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Estimating Multidimensional Poverty and Identifying the Poor in Pakistan:

An Alternative Approach

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Abstract

This paper argues for the multidimensional measurement of poverty in Pakistan particularly in the context of Millennium Development Goals. It critically examines the Poverty Scorecard, which was recently introduced by the Government of Pakistan for the identification of poor households under the Benazir Income Support Programme. By employing the Alkire and Foster measure to analyze household data from two provinces, Khyber-Pakhtoonkhwah (the re-named North-West Frontier Province) and Punjab, it provides an alternative method to estimate multidimensional poverty and identify poor households. The paper also investigates the relationship between household consumption and multidimensional poverty. It contrasts the results obtained by using a multidimensional measurement of poverty with those of the official poverty line. The limitations of the official poverty line are identified and the role of household consumption in explaining deprivations is discussed.

Key words: Multidimensional poverty measurement, BISP, identification of the poor, poverty scorecard, poverty line, Pakistan, capability approach.

JEL classification: D31, I32, I38

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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 the use of a multidimensional measurement of poverty in Pakistan. The case for multidimensional measurements 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. The MDG discourse provides a policy framework that stresses the enhancement of certain fundamental human capabilities. Moreover, the success and failure of recently launched social protection policies of the Government of Pakistan, such as the Benazir Income Support Programme (BISP), is highly dependent upon the identification of households deprived in a number of valuable dimensions of wellbeing.

This paper briefly reviews the literature on multidimensional measurements of poverty in Pakistan and identifies the methodological limitations of previous studies. As a special case of identifying multidimensional poor households, it provides a detailed assessment of the BISP Poverty Scorecard (henceforth, BPS). The in-depth analysis of the BPS shows there are serious problems in the selection of indicators, the determination of cut-off points of selected indicators, potential allocation of scores to each indicator, and finally the aggregation of scores on each indicator into a single index. Thus, BPS, being a flawed instrument that fails to capture deprivations faced by poor households, cannot be used to identify beneficiaries of BISP.

This paper adopts the Alkire and Foster measure (henceforth, AFM) as an alternative methodology to estimate multidimensional poverty and identify poor households. The AFM is a robust measure as it is specifically designed for categorical/ordinal data. After careful selection of dimensions, indicators and their cut-off points, the AFM decides whether or not a particular household is deprived in each selected dimension. In the next step, it aggregates the number of dimensions in which a particular household is deprived. An aggregate cut-off point is decided; that is the minimum number of dimensions in which a household has to be deprived to be declared as multidimensional poor. Households falling below this cut-off point are considered multidimensional poor. Moreover, the AFM is flexible to assign equal or various weights to different dimensions depending upon their relative importance.

By applying the AFM to analyze data from RECOUP[3] Household Survey 2006-07, we estimate incidence of multidimensional poverty in Khyber-Pakhtoonkhwah (henceforth 'KP') and Punjab provinces. Households deprived in multiple dimensions are identified and poverty rates, at aggregate, provincial and district levels are presented using equal weights for each dimension. In order to

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[3] The Research Consortium on Educational Outcomes and Poverty (RECOUP) is a DFID funded, five year project that explores the social, economic and human development outcomes of education in four developing countries, viz.; Pakistan, India, Kenya and Ghana. In Pakistan, research under the RECOUP is conducted by the Mahbub-ul-Haq Human Development Center which is a partner in the consortium.

elaborate the flexible characteristic of the AFM to assign different weights to various dimensions, weighted estimates of poverty are presented at each level.

Since consumption is traditionally used to measure poverty in Pakistan with an underlying assumption that households' consumption level explains their achievements over every other dimension, the last section of this paper critically examines the relationship between consumption and the estimates of multidimensional poverty. A simple correlation analysis between deprivation in consumption and in other dimensions shows that consumption has weak correlation with other dimensions. A comparison between multidimensional and the consumption based uni-dimensional poverty estimates using Official Poverty Line (OPL) for the year 2006-07 (for which the RECOUP data was collected) reveals that OPL, not only provides highly conservative estimates of poverty, it also fails to accurately capture deprivations faced by the poor. The OPL tends to declare households facing multiple deprivations as "non-poor" and vice versa. This provides strong evidence of the failure of OPL to identify households deprived in multiple dimensions. Similarly, the correlation between the two estimates of poverty, using the AFM and the OPL, is also calculated. While a statistically significant correlation is found between households identified as poor by both methods, nonetheless, the relationship is not strong enough to accept the consumption as a single, comprehensive measurement of poverty. The logistic regression analysis also reiterates the central argument that considering the consumption alone provides an inadequate reflection of deprivations faced by poor households. It is on the basis of evidences established in this paper that we recommend adopting the AFM as the methodology for official estimation of poverty in Pakistan.

2. Why use a multidimensional measurement of poverty?

The official measurement and analysis of poverty in Pakistan has historically relied upon the single dimension, consumption based monetary approach. However, recent developments in literature on poverty measurement have highlighted serious limitations of monetary approaches to measure poverty. Alkire and Santos (2009) summarise the following drawbacks of the income or consumption data based measurements of poverty: 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 provide no guarantee that these will be utilised on valuable goods and services; d) income or consumption data are collected at the household level and provide no information about the intra-household allocation of resources; e) such data are flawed due to missing observation and misrepresentation. To sum up, there are fundamental flaws in exclusively focusing upon consumption or income data while analyzing poverty.

Sen's capability approach, that has greatly influenced the global development agenda since last two decades, on the other hand, has extended the analysis of poverty, inequality and wellbeing from

income or consumption based monetary approaches to the capability based multidimensional approach. From the capability perspective, poverty is not mere deprivation of monetary resources. It is rather a state of deprivation of several fundamental freedoms that individuals have reason to value (Alkire 2007). Income, in this context, is merely one of such freedoms and is only important as a *mean* to achieve the valuable *ends*, the capabilities. The capability based analysis of poverty intrinsically demands a multidimensional measurement of poverty. Moreover, for a meaningful analysis of poverty, there is a need to understand the interconnections between various deprivations (Alkire and Santos 2009) as deprivation of some fundamental capabilities induces and reinforces the deprivation in 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 following eight MDGs by the year 2015: 1) end poverty and hunger; 2) achieve universal primary education; 3) promote gender equality; 4) improve child health; 5) improve maternal health; 6) combat HIV/AIDS; 7) ensure environmental sustainability; 8) enhance global partnership. As the list of goals shows, the conceptualization of poverty in the MDGs discourse goes well beyond monetary approach and includes a number of fundamental capabilities. While Pakistan has made significant achievements over various indicators of MDGs in the recent past, certain targets still appear to be over-ambitious and it is less than likely that Pakistan will accomplish most of these goals by 2015. Nonetheless, formulation of effective policies to achieve these goals and monitoring the progress over these policies require multidimensional measurements and analysis of deprivations faced by the poor.

There is yet another reason to recommend a multidimensional measurement of poverty in Pakistan. The Government of Pakistan (GOP) has recently launched various social protection programmes, such as Benazir Income Support Programme (BISP), that have replaced previous policies of across-the-board subsidy to more targeted subsidy. Under the BISP, a cash support of Rs. 1,000 per month is provided to poor households. Under this programme, the GoP is currently providing cash support to 2.7 million households and plans to extend the coverage to five to seven 10 million households during next year[4]. There are several other initiatives such as health insurance, vocational training, and microcredit to be launched for the social protection of the poor in near future. The Government of Pakistan forecasts to reduce poverty by 20 per cent in next three years through these programmes. However, the success or failure of such programmes is crucially dependent upon the accurate identification of the poor which largely relies upon how poverty is conceived. The focus of social arrangements, as repeatedly argued by the proponents of the capability approach, should not be on maximizing income, assets or resources only, as these are merely means to achieve valuable freedoms. Social arrangements, and thus social policies and programmes, should be evaluated on the basis of

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[4] http://dailymailnews.com/0410/19/CityPage/CityPages3.php last accessed; April 20, 2010.

their role in enhancing fundamental freedoms people value (Sen 1999). In the given context, the process of identifying the poor becomes decisively important and those who are deprived in several valuable capabilities, not just in terms of income or assets, need to be prioritised. Besides conceptualization of poverty, the appropriate methodology to identify the beneficiaries of programmes like BISP needs to be one that is technically robust as well as precisely capturing the multiple deprivations faced by the poor.

In conclusion, there are convincing reasons to extend the analysis and measurement of poverty in Pakistan from single dimensional, asset or income based to capability based, multidimensional measurement and analysis. Such a shift in the public policy can greatly facilitate the achievement of MDGs through identifying the deserving beneficiaries of social protection programmes like BISP and hence reduce poverty.

3. A brief overview of literature on multidimensional poverty measurement in Pakistan

While the official poverty measurement and analysis in Pakistan has historically been uni-dimensional, there have been few attempts to capture the multi-dimensional nature of deprivations faced by Pakistan's 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 what follows, we briefly review the methodology used by these studies and identify their shortcomings.

Jamal (2009) used 2004/05 PSLM data to estimate multidimensional poverty in Pakistan. He selected 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, he employed Factor Analysis (FA) - a multivariate statistical technique which reduces the dimensions of data by clustering all highly correlated variables into one factor or index. Like Jamal, Gwatkin *et al.* (2007) constructed a wealth index using Principal Component Analysis (PCA) for 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 by 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 or analysis of multidimensional poverty. 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 variables, 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.

Another important study in this direction is conducted by Schreiner (2009) who constructed a Poverty Scorecard to identify poor households. Schriener's Poverty Scorecard assigns scores to various dimensions and aggregates the total score to rank households. Households falling below a certain cut-off score are declared as poor. However, his methodology suffers from several problems related to selecting dimensions, determining cut-off points for each dimension, assigning scores to each dimension and aggregating dimension-specific scores into single measure. Schreiner claims to have used logistic regression while assigning non-negative weights (scores) to different dimensions, however, he fails to provide a clear explanation of how these scores are assigned. Since weights are extremely important, as they reflect on the relative importance of various dimensions, any ambiguity related to assigning weights (scores) to various dimensions casts serious doubts over the effectiveness of methodology for identifying the poor. A slightly varied version of Schreiner's Poverty Scorecard, developed by World Bank, is currently being used by the Benazir Income Support Programme (BISP) to identify poor households eligible for cash support. The BISP Poverty Scorecard (BPS) is also expected to serve as a main instrument to identify the poor for the provision of several social security benefits other than the income support, currently being developed by the Government of Pakistan. It would therefore be an imperative to critically examine various aspects of the BPS. The next section provides a detailed analysis of the BPS and discusses its limitations to identify poor households.

4. BISP Poverty Scorecard: A poor case of identifying the poor

4.1 Background

The Government of Pakistan has recently launched the Benazir Income Support Programme (BISP) to provide targeted subsidies to poor households. The Programme aims at providing cash transfer of Rs. 1,000 per month to 2.7 million poor households and plans to extend the coverage to 10 million households in next 10 years. This takes precedence over earlier policies of across-the-board general subsidies. The BISP, in its efforts to identify poor households through a multidimensional measure, is conducting a country-wide census using Poverty Scorecard. While the results of its pilot survey are yet to be produced, the instrument used for this purpose named as "BISP Poverty Scorecard (BPS)" is nonetheless available. A detailed examination of the BPS shows there are serious problems in selection of indicators, the determination of cut-off points of selected indicators, potential allocation of

weights/scores to each indicator, and finally aggregation of scores on each indicator into a single number/index.

The BPS is a 12 dimensional instrument that includes household size, type of housing and toilet facilities, education, child status, household assets, agricultural landholding, and livestock ownership. Based upon their conditions, households are scored against each dimension. It is pertinent to mention here that the score for each dimension and the process of determining scores for the BPS are yet to be disclosed[5]. After dimension specific scores are assigned, aggregate score is then calculated by simple addition. The lower the aggregate score, the poorer a household would be. This would be followed by determining a cut-off score as the poverty line for the BISP and households having total score below that point will be declared poor. The identified poor households will then be entitled to a cash grant of Rs. 1,000 per month. The BPS is also expected to be used for the provision of other social security benefits being currently deliberated upon by the Government of Pakistan.

4.2 Criticism of the BPS

A careful examination of the BPS identifies a number of limitations, categorised as follows.

   1- Conceptualization of poverty

   2- Selection of dimensions and their cut-off points

   3- Assigning scores to each dimension and aggregating score into a single measure

4.2.1 Conceptualization of poverty: Conceptualization of poverty has a direct bearing on the formulation of policies and interventions aimed at reducing deprivation. While there is little background information available about the theoretical underpinnings of the BISP, the BPS however shows that poverty is conceptualised in terms of deprivation in resources or assets[6]. The overwhelming focus of the BPS on resources is reflected by the fact that seven out of 12 dimensions pertain to assets. An increasing amount of literature shows serious flaws in the asset based conceptualization of poverty and inequality (see Sen 1992, Laderchi 1997 for example).

Social arrangements, as proposed by the capability approach, are to be evaluated primarily to the extent they promote people's freedoms they value (Sen 1999). Social policy, therefore, needs to enhance the valuable capabilities of the poor (such as health and nourishment, education and livelihoods, etc.) instead of mere ownership of assets. Whilst the BPS attempts to include education as a dimension, several important capabilities such as being well-nourished and healthy and having decent means of livelihood are ignored altogether. Apparently, the BISP aims to empower poor

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[5] A partial explanation is provided in the World Bank (2009), however, the central paper, titled, " Poverty Scorecard for Pakistan: A recommended Approach for Targeting the Poor" by Vishwanath, Hou and Yoshida (2009), that serves as the basis for the BISP Poverty Scorecard, is not shared by World Bank.
[6] Choice over the definition of poverty is ultimately subjective one, however, whatever definition one adopts, it should appropriately capture the deprivations faced by poor households.

women by granting them the Benazir Income Support Card. It is paradoxically worrying that the BPS does not analyze any information about the gender dimension of poverty. Overlooking these important dimensions leaves BPS with insufficient information to identify households deprived in a number of valuable capabilities.

4.2.2 Selection of dimensions and their cut-off points: Besides ignoring the valuable dimensions of wellbeing, the BPS has serious flaws in selection of indicators and decisions upon their cut-off points. The process of selecting various dimensions has several technical flaws. The cut-off points for several dimensions tend to obscure the difference between the rich and the poor. As discussed below, these limitations of BPS cast serious doubts over its ability to accurately identify households deprived even in the selected dimensions.

Process of selecting indicators: World Bank's project document[7] suggests that household consumption expenditure per adult equivalent was chosen as the basic welfare measure (World Bank 2009). The other dimensions or the "predictors of poverty" are then selected using Ordinary Least Square (OLS) regression. There are some fundamental problems, as listed below, associated with this method of selecting variables.

I. Household expenditure per adult equivalent, a uni-variate measure of welfare, is taken as the dependent variable and other indicators are selected through OLS. If the selection of indicators is being determined by a single measure (consumption) then there is no point in adopting a complicated process of selecting multiple dimensions, and assigning and aggregating scores.

II. Most of the variables included in the OLS are highly correlated with each other with a strong possibility of the incidence of multicollinearity. In the presence of multicollinearity, OLS estimators have large variances and co-variances (Gujrati 2003). Consequently, t-ratios of one or more coefficients tend to be statistically insignificant, however, the R^2 - the overall measure of "goodness of fit" - can appear to be very high. The inclusion/exclusion of variables, typically based upon the t-statistic, without applying any exclusion restriction test and without taking care of logical and theoretical relevance of variables, is technically incorrect and theoretically inaccurate.

III. After running 99 regressions, 23 relevant variables are identified. This method of selection of variables is both statistically and technically inappropriate as the nominal level of significance understates the probability of incorrectly rejecting the null hypothesis that the regression coefficients are zero *(see* Charemza and Deadman 1997, and also Lovell, 1983 & Berk. R, *et. al.*, 2009).

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[7] The BISP Poverty Scorecard and its methodology were developed by World Bank.

Since OLS is not a valid technique for this purpose, computing scores on its basis are likely to be misleading. Moreover, the conversion of regression coefficients into scores (that are to be assigned to each dimension) is highly ambiguous and no explanation is provided so far.

Indicators and their cut-off points: There are several problems associated with the selection of indicators and their cut-off points (see Annex). Dimension-specific detailed discussion is provided below.

1- Education: The BPS collects information at the household level, and the educational attainment of the head is taken as a proxy measure of educational attainment of all members. Certainly, there is some relationship between education level of household head and that of other household members. However, the former cannot be a true representative of the latter. Over the last 30 years, Pakistan has almost doubled its literacy rate. This implies that many households with their heads having little or no education, now, have young members who are educated. In fact, RECOUP data shows that correlation between the educational attainment of individuals and their fathers (usually heads of households) is only 0.232. This weak correlation provides strong evidence that the educational level of household head is an extremely poor measure of the entire household's educational attainment. There is a significant probability of a household being declared deprived in education (because of lack of education of the household head) when some of its members have high educational attainments. Thus, BPS data are misleading on the educational status of household.

2- Demography/dependency burden: The BPS analyzes dependency burden by enquiring about the number of household members in the age below 18 or above 65. The higher the number of individuals in these age groups in the household, the higher will be the probability of the household being declared as poor. However, in itself, the dependency burden gives little information about the level of poverty faced by households. RECOUP data finds no statistically significant relationship between size of the household and the number of deprivations faced by it.

Moreover, life expectancy is likely to be higher for the rich than for the poor. This may result in relatively larger number of individuals above 65 in rich households than in poor. Such a scenario is likely to reduce the ability of BPS to differentiate between rich and poor households. Additionally, declaring households poor because of greater number of children and providing them cash support may adversely affect the policies to reduce population growth.

3- Household assets: Owing to the asset-based conceptualization of poverty, as discussed earlier, BPS is overwhelmingly focused on household ownership of assets and seven out of twelve dimensions are assets of various kinds. However, indicators selected to assess the asset ownership of households are misleading, and perfunctorily conceived. For example, four out of seven asset-related dimensions deal with the ownership of electronic products, whereas the BPS falls silent on the electrification of household. RECOUP data shows that eight per cent of households in KP and Punjab are not electrified. These data also show that not all of these households are necessarily multidimensionally

poor. The BPS is likely to declare all these households poor, for they will score zero on four out of twelve of its dimensions.

Similarly, there are serious flaws in the way some of the assets are categorised that further undermines the ability of the BPS to differentiate between rich and poor households. It would be instructive to elaborate on these drawbacks by briefly discussing the way BPS asks questions about various assets.

In one of its questions, the BPS enquires about the ownership of at least one of these assets; air conditioner, air cooler, geyser or heater. The answer to this question is categorised as "Yes" or "No". It is clear that if a household owns any one of these assets, it will receive the same score as which owns all. Moreover, by equating highly expensive assets such as air-conditioners to low cost assets such as heaters, this question blurs the boundaries between the rich and the poor.

Similarly, another question asks whether a household owns at least one; cooking stove, cooking range or microwave oven. Answers are categorised as "Yes" or "No", carrying similar flaws as the earlier question. Giving an equal score to households owning any or all of these assets significantly reduces the quality of the BPS dataset.

Similar discrepancies arise in the way the BPS collects information about households' ownership of livestock. The fundamental problem here is that the BPS gives equal weight to the ownership of cow, goat and sheep, although they greatly vary in value. The price of a cow can be ten times higher than the price of a goat/sheep. Likewise, it does not take into account the number of animals owned by households. A household owning a herd of cows only, or a herd of goats/sheep only, or a herd of animals consisting of several cows, goats and sheep and no buffalo/bullocks will be considered equal to a household that owns one goat only (see Annex). Once again, a rich household is likely to receive the score equal to a poor household, thus failing BPS again on differentiating between the two.

Landholding is an important asset and an indicator of wellbeing of households. While the BPS takes into account households' ownership of agricultural land, it altogether ignores the ownership of urban land. This implies that a rich, urban household owning urban land but no agricultural land is considered (on this dimension) equal to a poor rural household with no landholding. Moreover, operationalisation of this dimensionraises serious concerns. The instrument currently being implemented does not mention the cut-off point for this dimension. However, the background information revealed by World Bank documents (provided in Schriener 2009) shows that households owning any piece of land of the size ranging from one *marla*[8] to even more than one *murabah*[9] are placed in the same category (as the answer is categorised as "some, up to 12.5 Ha"). The rich and the poor are once again placed in the same category and assigned the same score. In Pakistan, the average agricultural plot size is small. A household owning 12.5 Ha is typically very rich. Thus the question places the poor and the rich in the same category, and defeats its purpose of differentiating between

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[8] *Marla* is a very small uint of land area, equal to 0.006 acre
[9] *Murabbah* is equal to 25 acre or 10.12 Ha

the two. While the BPS considers the quantity of housing (number of rooms per person), the important dimension of wellbeing, the quality of housing is ignored altogether. Consider two households with the same number of individuals. A household with a relatively larger number of small *kacha* rooms (made up of mud) will score higher than a household with a less number of *pakka* rooms (made up of concrete). Thus ignoring the quality of housing and focusing entirely upon its quantity can provide potentially misleading results.

4.2.3 Assigning score to each dimension and aggregation into single score: As Alkire and Seth (2009) have highlighted in the case of estimation of "Below Poverty Line" in India, assigning cardinal scores to various dimensions of categorical data is not only technically inappropriate, it also leads to practically misleading results. The difference between each of the four categories of the education level of household head, for example, is not the same as the difference between each of the four categories of livestock ownership. Moreover, the process of determining the score for various dimensions of the BPS is also yet to be disclosed.

Secondly, the BPS constructs a single measure by adding up the score on each dimension. Alkire and Seth highlight that simple aggregation of the score across all dimensions into a single score assumes that there is a perfect substitutability across all dimensions. For example, a household scoring five on the education dimension and zero on the livestock dimensions is considered exactly equal to a household scoring zero on education and five on livestock. This is fundamentally wrong as the suffering of a household deprived in the education dimension is not similar to the suffering of a household deprived in the livestock ownership dimension.

Moreover, simple aggregation into a single score obscures the nature of deprivations faced by households. While a single score provides information about the level of deprivation faced by a particular household, it leaves policy makers clueless about the nature and type of interventions required to bring such households above the poverty line.

In summary, the BPS has a flawed conceptualization of poverty. It employs a technically inappropriate process of selecting indicators and poorly determines their cut-off points. It also assumes ordinal/categorical data as cardinal data and presupposes perfect substitutability across all dimensions. From a policy perspective, a single aggregate score leaves policy makers helpless while deciding upon the nature of interventions required pushing households out of poverty. These drawbacks prove the BPS a weak instrument for identification of households facing multidimensional deprivations[10]. Therefore, it is crucial to look for an alternative instrument and methodology, capable of accurately identifying multidimensionally poor households in order to achieve the stated objectives of the BISP.

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[10] World Bank's document (World Bank 2009) reports very high rates of under-coverage and leakage. Amongst the lowest consumption quartile, 52 per cent households are not identified by the Poverty Scorecard and among those that are identified, 37 per cent do not belong to the lowest consumption quartile.

5. The alternative, Alkire and Foster methodology

Alkire and Foster (2007) provide an alternative methodology (the AFM) for the measurement of multidimensional poverty and the identification of those deprived in multiple dimensions. Unlike other measures of multidimensional poverty, the AFM does not assume household data to be continuous. It is thus highly suitable for categorical/ordinal data which makes it a technically robust measure. In what follows, the methodology is briefly explained in simple and non-mathematical language.

The first step is the identification of suitable dimensions and indicators in which deprivation of households is to be analyzed. After the dimensions are identified, an appropriate cut-off point for each dimension is determined. If the household performs above the cut-off point in a particular dimension, it is declared non-poor. On the other hand, if a household performs lower than the cut-off point, it is declared poor in that particular dimension[11]. In this way, the number of dimensions a particular household is deprived in is identified. In the next step, an aggregate cut-off point is determined, that is the number of dimensions in which a household needs to be deprived, in order to be declared as multidimensionally poor. All households falling below the aggregate cut-off point are declared multidimensionally poor. Since Headcount Ratio provides information about the number of households falling below the poverty line without providing any information about the depth of deprivation faced by them, Adjusted Headcount Ratio is calculated. Adjusted Headcount Ratio is a ratio of the total number of deprivations faced by poor households with the total possible deprivations that all households can possibly experience (Alikre and Seth 2009). The AFM is flexible as it provides an opportunity to assign the same or different weights to various dimensions. Step-wise detailed explanation of the AFM and calculation of Headcount Ratio, Adjusted Headcount Ratio and Average Poverty are provided in the section 6 along with empirical results.

Alkire and Seth (2009) identify several advantages of using the AFM to estimate multidimensional poverty and to 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 treats each dimension independent of other dimensions without assuming 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 group of households. Besides these advantages, the AFM is highly useful for identifying households for various types of social protection. For example, if policy makers want to provide health insurance to the poor, they can identify households falling below the poverty line, as well as being

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[11] 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.

deprived in the health dimension. It is based upon such merits of the AFM that the Mexican government has recently adopted this methodology for official estimation of poverty in Mexico[12].

6. Data

This paper uses household data collected in 2006-07 by the DFID funded Research Consortium on Educational Outcomes and Poverty (RECOUP) of which the Mahbub-ul-Haq Human Development Center is a partner. In Pakistan, the RECOUP Household Survey is representative of two provinces; KP and Punjab. The Survey was administered using the sampling framework of the National Bureau of Statistics and the sample size (for this paper) is 1,077[13] 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, Northern region is considered to be the most developed one and the Southern region is the least developed one (Bhatti, *et al.* Forthcoming/2010). In KP, Southern KP is considered to be well-off and the Central KP least developed one.

This dataset is unique in that it collects extensive information on schooling, vocational training in formal and informal sector, economic activities, health and fertility, disability, empowerment and time allocation, and cognitive skills. It also collects data 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.

7. Conceptualization of poverty and selection of dimensions

Sen's capability approach is adopted as the theoretical framework for this paper. This approach sees poverty as a deprivation of capabilities; a state of the lack of multiple freedoms that individuals value and have reason to value (Alkire 2007). For measuring capability deprivation, the selection of dimensions is at least as important as the methodology used to analyze data. There is considerable disagreement between the proponents of capability approach over the process of deciding upon valuable dimensions. Nussbaum, on one hand, proposes a universal list of capabilities (Nussbaum 2000). Sen, on the other hand, opposes such authoritative listing of valuable capabilities and argues for a strong role of public reasoning and a discussion in determining the valuable dimensions and their respective weights (Sen 2004). In an extensive review of literature on the selection of dimensions and indicators, Alkire finds researchers justifying their selection of indicators on the basis of up to five criteria (Alkire 2007). These criteria are as follows: 1) data availability and adequacy; 2) normative

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[12] See http://www.ophi.org.uk/subindex.php?id=events0#mexico
[13] 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.

assumptions based upon theoretical frameworks; 3) public discussions; 4) deliberative participation; and 5) empirical analysis. By adopting the criteria 1, 2 and 5, a list of 12 indicators is selected for this paper. Nonetheless, this list of indicators is far from being perfect and is subject to public debate and scrutiny[14]. With some degree of variation, studies on capability-based multidimensional poverty measurements elsewhere have also used similar indicators (for further details, please see the analysis of multidimensional poverty in India (Alkire and Seth 2009), Bhutan (Santos and Ura 2008), Latin America (Battiston *et al.* 2009) and Sub Saharan Africa (Batana 2008)). In what follows, the description of dimensions selected for this paper and their cut-off points is provided.

1.   *Education*: Education is a central capability that has intrinsic as well as instrumental importance in enhancing individual wellbeing. It has a potential to enable individuals to participate in the social, economic and political spheres of their lives. Access to universal primary education is Goal 2 of the MDGs that Pakistan is committed to achieving by 2015; however, it falls far behind achieving the targets set for this goal. It is therefore pertinent to include education as an important dimension for multidimensional measurements of poverty.

Poverty cut-off point: A household is declared poor if the maximum years of education completed by any household member are less than five. To put it differently, the household is poor in education if none of its members has attained a primary education or above.

2.   *Health and nutrition/food security*: 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: Reduce child mortality, Goal 5: Improve maternal health, Goal 6: Combat HIV & AIDS, Malaria and other diseases). Malnutrition is yet another of the MDGs (Goal 1: Eradicate extreme poverty and hunger). Achievement of several valuable capabilities critically depends upon the health status of individuals (Ariana and Naveed 2009). Body Mass Index (BMI), which is a universally accepted measure of health and nutrition and also represents outcome of the long term food security, is taken as the indicator of health and nutrition. Since Pakistan is a country where 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[15] is analyzed. This also takes into account the intra-household allocation of resources and the gendered dimension of poverty and indirectly corresponds to Goal 3 (promote gender equality and women empowerment).

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[14] To select the dimensions for policy interventions, like the BISP, we recommend a process that combines all five criteria. Public discussion and deliberative participation are extremely important in determining what matters for the poor.

[15] The minimum age is taken 20 years as the height and weight becomes relatively stable at this age.

Poverty cut-off point: A household is declared poor in the health and nutrition/food security dimension if it has at least one woman (in the age group 20-60)[16] with BMI less than 18.5Kg/m² (World Health Organization standard).

3. **Living standards/ housing:** Housing is an important indicator of living standards. UN - HABITAT data show that 48 per cent of the urban population in Pakistan live in slums (including *katchi abadis*), with poor housing conditions (UN HABITAT 2009). We focus on 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).

Poverty cut-off points: A household is declared poor in the living standards dimension if it lives in a *kacha* house.

4. **Electrification:** Alkire and Seth (2009) take both the quality of housing and its electrification as indicators of living standards for India. Since household ownership of a number of assets (the electronic products) depends upon its electrification, we take this as a separate dimension.

Poverty cut-off points: A household is declared poor in electrification if it does not have access to electricity.

5. **Access to safe drinking water**: Access to safe drinking water is an important dimension of wellbeing. Diarrhoea, often due to unsafe drinking water, is one of the leading causes of childhood deaths in Pakistan (Neilson, *et al.* 2001). Several communicable diseases, such as Hepatitis are spread through unsafe drinking water (every sixth Pakistani is infected with hepatitis (The Nation 2009)). Moreover, increased access to safe drinking water is part of the MDG's Goal 7 (ensure environment sustainability).

Poverty cut-off point: A household is declared poor in this dimension if it has no access to covered sources of drinking water.

6. **Sanitation:** Like access to safe drinking water, access to sanitation is also an important dimension of the wellbeing of households. Various aspects of public health are closely associated with sanitation. Access to improved sanitation is also part of MDG's Goal 7 (ensure environment sustainability).

Poverty cut-off point: A household is declared poor if it has the following types of toilet facilities: a) none; b) pit latrine; c) bucket toilet; d) none/use field.

7. **Household assets:** Since the focus of analysis in this paper is on capabilities instead of assets or resources, we treat the holding of assets as one dimension only. 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

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households. While this list of assets might not fully capture the poverty level of households, as shown by the cut-off point, it can however, informs us whether or not a household is "non-poor"[17].

Poverty cut-off point: A household is declared poor if it owns none of these nine household assets.

8.   ***Livelihood***: Household poverty depends on the sources of livelihood of its members. Those having decent employment/self employment and regular earnings are less likely to be deprived in various dimensions as compared to those who are unemployed or employed in occupations with hazardous working conditions and low/irregular incomes. It is thus an important dimension of poverty and included in the analysis.

Poverty cut-off point: A household is declared poor if the head of the household[18] is either unemployed or employed in elementary occupations[19].

9.   ***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 and school enrolments are low. In order to take into account the incidence of child labour, we ask whether households have any child between ages six to thirteen[20] not enrolled in the school. This also captures households' lack of resources to provide education to their children. This dimension corresponds to MDG's Goal 2 (achieve universal primary education).

Poverty cut-off point: A household is declared poor in this dimension if it has any child in this age group not enrolled in school.

10.   ***Fuel used for cooking and air quality***: The type of fuel used for cooking is consequential for the health of a household, particularly for women who are almost exclusively involved in cooking in Pakistan. If solid waste material such as cow dung, wood or coal is used for cooking, the health of household members who breathe in such an environment for long periods can be adversely affected

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[17] Since the assets included 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 the index score as a dimension can provide a better solution. However, this lies beyond the scope of this paper.

[18] Evaluating livelihood status of all household members is tricky due to various factors such as; varying household size, age groups, and employment categories of members and so on. We have, therefore, analyzed the employment status of the head of household only. Moreover, the unemployment can also be temporary. Nonetheless, this indicator, being partial representative of the employment status of the household, is subject to criticism and we recommend for the identification of a better indicator than this one.

[19] Elementary occupations are: sales and services related elementary occupations (street vendors, shoe cleaners, domestic helpers, messengers, porters, building caretakers, garbage collectors); agricultural, fishery and related labourers; labourers in mining, construction, manufacturing and transport.

[20] The age group 6-13 corresponds to the children enrolled in various classes up-to grade 8. The official age brackets used to calculate enrollment rates are 5-9 for primary and 10-12 for middle level schooling. However, RECOUP data finds the incidence of late enrollment that is adjusted with the selected age group.

(Dufflo, *et al.* cited in Seth and Alkire 2009). Moreover, cooking fuel also impacts the environment. This dimension indirectly corresponds to MDG's Goal 7 (ensure environment sustainability).

Poverty cut-off point: A household is declared poor if it uses wood, cow dung or coal for cooking.

11.   ***Landholding*:** Ownership of land, whether it is urban/non-agricultural or rural/agricultural land, is an important asset and the latter is a productive asset. Across rural Pakistan, most of the households associated with 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 as an important dimension of households' wellbeing and is included as a dimensional in our analysis.

Cut-off point: This dimension has two components; agricultural land and non-agricultural land. Households are first declared poor or non-poor in each dimension separately. A household is declared poor in an agricultural landholding dimension if it owns less than two acres of agricultural land[21]. However, a household is declared non-poor in non-agricultural land if it owns any plot (of any size) of non-agricultural (residential or commercial) land. Secondly, in order for households to be declared poor in the landholding dimension it is necessary for them to be poor in both of its components. Thus, such households own no non-agricultural land and have less than two acres of agricultural land.

12.   ***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 the 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, the empirical work on multidimensional poverty has largely ignored income or consumption as important dimensions of poverty (see for example, Alkire and Seth 2009, Batana 2008, and Batteston *et al.* 2009, though Santos and Ura 2008 is an exception). 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. However, the RECOUP Survey also collects data on consumption. Household consumption level is thus included as an important dimension of poverty. As poverty is officially measured in terms of consumption level, this dimension corresponds to MDG's Goal 1 (Eradicating poverty and hunger).

Cut-off point: Using Pakistan's official poverty line for the year 2005-06 (as the one for 2006-07 is not available), households with adult equivalent per capita consumption below Rs. 944.47 are considered poor in this dimension.

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[21] 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.

It is pertinent to mention here, this list of dimensions also encompasses two highly important and cross-cutting dimensions of poverty; gender and environment. As is argued by many, the incidence of poverty affects men and women differently and it is women who are usually most affected. Pakistan is among those countries of the world where the incidence of malnutrition is the highest for women (MHHDC 2008). The selection of BMI to identify the presence of malnourished women in the household takes into account the gender dimension of poverty. Similarly, the inclusion of access to safe drinking water, improved sanitation, and the quality of air that households breathe as important dimensions take into account the environmental dimension of poverty. Both of these valuable dimensions are altogether ignored by the BPS.

8. Results

This section discusses the empirical results of the AFM in detail.

8.1 Aggregate results

Figure 1 presents the percentage of households deprived in each of the dimensions. Over 80 per cent of households are deprived in good air quality. Sixty seven per cent of households are deprived in the land ownership dimension and forty four per cent in the assets dimension[22]. The figure also shows that very few households are found to be poor in the electricity and water source dimensions.

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[22] Please refer to the footnote 16 while interpreting the deprivation in the assets dimension.

Figure 1: Percentage of households deprived in various deprivations
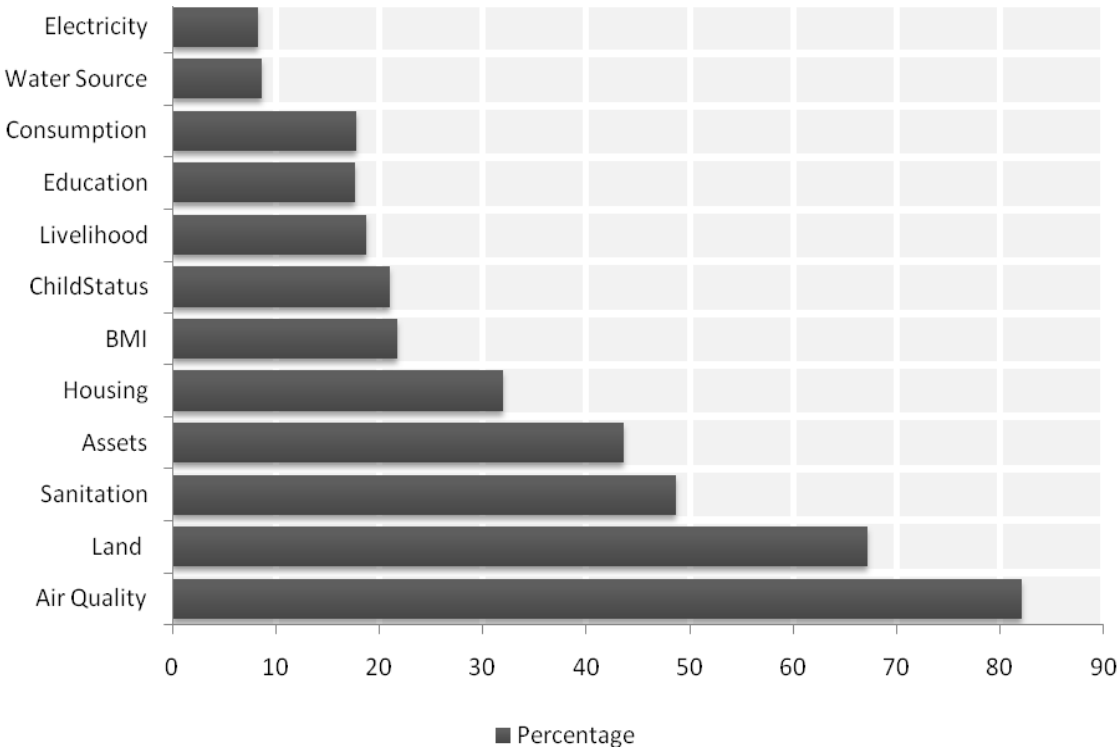
Figure 2 presents the percentage of households facing an exact number of deprivations. Very few households are found to have no deprivation at all. Most of households are deprived in one to six dimensions. The figure also reveals that almost 50 per cent of households are deprived in four or more dimensions.

Figure 2: Percentage of households facing various numbers of deprivations
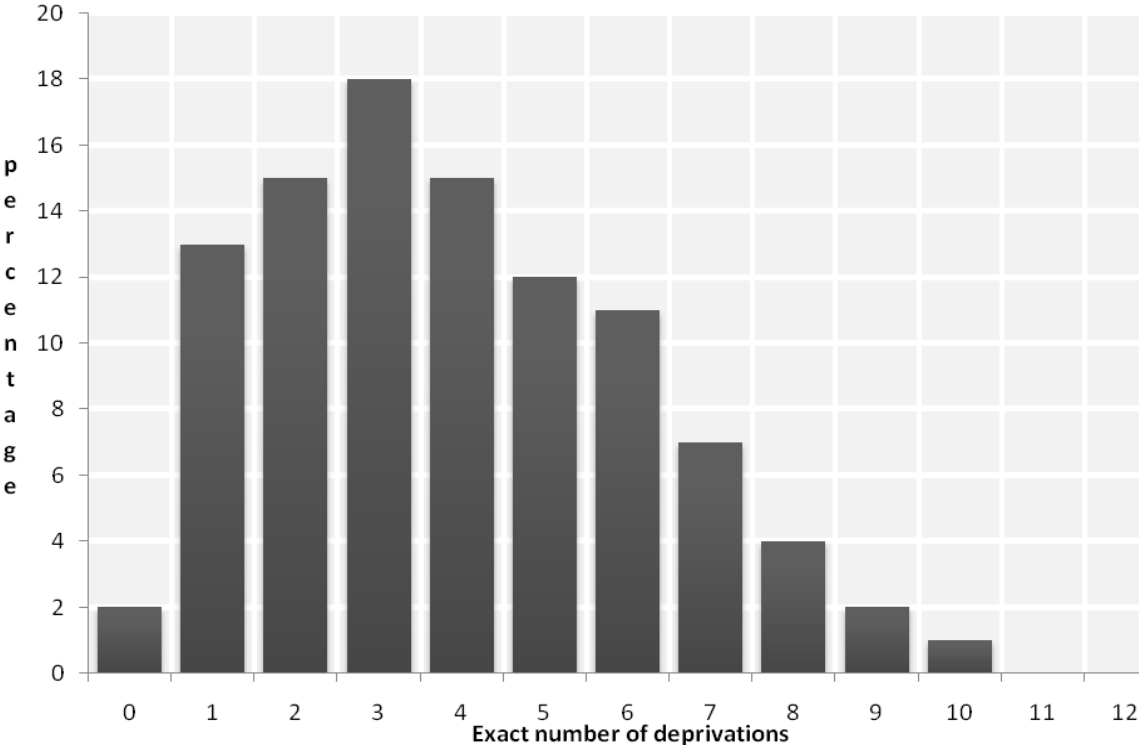
In order to declare a household multidimensionally poor, an aggregate cut-off point or dimensional cut-off point – the minimum number of dimensions in which a household needs to be poor to be declared as multidimensionally poor - is required. This cut-off point serves as the poverty line and all those households falling below the poverty line are taken as being multidimensionally poor. As Table 1 shows, if deprivation in four dimensions is taken as the poverty line ($k=4$), more than 51 per cent of households fall below that poverty line. Similarly, if five deprivations are taken as the cut-off point ($k=5$), more than one-third of households (36.2 per cent) fall below the poverty line. If six deprivations are taken as the cut-off point ($k=6$), one-fourth of households (24.5 per cent) fall below the poverty line. On the other hand, if seven deprivations are taken as the cut-off point, only 13.7 per cent of households are defined as poor.

Table 1: Estimates of multidimensional poverty at aggregate level

Aggregate cut-off point (k)	Headcount Ratio (H)	Adjusted Headcount Ratio - Ratio of deprivations experienced by all poor households (Mo)[23]	Average Poverty (A=Mo/H)
4	0.511	0.242	0.472
5	0.362	0.192	0.530
6	0.245	0.143	0.584
7	0.137	0.089	0.650

To capture the intensity or breadth of poverty faced by poor households, the Adjusted Headcount Ratio is calculated. At $k=4$, the Adjusted Headcount Ratio is 0.242 and it falls with the increasing cut-off point. The fourth column of Table 1 shows the average deprivation faced by poor households. At $k=4$, the Average Poverty is 0.472, revealing that poor households, on average, are deprived in 47 per cent of total dimensions. At $k=5$, the Average Poverty is 0.530 which implies that those falling below the poverty line are on average deprived in 53 per cent of total dimensions. The Average Poverty increases with the increasing cut-off point. At a higher cut-off point, those falling below the poverty line on average face more deprivations than those who fall below the poverty line at a lower cut-off point. At $k=6$, households are deprived, on average, in more than 58 per cent of all dimensions and at $k=7$, in 65 per cent of total dimensions.

8.2 Estimates at the provincial level with rural/urban breakdown

In order to capture inter-provincial differences in the incidence of poverty, we now turn to its breakdown at the provincial level, and later at the rural/urban level within each province (however, these estimates are presented by using two cut-off points only; $k=5$ and $k=6$). As Table 2 illustrates, the incidence of poverty is higher in Punjab than in KP. With $k=5$, more than 39 per cent households in Punjab fall below the poverty line, whereas, in KP, only 26.1 per cent households are found to be poor. The Adjusted Headcount Ratio is also higher for Punjab 0.209 than for KP which is 0.134. The average poverty is, however, slightly higher in KP than that in Punjab as poor households in KP, on the average, are deprived in 53.3 per cent of total dimensions and in Punjab, 51.4 per cent of total dimensions.

With poverty line $k=6$, more than 26 per cent of households in Punjab are found to be poor. In KP, slightly above 17 per cent of households are identified to be below this cut-off point. Like Headcount Ratio, the Adjusted Headcount Ratio is also higher for Punjab than KP. At this cut-off point, average poverty is also slightly higher in Punjab than KP. Poor households, on average, are deprived in 59 per

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[23] Mo is calculated by dividing the total number of deprivations faced by households falling below cut-off point, with all possible deprivations that all households can possibly face.

cent of total dimensions in Punjab and almost 56 per cent in KP. Thus, the incidence and severity of poverty are higher in Punjab than in KP.

Table 2: Breakdown of the poverty estimates at the provincial and rural/urban level

Multidimensional poverty		*K=5*			*K=6*		
		H	Mo	A	H	Mo	A
Punjab	Total	0.392	0.209	0.514	0.266	0.156	0.589
	Rural	0.490	0.264	0.538	0.337	0.200	0.593
	Urban	0.142	0.070	0.490	0.082	0.044	0.544
KP	Total	0.261	0.134	0.533	0.177	0.099	0.561
	Rural	0.298	0.154	0.515	0.210	0.117	0.557
	Urban	0.162	0.082	0.508	0.088	0.052	0.583

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, in both provinces. At *k=5*, the highest incidence of poverty (reflected by both Headcount Ratio and Adjusted Headcount Ratio) is found to be in rural Punjab with almost half of households (49 per cent) falling below the poverty line and only 14.2 per cent of urban households below the poverty line. Similarly, in KP, almost 30 per cent of rural households are poor, compared to only 16.2 per cent urban households. The depth of poverty (Average Poverty) is also highest in rural Punjab where poor households, on average, are deprived in almost 54 per cent of total dimensions. Urban households in KP experience the lowest depth of poverty where those falling below the poverty line, on average, are deprived in almost 50 per cent of total dimensions.

At *k=6,* almost one-third (33.7 per cent) of households in rural Punjab are identified as poor, whereas, only 8 per cent of urban households in Punjab are found to be poor. The Adjusted Headcount Ratio is also higher for rural than urban households in both provinces. Average Poverty is also higher in rural than urban Punjab. In KP, one-fifth (21 per cent) of rural households are in poverty, whereas, only 8.8 per cent of urban households fall below the poverty line. Difference between rural and urban poverty is also significant in KP, however, it is not as strong as in Punjab.

8.3 Estimates at the district level

Table 3 presents the estimates of multidimensional poverty at the district level, using two cut-off points; *k=5* and *k=6*. At *k=5,* the Rahim Yar Khan district in Southern Punjab records the highest incidence of poverty with as many as 59.6 per cent of households in poverty, followed by the Kasur district in Central Punjab, where half of the households fall below poverty line. The lowest poverty is observed in the Haripur district where only eight per cent of households are found to be in poverty. This is probably because Haripur is situated near Capital and is well connected to the main cities in

both provinces. Moreover it has both an agricultural and an industrial economic base. Within KP, the Charsaddah district is found to be the most impoverished with 44.4 per cent households falling below the poverty line. The pre-war on terrorism Swat fares better than Charsaddah with 22.5 per cent households falling below the poverty line. Within Punjab, the Attock district has the lowest percentage of poor and only 20 per cent of households fall below the poverty line.

The poverty ranking of districts remains the same after taking *k=6* as the poverty line, however, the Headcount Ratio decreases. At *k=6*, 45.2 per cent of households in district Rahim Yar Khan are found to be poor followed by district Kasur with more than 36 per cent households falling below poverty line. The Charsadda district in KP is ranked third in terms of the incidence of poverty as almost 32.2 per cent of households are found to be poor. As Table 3 shows, the ranking of districts remains approximately the same for the Adjusted Headcount Ratio as that of the Headcount Ratio (with a slight variation of ranking of two districts of Punjab).

Table 3: Multidimensional poverty at the district level

Province	District	k=5					k=6				
		H	H-Ranking	Mo	Mo-ranking	A	H	H-Ranking	Mo	Mo-ranking	A
Punjab	Sarghoda	0.307	3	0.152	4	0.494	0.193	3	0.104	4	0.539
	Kasur	0.500	2	0.266	2	0.533	0.368	2	0.211	2	0.574
	Attock	0.202	6	0.096	6	0.476	0.086	6	0.048	6	0.556
	Chakwal	0.256	5	0.119	4	0.462	0.103	5	0.054	5	0.531
	Rahim Yar Khan	0.596	1	0.342	1	0.574	0.452	1	0.282	1	0.624
	Khanewal	0.288	4	0.154	3	0.534	0.186	4	0.112	3	0.598
KP	Haripur	0.081	3	0.038	3	0.472	0.040	3	0.021	3	0.528
	Swat	0.224	2	0.111	2	0.496	0.141	2	0.076	2	0.542
	Charsadda	0.444	1	0.235	1	0.529	0.322	1	0.184	1	0.572

Like the Headcount Ratio, the Average Poverty is also highest in the district of Rahim Yar Khan. At *k=5*, households falling below poverty line experience, on average, deprivation in 57.4 per cent of total dimensions, whereas, at *k=6*, this percentage goes as high as 62.4. At *k=5*, the depth of poverty is the lowest in the district of Chakwal where poor households, on average, experience deprivation in

46.2 per cent of total dimensions. On the other hand, at $k=6$, the district of Haripur experiences the lowest depth of poverty with poor households, on average, deprived in 53 per cent of total dimensions.

8.4 Weighting and weighted estimates of multidimensional poverty

As was stated earlier, the AFM is flexible in assigning different weights to various dimensions, depending on their relative importance. For example, if policy makers want to focus more on the education and health dimensions, they can allocate deprivations in these dimensions greater weight than deprivations in other dimensions. In the previous section, we provided estimates of multidimensional poverty by assigning equal weights to all dimensions.

Assigning weights to various dimensions is critical in the measurement of multidimensional poverty as it involves value judgment. Capability approach has given a strong role to human agency and recommended the determining of weights through democratic processes and public debate instead or arbitrary selection (Sen 2004) or through processes that are methodologically justified, made explicit, debated and defended (Robeyns 2003).

Nonetheless, to elaborate the flexible characteristic of the AFM in assigning different weights to various dimensions, we provide revised, weighted estimates of multidimensional poverty. We assign double weights to three dimensions, education, health and consumption than the remaining dimensions. Assigning double weights to three dimensions produces a weight structure presented in Table 4.

Table 4: Weights for each dimension

No.	Dimension	Weight
1.	Education	1.5
2.	Health	1.5
3.	Consumption	1.5
4.	Child status	0.75
5.	Livelihood	0.75
6.	Housing	0.75
7.	Electricity	0.75
8.	Assets	0.75
9.	Landholding	0.75
10.	Access to safe drinking water	0.75
11.	Sanitation	0.75
12.	Fuel for cooking	0.75
	Total weight	12

While these weights are entirely for the purpose of illustration, the three dimensions are however, very important as they are elements of the Human Development Index. Moreover, these dimensions are also directly related to the first six of the eight MDGs. The weighted estimates of multidimensional poverty are produced below in Table 5.

Table 5: Weighted estimates of multidimensional poverty at aggregate level

Weighted estimates	K=4	K=5	K=6	K=7
Headcount Ratio (H)	0.319	0.229	0.155	0.055
Adjusted Headcount Ratio (Mo)	0.156	0.122	0.0898	0.037
Average Poverty (A)	0.489	0.533	0.579	0.681

Table 5 presents the estimates of multidimensional poverty with weights, using four different cut-off points ($k=4$ to 7). It is worth highlighting here that a cut-off point 4 ($k=4$) does not mean that a household deprived in four or more dimensions is called a multidimensionally poor household. Instead, a household that is deprived in number of dimensions whose weighted sum equals four or more is called a multidimensionally poor household. Results show that at $k=4$, 32 per cent households fall below the poverty line. The percentage of households falling below the poverty line decreases with

an increase in k. It is also relevant to point out here that at every cut-off point, the percentage of households falling below the poverty line using different weights to various dimensions is lower than those using equal weights. This is due to the fact that a relatively smaller percentage of households are deprived in three dimensions which are given double weights as compared to those in other dimensions.

In Table 6, weighted estimates of poverty at provincial and rural/urban level are presented.

Table 6: Weighted estimates of multidimensional poverty at provincial level

Cut-off	Province - rural/urban		H	Mo	A
K=4	Punjab	Total	0.341	0.168	0.492
		Rural	0.293	0.138	0.473
		Urban	0.132	0.062	0.465
	KP	Total	0.249	0.117	0.472
		Rural	0.421	0.210	0.498
		Urban	0.134	0.060	0.450
K=5	Punjab	Total	0.242	0.131	0.540
		Rural	0.227	0.114	0.502
		Urban	0.088	0.045	0.510
	KP	Total	0.189	0.095	0.503
		Rural	0.307	0.167	0.543
		Urban	0.073	0.037	0.511
K=6	Punjab	Total	0.171	0.100	0.582
		Rural	0.116	0.065	0.563
		Urban	0.059	0.032	0.547
	KP	Total	0.100	0.056	0.560
		Rural	0.218	0.128	0.586
		Urban	0.052	0.028	0.542
K=7	Punjab	Total	0.064	0.044	0.685
		Rural	0.028	0.018	0.650
		Urban	0.015	0.009	0.625
	KP	Total	0.024	0.016	0.646
		Rural	0.086	0.059	0.686
		Urban	0.009	0.006	0.656

As the table above illustrates, at each cut-off point, poverty is higher in Punjab than in KP. Moreover, in each province and at each cut-off point, multidimensional poverty is higher in rural areas than in urban areas.

9. Relationship between the consumption-based uni-dimensional and multidimensional estimates of 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 these approaches, 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) determined by the Government of Pakistan is Rs. 944.47[24] (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 per cent 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 36.2 per cent of households fall below the poverty line at $k=5$ and 24.5 per cent at $k=6$. These are significantly higher than those using the OPL which finds only 17.8 per cent of households to be below the poverty line.

Table 7 examines the level of deprivations faced by households declared as poor and non-poor by the consumption-based OPL. It is striking to note that despite being conservative in estimating poverty, OPL makes errors of both types by declaring multidimensionally poor households as non-poor and multidimensionally non-poor households as poor. If $k=5$ is used as a poverty line, 10.4 per cent of households declared as poor by OPL are multidimensionally non-poor and as much as 42.6 per cent of households declared non-poor by OPL are multidimensionally poor.

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[24] This poverty line is determined for the year 2005-06 and this is also used for the year 2007-08. Surprisingly, the official poverty estimates for the year 2006-07 are not provided in any of the Economic Surveys of the subsequent years.

Table 7: Number of deprivations faced by households below and above official poverty line

Percentage of households	*K=5*	*K=6*
OPL poor but multidimensional non-poor	10.4	26.1
OPL non-poor but multidimensional poor	42.6	18.2

Similarly, if *k=6* is taken as the poverty line, as many as 26.1 per cent of households declared as poor by OPL are found to be multidimensionally non-poor. Whereas 18.2 per cent of households declared non-poor by OPL are found to be multidimensionally poor. Some of the households declared non-poor by OPL are found to be deprived even in 10 and 11 out of a total of 12 dimensions. In other words, OPL fails to accurately identify households facing multiple deprivations. It is also important to highlight here that minimizing one type of error by adjusting the cut-off point *k* increases the other type of error as is reflected by the movement from *k=5* to *k=6*.

The relationship between the two methods of poverty estimation is explored by examining the correlation between the status of households as poor or non poor, calculated separately for both measures. The two-tailed Spearman correlation coefficient between the status of household as poor or non-poor determined by OPL, and multidimensional poverty lines with *k=5* is 0.451, and with *k=6*, it is 0.452, at the significance level of 0.000. Similarly, the correlation between households' adult equivalent per capita consumption and the number of deprivations faced is -0.483[25]. While these correlation coefficients are statistically significant, they are low and do not provide the basis for accepting the uni-dimensional measure as the single, comprehensive criterion for an 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. Thus 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 8, 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. This provides strong evidence that consumption alone does not satisfactorily explain deprivations faced by the poor.

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[25] Both, household per capita adult equivalent consumption and the number of deprivations faced by household provide more information than the binary variables (poor and non-poor) and tested for correlation in the previous step.

Table 8: Correlation (Kendall's tau b) between deprivation in each dimension

	BMI	Electricity	Water Source	Land	Housing	Air Quality	Asset	Child Status	Livelihood	Education	Sanitation
BMI											
Electricity	0.071*										
Water Source	0.029	-0.081**									
Land	0.023	0.023	-0.057								
Housing	0.015	0.213**	0.006	0.098**							
Air Quality	0.041	0.131**	0.093**	-0.068*	0.253**						
Asset	0.031	0.191**	-0.113**	0.196**	0.287**	0.216**					
Child Status	0.049	0.201**	0.018	0.088**	0.296**	0.163**	0.204**				
Livelihood	-0.063*	0.098**	0.003	0.153**	0.185**	0.107**	0.153**	0.126**			
Education	0.050	0.187**	-0.023	0.174**	0.301**	0.166**	0.268**	0.268**	0.225**		
Sanitation	0.037	0.254**	0.002	0.066*	0.335**	0.247**	0.282**	0.201**	0.184**	0.273**	
Consumption	0.037	0.160**	0.011	0.087**	0.278**	0.154**	0.162**	0.302**	0.118**	0.216**	0.207**

*Correlation is significant at the 0.05 level
** Correlation is significant at the 0.01 level

30

Similarly, the correlation between all other dimensions is also weak and very few dimensions have correlation coefficient higher than 0.3. This reiterates the arguments made in previous sections that deprivation in one dimension is not properly explained by deprivation in any other dimension. Thus for a meaningful analysis of poverty and policies to reduce it, the measurement of poverty needs to be multidimensional.

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 (*k=6*) 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 per cent and the fifth/last quintile represents the poorest 20 per cent 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 9.

Table 9: Results of the logistic regression

Explanatory Variables	B	S.E.	Wald Statistics	Degree of freedom	Significance	Exp(B)
urban_code	-1.271	.235	29.176	1	.000	.281
Quintiles	.741	.066	125.649	1	.000	2.098
Province	.663	.203	10.663	1	.001	1.940
Constant	-3.911	.318	151.116	1	.000	.020
Cox & Snell R^2 = 0.197 Nagelkerke R^2 = 0.293						

Results show that urban households have roughly a one in four probability (0.28 times) of being poor as compared to rural households. For households living in Punjab, the odds of being poor are almost two times (1.94) the odds of being poor for households in KP. Similarly, the odds of being poor increase two times 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

multidimensionally 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).

10. Conclusion

We have argued for the multidimensional measurement of poverty in Pakistan and identified several methodological limitations of previous studies in this regard. As a special case of identifying multidimensionally poor households, we have critically examined the BISP Poverty Scorecard (BPS) and found several lacunas in the BPS. As an alternative methodology to estimate multidimensional poverty in Pakistan and identify households deprived in several valuable capabilities, we have used the Alkire and Foster measure (AFM). We have applied the AFM to the RECOUP Household Survey 2005-06 data and provided estimates of multidimensional poverty at the aggregate, provincial (for KP and Punjab) and district level.

In this paper, we have also explored the relationship between consumption and multidimensional poverty. We have established that consumption alone, and thus the consumption-focused official poverty line fail to capture deprivations faced by households. On the basis of evidences established in this paper, we recommend the AFM be adopted for identifying poor households for social protection programmes, such as the Benazir Income Support Programme, as well for official estimation of poverty in Pakistan.

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Annex: List of indicators used by the Benazir Income Support Programme's Poverty Scorecard

	Questions	Responses			
		0-2	3-4	5-6	7 or more
1.	How many people live and eat in the household (do not list guest, visitors, etc)?	0-2	3-4	5-6	7 or more
2.	How many people in the household are under the age 18 or over the age 65?				
3.	What is the highest educational level of the head of the household (completed)?	Never attended school	Less than class one to five (included)	Class 6 to class 10 (included)	Class 11, college or beyond
4.	How many children in the household between 5 and 16 years old are currently attending school?	There are no children in the age 5-16 in this household	All the children between 5-16 attend school	Only some of the children between 5-16 attend school	None of the children between 5-16 attend school
5.	How many rooms does the household occupy, including bedrooms and living rooms? (do not count storage rooms, bathrooms, toilets, kitchen or rooms for business)				
6.	What kind of toilet is used by the household?	Flush connected to a public sewerage, to a pit or to open drain	Dry raised latrine or dry pit latrine	There is no toilet in the household	
7.	Does the household own at least one; refrigerator, freezer or washing machine?	Yes		No	
8.	Does the household own at least one; air conditioner, geyser or heater?	Yes		No	
9.	Does the household own at least one; cooking stove, cooking range or microwave oven?	Yes		No	

10.	Does the household own at least one TV?	Yes	No	
11.	Does the household own the following engine driven vehicle?	At least one car / tractor and at least one motorcycle / scooter	At least one car / tractor but no motorcycle / scooter	No car / tractor but at least one motorcycle / scooter	Neither car / tractor nor motorcycle / scooter
12.	Does the household own the following livestock?	At least one buffalo / bullock and at least one cow / goat / sheep	At least one buffalo / bullock but no cow / goat / sheep	No buffalo / bullock but at least one cow / goat / sheep	No buffalo / bullock but at least one cow / goat / sheep
13.	How much agricultural land does the household own?	Area	Unit of area	

Source: Benazir Income Support Programme