A New Methodological Framework for Measuring Poverty in Pakistan

Arif Naveed and Tanweer-ul-Islam

Working paper no 122
# Table of Content

**Abstract** ................................................................................................................................. 1

**Acknowledgment** ...................................................................................................................... 2

1. **Introduction** ........................................................................................................................... 3
2. **Measuring Poverty in Pakistan** ............................................................................................... 4
   2.1 Previous Studies on Measuring .............................................................................................. 5
3. **Data, Selection of Dimensions, Indicators, Weight** ................................................................. 7
   3.1 Data .......................................................................................................................................... 7
   3.2 Selection of Dimensions and Indicators ................................................................................... 8
   3.3 Aggregating Indicators and Dimensions ................................................................................. 12
   3.4 Indicators wise cut-off Points .................................................................................................. 16
   3.5 Weighting Dimensions and Poverty Cut-off Points ................................................................. 17
4. **Result** ........................................................................................................................................ 19
   4.1 Indicator Wise Deprivation ....................................................................................................... 19
   4.2 Poverty Line (aggregate cut-off Point) and Poverty Estimate .................................................. 20
   4.3 Poverty Estimates at Regional Level .......................................................................................... 21
   4.4 Poverty Estimates at the Provincial Level .................................................................................. 22
   4.5 Poverty Estimates at the District Level ..................................................................................... 22
   4.6 What Drives Poverty the Most? ............................................................................................... 26
   4.7 Decomposition of Adjusted Head Count Ratio (MO) ............................................................... 27
5. **Relationship between Consumption and Multidimensional Poverty** .................................... 31
6. **Conclusion and the Way Forward** ............................................................................................. 37
7. **Bibliography** ............................................................................................................................ 38
Board of Governors:

Dr. Saeed Shafqat

Chairman of the Board

Mr. Shafqat Kakakhe
Syed Naveed Qamar
Mr. Etrat H. Rizvi
Dr. Qasim Jan
Ms Roshan Khursheed Bharucha
Dr. Saba Gul Khattak
Ahsan Iqbal
Faryal Gohar
Dr. Abid Q. Suleri

Executive Director, SDPI
A New Methodological Framework for Measuring Poverty in Pakistan

Arif Naveed¹ and Tanweer-ul-Islam²

Abstract

This paper provides a critical analysis of poverty measurement in Pakistan and argues for adopting a multidimensional methodological framework. By applying the Alkire & Foster’s methodology over the RECOUP Household Survey data (2006-07) it provides multidimensional poverty estimates at the aggregate, provincial and district level and identifies the major drivers of poverty. The paper also elaborates how policy makers can prioritise the development budget among districts and allocation within each district based upon the level and nature of deprivation. Lastly, the paper empirically examines the effectiveness of the traditional measure of poverty, the consumption level, in explaining the multiple deprivations faced by poor households and establishes that consumption level alone is a poor measure of poverty.

Key words: Measuring poverty, multidimensional poverty, Pakistan, capability approach.

JEL classification: D31, I32, I38

¹ Senior Research Associate, Sustainable Development Policy Institute, Islamabad. Corresponding author: arif.naveed@gmail.com
² Lecturer, NUST Business School, National University of Science and Technology, Islamabad
Acknowledgment

This paper uses the household data collected under the DFID-funded Research Consortium on Educational Outcomes and Poverty (RECOUP) by the Mahbub-ul-Haq Human Development Center. Authors gratefully acknowledge the comments received by the following; Suman Seth, Sabina Alkire, Chrysanthi Hartzimasura, Nicolas Ruiz, Cem Mete, Alishan Azhar and Saba Gul Khattak. Suggestions received from Iftikhar Ahmad, Javeriya Hasan and Zulfiqar Sheikh also helped in improving the draft. The comments of the participants of OPHI workshop “Multidimensional poverty and inequality: New methods and research directions”, Oxford, June 12-14, 2010 and of ILO – Planning Commission’s joint seminar “Challenges to social protection”, Islamabad, March 21, 2011, have been very helpful.

The previous version of this paper was published as RECOUP Working Paper, titled “Estimating Multidimensional Poverty and Identifying the Poor in Pakistan: An Alternative Approach”. The views expressed in this paper are the authors’ alone and none of the institutions or individuals mentioned above are responsible for these.
1. Introduction

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 paper argues for adopting a framework to measure multidimensional poverty in Pakistan. The case for multidimensional measurement of poverty is also strengthened in the context of Millennium Development Goals (MDGs) that Pakistan, like other developing countries of the world, strives to realise. A brief review of the scarce literature on multidimensional measurements of poverty in Pakistan finds several methodological limitations of previous studies. Informed by the criticism of existing approaches, an alternative methodology to estimate poverty is suggested. This paper employs the Alkire and Foster Measure (henceforth, AFM) over the 2006-07 RECOUP\(^3\) Household Survey data of 1077\(^4\) households, representative of two provinces, Khyber Pakhtoonkhwa (KP) and Punjab, and estimates the incidence of poverty. It presents empirical estimates showing a higher incidence of poverty in rural rather than urban areas and in Punjab province than in KP. District level estimates of poverty are also presented showing that districts with a predominantly agricultural economic base are poorer than those with a diversified economic base (with relatively higher share of industry and services sector). The paper also identifies the major drivers of poverty. It is illustrated in this paper that the AFM guides policy makers to distribute resources among various districts and to prioritise spending within each district depending upon the level and nature of deprivation.

Lastly, the paper contributes to the literature on poverty measurement by empirically establishing that the traditional measure of poverty, adult equivalent per capita consumption, fails to accurately explain the multiple deprivations faced by poor households. It is argued in this paper that the national poverty measurement needs to adopt the Alkire & Foster measure for a meaningful assessment of the multiple deprivations faced by the poor.

---

\(^3\) Research Consortium on Educational Outcomes and Poverty (RECOUP) was a 5 year DFID funded project that explored social, economic and human development outcomes of education in poor countries. In Pakistan the RECOUP survey was conducted by the Mahbub-ul-Haq Human Development Centre.

\(^4\) The actual sample size of the survey was 1094. However, 17 households with missing values of one or more dimensions were excluded from the analysis in this paper.
2. Measuring Poverty in Pakistan

While the official measurement and analysis of poverty in Pakistan has historically relied upon a single dimension, consumption based monetary approach, the recent developments in literature on poverty measurement have highlighted serious limitations of this approach. These limitations could be summarised as (Alkire and Santos 2009): a) it is assumed that markets exist for all goods and services, ignoring the public goods and non-market provisions; b) it overlooks the fact that people have different conversion factors to convert monetary resources into valuable functions; c) the availability of certain amount of monetary resources provides no guarantee that these will be utilised on valuable goods and services; d) income or consumption data is collected at the household level and provides no information about the intra-household allocation of resources; e) such data is flawed due to missing observation and misrepresentation. These shortcomings of monetary approaches make a strong case against relying exclusively upon the consumption or income data while analyzing poverty.

Sen's capability approach has extended the analysis of poverty, inequality and wellbeing beyond income or consumption based monetary approach. From the capability perspective, poverty is not merely the deprivation of monetary resources. It is rather a state of deprivation of several fundamental freedoms that individuals have reason to value (Alkire 2007). Income (or consumption), in this context, is merely one of such freedoms and is only important as a means to achieve the valuable ends - the capabilities. The capability based analysis of poverty intrinsically demands a multidimensional measurement of poverty. Moreover, the meaningful analysis of poverty also needs to understand the interconnectedness of various deprivations (Alkire and Santos 2009). Deprivation of some fundamental capabilities may induce and reinforce the deprivation of several other capabilities (Ariana and Naveed 2009) thus furthering the vicious cycle of poverty.

Similarly, policies required to achieve the Millennium Development Goals (MDGs) also demand for a multidimensional understanding and measurement of poverty. As a signatory of the Millennium Declaration, Pakistan is committed to achieve the eight MDGs by the year 2015 pertaining to education, health, nutrition, gender equality and environment. In the recent past, Pakistan has made significant achievements over various indicators of MDGs. However, certain targets still appear to be over-ambitious and it is less than likely that Pakistan will accomplish most of these goals by 2015. The formulation of effective policies to achieve
these goals and monitoring their progress requires identifying the groups of population simultaneously deprived in a range of dimensions.

2.1. Previous Studies on Measuring Multidimensional Poverty in Pakistan

Although the official poverty measurement and analysis in Pakistan has historically been unidimensional, there have been few attempts to capture the multiple deprivations faced by the poor. The most notable of the studies in this direction are: Jamal (2009); Schreiner (2009); Gwatkin et al. (2007); Sahn and Stifel (2003); and Filmer and Pritchet (2001). In the following section, we briefly review the methodology used by these studies and identify their shortcomings. Jamal (2009) used 2004/05 PSLM data to estimate multidimensional poverty selecting 15 indicators of education, housing, assets and household consumption. In order to reduce the dimension of data and acquire a single score to rank households, Jamal employed Factor Analysis (FA) - a multivariate statistical technique which reduces the dimensions of the data by clustering all highly correlated variables into one factor or index. Like Jamal, Gwatkin et al. (2007) constructed a wealth index using the Principal Component Analysis (PCA) for the Pakistan Demographic and Health Survey 1990-91. The PCA is another multivariate statistical technique used to reduce the dimensions of data in a way similar to FA. Similarly, Sahn and Stifel (2003) also constructed a wealth index using FA for the PIHS 1991 data. Filmer and Pritchet (2001) also used the PCA and constructed an asset index, using the PIHS 1990-91 data. All these authors have used either FA or PCA to reduce the dimensions of data to construct a single index. Households are then ranked according to their index score, and those scoring less than a particular threshold are considered below the poverty line.

There is a fundamental problem associated with the use of FA or PCA for the type of data used to construct wealth index. Both FA and PCA are designed for continuous data with normality of distribution as a crucial assumption. Whereas, many variables related to household assets are categorical, ordinal or binary, with responses given either in "yes" or "no" or in three/four categories. Ordinal and binary data have high skewness and kurtosis which simply means that its distribution is not normal (Kolenikov and Angeles 2004). Moreover, the FA and PCA use the Pearson correlation coefficient as the basis for creating index score which is only suitable for continuous data. Any misleading information about the
correlation coefficients (by using inappropriate technique) is bound to give spurious results. Thus employing FA or PCA over such data is technically wrong. In summary, these methods are poor choice for the analysis of poverty and wellbeing.

The Multidimensional Poverty Index (Alkire and Santos 2010), recently launched by Oxford Poverty and Human Development Initiative and UNDP is nonetheless an exception in this regard. By employing the Alkire and Foster Measure (2007) that addresses the limitations of studies discussed above, the Country Profile of Pakistan provides estimates of the multidimensional poverty in Pakistan. The MPI uses nine indicators pertaining to three dimensions; living conditions, health and education. The current paper also adopts the same methodology however it differs from the MPI in number of dimensions and indicators as well as weights assigned to each dimension.
3. Data, Selection of Dimensions, Indicators, Weights and Methodology

The subsequent sections provide detailed a discussion on the data used, dimensions and indicators selected and various weights assigned to various dimensions and their respective indicators alongside explaining the methodology.

3.1 Data
This paper uses household data collected in 2006-07 by the DFID funded Research Consortium on Educational Outcomes and Poverty (RECOUP). RECOUP was a five year project that explored the social, economic and human development outcomes of education for the poor in four developing countries: Pakistan, India, Kenya and Ghana. In Pakistan, RECOUP Household Survey is representative of two provinces; KP and Punjab. The Survey was administered in nine districts using the sampling framework of the National Bureau of Statistics and the sample size (for this paper) is 1,077\(^5\) households. In total, nine districts were sampled; six from Punjab and three from KP. Sampled districts represent various regions within each province. From Punjab, districts Chakwal and Attock represent Northern Punjab, Kasur and Sargodha represent Central Punjab; and Khanewal and Rahim Yar Khan represent Southern Punjab. In KP, Swat, Charsaddah and Haripur represent Northern, Central and Southern KP, respectively. In Punjab, the Northern region is considered to be the most developed and the Southern region is the least developed one (Bhatti, et al. 2011). In KP, Southern KP is considered to be well-off and the Central KP is the least developed one (Ibid.).

This dataset is unique in that it provides extensive information on schooling, vocational training in formal and informal sector, economic activities, health and fertility, disability, empowerment, time allocation and cognitive skills. It also collects information on household assets as well as household consumption on various goods and services. This provides a freedom to select a set of suitable indicators for identification of households deprived in multiple dimensions.

---

\(^5\) The actual sample size of the survey was 1094. However, 17 households with missing values of one or more dimensions were excluded from the analysis in this paper.
3.2 Selection of Dimensions and Indicators

The selection of dimensions and respective indicators to measure poverty critically depends upon how poverty is perceived. This paper adopts Sen’s capability approach as the theoretical framework. It sees poverty as deprivation of capabilities: a state of the lack of multiple freedoms that individuals value and have reason to value (Alkire 2007). There is considerable disagreement between the proponents of capability approach over the process of deciding upon valuable dimensions. Nussbaum (2000) proposes a universal list of capabilities, whereas, Sen (2004) opposes such authoritative listing of capabilities and argues for a strong role of public reasoning and discussion in to determine what is valuable for poor. In an extensive review of literature on the selection of dimensions and indicators, Alkire (2007) finds researchers justifying their selection of indicators on the basis of up-to five criteria: 1) data availability and adequacy; 2) normative assumptions based upon theoretical frameworks; 3) public discussions; 4) deliberative participation; and 5) empirical analysis. By adopting criteria 1 and 2, and partially 5 (relying upon the empirical analysis of other studies, elsewhere), a list of 12 indicators is selected for this paper. Nonetheless, this list of indicators is not perfect and is subject to public debate and scrutiny. With some degree of variation, studies on capability based multidimensional poverty measurement elsewhere have also used similar indicators.6

This approach to select indicators has recently received strong criticism (Ravellion 2010, 2011) on theoretical grounds and it is argued that economic theory provides less explanation for selection of indicators through this process. Nonetheless, this criticism is responded convincingly by Foster (2010) who has highlighted that decisions on the selection of dimension in poverty analysis are normative, even in the case of standard measures of poverty. Foster notes that there is no strong explanation by the economic theory for taking consumption as the sole measure of individual welfare; however, it is adopted widely. There is instead an implicit decision made in the conventional approach by assuming income or consumption as the only indicator of poverty (Ibid.). The selection of indicators in this paper with a strong theoretical backing provided by Sen’s capability approach is in fact a better normative choice, at the very least, on the grounds of multiple dimensions that it covers and its focus on capabilities rather than on resources (income or consumption).

In what follows, the description of dimensions selected for this paper and their cut-off points is provided. A total of four valuable dimensions are selected;

---

6 See, for example, Alkire and Seth 2009, Santos and Ura 2008, Battiston et al. 2009 and Batana 2008.
1. Education
2. Health and nutrition
3. Living standards
4. Wealth (stock and flow)

1. Education

Education is a central capability that has intrinsic as well as instrumental importance in enhancing individuals’ wellbeing. It has the potential to enable individuals to participate in social, economic and political spheres of their lives. The two indicators selected under this dimension are described below;

   a. Household members' attainment of primary education: Access to universal primary education is Goal 2 of the MDGs. However, Pakistan falls far behind achieving the targets set for this goal. This indicator is also selected because there are positive intra-household externalities of the educated household members (Basu and Foster 1998).

   b. Child status: Whether children are involved in child labour or enrolled in school reflects on the ability of a household to provide its members opportunities to lead a better life. Pakistan is among those countries where the incidence of child labour is high combined with low school enrolments and high drop-out rates. In order to take into account these factors, we ask whether households have any child between ages six to 13\(^7\) not enrolled in the school. This also captures households' possible lack of resources to provide education to their children. This indicator also corresponds to MDG's Goal 2 (achieve universal primary education).

2. Health and Nutrition

Like education, health has instrumental as well as intrinsic value in determining the wellbeing of individuals. Three out of eight MDGs pertain to various aspects of health (Goal 4, 5 and 6). Malnutrition is yet another of the MDGs (Goal 1). Moreover, achievement of several valuable capabilities critically depends upon the health status of individuals (Ariana and Naveed 2009). Thus the following two indicators were selected under the health and nutrition dimension’

---

\(^7\) The age group 6-13 corresponds to the children enrolled in various classes up-to grade 8. The official age brackets used to calculate enrolment rates are 5-9 for primary and 10-12 for middle level schooling. However, RECOUP data finds the incidence of late enrolment that is adjusted with the selected age group.
a. *Nutritional status of women in the age group 20-60*: Body Mass Index (BMI), which is considered as one of the standard measures of health and nutrition and also represents the outcome of long term food security taken as the indicator of health and nutrition. Since Pakistan is a country where the incidence of malnutrition among women is one of the highest in the world (MHHDC 2008), the BMI of women in the age group 20-60 is analyzed. This also indirectly takes into account the intra-household allocation of resources and discrimination against women and indirectly corresponds to Goal 3 of MDGs.

b. *Under-five mortality rates*: Pakistan is among the countries that witness alarmingly high rates of child mortality. This indicator takes into account whether there has been any incidence of child mortality (age 0-5) in the household, without considering the year of the child death. The incidence of child mortality is assumed to reflect a total health functioning failure (Alkire and Santose 2010), taking into account child malnutrition as well.

3. **Living Standards/ Housing.**

The conditions under which households live are important indicator of their poverty or wellbeing. The UN - HABITAT data shows that 48 percent of the urban population in Pakistan lives in slums (including *katchi abadis*), with poor housing, water and sanitation conditions (UN HABITAT 2009). A total of four indicators are selected under this dimension that are described below:

a. *Quality of housing*: We emphasise upon the quality of housing that is assessed by asking whether the household lives in *kacha* house (made of mud) or *paka* house (made of concrete).

b. *Electrification*: Household electrification is also an important indicator of housing (Alkire and Seth 2009) as it allows access to several amenities. Household ownership of several assets also depends upon electric connectivity. Therefore it is included as an indicator of housing dimension.

c. *Access to safe drinking water*: Access to safe drinking water is also an important indicator of wellbeing. Diarrhoea, caused often due to unsafe drinking water, is one of

---

8 The minimum age is taken 20 years as the height and weight becomes relatively stable at this age.
the leading causes of the childhood deaths in Pakistan (Neilsen, et al. 2001). Several other communicable diseases, such as Hepatitis, spread through unsafe drinking water\(^9\). Moreover, increased access to safe drinking water is part of the MDG’s Goal 7. Thus household’s access to safe drinking water is taken into account.

d. **Sanitation:** Like access to safe drinking water, access to sanitation is also an important dimension of wellbeing of households. The consequences of poor sanitary facilities could be disastrous for human health (Bartram et al. 2005) as various aspects of public health are closely associated with sanitation. Access to improved sanitation is also part of MDG’s Goal 7. Based upon these merits, access to sanitation is also taken into account.

e. **Fuel used for cooking/air quality:** The type of fuel used for cooking could be consequential for the health of a household, particularly for women who are almost exclusively involved in cooking in Pakistan. If solid fuel such as cow dung, wood or coal is used for cooking, the health of household members who breathe in such an environment for long can be adversely affected (Duflo, et al. cited in Seth and Alkire 2009). Moreover, cooking fuel also impacts the environment and indirectly corresponds to MDG’s Goal 7. Hence it is also included in the analysis.

4. **Household Wealth (stock and flow)**

Wealth is an important dimension of material wellbeing. It gives individuals command over various goods and services and opportunity to enhance their valuable capabilities. However, most of the existing studies have focused on aspect of wealth; either stock or flow. Household wealth consists of a combination of both. We have included the following three indicators of wealth:

a. **Consumption:** Power to purchase goods and services that one values and has reason to value, is an important capability. While the capability approach has strongly contested exclusive reliance upon income or consumption as the only indicator of wellbeing and poverty, it has not denied the importance of income or consumption as an important dimension of wellbeing. However, due to the limitation of available household data, the empirical work on multidimensional poverty has not included income or

\(^9\) Every sixth Pakistani is infected with hepatitis (The Nation 2009)
consumption in the analysis of poverty\textsuperscript{10}. This is probably due to the fact that the standard surveys collecting data on multidimensional aspects of poverty usually do not gather any information on income or consumption. Nonetheless, RECOUP Survey also collects data on the consumption. Household consumption level is thus included as an important indicator of poverty. It reflects the short run fluctuations of material wellbeing of the household. As poverty is officially measured in terms of consumption level, this dimension corresponds to MDG's Goal 1.

b. \textit{Household assets}: As household assets are accumulated over a long period of time, they reflect long term material wellbeing status of the household. Asset holding shows the stock of wealth. We take the following nine household assets as indicators of wellbeing: air cooler, fridge, freezer, car, computer, tractor, thresher, generator and tube-well. These are a mix of assets considered important for urban as well as rural households. While this list of assets might not fully capture the deprivation level of households, as shown by the cut-off point, it can however, inform us whether or not a household is "not deprived"\textsuperscript{11} in asset holding.

c. \textit{Landholding}: Ownership of land, whether it is urban/non-agricultural or rural/agricultural land, is an important asset and later becomes a productive asset. Across rural Pakistan, most of households associated with the agricultural sector own small farms and earn their livelihoods through subsistence farming. Similarly, the ever-increasing worth of urban land also makes holding of non-agricultural land (commercial or residential plots) highly valuable. Thus, landholding, be it agricultural or non-agricultural can be considered an important dimension of households' wellbeing and is included in our analysis.

\subsection*{3.3 Aggregating Indicators and Dimensions - the Alkire and Foster Measure}

Once the valuable dimensions and their indicators are selected, we apply the Alkire and Foster Measure (2007) to consolidate the deprivations and estimate the incidence of multidimensional poverty. Unlike other measures of multidimensional poverty, the AFM does not assume household data to be continuous. It is thus highly suitable for

\textsuperscript{10} See for example, Alkire and Seth 2009, Batana 2008, and Batteston \textit{et al}. 2009, though Santos and Ura 2008 is an exception.

\textsuperscript{11} Since the assets included in this list are luxurious, there is a low probability that poor households would own these. Thus a household owning any of these assets is likely to be non-poor. It is worth mentioning that this list of indicators is illustrative rather than a definitive analysis at this stage. A definitive analysis would require a refined list of assets, sensitive to the income level of households. Furthermore, constructing an index of assets with a refined list of indicators and using index score as a dimension can provide a better solution. However, this falls beyond the scope of this paper.
categorical/ordinal data or even qualitative data as long as we can define who is deprived in a particular dimension (Foster 2010) and hence more effective for our purpose. In what follows, the methodology is briefly explained in simple and non-mathematical language.

After identifying the dimensions, a list of indicators is selected and an appropriate cut-off point for each indicator is determined. If the household performs below the cut-off point on a particular indicator, it is declared "deprived" on that particular indicator. On the other hand, if a household performs above the cut-off point, it is declared "non-deprived" on that indicator. In this way, the number of indicators/dimensions a particular household is deprived in is identified by adding up the deprivations. In the next step, weights are assigned to various dimensions/indicators on the basis of a specific criterion. The methodological flexibility of AFM provides the opportunity to assign the same or different weights to various dimensions. These weighted deprivations on each indicator/dimension are then aggregated at the household level. This is followed by determining an aggregate cut-off point – a poverty line - the number of dimensions/indicators or their weighted sum in which a household needs to be deprived, in order to be declared as multidimensional poor.

All households falling below the aggregate cut-off point are declared multidimensional poor. The Headcount Ratio provides information about number of households falling below the poverty line out of the total population. However, it doesn’t provide any information about the depth of deprivation faced by them. To assess the depth of deprivation, Adjusted Headcount Ratio is calculated which is the ratio of the total number of deprivations faced by poor households to the total possible deprivations that all households can possibly experience (Alikre and Seth 2009).

To this point, the AFM appears to be intuitively appealing and more informative than the conventional measures of poverty. However, it has recently come under serious scrutiny, primarily by the traditionalists. It is criticized mainly on the following two grounds; a) weighting dimensions; and b) aggregating weights into single index. In the following paragraphs, the main objections and response to these objections, as provided by the critics and proponents of the AFM, are elaborated.

\[12\] The creation of binary variables (poor and non-poor), while intuitively appealing, obscures the level of deprivation in each dimension. All households falling below the cut-off point in a particular dimension do not necessarily be facing the same level of deprivation in that particular dimension. Alkire and Foster provide the methodology to capture the level of deprivation in each dimension. However, this requires data to be continuous and using it for ordinal/categorical data, as ours, would be inappropriate.
**Assigning weights to dimensions:** Ravallion (2010, 2011) has pointed out that assigning weights to particular dimensions, as the studies using AFM do, is a highly questionable value judgement and has no theoretical foundations. Comparing AFM with traditional approach, Ravallion maintains that in the later approach such as that of consumption based measurement that aggregate market prices of a bundle of commodities, the weights are determined by market prices. On the other hand, weights in AFM, according to him, are assigned arbitrarily.

Foster responds to this criticism by taking these limitations as general ones, not AFM-specific, and argues that this criticism is equally applicable to other standard measures of poverty (2010). To Foster, the AFM is similar to the standard measure of poverty, the Foster-Greer-Thorbecke (FGT) measure, except that all the weight in the latter is assigned to income or consumption dimension. When zero weight is assigned to all dimensions other than income/consumption, the AFM reduces to FGT measure of poverty. This is in fact the case with the traditional measures that implicitly place zero weight on dimensions other than income/consumption. On theoretical grounds, the AFM evaluates the deprivations people face, not their achievements, so it does not need several assumptions to make it theoretically appropriate (Alkire 2010).

It is worth highlighting that both, the proponents and the critics of the AFM, agree that decisions on dimensions included, weights assigned and cut-off points determined at the country level are normative ones and involve certain policy trade-offs appropriate in the national context. This paper also takes this normative position. Moreover, the approach followed here is not entirely different from the case of traditional poverty measures such as setting up the poverty line since different countries have different poverty lines (Foster 2010).

Alkire (2010) also responds to this criticism on “arbitrarily” assigning weights on the following grounds; a) setting up the prices for conventional poverty measurement is not less problematic; b) the fact that the AFM uses value judgement instead of problematic prices as weights is a strength of this approach and not the limitation; c) setting up weights “precisely” may not be necessary since the estimates may be robust to a range of weights, and; d) weights trigger public debate that may inform the policy makers about the tradeoffs.

**Aggregating deprivations into single index:** The second objection raised by the critics relates to aggregating various dimensions into a single score. Ravallion (2010) calls it “adding up oranges and apples without knowing their relative prices”. Ravallion finds no theoretical
justification behind aggregating child mortality with living conditions and so on. He considers this approach equivalent to the Human Development Index that makes several assumptions (that according to Ravallion are problematic) in aggregating income with health and education. While acknowledging the importance of multidimensional perspective of poverty, he doesn’t find any use of constructing a single, composite index of many dimensions. He states “being multidimensional about poverty is not about adding up fundamentally different things in arbitrary ways. Rather it is about explicitly recognizing that there are important aspects of welfare that cannot be captured in a single index.”

Foster (2010) justifies the aggregation into single score by considering it the “goal of Sen’s defining contribution to poverty”. Sen’s capability approach that serves as a strong conceptual framework for measurement of poverty through this methodology takes poverty an aggregate of multiple deprivations. Alkire (2010) responds to this by stating that the composite index successfully embraces the challenge of operationalizing the multidimensional nature of poverty. Alkire maintains that aggregation of various dimensions into a single index provides a great deal of information about both the incidence and the intensity of poverty. It tells one about the number of deprivations the poor face. One can simultaneously jump into dimension/indicator wise state of deprivations. Foster also highlights that every measure of poverty makes its own arbitrary choices. He questions the explanation provided by economic theory to select a particular bundle of goods and aggregate their prices for determining a poverty line or setting up PPP values.

The discussion provided above, establishes, at the very least, that AFM doesn’t suffer from limitations more than the conventional measures poverty. It however, provides a great deal of information about the deprivations faced by the poor, illustrating the nature, depth and breadth of poverty. Alkire and Seth (2009) identify several other advantages of using the AFM to estimate multidimensional poverty and identify poor households. These are as follows: a) it provides a valid treatment of the ordinal/categorical data; b) being poverty and deprivation focused, it does not assume perfect substitutability across dimensions; c) it is flexible to assign equal or various weights to different dimensions depending upon their relative importance; d) it is robust in identifying poorest of the poor by increasing the aggregate cut-off point; e) it is highly informative for policy as it shows what dimensions are driving the multidimensional poverty in certain regions or groups of households. It is based
upon such merits of the AFM that Mexican government has recently adopted this methodology for official estimation of poverty in Mexico.\textsuperscript{13}

### 3.4 Indicator wise cut-off Points

Table 1: Dimensions, indicators and their cut-off points

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Indicators</th>
<th>Poverty cut-off points: A household is declared &quot;deprived&quot; if;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education</strong></td>
<td>Attainment of primary education</td>
<td>The maximum years of education completed by any household member are less than five. To put it differently, the household is deprived if none of its members has attained a primary education or above.\textsuperscript{14}</td>
</tr>
<tr>
<td></td>
<td>Child enrolment status</td>
<td>It has at least one child in the age group 6-13 not enrolled in school.</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td>Body Mass Index of women 20-60</td>
<td>It has at least one woman (in the age group 20-60) with BMI less than 18.5Kg/m(^2) (World Health Organization standard).</td>
</tr>
<tr>
<td></td>
<td>Under-five child mortality</td>
<td>The incidence of a death of at least one child of age 0-5 years</td>
</tr>
<tr>
<td><strong>Living Standards</strong></td>
<td>House quality</td>
<td>It lives in a <em>kacha</em> house.</td>
</tr>
<tr>
<td></td>
<td>Electricity</td>
<td>It is not connected to electricity.</td>
</tr>
<tr>
<td></td>
<td>Access to safe drinking water</td>
<td>It has no access to covered sources of drinking water.</td>
</tr>
<tr>
<td></td>
<td>Sanitation</td>
<td>It has following types of toilet facilities: a) none; b) pit latrine; c) bucket toilet</td>
</tr>
<tr>
<td></td>
<td>Cooking fuel</td>
<td>It uses wood, cow dung or coal for cooking.</td>
</tr>
</tbody>
</table>

\textsuperscript{13} See [http://www.ophi.org.uk/subindex.php?id=events0#mexico](http://www.ophi.org.uk/subindex.php?id=events0#mexico)

\textsuperscript{14} As Basu and Foster (1998) observe, there are intra-household externality of the presence of a literate member in the family.
The adult equivalent per capita consumption is below Rs. 944.47 (Pakistan’s official poverty line for the year 2005-06, as the one for 2006-07 is not available).

Ownership of household assets
It owns none of these nine household assets; air cooler, fridge, freezer, car, computer, tractor, thresher, generator and tube-well.

First step: a) A household is deprived in “agricultural landholding” dimension if it owns less than two acres of agricultural land; b) A household is declared deprived in “non-agricultural land” (residential or commercial) if it doesn’t own any plot (of any size).

Second step: Households deprived in both components of landholding are declared deprived in landholding. Thus a household deprived in this dimension does not own any non-agricultural land and has no/less than two acres of agricultural land.

3.5 Weighting Dimensions and Poverty Cut-off Points
As it is stated earlier, the AFM is flexible in assigning different weights to various dimensions and their respective indicators, depending upon their relative importance. For example, if policy makers want to emphasise more upon the education and health dimensions, they can allocate deprivations in these dimensions higher weight than others. Assigning weights to various dimensions is critical as it involves value judgment. Capability theorists have given a strong role to human agency and recommended the determining of weights through democratic processes and public debate instead of arbitrary selection (Sen 2004) or through processes that are methodologically justified, made explicit, debated and defended (Robeyns 2003). To elaborate the flexible characteristic of the AFM in assigning weights to various dimensions, we assign equal weights to all four dimensions; education, health, living standards, and wealth. Since the four dimensions vary in terms of number of

---

15 Selection of this cut-off point is discretionary, however, it is expected that 2 acres agricultural land will reasonably enable a household to involve in subsistence farming. Alkire and Seth (2009) use approximately similar cut-off point for India.
indicators, respective weights are distributed among indicators within each dimension. The details of the weights are provided below in table 2.

Table 2: Weights assigned to each dimension and indicator

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Name</strong></td>
<td><strong>Weight</strong></td>
</tr>
<tr>
<td>Education</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Living standards</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Wealth</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.00</td>
</tr>
</tbody>
</table>
4. Results

This section discusses the empirical results in detail.

4.1 Indicator Wise Deprivation

Figure 1 presents the percentage of households deprived in each of the indicators. Over 80 percent of households are deprived in good air quality. Sixty seven percent of households are deprived in land ownership and forty four percent in asset ownership\(^\text{16}\). The figure also shows that very few households are found to be deprived on electricity and water source indicators.

Figure 1: Percentage of households deprived on various indicators

![Bar Chart of Indicators](image)

Figure 2 presents the percentage of households facing deprivation on an exact number of indicators. Very few households are found to have no deprivation at all. Most of households are deprived on one to six indicators. The figure also reveals that almost 50 percent of households are deprived on four or more indicators.

\(^{16}\) Please refer to the footnote 16 while interpreting the deprivation in the assets dimension.
4.2 Poverty Line (aggregate cut-off point) and Poverty Estimates

We now turn to decide upon the aggregate cut-off point or the poverty line - the weighted sum of dimensions in which a household needs to be deprived to be declared as multidimensional poor. Table 3 provides the estimates of poverty using various poverty lines/cut-off points. At each cut-off point, the following statistics are provided; a) percentage of poor households out of total households - the Head Count Ratio H; b) percentage of deprivations faced by poor households out of total possible deprivations – the Adjusted Head Count Ratio Mo; and c) the average deprivations faced by households falling below the poverty line – the Average Poverty A.

Table 3: Estimates of multidimensional poverty on various aggregate cut-off points

<table>
<thead>
<tr>
<th>Cut-off points</th>
<th>Head Count Ratio (H)</th>
<th>Adjusted Head Count Ratio Mo</th>
<th>Average Poverty A=M0/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>1.00</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>0.10</td>
<td>0.88</td>
<td>0.31</td>
<td>0.35</td>
</tr>
<tr>
<td>0.20</td>
<td>0.70</td>
<td>0.28</td>
<td>0.41</td>
</tr>
<tr>
<td>0.30</td>
<td>0.51</td>
<td>0.24</td>
<td>0.47</td>
</tr>
</tbody>
</table>
We take the cut-off point 0.40 as our poverty line since it makes sense to declare households deprived in 40 percent of weighted sum of dimensions as multidimensional poor households. With this poverty line, as many as 31 percent of the households are poor. Those falling below the poverty line are on the average deprived in 55 percent of the weighted sum of dimensions. Table 3 shows that at the higher cut-off points, the lower is the Head Count Ratio and the Adjusted Head Count Ratio. However, the Average Poverty increases with increasing the cut-off points. At a higher cut-off point, those falling below the poverty line, on the average, face more deprivations than those who fall below the poverty line at a lower cut-off point.

### 4.3 Poverty Estimates at Regional Level

It is often stated that poverty in Pakistan is predominantly a rural phenomenon. Our results show significantly higher incidence and severity of poverty in rural than in urban areas. As the table 4 shows, as many as 37 percent of rural households fall below the poverty line compared to 15 percent of the urban households.

---

17 Using the same indicators and cut-off points for both rural and urban areas could be problematic since socio-economic structures and cost of living vary in both. It may be imperative to use different poverty lines for both. However, we have used some of the fundamental capabilities such as education and health which are equally important for rural and urban households. Indicators used to assess living conditions are also important for both types of households. “Asset holding” indicators present a mix of rural as well as urban assets. Similarly, landholding also takes care of rural and urban land. For consumption, the official poverty line is taken as cut-off point which is based on minimum caloric requirement and is same for both rural and urban population.
Table 4: Estimates of rural/urban poverty

<table>
<thead>
<tr>
<th></th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Count Ratio</td>
<td>0.37</td>
<td>0.15</td>
</tr>
<tr>
<td>Adjusted Head Count Ratio</td>
<td>0.20</td>
<td>0.08</td>
</tr>
<tr>
<td>Average Poverty</td>
<td>0.55</td>
<td>0.52</td>
</tr>
</tbody>
</table>

As reflected in table 4, the ratio of poor is higher in rural areas. The depth of poverty (adjusted head count ratio) as well as the average poverty are also higher in rural than in urban areas. This makes a strong case for prioritizing rural development in both provinces.

4.4 Poverty Estimates at the Provincial Level

In order to capture inter-provincial differences in the incidence of poverty, we now turn to its breakdown at the provincial level. As table 5 illustrates, the incidence of poverty is higher in Punjab than in KP. At the given poverty line ($k=0.40$), one-third of households (33 percent) in Punjab fall below the poverty line, whereas, in KP, only 22 percent households are found to be poor. The Adjusted Head Count Ratio which reflects the depth of deprivations is also higher for Punjab 0.18 than for KP which is 0.12.

Table 5: Estimates of poverty at provincial level

<table>
<thead>
<tr>
<th></th>
<th>KP</th>
<th>Punjab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Count Ratio</td>
<td>0.22</td>
<td>0.33</td>
</tr>
<tr>
<td>Adjusted Head Count Ratio</td>
<td>0.12</td>
<td>0.18</td>
</tr>
<tr>
<td>Average Poverty</td>
<td>0.53</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Similarly, the average poverty is also higher in Punjab than in KP. Households falling below the poverty line in Punjab experience deprivation in 5 percent of the weighted sum of dimensions compared to 53 percent in KP.

4.5 Poverty Estimates at the District Level

Table 6 presents the estimates of multidimensional poverty at the district level using the poverty line of 40 percent deprivation in the weighted sum of dimensions. Rahim Yar Khan (RYK) District in Southern Punjab records the highest incidence of poverty with as many as
55 percent of households following below the poverty line. The second highest incidence of poverty is found to be in district Kasur where 43 percent of the households are found to be poor. DistrictCharsadda in KP records the third highest incidence of poverty with 36 percent poor households. Districts Sargodha and Khanewal also record a significant incidence of poverty with headcount ratio as 26 and 24 percent respectively. The pre-war on terrorism Swat fares better thanCharsadda and most of the districts in Punjab with 21 percent households falling below the poverty line.

The lowest poverty is observed in district Haripur where only 8 percent households are found to be poor. This is probably because Haripur is situated near Federal Capital and is well connected to the main cities in both KP and Punjab provinces. Moreover it has both an agricultural and an industrial economic base. Within Punjab, district Chakwal has the lowest percentage of poor, only 13 percent of households which is followed by district Attock with 16 percent households below poverty line.

Like the Head Count Ratio, the depth of poverty or Adjusted Head Count Ratio (Mo) is also the highest in district RYK which is followed by district Kasure and then by districtCharsadda. Districts Sargodha and Khanewal also experience significant depth of poverty. On the other hand, district Haripur is reported to experience the lowest depth of poverty, followed by districts Chakwal and Attock.

Table 6: Poverty estimates at district level

<table>
<thead>
<tr>
<th>Province</th>
<th>District</th>
<th>Head Count Ratio H</th>
<th>H Ranking</th>
<th>Adjusted Headcount Ratio Mo</th>
<th>Mo Ranking</th>
<th>Average Poverty A=M0/H</th>
<th>A Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khyber Pakhtunkhwa</td>
<td>Haripur</td>
<td>0.08</td>
<td>9</td>
<td>0.04</td>
<td>9</td>
<td>0.51</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Charsadda</td>
<td>0.36</td>
<td>3</td>
<td>0.20</td>
<td>3</td>
<td>0.55</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Swat</td>
<td>0.21</td>
<td>6</td>
<td>0.11</td>
<td>6</td>
<td>0.51</td>
<td>5</td>
</tr>
<tr>
<td>Punjab</td>
<td>Attock</td>
<td>0.16</td>
<td>7</td>
<td>0.08</td>
<td>7</td>
<td>0.48</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Kasur</td>
<td>0.43</td>
<td>2</td>
<td>0.24</td>
<td>2</td>
<td>0.55</td>
<td>2</td>
</tr>
</tbody>
</table>
Among the multidimensional poor households, those living in district Rahim Yar Khan experience the highest level of deprivations – on the average in 57 percent of the weighted sum of dimensions. This is followed by districts Kasur, Khanewal and Charsadda where those falling below the poverty line are on the average deprived in 55 percent of the weighted sum of dimensions. The lowest average poverty is found to be in district Attock, followed by Haripur, Swat, Chakwal and Sargodha.

The maps presented below visually illustrate the incidence, depth and breadth of poverty in each district.

Map 1: Head Count Ratio
Map 2: Adjusted Head Count Ratio

Map 3: Average Poverty
It would be pertinent to keep in view the economic base of each district while analyzing the incidence of poverty. The table 7 provides the economic mainstay of each district.

Table 7: Economic base of the districts

<table>
<thead>
<tr>
<th>Region</th>
<th>Districts</th>
<th>Economic Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Punjab</td>
<td>Attock and Chakwal</td>
<td>Agriculture and industry</td>
</tr>
<tr>
<td>Central Punjab</td>
<td>Kasur and Sargodha</td>
<td>Mainly agriculture, some industry</td>
</tr>
<tr>
<td>South Punjab</td>
<td>Rahim Yar Khan and Khanewal</td>
<td>Predominantly agriculture with some industry and persistent feudal structures</td>
</tr>
<tr>
<td>North KP</td>
<td>Swat</td>
<td>Agriculture and services</td>
</tr>
<tr>
<td>Central KP</td>
<td>Charsadda</td>
<td>Agriculture</td>
</tr>
<tr>
<td>South KP</td>
<td>Haripur</td>
<td>Industry and agriculture</td>
</tr>
</tbody>
</table>


As table 6 shows, the incidence of poverty is significantly high in districts with more reliance upon agriculture as the economic base. On the other hand, most of the districts with strong industrial base such as Haripur, and Attock witness low levels of poverty.

4.6 What Drives Poverty the Most?

The graph shows indicator-wise decomposition of poverty at the aggregate level. It shows the contribution of each dimension in the overall deprivation experienced by those falling below the poverty line \( (k=0.4) \). Child mortality makes the largest contribution in overall deprivations faced by multidimensional poor households. This reflects upon the extremely poor state of health in the country. The second contributor of poverty is landholding. Landholding in Pakistan is extremely skewed resulting in feudal social and political structures that are intrinsically linked with poverty. This skewed land distribution also explains the reason behind the high incidence of poverty in the districts with high economic dependence upon agriculture. Child enrolment appears to be the third major driver of poverty. This is in-line with the overall low educational level in the country. The fourth major contributor to the deprivations of poor households is the lack of asset ownership, followed by educational level of the household. Among the remaining indicators, air quality, health &
nutritional status of women and improved sanitation facilities appear to be the significant contributors of multidimensional poverty.

Figure 3: Drivers of poverty

In order to bring the multidimensional poor households out of poverty trap, as is evident that from this picture, government and other development actors need to prioritize health (particularly child health) education, introduce land reforms and promote economic opportunities. These are the main drivers of multidimensional poverty in the two provinces under study.

4.7 Decomposition of Adjusted Head Count Ratio (M0) and policy implications

M0 reflects the total deprivation faced by poor as ratio of the total possible deprivations. Higher the value of M0, higher is the overall deprivation. It enables policy makers to rank various regions (provinces and districts) according to their level of deprivation, hence help prioritise regions for development spending.

If M0 is taken as a guide to prioritise districts for allocation of resources, district RYK would rank at the top followed by district Kasur. In KP province, among the sampled districts, Charsadda records the highest level of M0, hence deserves to be given priority in poverty in development and poverty reduction programmes, followed by Swat.
It is worth highlighting that $M_0$ can be decomposed by dimension to track down the share of each indicator in overall deprivation within each district. As the table 8 shows, different dimensions and indicators contribute differently to the overall $M_0$ in each district. This information helps each district to prioritise its spending on various projects and programmes. Dimensions recording higher deprivations would require greater resources.

Table 8: Indicator wise decomposition of $M_0$ at district level

<table>
<thead>
<tr>
<th>District</th>
<th>Education</th>
<th>Health</th>
<th>Housing</th>
<th>wealth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Edu</td>
<td>Child Status</td>
<td>BMI</td>
<td>Child Mortality</td>
</tr>
<tr>
<td>Sargodah</td>
<td>0.012</td>
<td>0.011</td>
<td>0.012</td>
<td>0.023</td>
</tr>
<tr>
<td>Break Down</td>
<td>8.7%</td>
<td>8.2%</td>
<td>8.7%</td>
<td>18.2%</td>
</tr>
<tr>
<td>Kasur</td>
<td>0.027</td>
<td>0.026</td>
<td>0.019</td>
<td>0.029</td>
</tr>
<tr>
<td>Break Down</td>
<td>11.5%</td>
<td>10.9%</td>
<td>7.9%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Attock</td>
<td>0.007</td>
<td>0.008</td>
<td>0.006</td>
<td>0.014</td>
</tr>
<tr>
<td>Break Down</td>
<td>9.1%</td>
<td>10.6%</td>
<td>7.6%</td>
<td>17.3%</td>
</tr>
<tr>
<td>Chakwal</td>
<td>0.003</td>
<td>0.005</td>
<td>0.006</td>
<td>0.013</td>
</tr>
<tr>
<td>Break Down</td>
<td>4.8%</td>
<td>7.3%</td>
<td>9.7%</td>
<td>22.6%</td>
</tr>
<tr>
<td>Rahim yar Khan</td>
<td>0.039</td>
<td>0.043</td>
<td>0.025</td>
<td>0.037</td>
</tr>
<tr>
<td>Break Down</td>
<td>12.3%</td>
<td>13.8%</td>
<td>7.8%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Khanewal</td>
<td>0.018</td>
<td>0.019</td>
<td>0.007</td>
<td>0.018</td>
</tr>
<tr>
<td>Break Down</td>
<td>13.8%</td>
<td>14.6%</td>
<td>5.7%</td>
<td>13.5%</td>
</tr>
<tr>
<td>Haripur</td>
<td>0.002</td>
<td>0.003</td>
<td>0.005</td>
<td>0.009</td>
</tr>
<tr>
<td>Break Down</td>
<td>4.1%</td>
<td>8.2%</td>
<td>12.2%</td>
<td>21.2%</td>
</tr>
<tr>
<td>Swat</td>
<td>0.007</td>
<td>0.016</td>
<td>0.009</td>
<td>0.015</td>
</tr>
<tr>
<td>Break Down</td>
<td>6.7%</td>
<td>14.8%</td>
<td>8.1%</td>
<td>14.0%</td>
</tr>
<tr>
<td>Char Sadda</td>
<td>0.022</td>
<td>0.026</td>
<td>0.015</td>
<td>0.027</td>
</tr>
<tr>
<td>Break Down</td>
<td>11.3%</td>
<td>13.5%</td>
<td>7.8%</td>
<td>14.0%</td>
</tr>
</tbody>
</table>

We illustrate here the way some of the districts can make best use of this information while allocating their budget on various sectors. In district RYK, child enrolment records the highest contribution by any single indicator to the overall $M_0$ followed by the educational attainment of the household. This makes a strong case for allocation of major share of district’s resources to education, particularly to increase enrollment rates and retention of students in the primary school as well as to improve the overall literacy rates. Owning
household assets ranks next, implying for programmes to increase economic opportunities that could increase the incomes and hence savings of the poor. As the child mortality also appears to be a significant contributor to the overall \( M_0 \), RYK also needs to invest in improving health particularly when the interlinked indicator of improved sanitation makes a notable contribution to the overall \( M_0 \). It is worth noting that share of consumption deprivation is very small (5.5 percent only) in the overall deprivation.

In district Kasur, on the other hand, asset holding appears to be the leading contributors of poverty meriting for allocation of resources towards increasing income generation opportunities. The second major contributor to overall \( M_0 \) is land holding. As we have seen in table 7 Kasur has primarily an agricultural economic base. Land reforms aimed at addressing skewed land holding would not only reduce poverty, it is also likely to increase economic opportunities particularly for the landless former and tenants. The high share of child mortality in overall deprivation also makes a strong case for allocating resources to health particularly to the factors contributing to child mortality. Similarly, the significant share of child enrollment and overall educational status of the household in overall deprivation demand for resource allocation to education. Consumption deprivation makes a relatively small share of 7.8 percent in the overall deprivation.

The composition of poverty is similar to a considerable extent in the two least deprived districts in Punjab, Chakwal and Attock. Child mortality is the highest contributor to \( M_0 \) implying that both districts need to spend the largest share of their resources on improving factors affecting child mortality. The next major contributors to \( M_0 \) are land and asset holding, making the case for land reforms and expansion of economic opportunities. High contribution of child enrolment in the overall \( M_0 \) in district Attock calls for increased allocation of resources for education. As the air quality and health & nutrition status of women are also significant contributors to the overall \( M_0 \) in both districts, access to better cooking fuel and health care merit high spendings given the co-incidence of high child mortality. The contribution of consumption in \( M_0 \) is very low in both districts and the lowest amongst all sampled districts in Attock (3 percent).

In KP, land holding appears to be the largest contributor to the overall \( M_0 \) of the most deprived district, Charsadda as well as in district Swat. This is followed by child mortality and child enrolment status in both districts and overall educational levels of the household in Charsadda. This implies that districts need to introduce land reforms and invest heavily in
health and education. As air quality is also a significant contributor to the overall $M_0$, improved cooking fuel options need to be provided to the households. Consumption level of household appears to be significant contributors to the $M_0$ in Charsadda, and asset holding more serious a problem in Swat signal at enhancing income generation activities.

While overall poverty is very low in district Haripur, its composition is different from the other two districts in KP. The relative share of child mortality is the highest in overall $M_0$ (21.2 percent) implying for a strong need of allocation of resources to health. This is followed by wealth indicators, land and asset holding implying the need for land reforms and expanding economic opportunities. Health and nutritional status of women and air quality also appear to be the significant contributors to overall deprivation. Thus Haripur district would reduce poverty if it also allocates resources for improving health and nutrition status of women as well as increase households’ access to improved cooking fuel.
5. **Relationship between Consumption and Multidimensional Poverty**

After illustrating the Alkire and Foster measure by providing empirical estimates of multidimensional poverty, it is now imperative to examine the relationship between uni-dimensional and multidimensional estimates of poverty. The official estimation of poverty in Pakistan has relied exclusively upon uni-dimensional measurements; mainly using consumption-based poverty lines. Under this approach, data collected through surveys like the Household Income and Expenditure Survey (HIES) are used and a poverty line is established based on the price of a basket of goods and services. In order to adjust for household size and varying numbers of individuals of different ages, an age and household size adjusted adult equivalent per capita consumption is calculated. Households with adult equivalent per capita consumption below the poverty line are considered to be poor. The official poverty line (OPL) for the year under study, determined by the Government of Pakistan, is Rs. 944.4724 (GoP 2008).

One of the striking features of the RECOUP Household Survey is that it also collects information about the consumption of various goods and services by households. We calculate the age and household size adjusted adult equivalent per capita consumption. Using the OPL of Rs. 944.47, we find that 17.8 percent of the households (in 2006-07) fall below the poverty line. There are a few caveats to be made before comparing these estimates with those from other sources. Our estimates are at the household level, not at an individual level and the data we use are representative of two provinces only, Punjab and KP, which are less poor, relatively speaking, than Sindh and Baluchistan (not covered by RECOUP Survey). The main purpose of presenting these statistics is to contrast uni-dimensional estimates of poverty with multidimensional estimates.

The main difference between the two measures is that the OPL provides very conservative estimates of poverty. Multidimensional poverty estimates show 51 percent of households fall below the poverty line at – three times higher than those using the OPL which finds only 17.8 percent of households to be below the poverty line.

Table 9 contrasts the status of households using both measures of poverty. It is important to note that despite being conservative in estimating poverty, OPL makes errors of both types by declaring multidimensional poor households as non-poor and multidimensional non-poor households as poor. At the given poverty line, $k = 0.4$, 4.6 percent of households declared as
poor by OPL are multidimensional non-poor. At the same poverty line, there are 17.8 percent households that are multidimensional poor but the OPL declares them as non-poor.

Table 9: Contrasting the two poverty lines

<table>
<thead>
<tr>
<th>Poverty status</th>
<th>Percentage of households</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPL poor but MD non-poor</td>
<td>4.6</td>
</tr>
<tr>
<td>MD poor but OPL non-poor</td>
<td>17.8</td>
</tr>
</tbody>
</table>

Table 9 also makes a strong case for adopting a multidimensional measurement of poverty. It shows that if poverty is measured using multidimensional framework, only 4.6 percent of the households, who are OPL/consumption poor would be declared non poor. This “leakage” of 4.6 percent is not significant in the context that multidimensional framework is covering a wide range of deprivations along with consumption. On the other hand, if OPL is used to estimate poverty, it would include all those deprived in consumption but would overlook as many as 17.8 percent of the households facing multiple deprivations. In the last case, the “leakage” is four times higher.

The relationship between the two methods of poverty estimation is explored by Spearman correlation (two-tailed) coefficient between the status of household as poor or non-poor determined by OPL, and multidimensional poverty lines with $k=0.4$ separately. The correlation coefficient is 0.432 ($p$-value = 0.000). While this co-efficient is statistically significant, it is low and does not provide the basis for accepting the uni-dimensional measure as the single, comprehensive criterion for the estimation of poverty.

Among the proponents of uni-dimensional measurement of poverty, it is widely believed that consumption has a strong correlation with other dimensions. Households' levels of consumption thus explain households' achievements on every other valuable dimension of wellbeing. Hence estimating poverty on the basis of consumption (or income) automatically takes care of deprivations in other dimensions. However, in Pakistan, like in Bhutan (Santos and Ura 2008), empirical evidence challenges this belief. As shown in Table 10, deprivation in consumption has a low correlation with deprivation in other dimensions. The highest correlation of the 'consumption' dimension is 0.3 with the 'child status' dimension (at level of
significance 0.01). This provides strong evidence that consumption alone does not satisfactorily explain deprivations faced by the poor.
Table 10: Correlation Matrix of deprivation on each indicator

<table>
<thead>
<tr>
<th></th>
<th>BMI</th>
<th>Electricity</th>
<th>Water Source</th>
<th>Land</th>
<th>Housing</th>
<th>Air Quality</th>
<th>Asset</th>
<th>Child Status</th>
<th>U5 Mortality</th>
<th>Education</th>
<th>Sanitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td>0.071*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Source</td>
<td>0.029</td>
<td>-0.081**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land</td>
<td>0.023</td>
<td>0.023</td>
<td>-0.057</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td>0.015</td>
<td>0.213**</td>
<td>0.006</td>
<td>0.098**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality</td>
<td>0.041</td>
<td>0.131**</td>
<td>0.093**</td>
<td>-0.068*</td>
<td>0.253**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset</td>
<td>0.031</td>
<td>0.191**</td>
<td>-0.113**</td>
<td>0.196**</td>
<td>0.287**</td>
<td>0.216**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child Status</td>
<td>0.049</td>
<td>0.201**</td>
<td>0.018</td>
<td>0.088**</td>
<td>0.296**</td>
<td>0.163**</td>
<td>0.204**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U5 Mortality</td>
<td>.014</td>
<td>.017</td>
<td>.018</td>
<td>.008</td>
<td>.064*</td>
<td>.053</td>
<td>.084**</td>
<td>.054</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.050</td>
<td>0.187**</td>
<td>-0.023</td>
<td>0.174**</td>
<td>0.301**</td>
<td>0.166**</td>
<td>0.268**</td>
<td>0.268**</td>
<td>0.268**</td>
<td>.057</td>
<td></td>
</tr>
<tr>
<td>Sanitation</td>
<td>0.037</td>
<td>0.254**</td>
<td>0.002</td>
<td>0.066*</td>
<td>0.335**</td>
<td>0.247**</td>
<td>0.282**</td>
<td>0.201**</td>
<td>0.201**</td>
<td>.056</td>
<td>0.273**</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.037</td>
<td>0.160**</td>
<td>0.011</td>
<td>0.087**</td>
<td>0.278**</td>
<td>0.154**</td>
<td>0.162**</td>
<td>0.302**</td>
<td>0.067*</td>
<td>0.216**</td>
<td>0.207**</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level
Lastly, to re-emphasise the central argument, the relationship between the consumption level of households and the number of deprivations faced by them is also investigated using logistic regression. For the purpose of illustration, we take being “poor” or “non-poor” as the dependent variable and the following variables as explanatory variables: urban/rural, consumption quintiles, and province. The consumption quintiles are calculated on the basis of adult equivalent per capita consumption and are ranked such that the first quintile represents the richest 20 percent and the fifth/last quintile represents the poorest 20 percent of households. It is worth mentioning here that consumption, as a dimension, is already contributing in determining households’ probability of being poor or non-poor. Since consumption is present on both sides of the equation (as adult equivalent per capita consumption on the left side and as quintiles of adult equivalent per capita on the right side) its power to explain deprivations faced by households, calculated through the logistic regression model, needs to be interpreted carefully. The results are presented below in Table 11.

Table 11: Results of the logistic regression

<table>
<thead>
<tr>
<th>Explanatory variable</th>
<th>$B$</th>
<th>Standard Error</th>
<th>Wald Statistics</th>
<th>Degree of freedom</th>
<th>Significance</th>
<th>Expected $\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption Quintile</td>
<td>0.667</td>
<td>0.058</td>
<td>131.11</td>
<td>1</td>
<td>0.000</td>
<td>1.948</td>
</tr>
<tr>
<td>Province</td>
<td>0.680</td>
<td>0.185</td>
<td>13.49</td>
<td>1</td>
<td>0.000</td>
<td>1.973</td>
</tr>
<tr>
<td>Rural/Urban</td>
<td>-0.861</td>
<td>0.189</td>
<td>20.65</td>
<td>1</td>
<td>0.000</td>
<td>0.423</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.32</td>
<td>0.277</td>
<td>144.28</td>
<td>1</td>
<td>0.000</td>
<td>0.036</td>
</tr>
</tbody>
</table>

Cox & Snell $R^2 = 0.185$, Nagelkerke $R^2 = 0.261$

Results show that urban households have less than half probability (0.42 times) of being poor as compared to rural households. For households living in Punjab, the odds of being poor are almost two times (1.97) the odds of being poor for households in KP. Similarly, the odds of being poor increase two times (1.95) as we move from a rich consumption quintile to the nearest poor consumption quintile. These results show that the consumption level explains the multidimensional poverty status of households roughly as much as does the households'
province of residence. It is also pertinent to mention here that the computed power of consumption to explain deprivations faced by households is also escalated in the sense that consumption is already included in the left side of the equation. In summary, the consumption level has little power in explaining the probability of a household being multidimensional poor or non-poor. Thus we conclude that the consumption level alone cannot be taken as a comprehensive measure of the deprivations faced by poor households. These results are consistent with findings from elsewhere (see for Chilean data in Laderchi 1997, and for Spanish data on income and multiple deprivations, see Ayala et al. 2011).
6. Conclusion and the Way Forward

This paper has argued for adopting a multidimensional framework to estimate poverty and identify the poor for social protection in Pakistan. A critical analysis of the methodologies previously used for measuring multidimensional poverty in Pakistan is provided and their limitations are identified. It has employed an alternative methodology Alkire and Foster Measure (AFM), to provide the estimates of multidimensional poverty in KP and Punjab provinces for year 2006-07. It has analysed data on 12 indicators pertaining to four valuable dimensions of wellbeing; education, health, living conditions and wealth. The paper finds that 31 percent of households fall below the poverty line. Disaggregated results show higher poverty in rural than urban areas and in Punjab province than in KP. Child mortality, skewed landholding and children not enrolled in school are found to be three major drivers of multidimensional poverty. From a policy perspective, the paper has also discussed the advantage of using the AFM to allocate resources among districts and prioritise spending within districts.

In this paper, we have also explored the relationship between consumption and multidimensional poverty. It is empirically established that consumption alone fails to capture deprivations faced by households. Thus consumption based uni-dimensional measurement of poverty is an insufficient measure of poverty. Based upon the advantages of the proposed methodological framework, it is argued that AFM should officially be adopted to estimate poverty in Pakistan.
Bibliography


Government of Pakistan (GOP) 2008 'Pakistan Economic Survey 2007-08', Finance Division, Economic Advisor's Wing, Islamabad


Kline, P 1994 'An easy guide to factor analysis' Routledge, London


Sen, AK 1999 'Development as Freedom', Oxford University Press, New Delhi
Sen, AK 2004 ‘Dialogue: Capabilities, lists and public reasons: Continuing the conversation’ 
*Feminist Economics* Vol. 10, Issue 3, pp. 77-80


World Bank 2009 'Project Appraisal Document on a Proposed Credit in the Amount of SDR 40.2 Million (US$60 Million Equivalent) to the Islamic Republic of Pakistan for a Social Safety Net Technical Assistance Project' South Asia Region; Human Development Unit