Macro level Determinants of Poverty:

Investigation through poverty mapping of districts of Pakistan

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Abstract

The study explores the spatial patterns of poverty in Pakistan through two dimensions: asset accumulation and basic needs. For this purpose Pakistan Standard of Living Measurement 08-09 is employed to construct an Asset Index and a Basic Needs index, at a district level, through the use of household level indicators. The study finds a clear north south divide, with particular concentration of better off districts in the north east of the country. Additionally, regression analysis is carried out to help identify the macro level factors contributing towards the observed pattern. Results reveal infrastructural and industrial development to be significant factors behind a district's well being. This indicates that public policy directed towards developing deprived districts should be centered on these factors, specifically expanding road networks, and incentives for industrial development in those districts.

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 behooves 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 wellbeing 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 wellbeing 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 is not been

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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).

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.

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% of the population is poor, with an overwhelming 70% 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 organization 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 and Section 5 concludes the paper with discussion on possible policy implications of the results.

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

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 urbanization 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. (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 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.

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[5] Number of schools, number of hospitals, number of factories and road density
[6] Jamal,H. (2004)
[7] Akhtar & Ahmad (2003)

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 aggregated at the district level from the household level data to arrive at an estimate for each 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.

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, immunization 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. enrollment rates at primary and

secondary levels and stock measures i.e. male and female adult literacy rates.

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

Table 2: Variables used in the construction of the Basic Needs index

Variable	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
Immunization Rate of the district	Number of children aged 6 and below immunized/Total number of children aged 6 and below
Education Indicators	
Gross Primary enrollment rate of the district	Number of children enrolled in primary schools/Total number of children aged between 3 and 10 years
Gross Secondary enrollment 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

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:

$$I_i = \alpha_0 + \sum \boldsymbol{\beta X} + \sum \boldsymbol{\theta Y} + \sum \boldsymbol{\gamma Z} + \delta d_i + \varepsilon_i \ (1)$$

Where I_i is the index value for district i, $\boldsymbol{X}$ is a vector of social service variables in the district, $\boldsymbol{Y}$ is a vector of variables capturing the physical development of the district, $\boldsymbol{Z}$ 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 Baluchistan 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 dependant variable.

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 urbanization 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 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.[8] 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 kilometers of metalled roads as a ratio of the total area of the district.

4. Results

4.1 Spatial mapping

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[8] Rupasingha and Goetz (2007)

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 are the poverty maps representing the Basic Needs and Asset indices, respectively. Most of the districts of Punjab and Khyber Paktunkhuwa lie in the top two quartiles for the Asset index. Likewise, most of the districts lying in the 3rd and 4rd quartiles belong to Baluchistan 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% of the districts from the bottom quartile belonging to Baluchistan. Tables 3 details the top and bottom ten districts for both indices. The Federal Capital Territory Islamabad ranks the highest from either angle[9]. Its index value for the Asset index (10.53) is almost twice that of the next district in ranking.

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

[9]Islamabad is the capital of the country and 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.

As can be seen, seven out of the top ten districts in the basic needs index are from Punjab, two from KP 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 KP.

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 KP and the remaining six are from Baluchistan.

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 KP.

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 KP. 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 would help in providing an overview of the results at a more disaggregated level and recognize 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*		*KP*	*Rank*	*Baluchistan Rank*	
Top 3	Lahore	2	Karachi	4	Peshawer	4	Quetta	8
	Rawalpindi	5	Hyderabad	14	Bannu	12	Pashin	20
	Jhelum	6	Nowshero Feroze	18	Abbotabad	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.[10] 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.

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

Table 5: Province wise Top and Bottom Districts – Basic Needs Index

	Punjab	*Rank*	*Sindh*	*Rank*	*KP*	*Rank*	*Balouchistan*	*Rank*
Top 3	Lahore	3	Karachi	2	Abbotabad	8	Quetta	20
	Rawalpindi	4	Hyderabad	15	Haripur	9	Gawadar	68
	Jhelum	5	Nowshero Feroze	18	Peshawar	13	Ziarat	76
Bottom 3	D I Khan	69	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

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 KP and Baluchistan 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.

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 KP 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 Baluchistan.

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).[11] Therefore, we have a combined discussion on the results.[12]

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[11] Macro level variables employed in the regression are not available for Baluchistan 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 Baluchistan for the purpose of regression analysis, and not districts. The use of divisions rather than districts is reasonable for the case of Baluchistan, 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).

[12] The variable number of people to one school came out to be highly correlated with the number of factories in the district and was therefore dropped from the final regression. Also, provincial dummies came out to be

Table 6: OLS Regression Results

	Basic Needs Index	Asset Index
Road Density	5.02***	2.83***
	(4.05)	(3.04)
Employment Rate	4.23**	2.46*
	(2.43)	(1.88)
Dependency Ratio	0.87	2.75
	(0.10)	(0.41)
Urbanization Rate	0.97	1.54
	(0.47)	(1.00)
People to hospital Ratio	-0.0000005	-0.0000002
	(-0.54)	(-0.31)
Number of factories	0.004***	0.004***
	(3.79)	(5.56)
Constant	-6.13	-5.27
	(-1.31)	(-1.50)
N	84	84
Adj R^2	41.3	46.5

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) 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.

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insignificant, indicating that differences in provinces are accounted for by the remaining variables. The final results reported do not include the dummies.

With the exception of Punjab and most of KP, majority of Sindh and all of Baluchistan 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 KP. 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 labor mobility[13]. 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.

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 determining the choice of location for an industry. All inputs (both raw material and labor), 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

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[13] See UNESCAP report (2008), Van de Walle (1999), Bryceson et al (2006).

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, the number of factories also comes out to be 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. 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 acquire assets and 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 urbanization 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 urbanized district might be so hard-pressed to fulfill their basic needs that in spite of ready availability of consumer durables as well as schools/hospitals, their ability to avail these services and enjoy consumer good may not be any better than their counterparts in less urbanized 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 urbanization has no effect.

Finally, social service provision in a district as proxied by the number of people to a hospital is also insignificant. Perhaps there is not enough variation in the provision of hospitals to explain the variation in index values.

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 apriori 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 favorable 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. Thus recognition of this issue at the policy makers end followed by a concrete plan to enforce a reversal of the trend can be a key instrument for the development of these regions.

This bias in infrastructure seems to have fed into the pattern of industrial development and employment in the country. Both turn out to be significant and positive factors contributing to the superior performance of districts. Therefore, we may hypothesize that road development would lead to improvement in the performance of these two indicators. In addition, active government policy to provide incentives for industries to set up and enterprise to thrive in these marginalized areas would a step towards pulling these regions out of their current state.

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Appendix

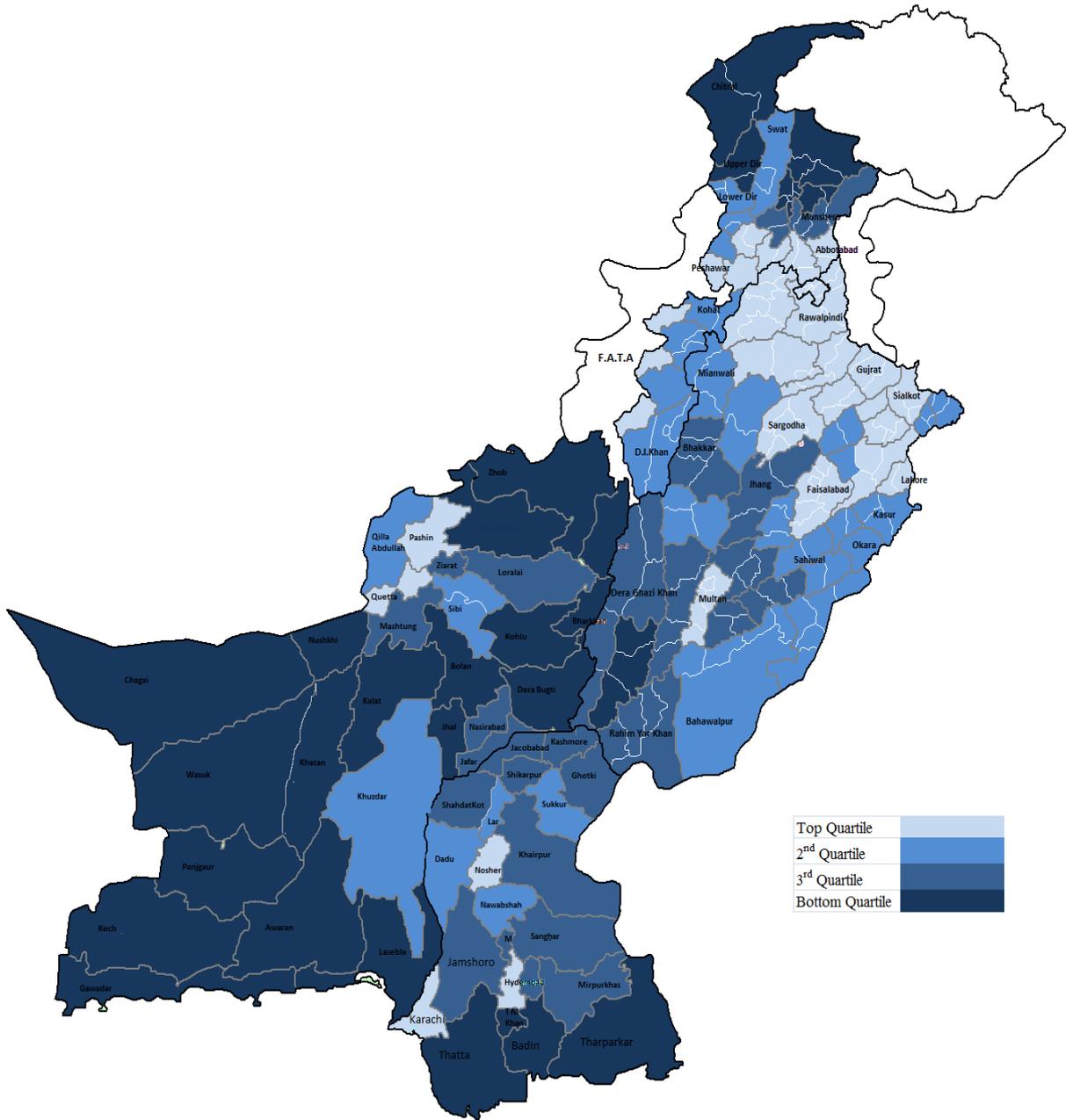## Figure 1 - Spatial Mapping of Asset Index

Figure 2 - Spatial Mapping of Basic Needs Index

Figure 3 - Spatial Mapping of Road Density