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Macro Level Determinants of Poverty: Investigation Through Poverty Mapping of Districts of Pakistan

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1. INTRODUCTION

Successful intervention for social protection of the vulnerable poor first necessitates the identification of the most deprived areas of the country and then an analysis of the factors underlying the prevalence of poverty. A disaggregated, spatial investigation of poverty shows severe regional disparities in the incidence of poverty in Pakistan and often leads us to question whether the determinants of poverty are region based. If so, it behoves us to question whether certain regions are destined to be chronically poorer or is it possible to influence poverty and inequality through planned interventions.[1] Using potential and actual measures of income and wealth, Jamal (2003) shows how regional poverty and inequality has persisted in Pakistan between 1981and 1998; if anything, the gaps between the provinces have increased.

Sen's (1985) capability approach highlights that poverty is multi-dimensional, and indeed there is increasingly a consensus forming in literature that poverty cannot be reduced to a single index. Although income and consumption based indexes are still used and defended by some,[2] others argue that well-being is not completely dependent on these economic measures. Data on income and expenditure tends to be noisy, is often misreported and the link between income and well-being is not always clear. Welfare functions, based on socio-economic factors such as nutrition, wealth, sanitation, education, infrastructure and access to opportunities, are used commonly to explain the incidence of poverty.[3] For this reason, and also due to paucity of relevant data, conventionally used poverty lines based on consumption expenditure are rejected—any threshold for poverty is normative and vulnerable to inflation and shocks, and recent data on alternative measures such as calorie intake has not been available. Instead, this paper develops and uses two indices to determine spatial poverty: one quantifying wealth and asset ownership and the other being a measure of basic household needs.

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[1]Amjad and Kamal (1997).

[2]Glewwe and Gaag (1988), Zaidi and Klaas de Vos (2001).

[3]See Henninger (1998), Ravallion (1996), Bellido, *et al*. (1998), Hayati, *et al*. (2006), Booysen, *et al.* (2008), Esposito and Chiappero-Martinetti (2010), Jamal (2009).

The study of the extent and nature of poverty in Pakistan is not a new one. Studies have used both basic needs and calorie-intake measures. Within these some provincial level studies also concentrate on the rural-urban or male-female dimension of the poverty severity front.[4] Cheema, *et al*. (2008) use district representative data from the Multiple Indicators Cluster Survey 2003-04 for Punjab and find concentration of high poverty regions in the South and West of Punjab. Jamal (2009) does the same for Pakistan using household data from PSLM 2004-05 to show that over half of Pakistan's population belongs to poor households. Both Jamal and Cheema make use of Principal Component Analysis (PCA) to form poverty measures. Jamal's study reflects the exacerbation in poverty and inequality when seen in context of an older analysis by Ghaus-Pasha and Jamal (2001) who use a poverty line measure and are able to demonstrate that 30 percent of the population is poor, with an overwhelming 70 percent of them chronically poor.

The contribution of this paper, apart from using recent data (PSLM 2007-08) for a country-wide analysis, is that it delves into uncovering the determinants of poverty econometrically. These determinants will have important poverty alleviation policy implications.

The organisation of the paper is as follows: Section 2 describes the data employed, Section 3 details the methodology used, while results of poverty mapping and regression analysis are in Section 4. Section 5 concludes the paper with a discussion on possible policy implications of the results.

2. DATA

The data employed for the study is The Pakistan Social and Living Standards Measurement Survey (PSLM) 2008-09. PSLM is the latest household survey for Pakistan which is representative at the district level, covering both rural and urban areas, and is complete for all four provinces. PSLM provides a set of representative, population based estimates of social indicators which help in assessing the well-being of the population. Since the PSLM is designed to assess the Millennium Development Goals, it provides a range of health, education and physical environment indicators. For the purpose of this study, these indicators are used in constructing the Asset index and Basic Needs index.

The data for the econometric part of the study is gathered from multiple sources. Since the analysis is conducted at the district level, some of the variables are computed from PSLM 08-09 such as urbanisation and dependency ratios for districts. Employment rates are obtained from the Labour Force Survey 2007-08. Additionally, some variables[5] are obtained from Provincial Development Reports of the four provinces and the Population Census of 1998. (Appendix A details the sources of data for the variables employed in the study).

3. METHODOLOGY

Previous studies on Pakistan have largely focused on identifying micro level determinants with households as the unit of analysis,[6] with fewer studies focusing on the

[4]Jamal (2009), Malik (1996), Ali and Tahir (1999).

[5]Number of schools, number of hospitals, number of factories and road density.

[6]Jamal (2004).

macroeconomics factors contributing towards varying poverty levels in different regions.[7] We take a different approach by using the household level data to estimate our poverty indices and then attempting to identify the macro level factors that determine these estimates.

3.1. Constructing Indices

The first part of the study entails ranking the districts in terms of poverty along multiple definitions of poverty. As discussed above, income measures can be noisy due to the shocks or cyclical changes in earnings of individuals. It also tends to be deliberately misreported at times due to concerns with tax authorities. Therefore, we concentrate on the wealth and living status of the households which reflects both aggregate income and smoothed out consumption. This will be carried out through the construction of two indices: Asset index and a Basic Needs index using the Principal Component Analysis (PCA) technique. The factors that are included in the construction of both indices will be averaged at the district level from the household level data to arrive at an estimate for each district. This averaging out will also serve the purpose of dealing with a criticism of the PCA approach i.e. the failure of PCA to properly deal with categorical, hence non-normal, variables in the construction of indices.[8] In this process, the categorical variables, such as those for asset ownership are converted in to averages and therefore into non-categorical values for the district. These indices will serve as the basis of our analysis in the next part and also allow us to map wellbeing at the district level.

Asset index covers a range of durable assets that the household might own (variables used detailed in Table 1 and Table 2). These include assets contributing to a better living environment such as a fan, assets for transportation purposes (motorbike) and assets for communication purposes (television, telephone). Additionally, house ownership is also considered. Ownership of land, livestock etc., is not considered because such variables bias the index between the rural and urban households, since rural households tend to own such assets for sustenance purposes. The Asset index therefore presents a holistic view of asset ownership of the households.

Table 1

Variables used in the Construction of the Asset Index

Variables	Value
Does the household own the house?	=1 if yes, 0 otherwise
Does the household possess an electric fan?	=1 if yes, 0 otherwise
Does the household possess a radio/cassette player?	=1 if yes, 0 otherwise
Does the household possess a television?	=1 if yes, 0 otherwise
Does the household possess a refrigerator?	=1 if yes, 0 otherwise
Does the household possess a cooler?	=1 if yes, 0 otherwise
Does the household possess an air conditioner?	=1 if yes, 0 otherwise
Does the household possess an iron?	=1 if yes, 0 otherwise
Does the household possess a computer?	=1 if yes, 0 otherwise
Does the household possess a bicycle?	=1 if yes, 0 otherwise
Does the household possess a motorcycle/scooter?	=1 if yes, 0 otherwise

[7]Akhtar and Ahmad (2003).

[8]Kolenikov and Angeles (2009).

Table 2

Variables used in the Construction of the Basic Needs index

Variables	Value
Housing Characteristics/Physical Environment	
What type of toilet facility does the household have?	=1 if flush system, 0 otherwise (Averaged at district level)
What is the main source of drinking water for the household?	=1 if any other source, =2 if Tanker Trunk, water fetcher. =3 if river, stream or pond, =4 if Open well =5 if covered well, =6 if water motor, =7 if hand pump, =8 if tap (outside home),=9 if tap (inside home)
What is the main source of fuel for cooking?	=1 if electricity, gas or oil, 0 otherwise (Averaged at district level)
What is the main source of fuel for lighting?	=1 if electricity or gas, 0 otherwise (Averaged at district level)
Does the household have access to telephone?	=1 if mobile or landline, 0 otherwise (Averaged at district level)
What is the material used in construction of the walls of the house?	=1 if burned bricks/blocks, 0 otherwise (Averaged at district level)
What is the material used in construction of the roof of the house?	=1 if RCC/BCC or cement, 0 otherwise (Averaged at district level)
Health Indicators	
Attended births in the district	Number of births in the last 3 years attended by doctor, nurse or trained midwife/Total number of births in the last 3 years
Immunisation Rate of the district	Number of children aged 6 and below immunised/Total number of children aged 6 and below
Education Indicators	
Gross Primary enrolment rate of the district	Number of children enrolled in primary schools/Total number of children aged between 3 and 10 years
Gross Secondary enrolment rate of the district	Number of children enrolled in secondary schools/Total number of children aged between 9 and 15 years
Adult Literacy Rate (Female) of the district	Number of females aged 17 and above who can read and write in any language with understanding/Total Number of females aged 17 and above
Adult Literacy Rate (Male) of the district	Number of males aged 17 and above who can read and write in any language with understanding/Total Number of males aged 17 and above

The Basic Needs index looks at three broad dimensions. Firstly, the physical environment of the households, which includes variables pertaining to the type of dwelling, water and sanitation and access to utilities like electricity and gas. Secondly, immunisation rates amongst children and proportion of attended births are taken as indicators of health. Lastly, educational levels are estimated both by flow measures i.e., enrolment rates at primary and secondary levels and stock measures i.e., male and female adult literacy rates.

3.2. Regression Analysis

In the second part of the study, OLS regression technique will be employed to identify macroeconomic determinants of poverty at a district level for Pakistan. The following specification will be separately estimated with the two indices calculated above as the dependent variable in each:

$$I_i = \alpha_0 + \sum \beta X + \sum \theta Y + \sum \gamma Z + \delta d_i + \varepsilon_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where I_i is the index value for district *i*, *X* is a vector of social service variables in the district, *Y* is a vector of variables capturing the physical development of the district, *Z* is a vector of demographic factors and *d* are provincial dummies. α_0, β, γ and δ are regression parameters while ε is the error term of the regression.

Difference across provinces can be an important determinant of varying degrees of acquisition of assets and level of well-being of inhabitants even when other factors are similar. Therefore, provincial dummies with Balochistan as the base category are included in the analysis. It is expected that given the lack of development of the province, the districts of other three provinces will have better indices and hence a positive coefficient.

Social services span indicators related to health and educational facilities available in the district. On the educational side, these have been incorporated by using the number of government schools both at the primary and secondary level and health dimension by the number of government hospitals in the district. We take the average number of people per school and people per hospital and hence expect that there would be a negative relation to the dependent variable. Since health and education provisions are expected to impact the current working population with lag, we employ the 1998 census values in the regression analysis. We are not using conventional measures for health and education such as literacy and immunisation rates of the district because these measures have already been used in the construction of basic needs index.

To capture the demographic profile of the district we factor in the overall employment opportunity in the district as indicated by the employed people as a proportion of the total labour force. High employment rates will reflect in better living standards and asset acquisition capabilities and so should result in higher value of indices for these districts. The urbanisation rate is the number of households living in the urban area in a district as a ratio of the total number of households in the district. On the one hand, it can lead to better standard of living and easier access to assets; while on the other it can cause congestion and result in a larger number of people contesting over a few resources. Hence, the expected sign of the coefficient on the variable is ambiguous.

Further, the dependency ratio (we take the conventional definition: number of people below16 and above the age of 60 as a ratio of people between 16 and 60 in each household) is included to ascertain if there is any variation in the indices due to the differing burden on the earning hands in a district. Other things remaining the same, the greater the number of mouths to feed, on average, as compared to the hands contributing to the livelihood, the less likely is the household to have a higher level of standard of living and asset accumulation.

The physical dimension will capture factors like industrial development and road access.[9] We use the number of registered factories in the district to proxy for industrial development—this is expected to have a positive relation with the indices. Finally, the ease of access to and from the district is important to the overall development of the district both in terms of facilitating enterprise and businesses and in guaranteeing ready availability of goods. One way of capturing this is the road density of the district, measured by the kilometres of metalled roads as a ratio of the total area of the district.

4. RESULTS

4.1. Spatial Mapping

The construction of the two indices allows us to identify the deprived districts of Pakistan. Poverty maps—the spatial representation of wellbeing and poverty, represented in this case through our basic needs and asset ownership indices—are powerful tools to identify clusters, trends and patterns [Davis (2002)]. They are especially helpful for development practitioners and policy makers in identifying the regions where intervention is needed most and to then track the impact of the said intervention.

Figures 1 and 2 in Appendix C are the poverty maps representing the Basic Needs and Asset indices, respectively. Most of the districts of Punjab and Khyber Pakhtunkhwa lie in the top two quartiles for the Asset index. Likewise, most of the districts lying in the 3rd and 4th quartiles belong to Balochistan and Sindh. This clustering is further intensified for the Basic Needs index, with most of the relatively well-off districts lying in Punjab only and almost 90 percent of the districts from the bottom quartile belonging to Balochistan. Table 3 details the top and bottom ten districts for both indices.[10] The Federal Capital Territory Islamabad ranks the highest from either angle.[11] Its index value for the Asset index (10.53) is almost twice that of the next district in ranking.

As can be seen, seven out of the top ten districts in the basic needs index are from Punjab, two from KPK and one is from Sindh. Interestingly only two of the provincial capitals—Lahore and Karachi—appear in the top ten districts while Quetta is ranked at 20th and Peshawar at 15th. On the other hand, none of the districts of Sindh or Punjab appear in the bottom ten districts, where nine out of the bottom ten districts are from Baluchistan, the remaining one being from KPK.

[9]Rupasingha and Goetz (2007).

[10]For complete district wise rankings for both indices, see Appendix B.

[11]Islamabad being capital of the country is not reported as a district by the Punjab Government. Additionally, index values for Islamabad were exceptionally high and appeared to be an outlier. It was therefore excluded from the analysis.

Table 3

Top and Bottom Ten Districts by Basic Needs and Asset Index

Basic Needs Index				Asset Index			
Top Ten		Bottom Ten		Top Ten		Bottom Ten	
District	Index Value	District	Index Value	District	Index Value	District	Index Value
Karachi	5.90	Awaran	–4.21	Lahore	6.53	Lasbilla	–3.054
Lahore	5.58	Qillah Sai	–4.57	Karachi	5.69	Thatta	–3.12
Rawalpindi	5.50	Chagi	–4.74	Peshawar	5.61	Barkhan	–3.13
Jehlum	4.76	Bolan	–4.90	Rawalpindi	5.10	Badin	–3.17
Sialkot	4.74	Barkhan	–4.94	Jehlum	3.62	Chagi	–3.19
Chakwal	4.73	Musakhel	–5.54	Sialkot	3.31	Tharparkar	–3.73
Abbottabad	4.65	Jhal Magsi	–5.59	Quetta	3.01	Musakhel	–3.80
Haripur	4.35	Kohistan	–5.81	Gujrat	2.71	Awaran	–4.15
Gujrat	4.35	Dera Bugti	–5.82	Gujranwala	2.63	Kohlu	–4.42
Gujranwala	4.11	Kohlu	–6.87	Sargodha	2.52	Kohistan	–4.52

For the Asset index seven out of the top ten districts are from Punjab, and one each from the remaining three provinces. Unlike the Basic Needs index all the provincial capitals appear in the top ten districts for the Asset index. Six districts of Punjab are the same as the Basic Needs index, with one exception being Sargodha that appears in the top ten for Asset index in place of Sialkot. For the bottom ten districts, the distribution is skewed towards districts of Baluchistan but not as much as the Basic Needs index. Three districts from Sindh appear in the lowest ten compared to none for the case of Basic Needs index. Just one district appears from KPK and the remaining six are from Balochistan.

Overall, 72 districts remain in the same quartile whether viewed by the Asset index or the Basic Needs index. As compared to the Asset index however, 13 districts shift 1 quartile down in the Basic Needs index while 18 move up one quartile. More interestingly, however, is the move of more than one quartile between the two indices for some districts. Mansehra, for example, ranked in the third quartile according to the Asset index moves up to the top quartile for the Basic Needs index. Likewise, Batagram moves from the bottom quartile of the Asset index up to the 2nd quartile of the Basic Needs index. It is interesting to note that both the districts moving up two quartiles in Basic Needs as compared to the Asset index are from the KPK.

Five districts, namely Khuzdar, Pishin, Sibi, Qillah Abdullah and Tank, fare worse by two quartiles in terms of basic needs as compared to the Asset index. As can be seen, four out of these five districts are from Balochistan and one from KPK. None of the districts of Sindh and Punjab present such a picture and there are no districts in Punjab which shift places by more than two quartiles for any of the indices.

4.1.1. *Spatial Mapping at Provincial Level*

Insight into the spatial mapping of indices at the provincial level would help in providing an overview of the results at a more disaggregated level and recognise areas of concern for respective provincial governments. Table 4 below shows the top and bottom three districts of each province and their overall ranking with respect to the entire country.

Table 4

Province wise Top and Bottom Districts—Asset Index

	Punjab	Rank	Sindh	Rank	KPK	Rank	Balochistan	Rank
Top 3	Lahore	2	Karachi	4	Peshawer	4	Quetta	8
	Rawalpindi	5	Hyderabad	14	Bannu	12	Pashin	20
	Jhelum	6	Nowshero Feroze	18	Abbottabad	21	Qilla Abdullah	30
Bottom 3	Jhang	71	Thatta	102	Upper Dir	98	Musakhel	107
	Muzaffargarh	82	Badin	104	Shangla	100	Awaran	108
	Rajanpur	88	Tharparkar	106	Kohistan	110	Kohlu	109

Districts encompassing the provincial capitals ranked at the top for each province.[12] The top three districts of Punjab are amongst the top ten of the country. In fact, with the exception of Qilla Abdullah in Balochistan, the top three districts of all provinces belong to the overall top quartile of the Asset index. With the exception of Jhang and Muzaffargarh in Punjab, the bottom districts of all provinces lie in the country-wide bottom quartile. The following table lists the corresponding values and districts for the Basic Needs index.

Once again all the provincial capitals appear in the top three districts of each province. For Punjab and Sindh the top three districts in terms of basic needs are the same as those under the Asset index, as opposed to KPK and Balochistan where changes are seen. Top three districts for all provinces belong to the country-wide top quartile except Baluchistan, where Gawadar and Ziarat lie in the third quartile.

Table 5

Province wise Top and Bottom Districts—Basic Needs Index

	Punjab	Rank	Sindh	Rank	KPK	Rank	Balochistan	Rank
Top 3	Lahore	3	Karachi	2	Abbottabad	8	Quetta	20
	Rawalpindi	4	Hyderabad	15	Haripur	9	Gawadar	68
	Jhelum	5	Nowshero Feroze	18	Peshawar	13	Ziarat	76
Bottom 3	D G Khan	66	Thatta	89	Upper Dir	81	Jhal Magsi	107
	Muzaffargarh	70	Badin	91	Shangla	90	Dera Bugti	109
	Rajanpur	82	Tharparkar	95	Kohistan	108	Kohlu	110

None of the lowest three districts of Punjab belong to the country-wide bottom quartile, while the lowest three districts for each of the other provinces lie in it. In the case of both KPK and Sindh, the bottom three districts from the basic needs perspective are the same as those for Asset accumulation. However, there are differences in the rankings by asset accumulation and basic needs for Punjab and Balochistan.

4.2. Regression Results

Estimation of Equation 1 across the two dimensions of poverty under study reveals that the macro determinants of these appear to be similar (results in Table 6).[13] Therefore, we have a combined discussion on the results.[14]

[12]For provincial level analysis the capital, Islamabad, is not considered.

[13]Macro level variables employed in the regression are not available for Balochistan at the district level for the years relevant to the analysis. To overcome the issue of employing out dated data, we use divisional level data for Baluchistan for the year 2006 and therefore include divisions of Balochistan for the purpose of regression analysis, and not districts. The use of divisions rather than districts is reasonable for the case of Balochistan, given the sparsely populated districts in the province relative to other districts of the country. The divisions employed are in line with those defined and used in Burki (2011).

[14]Provincial dummies came out to be insignificant, indicating that differences in provinces are accounted for by the remaining variables. The final results reported do not include the dummies.

Table 6

OLS Regression Results

	Basic Needs Index	Asset Index
Industrialisation	0.004***	0.004***
	(3.29)	(4.33)
Road Density	4.87***	2.65**
	(3.49)	(2.51)
Employment Rate	4.14*	2.01
	(1.97)	(1.26)
Dependency Ratio	–6.15	–1.09
	(–0.58)	(–0.14)
Urbanisation	0.13	0.25
	(0.04)	(0.12)
People to School	0.0002	0.0001
	(0.39)	(0.32)
People to Hospital Beds	0.0002	0.00005
	(0.52)	(0.20)
Constant	–3.02	–2.78
	(–0.54)	(–0.66)
N	65	65
Adjusted R^2	0.38	0.36

t-statistics in parenthesis, *** p<0.01, ** p<0.05, * p<0.1.

Road density across both measures of poverty is positive and highly significant. It appears to be a very important variable in explaining the pattern of poverty in Pakistan. Therefore, we also map road density of Pakistan (Figure 3 in Appendix B) to try to ascertain if it follows a similar pattern to the spatial pattern of the poverty indices. This can help shed further light on the significance of this particular variable in explaining poverty patterns in the country.

With the exception of Punjab and most of KPK, majority of Sindh and all of Balochistan fare poorly in the availability of road network (measured against land area). Note how the road densities correspond to the poverty maps drawn for the Asset and Basic Need indices. If anything, the road density map provides a starker picture. Excepting Lahore, none of the other districts containing the provincial capitals appear in the upper tier of road density. This only serves to highlight the almost privileged position Punjab seems to hold in terms of access by a metalled road network, followed closely by KPK. As discussed earlier, metalled road density is a key measure of infrastructure development in any district. At the micro level it ensures individual access to and from potential markets, thereby boosting economic activities both in terms of business activity and labour mobility.[15] Linkage with the rest of the country is of utmost importance both at the input and the output end for any business to thrive. Therefore, road network is a basic requirement for enterprises. This business activity will in turn not just benefit the individual but will be a source of employment for the entire region/area. Thus, road network has significant positive spillover effects in the district.

[15]See UNESCAP Report (2008), Van de Walle (1999), Bryceson, *et al*. (2006).

For people to work outside their hometowns, commuting with ease is necessary. A good road network will facilitate this and would mean that inhabitants are not just restricted to their native areas in seeking employment. This also becomes an important factor in determining the choice of location for an industry. All inputs (both raw material and labour), as well as the end product, will require, at least, ease of access that a good road network provides.

For an agriculturally biased country like Pakistan, especially for those whose main source of livelihood depends on agricultural produce, good roads also allow the transportation of the produce from one area to the other. Perishable agricultural commodities, unless transported in a timely manner will rot and be wasted leading to high economic costs for the producer. A good transport network would mean that this wastage can be reduced and result in higher incomes for these farmers.

A good road network will in general also mean that products from other areas will reach the district with ease and hence without overhead costs. This results in an increase in the availability and variety of consumer durables, facilitating higher asset accumulation. In general, it also allows easy flow of information and results in an integration of that particular area with the rest of the country which, as discussed, benefits the area in many ways. Hence, it is not surprising that the coefficient on the variable is positive and highly significant in explaining districts with superior Asset and Basic Needs indices.

On the physical development side, industrialisation also comes out to be positive and highly significant in both specifications. It captures the level of industrial development in a district and as discussed earlier will benefit the people of the area both in terms of direct and indirect employment generation. This in turn will have an income enhancing impact which would allow greater acquisition of assets as well as higher spending on well-being of the households.

On the demographic side, only employment comes out to be a significant factor in explaining the variation amongst districts for the basic needs index only. This is not surprising since higher employment will be a result of greater business activity (industrial and/or agriculture) in the region. This seems to be resulting in greater ability to spend on education, health and maintaining better living conditions.

Dependency ratio comes out to be an insignificant factor in explaining the variation in the indices across provinces. This might be attributable to the social structure of the country where children from a very young age in poor households start to work and in turn are no longer a burden on the family. They in fact contribute to the livelihood of the family.

Greater urbanisation can have a dual impact: it can result in easier access to assets but it can also have a detrimental impact on the standard of living due to congestion and higher cost of living. Households living in a more urbanised district might be so hard-pressed to fulfil their basic needs that in spite of ready availability of consumer durables as well as schools and hospitals, their ability to avail these services and enjoy consumer good may not be any better than their counterparts in less urbanised areas. For those, who are able to afford these goods and services, it is likely to have a positive impact. It appears that neither of these countervailing effects overwhelms the other and hence, on average, the extent of urbanisation has no effect.

Finally, social service provision in a district as proxied by the number of people to a hospital and number of people to a school does not explain any variation across districts. This may be due to the quality of public sector services or the possibility that the contribution of the private sector is more meaningful in these areas. District level data on the private sector both for quantity and quality of these services can help us explore this avenue.

5. CONCLUSION

The objective of this paper was to develop a spatial map of poverty for Pakistan based on micro level asset and basic needs indicators. As per *a priori* expectations there is an obvious bias towards the districts of the north (particularly north east), with the exception of the district that contains the largest city of the country (Karachi). Such stark disparities between the provinces, particularly the favourable position held by Punjab, requires investigation into whether it is the result of historical biases, public policy or a combination of both. This would first necessitate looking into the factors influencing well-being in a district.

Econometric analysis indicates that development of infrastructure is a key contributor towards a particular regions relative ability to thrive. This result is further corroborated by the spatial mapping of road density. Once again whether a result of the initial endowment or deliberate public policy, road densities in Punjab are significantly higher than anywhere else in the country, even the district of Karachi.

Econometric results provide a very interesting insight into what potentially influences poverty in Pakistan. Contrary to popular criticism about potential over spending on building infrastructure, it turns out that rather than public sector education and health provision, roads or the lack thereof seem to be the major factor impacting deprivation in the country. Again, as discussed earlier the role of the private sector in social service provision is important to be accounted for in order to present a more complete picture. In addition, active government policy to provide incentives for industries to set up and enterprise to thrive in these marginalised areas would be a step towards pulling these regions out of their current state.

Appendices

APPENDIX A

Variable	Source
Number of Schools	Population Census 1998
Number of Hospitals	Population Census 1998
Urbanisation	PSLM 08-09
Employment Rate	PSLM 08-09
Industrialisation	Provincial Development Statistics
Road Density	Provincial Development Statistics
Dependency Ratio	PSLM 08-09

APPENDIX B

Fig. 1. Spatial Mapping of Asset Index

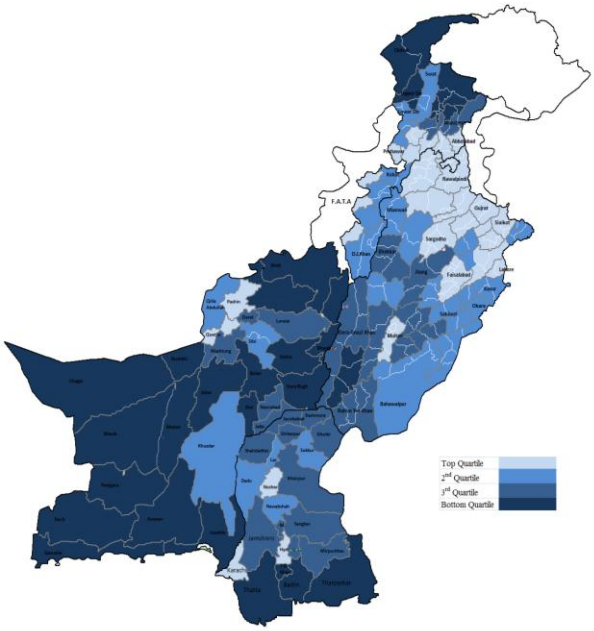


Fig. 2. Spatial Mapping of Basic Needs Index

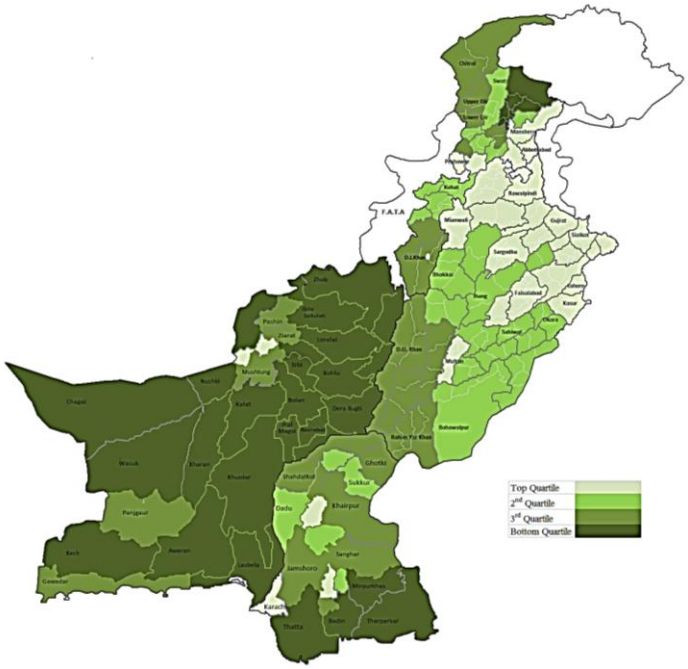
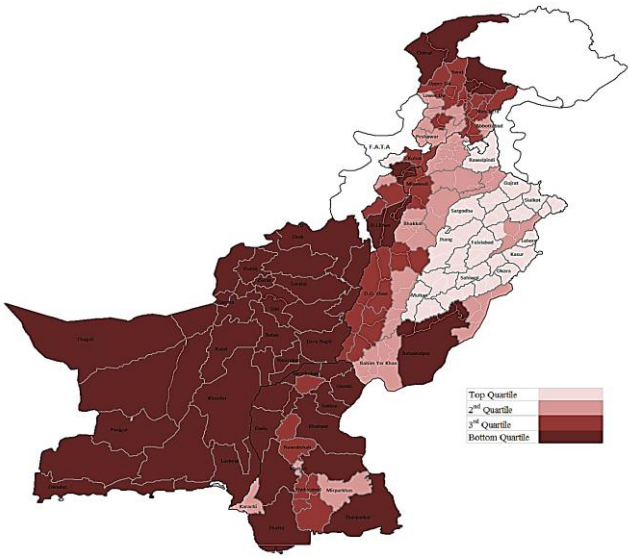


Fig. 3. Spatial Mapping of Road Density



APPENDIX C

Asset Index Values

1	Islamabad	10.53398	38	Khushab	0.578715	75	Jamshoro	–0.8139
2	Lahore	6.531246	39	Mianwali	0.523907	76	Manshera	–0.88276
3	Karachi	5.690967	40	Hafizabad	0.424956	77	Tando Allah	–0.88932
4	Peshawar	5.605258	41	Kasur	0.275251	78	Mastung	–0.89089
5	Rawalpindi	5.09841	42	Karak	0.22588	79	Nasirabad	–1.04458
6	Jhelum	3.62432	43	Dadu	0.198945	80	Lorali	–1.0821
7	Sialkot	3.309069	44	Bahawalpur	0.194226	81	Shahdadkot	–1.12523
8	Quetta	3.006212	45	Nankana Sahib	0.16253	82	Muzaffargarh	–1.12786
9	Gujrat	2.711241	46	Sahiwal	0.120562	83	Zhob	–1.14092
10	Gujranwala	2.63034	47	Okara	0.093955	84	Gwadar	–1.4655
11	Sargodha	2.523592	48	Pakpattan	0.084401	85	Batagram	–1.53491
12	Bannu	2.444482	49	Narowal	–0.04694	86	Panjgur	–1.55675
13	Hyderabad	2.374197	50	Bahawalnagar	–0.11433	87	Kalat	–1.57494
14	Faisalabad	2.346325	51	Nawabshah	–0.12264	88	Rajanpur	–1.59099
15	Haripur	2.195988	52	Layyah	–0.16483	89	Ketch	–1.6377
16	Chakwal	2.193927	53	Lower Dir	–0.2222	90	Tando Muda	–1.69902
17	Nowshero F	1.945039	54	Khuzdar	–0.23433	91	Nushki	–1.8301
18	M Bahuaddin	1.836626	55	Larkana	–0.27378	92	Qillah Saifullah	–2.06641
19	Multan	1.776168	56	Lakki Marwat	–0.33435	93	Kharan	–2.24803
20	Pashin	1.743047	57	D.G.Khan	–0.34163	94	Bolan	–2.33969
21	Abbottabad	1.413793	58	Vehari	–0.40333	95	Jhal Magsi	–2.34866
22	Sheikupura	1.402695	59	Kashmore	–0.43022	96	Washuk	–2.37476
23	Attock	1.371606	60	Shikarpur	–0.44004	97	Chitral	–2.46526
24	Tank	1.350145	61	Sanghar	–0.44522	98	Upper Dir	–2.46611
25	Nowshera	1.277339	62	Khanewal	–0.46102	99	Dera Bugti	–2.96835
26	Mardan	1.276713	63	Khairpur	–0.46932	100	Shangla	–3.03858
27	Hangu	1.245491	64	Ziarat	–0.49268	101	Lasbela	–3.05395
28	Swabi	1.156287	65	Lodhran	–0.52071	102	Thatta	–3.11718
29	Swat	1.100324	66	RahimYar Khan	–0.52165	103	Barkhan	–3.13219
30	Qillah Abd	1.011304	67	Mirpur Khas	–0.54322	104	Badin	–3.17392
31	Charsada	0.967917	68	Bhakhar	–0.58027	105	Chagi	–3.18545
32	T.T.Singh	0.954534	69	Bonair	–0.59717	107	Musakhel	–3.80096
33	D.I.Khan	0.887271	70	Jaccobabad	–0.63845	108	Awaran	–4.14663
34	Sibi	0.878156	71	Jhang	–0.70223	109	Kohlu	–4.42047
35	Malakand	0.866824	72	Maitari	–0.7194	110	Kohistan	–4.51882
36	Kohat	0.847362	73	Ghotki	–0.74046			
37	Sukkur	0.835253	74	Jafarabad	–0.80344			

Well-being Index Values

1	Islamabad	6.234603	38	Karak	0.9754925	75	Jaccobabad	–1.226724
2	Karachi	5.903576	39	Bahawalpur	0.8810728	76	Ziarat	–1.291056
3	Lahore	5.57656	40	Khanewal	0.8675861	77	Pashin	–1.308706
4	Rawalpindi	5.49893	41	Layyah	0.7846873	78	Panjgur	–1.508751
5	Jehlum	4.763879	42	Hangu	0.784137	79	Shahdadkot	–1.599927
6	Sialkot	4.736196	43	Jhang	0.7699276	80	Mastung	–1.624826
7	Chakwal	4.72863	44	Batagram	0.7327576	81	Upper Dir	–1.699977
8	Abbottabad	4.654023	45	Swabi	0.7081991	82	Rajanpur	–1.852241
9	Haripur	4.353773	46	Pakpattan	0.6915661	83	Lasbela	–1.858197
10	Gujrat	4.347954	47	Mardan	0.5673209	84	Ketch	–1.956589
11	Gujranwala	4.110255	48	Malakand	0.5231762	85	Khuzdar	–1.979743
12	Sheikupura	3.291612	49	Dadu	0.4704441	86	Mirpur Khas	–1.980095
13	Peshawar	3.225019	50	Lodhran	0.2889536	87	Jafarabad	–2.019936
14	Faisalabad	3.205434	51	Bahawalnag	0.2612551	88	Sibi	–2.050518
15	Hyderabad	3.087317	52	Shikarpur	0.2332857	89	Thatta	–2.173111
16	M Bahuaddin	3.035786	53	Tando Allah	0.2249512	90	Shangla	–2.420689
17	Attock	2.92887	54	Bhakhar	0.2153661	91	Badin	–2.424553
18	Nowshero F	2.919385	55	Nawabshah	0.1744347	92	Zhob	–2.710144
19	T.T.Singh	2.864092	56	Sanghar	0.1087336	93	Kalat	–2.991286
20	Quetta	2.805496	57	Charsada	–0.013796	94	Nasirabad	–3.023462
21	Nankana Sahib	2.523984	58	Maitari	–0.018679	95	Tharparkar	–3.040952
22	Narowal	2.471714	59	Lakki Marwat	–0.046269	96	Nushki	–3.056986
23	Sargodha	2.42417	60	RahimYar Khan	–0.089535	97	Lorali	–3.207207
24	Nowshera	2.143239	61	Khairpur	–0.205919	98	Qillah Abd	–3.669676
25	Mianwali	2.032709	62	Jamshoro	–0.279425	99	Kharan	–4.034562
26	Kasur	1.939824	63	Ghotki	–0.301621	100	Washuk	–4.11888
27	Multan	1.9387	64	Larkana	–0.305670	101	Awaran	–4.209447
28	Manshera	1.880795	65	Kashmore	–0.379073	102	Qillah Saifullah	–4.571843
29	Sukkur	1.80054	66	D.G.Khan	–0.446036	103	Chagi	–4.743874
30	Khushab	1.794379	67	Bonair	–0.749114	104	Bolan	–4.907412
31	Okara	1.715305	68	Gwadar	–0.750567	105	Barkhan	–4.937888
32	Hafizabad	1.589369	69	D.I.Khan	–0.763493	106	Musakhel	–5.54526
33	Bannu	1.438993	70	Muzaffargarh	–0.871703	107	Jhal Magsi	–5.586706
34	Swat	1.426383	71	Chitral	–0.930833	108	Kohistan	–5.808076
35	Sahiwal	1.374916	72	Tank	–0.997125	109	Dera Bugti	–5.815793
36	Kohat	1.166668	73	Tando Muda	–1.118154	110	Kohlu	–6.865423
37	Vehari	1.074477	74	Lower Dir	–1.183369			

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