). Based on the availability of nationwide data, following three indicators have been included in the dimension of health that are directly related to the MDGs; Reduce child mortality rates, Immunization, and Improve maternal health.

Living Standard

Living standard refers to the cost of living. If a household is paying high cost of living, definitely it is enjoying a high standard of living. To measure living standard as a single variable is not possible as it includes numerous indicators. However, due to limitations of available data, on the basis of MDGs, six indicators have been included in this dimension; electricity, drinking, water, sanitation, housing, home appliances, and property assets.

Expenditures

Although the capability approach convincingly opposes the dependence on income only, while measuring the poverty, but that doesn't mean to ignore the importance of income as an important factor determining poverty and wellbeing. Income provides power to purchase valuable goods and services. However, the most important indicator in the study of poverty, i.e.

income, has been ignored in the most of empirical work on the estimation of poverty in a multidimensional perspective. For example, Batana (2008), Alkire and Seth (2009), and Batteston et al. (2009) etc. This is not because the income is less important in the study of multidimensional poverty but due to limitations of income or expenditure data from the same surveys. However, PSLM, along with other dimensions, collects data on household consumption and consumption is mostly used as a proxy of income to measure poverty. Also this dimension depicts the MDG No.1 (Eradicating poverty and hunger). Thus, in this study, along with other important dimensions, household level of consumption is also included as an important dimension of welfare and wellbeing. The details of indicators in relation to MDGs along with their cut off values are given in table 4.1.

(Insert table 4.1 here)

Results

The MPI reflects both the incidence (H) of poverty – the proportion of the population that is multidimensionally poor – and the average intensity (A) of their deprivation – the average proportion of indicators in which they are deprived. The MPI is calculated by multiplying the incidence of poverty by the average intensity across the poor. A household is identified as poor if it is deprived in at least 30 percent of the weighted indicators. Table 2 shows the multidimensional poverty rate (MPI) and its two components: incidence of poverty (H) and average intensity of deprivation faced by the poor (A). The results show that 57.53 percent of households in Pakistan are deprived in 45.14 percent of the weighted indicators. MPI calculated for the Pakistan is O.26 which is similar to the results captured by Oxford Poverty and Human Development Initiative (OPHI) that is O.27.

(Insert Table: 2 here)

Generally it is believed, among the supporters of uni-dimensional approach to measure poverty, that income of the household has a high correlation with all the dimensions of being poor. Hence there is no need to estimate poverty in a multidimensional perspective as the measurement of poverty on the basis of income instinctively captures the effect of deprivations in all other dimensions. However, empirical results are somewhat different from the belief of proponents of uni-dimensional measurement of poverty, e.g Bhutan (Santos and Ura, 2008), Pakistan (Arif and Tanweer, 2010), (Awan, 2012) and (Chaudhary and Awan 2012). Results of this study also support the belief that poverty is a multidimensional phenomenon. It can be seen clearly from table 3 that there is no significant relationship between household income or expenditure and other dimensions of poverty. Hence poverty should be measured in a multidimensional perspective rather relying on just a single variable, like income or expenditure.

(Insert Table: 3 here)

The comparison of the two measures, unidimensional and multidimensional, also depicts that income alone cannot capture different aspects of poverty. Column chart in figure 1 shows the percentage of people who are multidimensionally poor (also called the incidence or headcount) in Pakistan at national level as well as regional level for all provinces, while the line across the column chart denotes the percentage of people who are income poor according to the National Poverty Line in Pakistan. The difference between bars and line points can be observed clearly from the figure.

(Insert Figure: 1 here)

Figure 2 shows contribution of four provinces to overall multidimensional poverty in Pakistan. Results show that Punjab is the least deprived while Baluchistan is the most deprived province with shares of 22 percent and 29 percent, respectively.

(Insert Figure: 2 here)

By zooming in the picture, multidimensional poverty in rural and urban regions of all the four provinces can be observed separately. From figure 4, the ranking of regions from more deprived to less deprived can be illustrated as:1-Balochistan Rural, 2-Sindh Rural, 3-KPK Rural, 4-Punjab Rural, 5-Balochistan Urban, 6-KPK Urban, 7-Punjab Urban, and 8-Sindh Urban. The multidimensionally poor households reflects a surprising behavior in province Sindh; Sindh rural is the second most deprived region among all eight, while, Sindh urban is the least deprived one. It represents that degree of inequality is highest in the Sindh province while talking about the rural and urban regions in a multidimensional perspective.

(Insert Figure: 4 here)

In this study, MPI uses 12 indicators to measure poverty in four dimensions: Education, Health, Living Standard, and Expenditures. Figures 5 and 6 show the percentage of households that are poor and deprived in each indicator. Dimension wise break down of MPI shows that lack of number of bed rooms available per person, home appliances, schooling years and property assets contribute about 55 percent to the overall multidimensional poverty in urban Pakistan, while the dimension of rooms available per person, home appliances, schooling years and sanitation are responsible for 53 percent deprivations in rural regions of Pakistan.

(Insert Figure: 5 here)

(Insert Figure: 6 here)

Figure 7 shows the percentage of households deprived in each dimension separately in province Punjab. It can be observed from the figure that about some 50 percent of the households are deprived in the dimension of home appliances. Figure also shows that almost 48 percent people are deprived in the dimension of housing; in 48 percent of the households, three or more persons share a sleeping room. About 44 percent households are deprived in years of schooling i.e. that in almost 44 percent households, even a single member has not completed 5 years of schooling. It can be observed from the figure that almost 38 percent of the households are deprived in the dimension of enrollment. About some 35 percent of the households do not have proper sanitation facilities in the province Punjab and 33 percent of households are deprived the dimension of property assets which shows that 33 percent of the households do not possess a land, agricultural or non agricultural, comprising of market value Rs. 3,00,000. While, 17 percent households fall below traditional income poverty line.

(Insert Figure: 7 here)

Multidimensional Poverty composition is somewhat different in urban and rural Punjab. Figure 8 illustrates the dimension wise break down of MPI which shows that the dimensions of housing, home appliances, schooling years, and property asset contribute 57 percent to overall multidimensional poverty in urban Punjab. On the other hand, in rural Punjab, the dimensions of housing, home appliances, schooling years and sanitation contributes 53 percent to overall multidimensional poverty in rural Punjab, as it can be observed from figure 9.

(Insert Figure: 8 here)

(Insert Figure: 9 here)

Figure 10 represents the dimension wise breakdown of deprived households residing in province Sindh. Figure shows that 22 percent households are deprived in the dimension of Immunization i.e. that in almost 22 percent households, not even a single child has been

immunized for the measles. Similarly 32 percent households are deprived in the dimension of prenatal care which shows that from 32 percent of households, no woman received prenatal care. About some 41 percent of households are deprived the dimension of schooling years which implies that in the Sindh province, from 41 percent of the households, not even a single individual completed at least five years of schooling. Figure also illustrates that almost 52 percent of the households are deprived in the dimensions of property assets and 51 percent in the dimension of home appliances; 52 percent households do not possess a land, agricultural or non agricultural, comprising of market value rs. 3,00,000, and 51 percent of the households do not own any of the nine home appliances listed above. It can also be observed from the graph that deprivations in the dimension of electricity connection in Sindh 14 percent, which is much higher than that of the province Punjab, i.e. 6 percent.

(Insert Figure: 10 here)

The composition of multidimensional poverty is entirely different in urban and rural regions of Sindh. Dimension wise break down of MPI shows that lack of property assets, home appliance, sanitation, and the number of bed rooms available per person contribute 57 percent to overall multidimensional poverty in urban Sindh. The results are somewhat similar to the province Punjab, as it can be observed from figure 11. On the other hand, figure 12 shows that in rural Sindh, the same four dimensions contribute 54 percent to overall multidimensional poverty in rural Sindh. It indicates that though headcount of poor in rural area exceeds urban regions but the severity is higher in urban area as compared to rural ones.

(Insert Figure: 11 here)

(Insert Figure: 12 here)

Figure 13 represents dimension wise deprivations of households separately in the province of Khayber Pakhtunkhwa (KPK). Figure shows that 54 percent households are deprived in years of schooling i.e. that in almost 54 percent households, even a single member has not completed 5 years of schooling. Some 39 percent of households in KPK face lack of basic sanitation facilities. About 37 percent households are deprived in the dimension of prenatal care which means, that in KPK, women from 37 percent households did not receive prenatal care during pregnancy. Some 28 percent of households are deprived the dimension of property assets which shows that 28 percent of the households do not possess a land, agricultural or non agricultural, comprising of market value Rs. 3,00,000. Figure depicts that in KPK, a considerable portion of population is deprived in the dimension of housing; in 54 percent of the households, three or more persons share a sleeping room.

(Insert Figure: 13 here)

Figure 14 and 15 represents the composition of multidimensional poverty in urban and rural KPK, respectively. Dimension wise break down of multidimensional poverty indices shows that composition of multidimensional poverty is somewhat different in the urban and rural KPK, but with slightly higher extent in rural region of KPK. Figure 14 shows that the dimensions of education, housing, and home appliances contribute 56 percent to overall multidimensional poverty in urban KPK. While the dimensions of education, home appliances and housing contribute 57 percent to multidimensional poverty in rural KPK.

(Insert Figure: 14 here)

(Insert Figure: 15 here)

Figure 16 depicts the percentage of households deprived in each dimension separately in province Baluchistan. Figure shows that from all 8 regions, majority of the households deprived in the dimension of expenditure belongs to Baluchistan; the headcount for expenditure poor is 31 percent which means that per capita households expenditure of 31

percent households are less than rupees 1141.53 per month. Some 56 percent households are deprived in years of schooling i.e. that in almost 56 percent households, even a single member has not completed 5 years of schooling. Figure shows that about 57 percent of households do not own even a single home appliance out of the nine, listed above. About 54 percent of the households are deprived in the dimension of enrollment, which means that from 54 percent household having children, no child has ever been enrolled to school. Figure illustrates that about some 59 percent of households are deprived the dimension of property assets which shows that 59 percent of the households do not possess a land, agricultural or non agricultural, comprising of market value Rs. 3,00,000. Figure also points up that more than 79 percent of the households do not have proper sanitation facilities in the province Baluchistan and almost 53 percent households are deprived in the dimension of housing; in 53 percent of the households, three or more persons share a sleeping room, while, 29 percent households, in Baluchistan, do not have an electricity connection yet.

(Insert Figure: 16 here)

Multidimensional poverty composition is somewhat similar in urban and rural Baluchistan, as it can be observed from figure 17 and 18. Dimension wise break down of MPI shows that lack of property assets, home appliance, housing, and sanitation facilities contribute 57% to overall multidimensional poverty in urban Baluchistan. On the other hand, in rural Baluchistan, the dimensions of housing and home appliances are replaced by the dimension of education. Again it is revelation to observe that though the incidence of multidimensional poverty is higher in rural Baluchistan, but the severity of it is greater in urban Baluchistan; the dimensions of property assets and sanitation comprise 28% of multidimensional poverty in rural Baluchistan, while 29% in urban Baluchistan.

(Insert Figure: 17 here)

(Insert Figure: 18 here)

The MPI can be decomposed by different population subgroups, and then broken down by dimension, to show how the composition of poverty differs between different regions or groups. In figure 19, the height of each of the ten bars shows the level of MPI at the national and provincial level, for urban areas, and for rural areas, respectively. The colors inside each bar denote the percentage contribution of each indicator to the overall MPI, and all bars add up to 100 percent. This enables an immediate visual comparison of the composition of poverty across regions.

Conclusions and Policy Recommendations

The study has argued for the multidimensional measurement of poverty in Pakistan and identified several methodological limitations of previous research. In this regard multidimensional poverty indicators were calculated n the basis of variables that can be supposed to reflect persistent deprivations. The study applied Alkire and Foster Measure (2007) on 15512 household in Pakistan, by using Pakistan Social & Living Standards Measurement (PSLM) Survey (2007-08). The variables that were included are: enrollment, primary education, immunization of measles, child mortality, prenatal care, housing, electricity connection, access to drinking water, sanitation, asset: including home appliances and property assets, and expenditures.

In unidimensional perspective, poverty in Pakistan is predominantly a rural phenomenon. Multidimensional estimates of the study also support the phenomenon as M_0 for rural Pakistan is 33 percent while 15 percent for urban Pakistan. Study also proves that there is no significant relationship between household expenditure and other dimensions of poverty.

Hence to capture the true picture of poverty we cannot rely on the income alone, rather a multidimensional analysis is required.

Regional estimates of multidimensional poverty shows that the most deprived regions are rural Baluchistan and rural Sindh that contributes 18% and 17% to overall poverty, respectively. While urban Sindh and urban Punjab are the least deprived regions with shares of 7% and 8%, respectively, to overall multidimensional poverty in Pakistan.

Dimension wise break down of MPI shows that the dimensions of schooling years, property assets, home appliance, and the number of bed rooms available per person contribute 55% to the multidimensional poverty in urban Pakistan. While in rural Pakistan, deprivation in the dimension of housing is replaced by the dimension of sanitation. By zooming in the contribution of each dimension to multidimensional poverty by provinces and regions, it was revealed that the major components of overall poverty are somewhat different in every region. Urban Punjab is more deprived in the dimension of housing, home appliances, schooling year, and property assets. While on the other hand, rural Punjab, along with the dimensions of schooling years, home appliances, and housing, is more deprived in the dimension of sanitation. If we have a look on the Sindh province indices, they reveal that lack of bedrooms available per person, property assets, sanitation, and lack of home appliances contribute 57% to overall poverty. While sanitation, housing, property assets, and home appliances, add up to 54% to multidimensional poverty in rural Sindh.

While coming towards the Khayber Pakhtonkhwa both urban KPK and the rural KPK are deprived in education, housing and home appliances but it constitutes 56% of multidimensional poverty in urban KPK while 57% of it in rural KPK Poverty. While in Baluchistan, there is a problem of sanitation, housing, home appliances, and property assets in urban Baluchistan. At the same time as in rural Baluchistan, the dimensions of housing and property assets are replaced by the dimension of education.

The implications of the results are both for research and policy: By means of research, the study established a measurement of multidimensional poverty using data from a large scale population based survey. It is also constructive to connect multidimensional poverty with several other indicators such as literacy, health, nutrition, and justice etc in the population and develop conclusions for evidence based planning.

On the basis of findings, the prime policy implication of the study is to take into account the exclusion of a high proportion of the abject poor in social protection programs which are particularly designed for conditional cash transfers and eliminating chronic poverty. Instead of the whole population, targeting poverty on geographical basis is appealing for the reason that it is relatively easy to deal with.

Various regions of the country like rural urban, and provinces, have been ranked by an appropriate measure of deprivation. Hence the resources must be allocated in an inverse proportion to average the welfare and wellbeing of households, with the intention that the poorer areas get higher per capita transfers than the richer ones. And further in poorer regions, the rural ones, funds for education must be increased as it is a major contributor to multidimensional poverty in Pakistan, especially in rural Khayber Pakhtonkhwa. Further, conditional cash transfers must be appreciated for the children enrollment. Programs, like *Aashiyana* in Punjab, must be commenced in all provinces, especially in urban areas as housing deprivation represents 13% of overall multidimensional poverty in Pakistan. Along with education and assets, rural areas are deprived in sanitation. Local government should adopt some proper measures to improve sanitation facilities while considering the policy for rural regions of Pakistan. Similarly, conditional cash transfers, like BISP, are required more in

rural areas as there are noticeably a large number of expenditures poor in rural regions than the urban ones. Coming towards health, the state of deprivations in measles immunization and child mortality is somewhat acceptable, but people are more deprived in prenatal care, especially in Khaber Pakhtonkhwa and rural Baluchistan. Though problem is sever but it requires less resources to improve health sector as Pakistan already has 5,301 Basic Health Units (BHUs), 906 maternity and health care centers, 552 Rural Health Centres (RHCs), 1,13,206 registered doctors and 6,741 Lady Health Workers[4]. Along with fewer endeavors towards infrastructure, the need is to monitor the working and efficiency of the units. Increase in the number Maternity centres and monthly visits of LHVs can play a vital role in improving the mother's health. And all these efforts, indirectly, will definitely help to reduce child mortality also.

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Appendix I
Table 1:   **Selected Dimensions and Their Cutoff Values**

Sr. No.	Indicator	Cut-Off	MDG No.	MDG Indicator No.
1	Enrollment	Deprived if no child in household attending school	2	2.1
2	Schooling	Deprived if none of the household members have completed at least 5 years of education	2	2.3
3	Child Mortality	Deprived if any child till age 5 has died in the family	4	4.1
4	Immunization	Deprived if no child is immunized for measles	4	4.3
5	Prenatal Care	Deprived if mother in the family never got prenatal care	5	5.5
6	Housing	Deprived if three or more household members share the sleeping room	-	-
7	Drinking Water	Deprived if the household does not have access to drinking water at home or water source is more than 30 minutes (a roundtrip) away from home	7	7.8
8	Sanitation	Deprived if household does not have an improved toilet	7	7.9
9	Electricity	Deprived if household is not electrified	-	-
10	Home Appliances	Deprived if household does not own any of the listed items[*]	-	-
11	Property Assets	Deprived if land possessions (rural or urban) of household is less than rupees three lacs[**]	-	-
12	Expenditures	Deprived if household per capita consumption is below official poverty line for the year 2007-08 (i.e. Rs. 1141.53)	1	1.1

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[*] Television, Refrigerator, Washing Machine, Air Conditioner, Vacuum Cleaner, Motorbike, Car or Tractor, and Personal Computer

[**] Awan (2012)

Table 2:   Multidimensional Poverty Index at K=2

	Multidimensional Poverty Index	Incidence of Poverty	Average Intensity Across the Poor
Region	**Mo = H x A**	**H**	**A**
National	**0.260**	**57.53%**	**45.14%**
Urban	0.148	38.07%	38.88%
Rural	0.335	70.68%	47.42%
Punjab	**0.223**	**52.12%**	**42.71%**
Urban	0.135	36.02%	37.58%
Rural	0.285	63.65%	44.79%
Sindh	**0.279**	**57.42%**	**48.60%**
Urban	0.136	32.83%	41.41%
Rural	0.393	77.07%	51.05%
KPK	**0.252**	**60.61%**	**41.51%**
Urban	0.167	44.52%	37.54%
Rural	0.298	69.54%	42.92%
Baluchistan	**0.350**	**70.06%**	**49.97%**
Urban	0.194	48.04%	40.33%
Rural	0.435	82.03%	53.04%

Source: Author's own calculations

Table 3: *Correlation Between Deprevations in Each Dimension*

	Primary Education	Immunization	Child Mortality	Children Enrolled	Person per Room	Home Appliances	Electricity	Drinking Water	Sanitation	Property Assets
Immunization	-0.084									
Child Mortality	0.036	-0.038								
Children Enrolled	0.124	-0.103	-0.091							
Person per Room	-0.181	0.207	-0.132	-0.026						
Home Appliances	0.317	-0.073	0.094	0.088	-0.289					
Electricity	0.231	-0.068	-0.008	0.074	-0.066	0.113				
Drinking Water	0.056	-0.016	-0.018	0.018	0.030	0.008	0.132			
Sanitation	0.287	-0.113	0.061	0.102	-0.231	0.318	0.297	0.062		
Property Assets	0.124	-0.028	0.043	0.015	-0.144	0.348	0.073	0.012	0.145	
Per Capita Expenditures	0.259	-0.127	0.079	0.019	-0.329	0.555	0.146	0.012	0.271	0.379

Appendix 2

Figure 1:   Comparative Poverty Measures
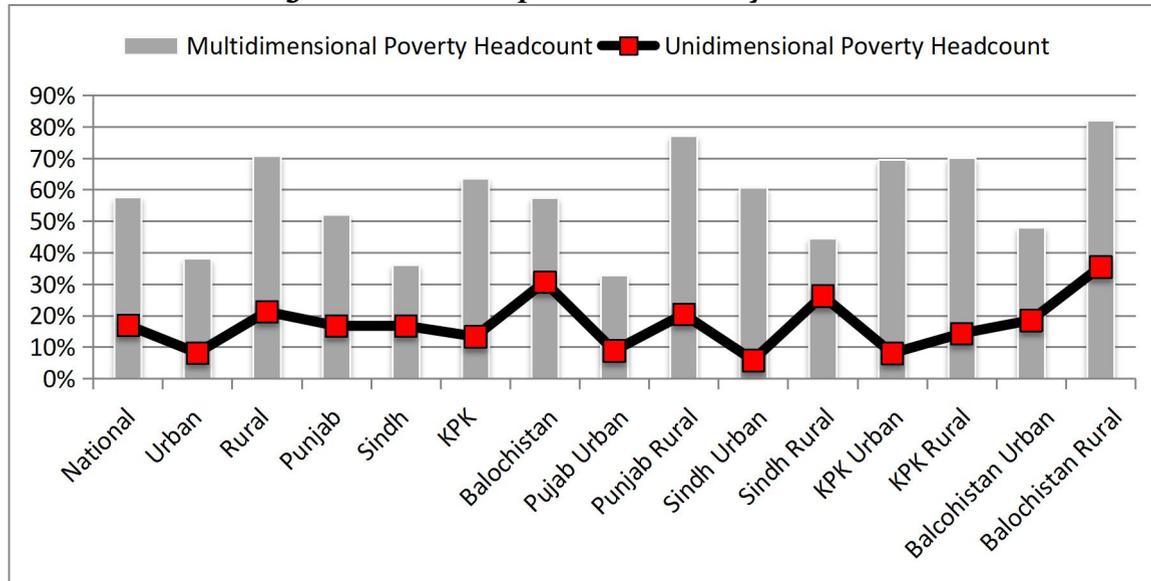
Source: Author's own calculations

Figure 2:   Contribution of Provinces to National MPI
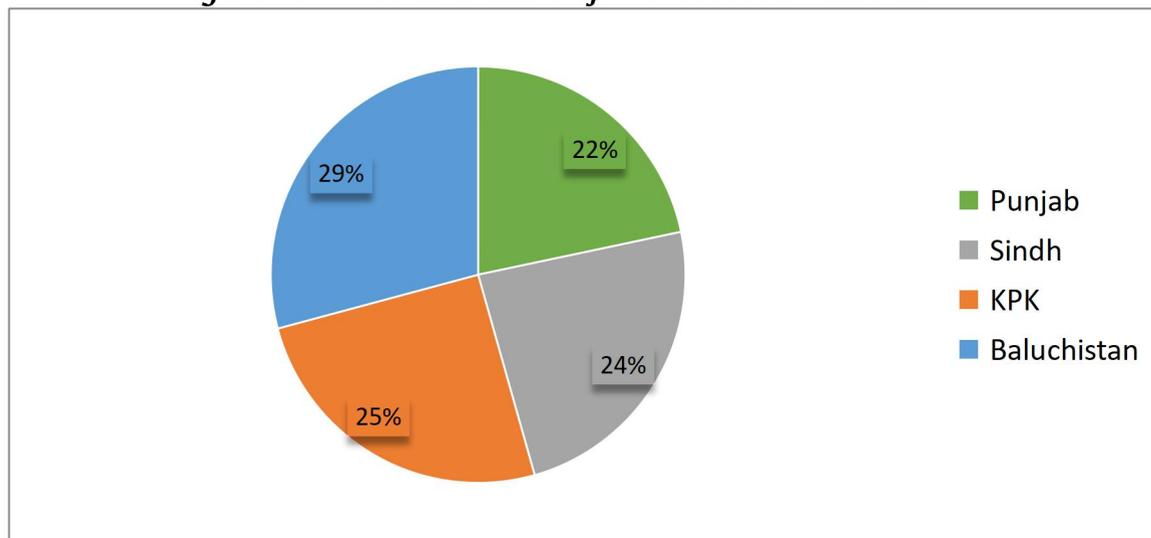
Source: Author's own calculations

Figure 3:   Headcount of Multidimensional Poor by Provinces
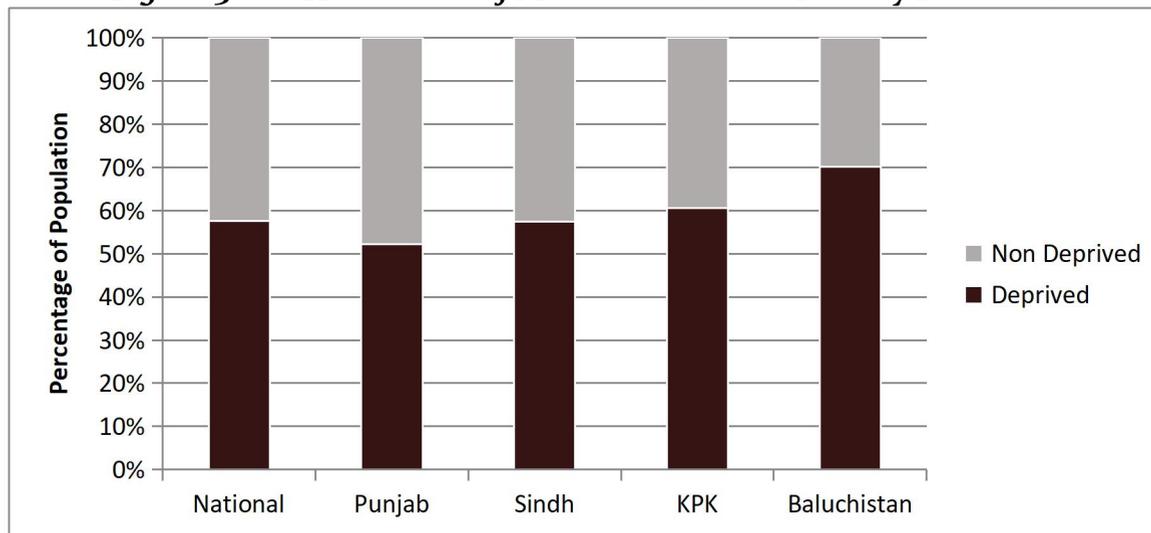
Source: Author's own calculations

Figure 4:   Headcount of Multidimensional Poor by Provinces and Regions
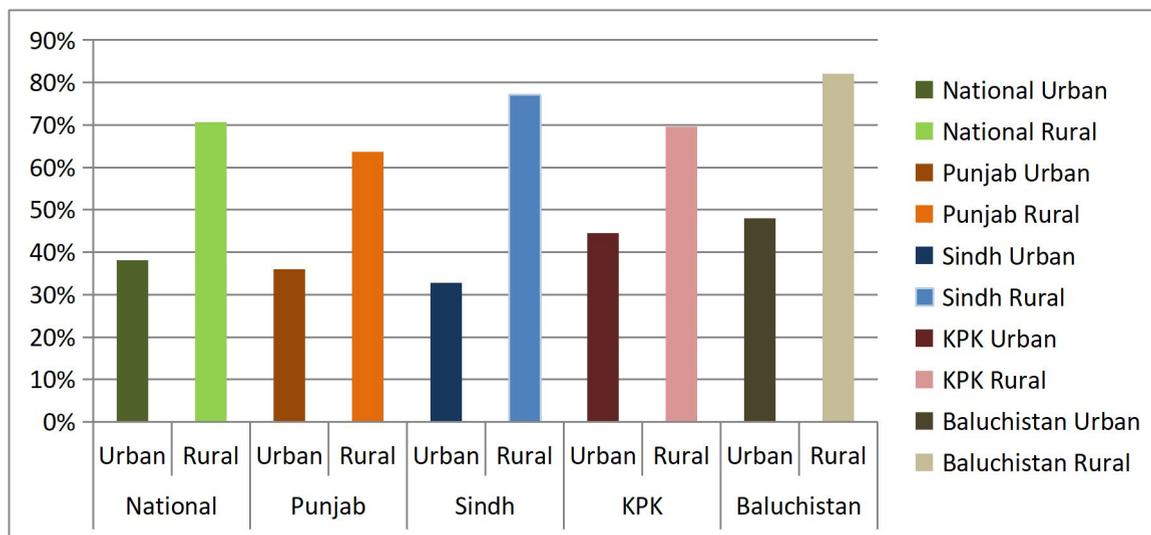
Source: Author's own calculations

Figure 5: ***Major Contributors to Multidimensional Poverty in Urban Pakistan***
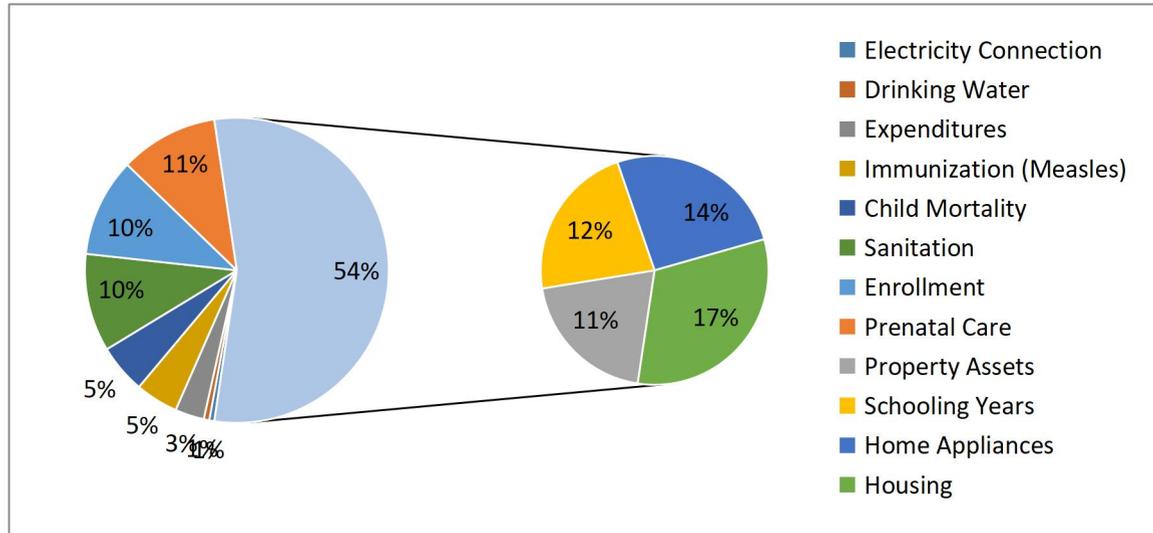
Source: Author's own calculations

Figure 6: ***Major Contributors to Multidimensional Poverty in Rural Pakistan***
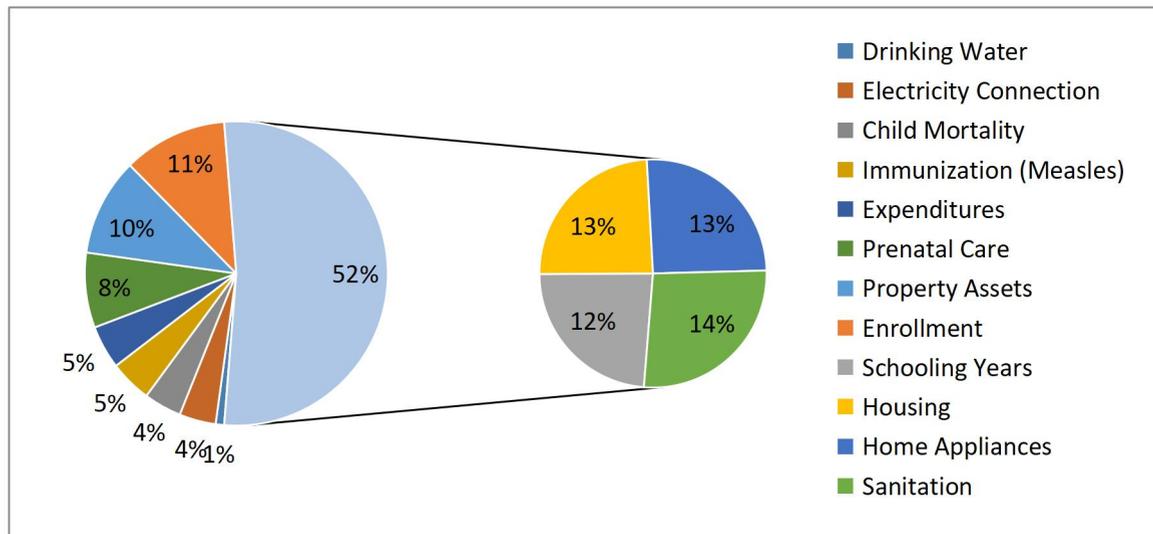
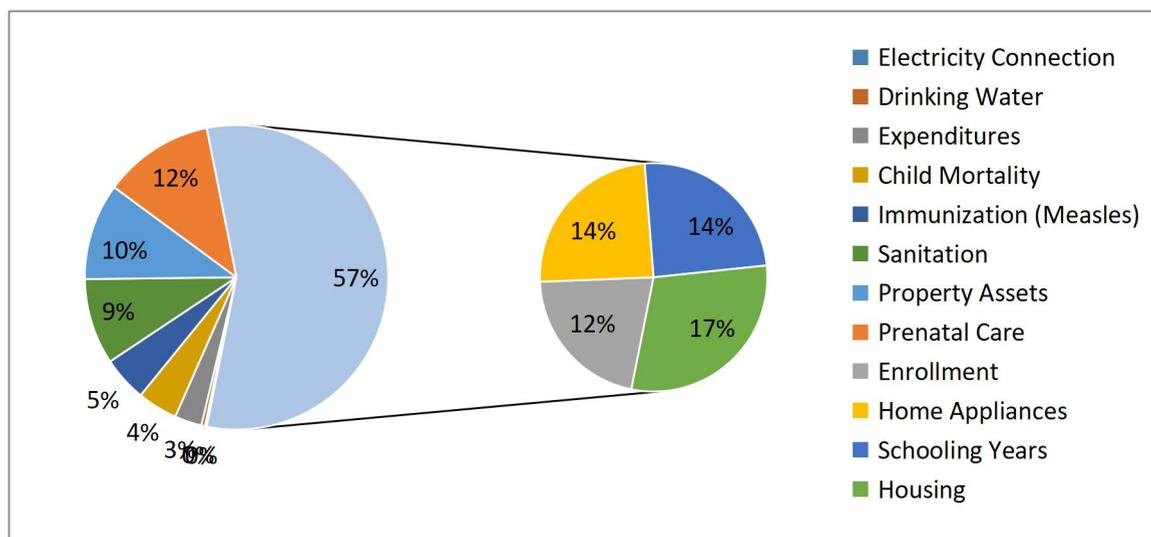

Source: Author's own calculations

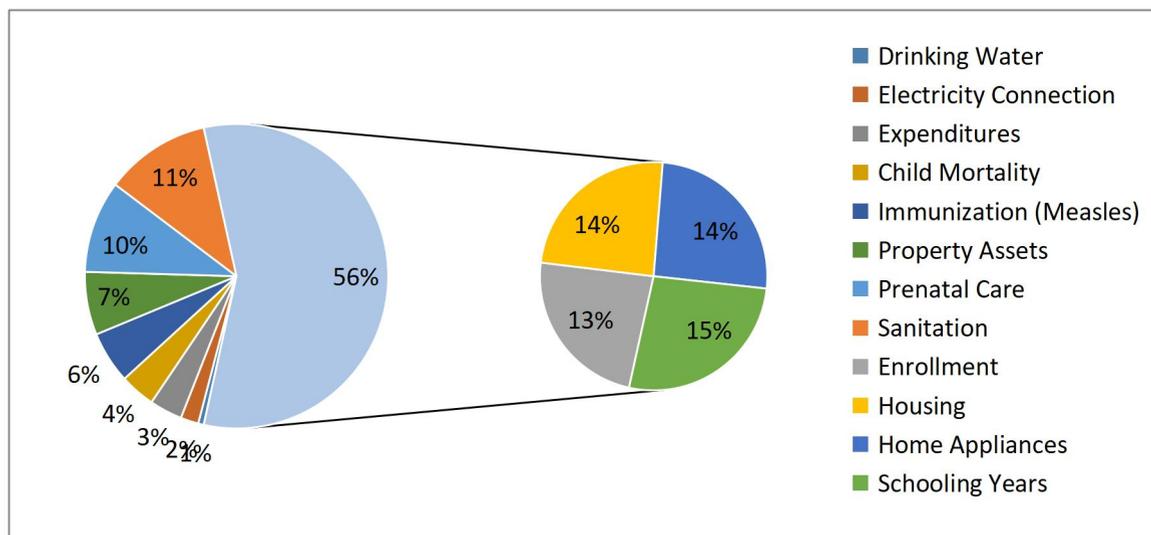*Figure 7: Incidence of Deprivation in Each of the MPI Dimensions in Punjab*
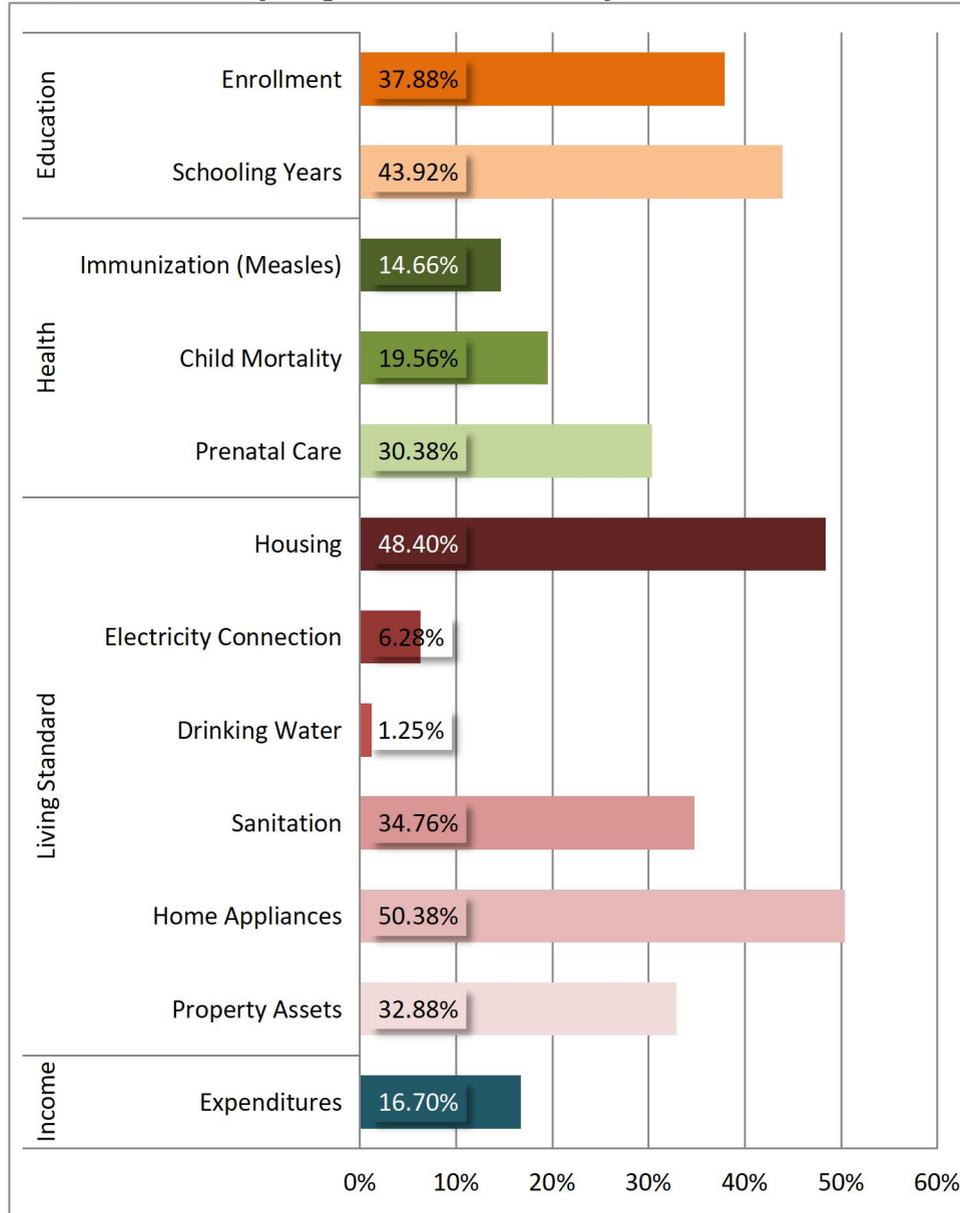
Source: Author's own calculations

Figure 8:   *Major Contributors to Multidimensional Poverty in Urban Punjab*
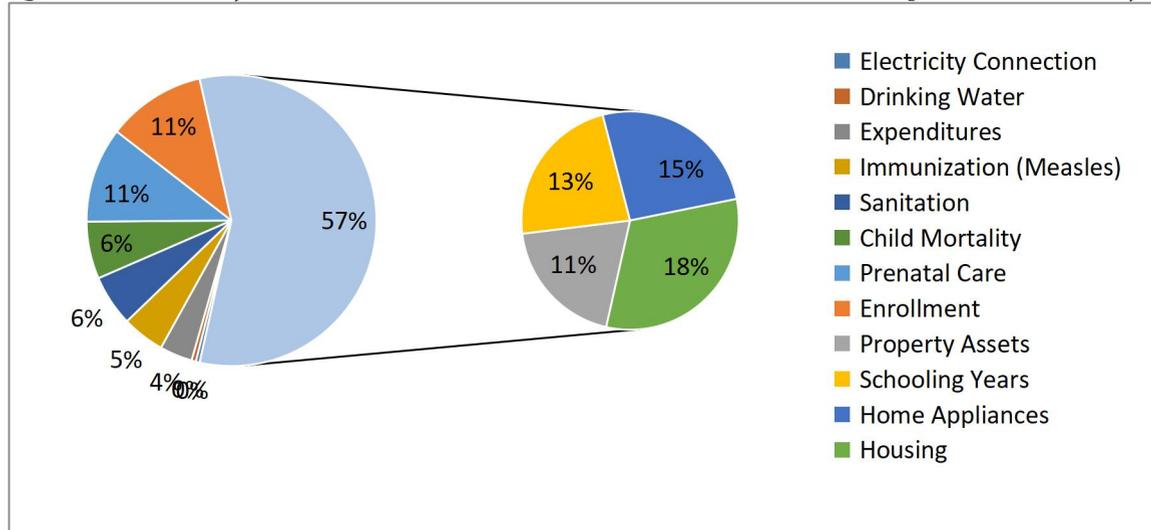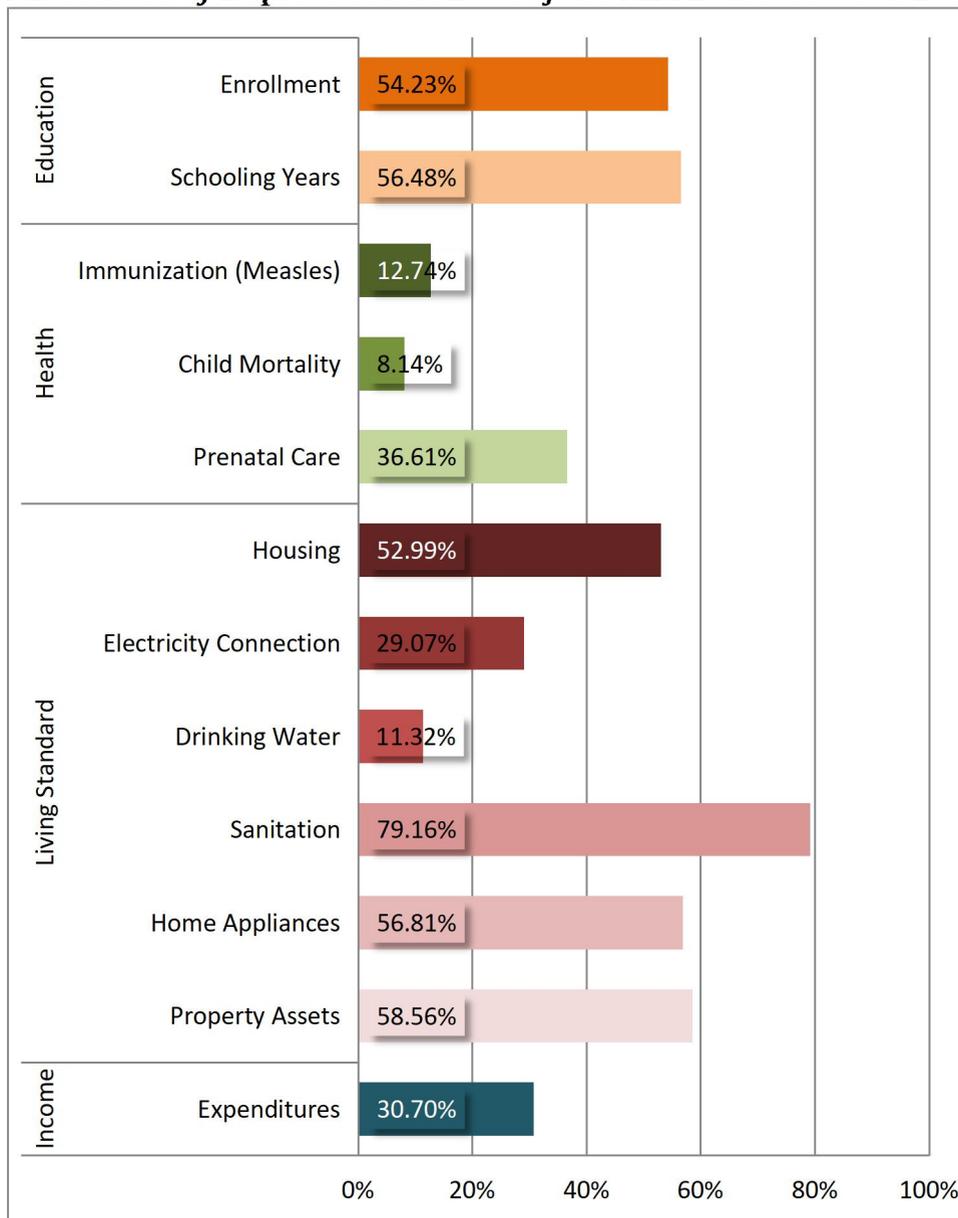

Source: Author's own calculations

Figure 9:   *Major Contributors to Multidimensional Poverty in Rural Punjab*
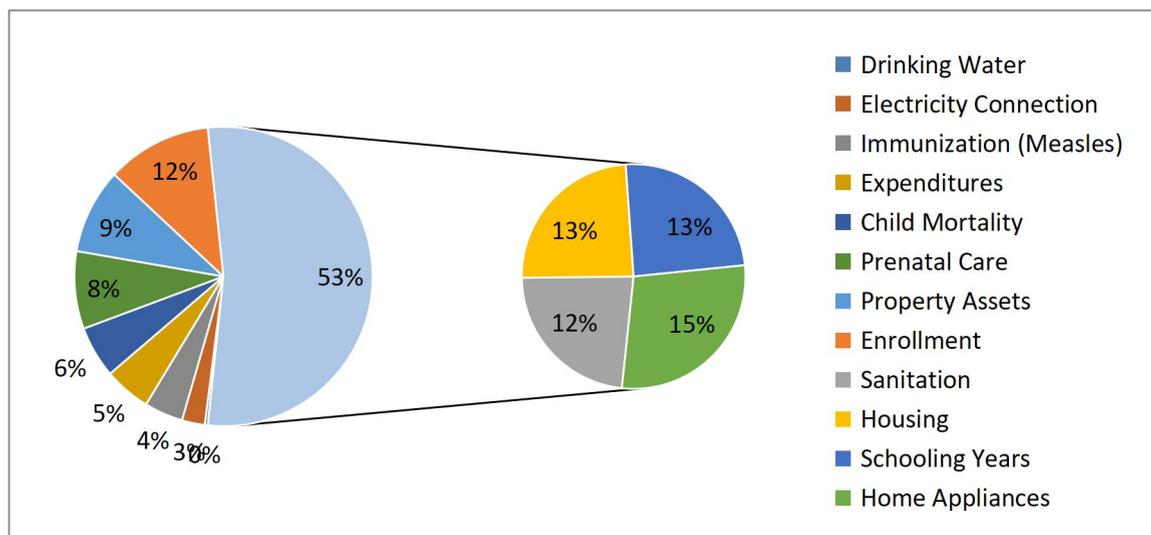
Source: Author's own calculations

Figure 10:Incidence of Deprivation in Each of the MPI Dimensions in Sindh
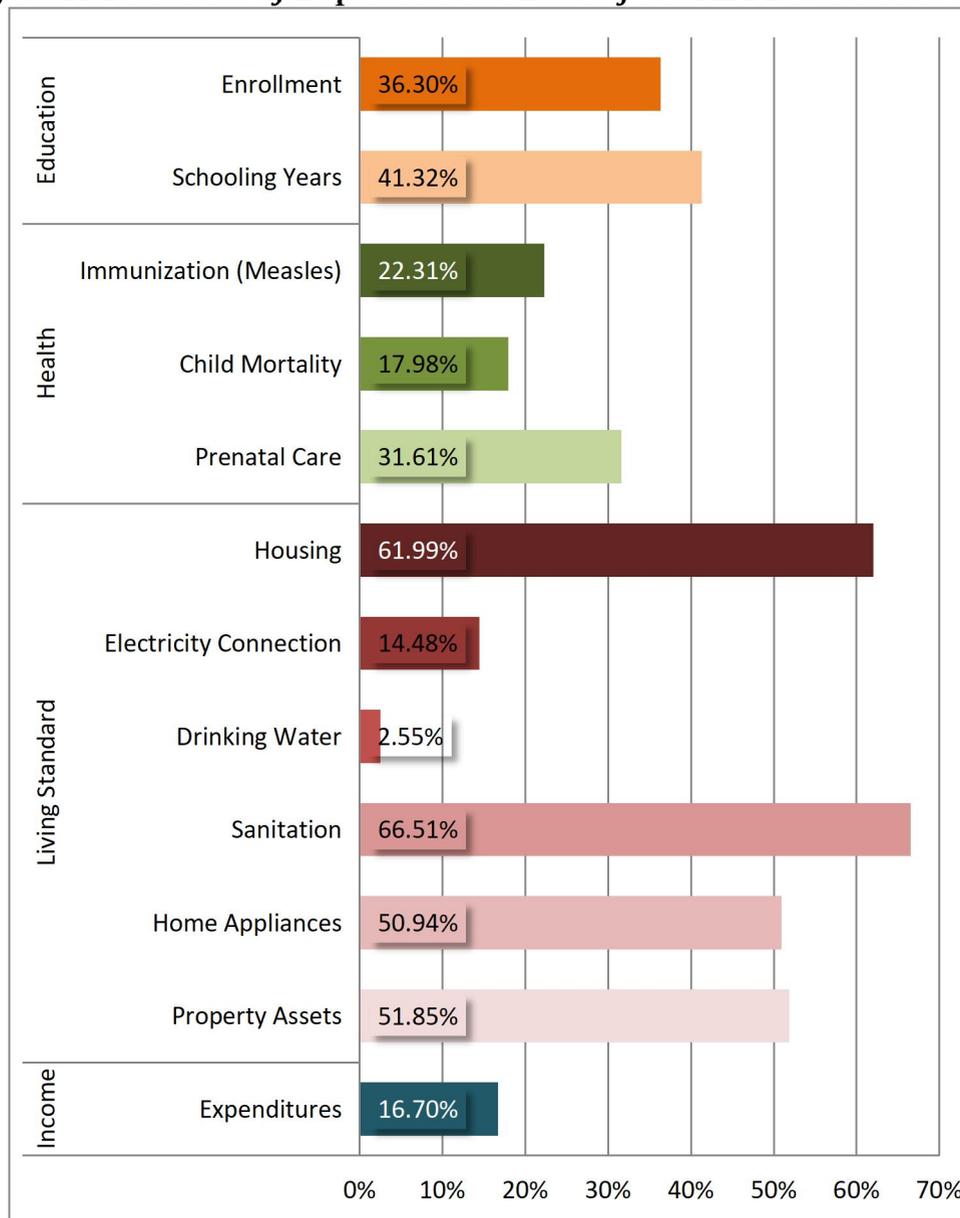
Source: Author's own calculations

Figure 11:   *Major Contributors to Multidimensional Poverty in Urban Sindh*
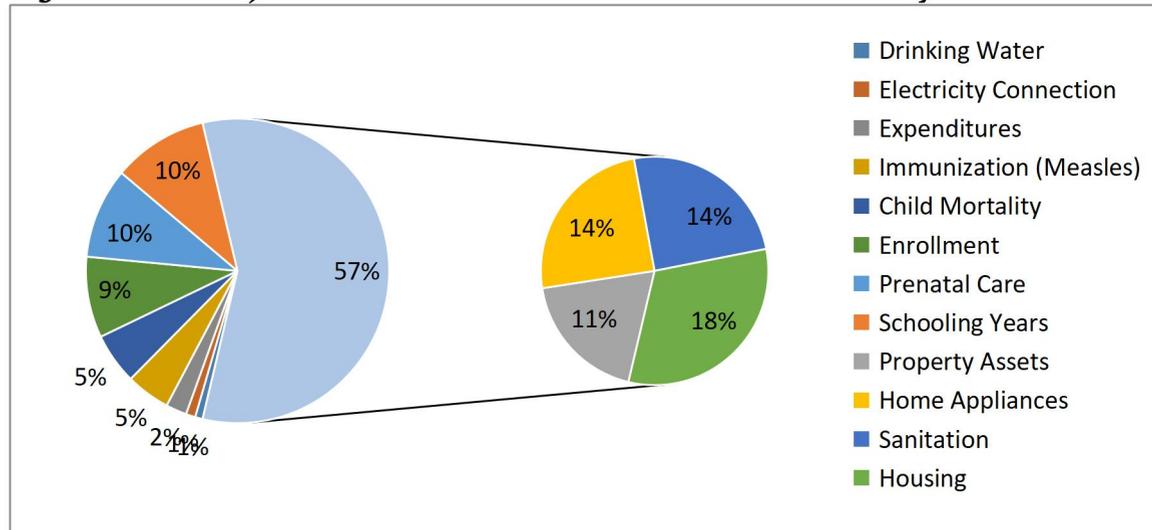
Source: Author's own calculations

Figure 12:   *Major Contributors to Multidimensional Poverty in Rural Sindh*
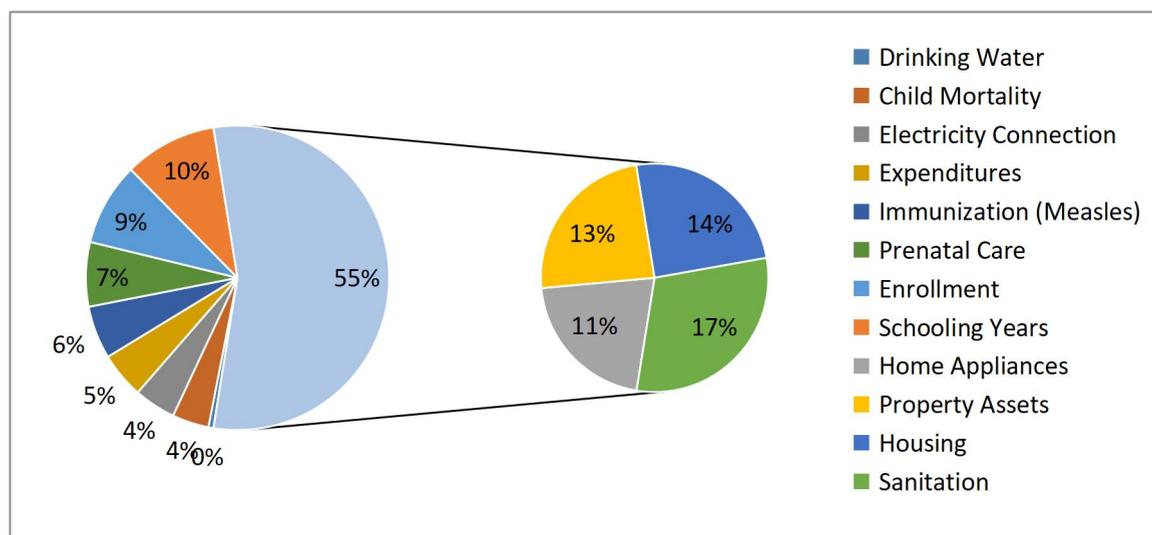
Source: Author's own calculations

Figure 13: Incidence of Deprivation in Each of the MPI Dimensions in KPK
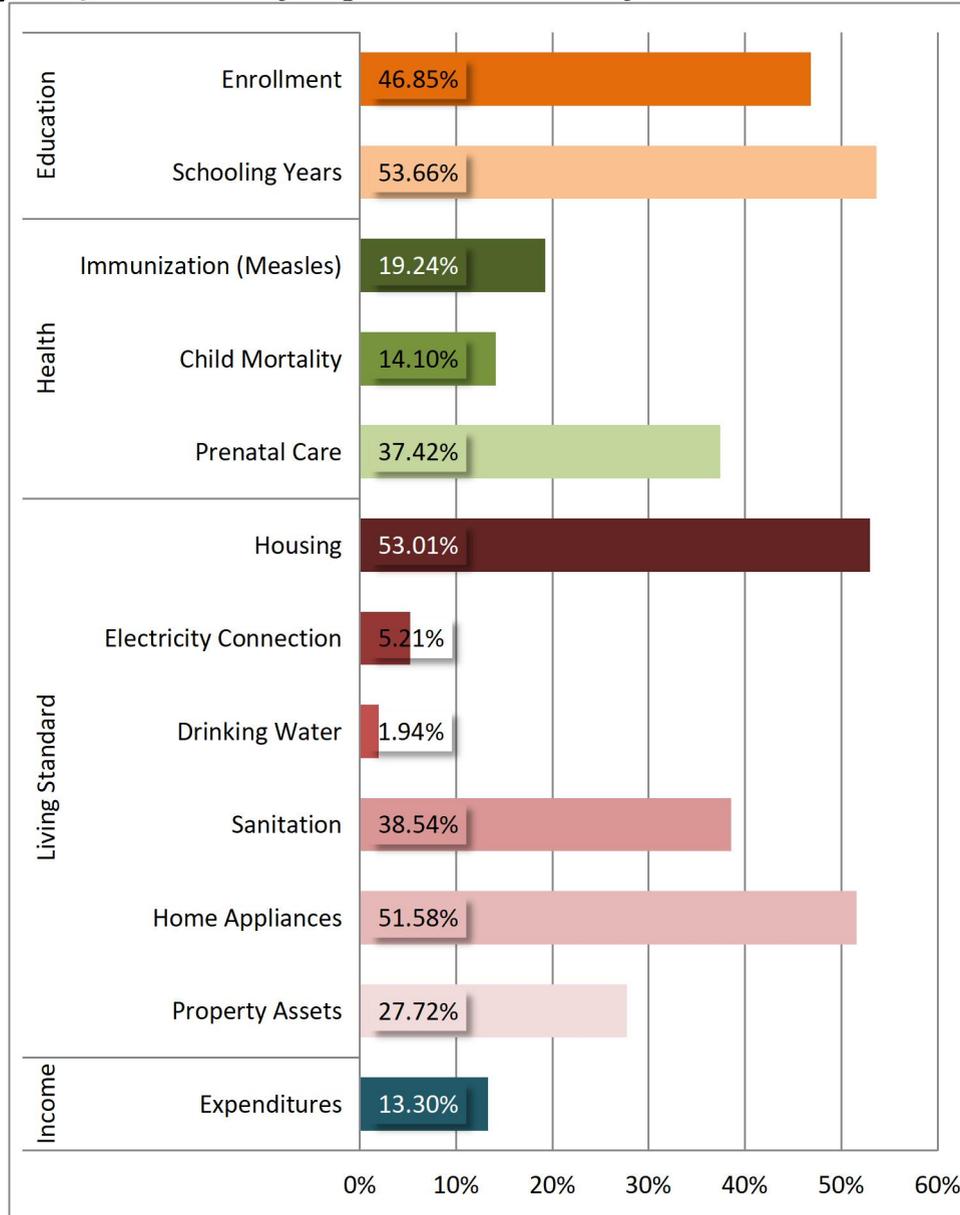
Source: Author's own calculations

Figure14:   *Major Contributors to Multidimensional Poverty in Urban KPK*

Source: Author's own calculations

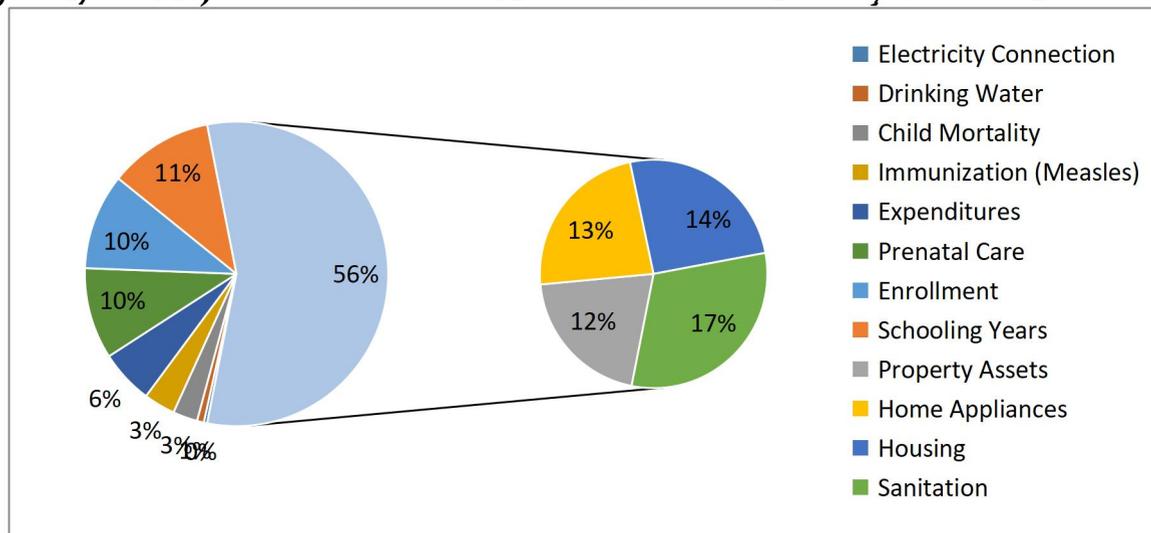*Figure 15:*   *Major Contributors to Multidimensional Poverty in Rural KPK*

Source: Author's own calculations

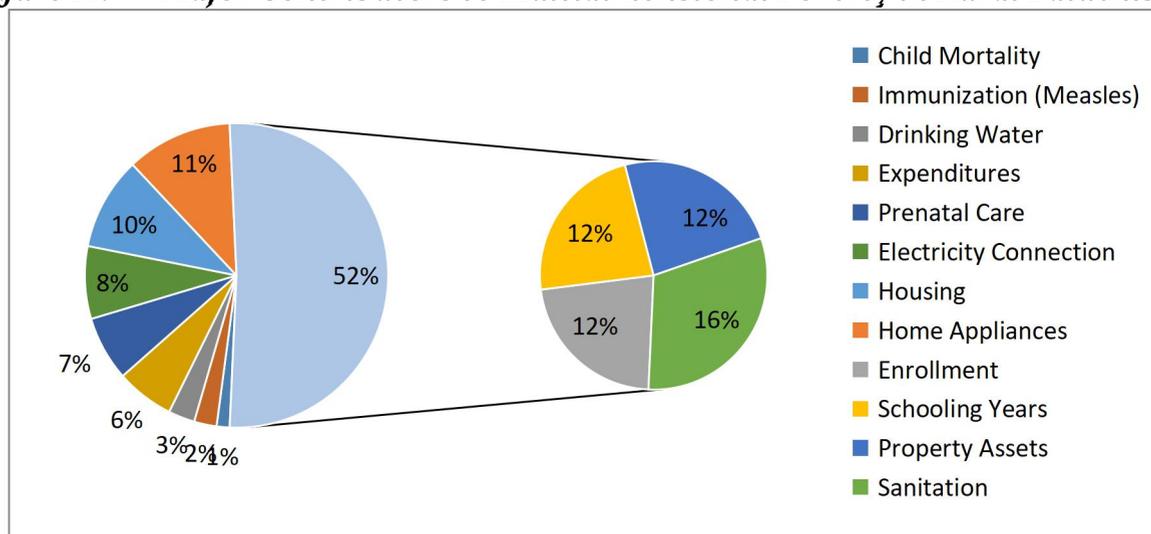*Figure 16:Incidence of Deprivation in Each of the MPI Dimensions in Baluchistan*

Source: Author's own calculations

Figure 17:   *Major Contributors to Multidimensional Poverty in Urban Baluchistan*
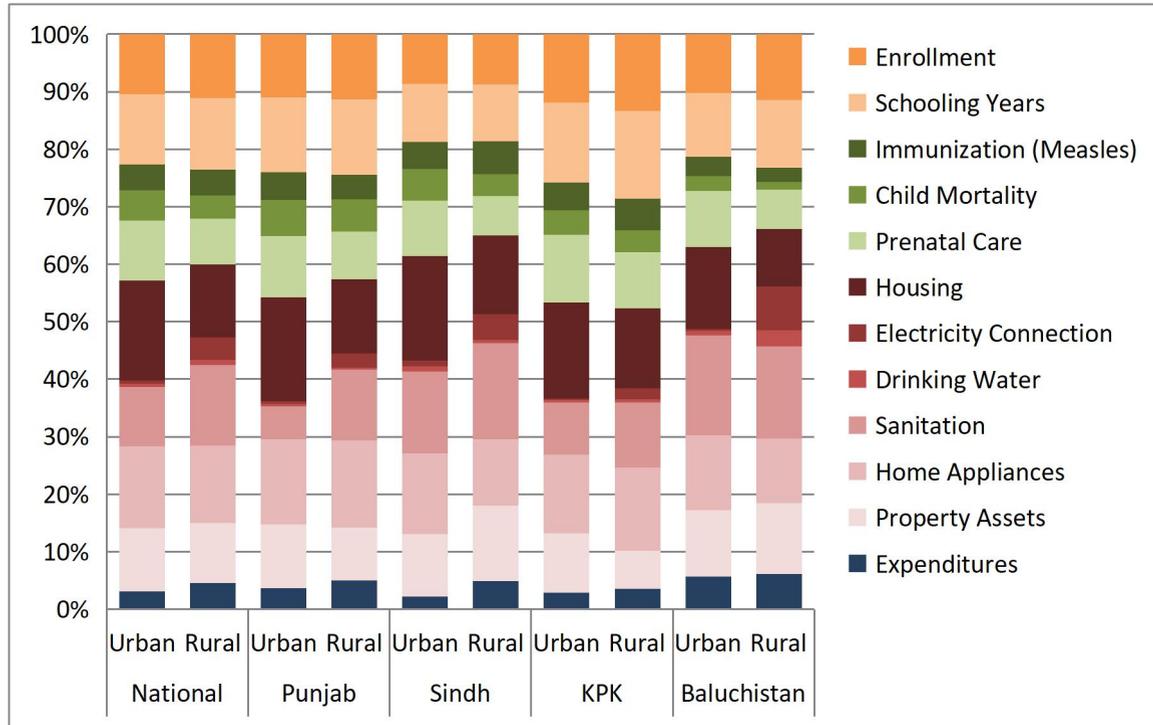

Source: Author's own calculations

Figure 18:   *Major Contributors to Multidimensional Poverty in Rural Baluchistan*

Source: Author's own calculations

Figure 19:   Composition of MPI in Provinces and Regions

Source: Author's own calculations