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DEVELOPMENT RANKING OF DISTRICTS OF PAKISTAN

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This paper employs two different techniques – the ZSUM and Weighted Factor Socre – and twentyseven indicators to quantify the levels of development in the districts of Pakistan in the 1970s. The magnitude of development indicators in relatively underdeveloped districts are analyzed to construct a profile of backwardness. Also, our rankings are compared with those obtained by Helbock and Naqavi (1976) for Pakistan in the 1960s.

I. Introduction

The existence of significant regional variation in level of development in Pakistan is a widely recognized fact. The two provinces of Baluchistan and the North West Frontier Province (NWFP) are generally seen as relatively backward while the two other provinces, Sind and Punjab, are considered as relatively developed. This is reflected in the nature of federal subventions and grants-in-aid. However, this level of regional generalization masks large intra-provincial disparities at the district or at the tehsil/taluka level. It is necessary, therefore, to have knowledge of the variation in the level of development at a more regionally disaggregated level so as to be able to identify more precisely the location of the poorer segments of the national population from the viewpoint of provision of basic infrastructure and services.

However, research on regional levels of development in Pakistan has been severely constrained by the lack of data at the district level. The objective of this study, therefore, is to make a first attempt at the quantification of the level of development attained by each district of Pakistan. It needs to be emphasized at this stage that development has not been seen simply in terms of the level of per capita income for a number of reasons. Firstly, in an economy like that of Pakistan where almost 75 percent of the population is rural and agriculture is characterized primarily by traditional,

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subsistence farming, per capita income is likely to be a distorted measure of welfare because of changes in the quality of goods, access to services, in the extent of leisure and decline over time in the share of non-marketed products. Secondly, if development is viewed as a multidimensional and not a purely economic phenomenon, then the use of per capita income as the sole indicator of development is open to criticism. Therefore, a number of development indicators have been defined, including per capita income, in this study to measure the level of development of individual districts.

The paper is organized as follows: Section II gives a description of the development indicators included. Summary statistics of the distribution of indicators at the district level are presented in section III. The techniques used for deriving a composite indicator of the level of development from the individual indicators are described in section IV.[1] Section V presents the results of the application of these techniques in terms of their implications about the interaction of different factors during the process of development. Section VI identifies the relatively developed and underdeveloped districts of Pakistan. In this section an attempt is also made to see if the development ranking of districts is sensitive to the choice of technique for measuring level of development. Section VII identifies the lagging sectors in the relatively underdeveloped districts thereby indicating the nature of backwardness in Pakistan. Section VIII attempts to determine the trend over time in regional disparities and provides a preliminary answer to the question as to whether such disparities have tended to narrow or widen. Finally, section IX contains a summary of the principal findings and conclusions.

II. Choice of Development Indicators

As mentioned above, the traditional approach of using per capita income as the sole indicator of development has been largely discarded. It is now recognized that development is a complex process which involves basic social and political changes in a society as well as growth in per capita income. Furthermore, at different levels of development the relationship between social, political and economic variables is likely to be different, as highlighted by Adelman and Morris (1967). Therefore, a multidimensional approach to the measurement of development must emphasize both changes in the capacity to attain development objectives as well as the actual attainment of these objectives. This means that development indicators could acquire an operational significance for planning purposes.

The choice of development indicators at the district level in this study

[1] Readers who are primarily interested in the results of the study and not in the methodology may skip section IV.

has been governed by a number of considerations. Firstly, an attempt has been made to achieve as wide a sectoral coverage as possible through the indicators. As such, indicators have been selected to highlight the development of sectors like agriculture, industry, education, health, housing, transport and telecommunications. Secondly, two alternatives were available regarding the choice of indicators: we could concentrate on measuring the consequences of development or the level of development inputs. Reliance has been placed on the latter approach primarily because of the relative absence of data on the former. For example, if the output approach had been adopted to measure the development of the health sector, the indicators used would have been life expectancy, infant mortality, etc. But since data was not available on these magnitudes at the district level, the alternative chosen was to quantify the level of inputs in the form of doctors, hospital beds, etc. Therefore, while there may have been some loss of precision in quantification of the level of development, the results are perhaps more operational in character from the planning viewpoint as the focus is more on development inputs.

The lack of data has not only constrained the approach to the construction of development indicators, but it has limited the number of development indicators and in some cases led to the choice of relatively crude proxies. Nevertheless, it has been possible to identify 27 indicators relating to different sectors.

Diverse sources of data have been used for quantifying the indicators. Firstly, reliance has been placed on the various censuses of population, manufacturing, housing, agriculture and livestock that have been carried out in Pakistan during the '70s. Secondly, relevant data has been collected from the published documents of the various ministries and departments of the Federal and Provincial governments. Thirdly, some primary data collection has been resorted to by establishing contacts with line departments like the Highways Department, Railway, etc. Finally, in some cases, unconventional sources of data have been tapped. For example, no published data was available on the total number of doctors, private and government, in each district. The approach adopted, therefore, was to contact the large pharmaceutical companies in the country who maintain an up-to-date list of doctor's addresses for purposes of sales promotion through their medical representatives. In this way, it was possible to derive the regional distribution of doctors.

Described below are the development indicators chosen in each sector along with their possible defects. A detailed description of the methodology of construction of the different indicators is given in the Statistical Appendix with a listing of the sources of data.

INCOME AND WEALTH

Crop Cash Value Per Capita (CASHV)

This is the basic indicator of the income level in the rural area of a district. The crop cash value (price multiplied by output) has been estimated for each crop, major and minor, and the individual crop cash values aggregated to arrive at the overall crop cash value. Thirtythree crops were included in this exercise, which is described in detail in the Statistical Appendix. The aggregate crop cash value was then divided by the projected rural population to give the per capita cash value. This indicator has been constructed for the year 1975-76.

There are a number of problems with this indicator. Firstly, it is not comprehensive enough in coverage. It relates only to the value generated in the crop sector of the rural economy and misses out the income derived not only from other forms of agricultural activity like livestock, forestry and fishing, but also from non-agricultural occupations like small scale industry, trading, etc. The former gap has been covered partially by incorporating the value added in the fisheries sector into the cash value. This has raised the cash value of agricultural output primarily of the coastal districts like Lasbela and Mekran in Baluchistan province. Also, a separate indicator has been constructed for the livestock sector which is described below. It has not been possible, however, to adjust for the undercoverage of non-agricultrual activities in the rural sector due to the absence of data.

The second problem with the crop cash value per capita indicator is that it is sensitive to the random elements which characterize agriculture. For example, weather variations, pest attacks and floods could affect different districts to a varying extent. As such, it is necessary to take a year which is the more representative of the normal districtwise variations in cropping patterns and yield. The year, 1975-76, in fact, witnessed a major decline in cotton output due to floods and pest attack. Therefore, if total reliance was placed only on this year for estimating the crop cash value, it would tend to give a downward bias to the cash value of the major cotton-growing districts in the country. The adjustment procedure followed, therefore, is to replace the cotton output figures for the year 1975-76 by those of the last normal year which in this case was 1973-74.

Industrial Value Added Per Capita (INDVAD)

Data for the value added in the large-scale industrial sector was obtained from the latest census of manufacturing. This was divided by the projected

urban population for the year to arrive at the per capita industrial value added.

One of the basic problems with this indicator is that it excludes the value added in the small-scale industrial sector due to the lack of data. This is a significant exclusion as at the national level almost 30% of the total value added in manufacturing is estimated to originate from small-scale operations. It affects, in particular, some districts of Punjab like Sialkot, Sheikhupura, etc., where small-scale industry is concentrated and probably accounts for the major portion of the industrial value added.

Number of Commercial Bank Branches Per 100,000 Population (BANKS)

This is both an income and wealth indicator. The number of commercial bank branches in 1975-76 in each district has been divided by the projected total population of the district. It is clear that the number of commercial bank branches in a district is a relatively crude indicator of the income or wealth position of a district. A better indicator would have been the total volume of commercial bank deposits by type generated from the district. However, such information is not published either by the commercial banks or the central bank.

Number of Livestock Units Per Capita (LIVSTK)

Data is available currently on the number of livestock by type in each district, but no information is available on livestock output by type at the district level. Therefore, it is not possible to construct an income measure for the livestock sector. Instead, an indicator relating to wealth in the form of livestock has been defined. Different animals have been converted into equivalent units by assigning weights which are described in detail in the Statistical Appendix.

AGRICULTURE

The basic indicator of development of this sector is *crop cash value per capita* which has already been defined as an income indicator. A number of other indicators have been defined to capture the level of development of the agricultural sector. As mentioned earlier, the approach has been to quantify the inputs to development. In the context of agriculture, this has meant determination of the level of use of inputs like irrigation water, fertilizer, and tractors in each district. The indicators defined are *percentage of cultivated area irrigated (IRRIGATE), percentage of cropped area fertilized (FERTILIZ),* and *percentage of farmers using tractors (TRACTOR).* The latest available data is for 1972.

The problem with these three indicators is that while they probably adequately reflect the spread of technology, they do not capture inter-district variations in the intensity of use of irrigation water, fertilizer and tractors. In addition, if data had been available, an attempt would also have been made to quantify the use of other inputs like improved seeds, pesticides, etc.

Another indicator which has been defined to measure agricultural development is the *extent of commercialization of agriculture (COMMAG).* It is argued that as development proceeds, subsistence farming is replaced by commercialized farming and the share of output marketed increases. Marketing, in this context, is defined not only as the net surplus marketed by the rural sector to urban areas, but also intra-rural marketing. It is essentially a measure of marketing at the individual farm and not at the sectoral level.

It has been assumed that bulk of the output of cash crops like cotton, sugarcane, rice, tobacco, fruits and vegetables, etc., is marketed. The major difficulty is in estimating the component of wheat output that is marketed. For this purpose, a special methodology has been developed which is described in the Statistical Appendix. Essentially, it consists of determining the net surplus/deficit by farm size category given estimates of production, home consumption and seed requirement of wheat.

The magnitude of this indicator has been derived for 1975-76 from the crop cash values estimated in the first indicator.

INDUSTRY

The basic indicator of industrial development is *industrial value added per capita* which has already been defined as an income indicator. Two other indicators have been defined. The first measures the *percentage of the urban labour force in industry (INDEMP)* and the second relates to the *percentage of industrial employment in intermediate and capital goods industries (CAPEMP).* The defect with the former indicator is that it does not include employment in the small-scale industrial sector. The logic behind the inclusion of the latter indicator is that as industrialization proceeds, a greater share of industrial employment tends to get concentrated in relatively sophisticated industries manufacturing intermediate and capital goods, whereas in the initial stages of import substitution bulk of the employment is in consumer goods, particularly those based on processing of agricultural output. Such a pattern is also observed in international cross-country data on industry as demonstrated by Kuznets (1971).

HOUSING

Four indicators have been defined to measure the quality of housing stock in a district and access to basic services like water, electricity and gas. The indicators are *percentage of dwelling units which are pucca (PUCCA), with inside water connections (WATHSE), with electricity (ELECHSE) and with gas connections (GASHSE).* Latest data on these four indicators was obtained for 1973.

The basic problem with the above indicators is that while they are able, more or less, to catch the access to basic services, they do not reflect variations in the level of per capita consumption of water, electricity and gas.

EDUCATION

Both stock and flow measures have been defined for the education sector. The stock measure is the *literacy rate (LITRATE),* which indicates the level of literacy among the population aged ten years and above in a district.

Measures of flow of output from the education sector relate to *enrollment rates at the primary (PRIMARY), secondary (SECONDARY),* and *college level (COLLEGE).* The relevant school and college-age going populations in each district have been projected on the basis of intercensal growth rates for purposes of deriving the enrollment rates.

HEALTH

Two indicators of inputs into the health sector have been defined. The first relates to *doctors per 10,000 population (DOCTOR)* and the other to *hospital beds per 10,000 population (HOSPBED).*

TRANSPORT AND COMMUNICATIONS

The development of the road transport sector is measured in terms of *metalled road mileage per 100 sq. miles of geographical area (METROAD),* and *unmetalled road mileage per 100 sq. miles of geographical area (UNMTROAD)* for the year 1972. The latter relates to inter-district and inter-provincial highways while the former essentially catches the presence of farm-to-market roads.

Railway mileage per 100 sq. miles of geographical area (RAILWAY) enables the determination of the extent of railway network passing through a district. Weighting factors were used to allow for different types of gauge

(broad, narrow) and for single and double track, as described in the Statistical Appendix.

In the case of both the above indicators, preference was given to measuring the presence of transport network, in terms of mileage, in relation to geographical area over either population or cultivated area. Mileage in relation to population does not necessarily give a correct measure of access to transport because the network may pass only through the large urban concentrations and leave bulk of the rural areas largely inaccessible. Coverage with respect to cultivated area gives a somewhat better indication of access. However, it assumes, firstly, that bulk of the transport demand is essentially from the agricultural sector and, secondly, that the rural population is not widely dispersed. It is clear, for example, that if road or railway mileage is seen with respect to population and cultivated area and not in relation to geographical area, then the province of Baluchistan, the largest province of Pakistan in terms of geographical area, would appear to be relatively well endowed with transport infrastructure whereas, in fact, it is generally recognized that the transport sector is least developed in this province.

Given the road mileage, it is also important to determine the stock of vehicles in a district which influences the capacity of road transport. As such, another indicator has been defined, *passenger load carrying capacity per capita (PASLOAD),* and different types of vehicles, viz, buses, cars, motorcycles, etc., have been aggregated by using weights equal to the passenger carrying capacity of each type of vehicle. These weights are given in the Statistical Appendix.

Development of telecommunications in a district has been quantified with the help of the indicator, *telephones per 1,000 population (TELPHON).* Industrial, commercial and government connections have been excluded as they tend to overstate the magnitude of this development indicator in the case of districts that are playing an important administrative or commercial role, which is captured by other indicators.

SEXUAL EQUALITY

As development proceeds, it has been observed that one of the major social changes that occurs is the transformation in the role of women. Female literacy, school and college enrollment and labour force participation rates tend to rise. As such, indicators have been chosen to quantify the extent of sexual equality in the district. These are *female to male literacy rate (SEXLIT)* and *female to male primary and secondary enrollment rate (SEXENRL).*

III. Summary Measures of Development Indicators

Magnitude of the development indicator for each district is given in Table S.1 in the Statistical Appendix. The district boundaries correspond to those that were prevailing at the time the population census of 1972 was carried out. Fortysix districts have been included in the analysis. Districts of the Malakand Division in the NWFP and the Centrally Administered Areas have not been included due to the almost complete paucity of data on these areas. About 93 percent of the national population is estimated to have been residing in the districts included in the study in 1972.

Three summary measures have been calculated to describe and compare the distributions of the indicators. These are respectively the first, second and third moments referred to as the mean, variance and skewness. In addition, the coefficient of variation has also been computed. The last two measures are perhaps the basic indicators of the extent of regional inequality. These measures are presented in Table 1. It needs to be pointed out that the means of the various indicators do not correspond to the national values of these indicators. This is because they are simple averages and not averages weighted by the population or area of the discticts depending upon the indicator.

Highest dispersion is observed in the case of GASHSE reflecting the fact that currently domestic gas connections have been extended to only a few of the larger cities and towns in the country. Therefore, as expected, this indicator also shows a high degree of skewness. Other indicators exhibiting high degree of regional concentration are PUCCA and METROAD. At the other extreme, indicators with the least dispersion are CASHV, BANKS, IRRIGATION, PRIMARY, LITRATE and SEXLIT. In particular it is interesting to note the widespread network of commercial bank branches in the country. Banks appear to have followed a policy of regional penetration even perhaps at the expense of profitability. In addition, the relative uniformity of PRIMARY and LITRATE among districts attests to the fact that there has been a commitment to the goal of universal basic education.

It appears from the table of zero-order correlation coefficients (available from authors on request) that INDVAD, BANKS, DOCTORS, HOSPBED, PUCCA, ELECHSE, WATHSE, METROAD and GASHSE are highly intercorrelated with correlation coefficients ranging from 0.70 to 0.75. It is likely, therefore, that they represent some common underlying phenomenon associated with development. This is discussed in a later section.

Correlations between the four agricultural indicators are not very high (except for IRRIGATE and FERTILIZ at 0.75). Nor are the two employ-

TABLE 1

Summary measures of distribution of indicators at district level

Indicator	Unit	Mean	Standard deviation	Coefficient of variation	Skewness
CASHV	Rs. per capita	544.428	256.871	0.472	0.691
INDVAD	Rs. per capita	106.817	158.739	1.486	3.207
BANKS	No. per 100,000 population	5.517	2.931	0.531	1.774
LIVESTK	Units per capita	0.575	0.371	0.645	3.902
IRRIGATE	%	62.487	33.556	0.537	−0.558
FERTILIZ	%	32.565	28.537	0.876	0.369
TRACTOR	%	12.970	12.816	0.988	1.134
COMMAG	%	79.170	14.822	0.187	−1.735
INDEMP	%	8.976	10.813	1.205	1.953
CAPEMP	%	12.835	18.785	1.464	1.445
PUCCA	%	6.102	11.506	1.886	5.445
WATHSE	%	5.928	6.686	1.128	3.137
ELECHSE	%	13.317	10.619	0.797	1.921
GASHSE	%	1.147	2.718	2.370	4.358
LITRATE	%	17.774	9.282	0.522	1.361
PRIMARY	%	30.763	12.586	0.403	1.605
SECONDARY	%	20.007	13.922	0.696	0.905
COLLEGE	%	2.072	1.312	0.633	1.446
DOCTOR	%	1.118	1.191	1.065	2.632
HOSPBED	No. per 10,000 population	5.093	4.002	0.786	2.010
METROAD	No. per 10,000 population	10.139	17.259	1.702	5.512
UNMETROAD	Miles per 100 sq. miles	11.787	11.481	0.974	−0.778
RAILWAY	Miles per 100 sq. miles	4.526	3.207	0.709	0.763
PASLOAD	No. per 10,000 population	18.583	22.029	1.185	1.827
TELPHON	No per 1,000 population	6.104	5.367	0.879	2.147
SEXLIT		28.261	13.040	0.461	1.746
SEXENRL		33.520	21.721	0.648	0.708

ment indicators highly correlated at 0.28. Correlation among the education indicators is relatively high. This is also the case with the health and sexual equality indicators. However, there is not much correlation among the transport indicators.

With regard to the income and wealth indicators – CASHV, INDVAD, BANKS, LIVESTK – it is interesting to note that they are not highly correlated with each other (except for the correlation between INDVAD and BANKS of 0.74). However, their correlation with the education, health, housing and sexual equality indicators is quite high.

IV. Techniques for Deriving Composite Indicator

Two types of composite indicators have been derived for development ranking purposes. The first (ZSUM) is based on standardization of the indicators. The second (WEIGHTED FACTOR SCORE) emerges from principal components analysis of the indicators.

Z-SUM

This technique involves the standardization of variables so that each indicator has a distribution with a zero mean and a standard deviation of unity, as follows:

$$Z_{ij} = \frac{X_{ij} - \overline{X}_i}{S_i}$$

where i refers to the indicator (i=1,...,27) and j refers to the district (j=1,...,46), X_i is the mean of the ith indicator and S_i the standard deviation.

The composite indicator is then constructed simply by assigning equal weights to all indicators and summing them as follows:

$$Z\ SUM = \sum_{i=1}^{27} Z_{ij}$$

where Z_{ij} is the value of the ith z-score for the jth district.

The resulting distribution of Z-SUM also has a zero mean which provides a reference point for comparing districts with the average. However, the basic defect with this technique is that it attaches equal weight to all the indicators.

A variant of the above type of composite indicator attempts to make

the distribution of each indicator more closely approximate the normal distribution by first taking natural logarithms of variables, deriving the z-scores and then summing them. This transformation tends to compress the outliers by approximating long tails more closely to the normal curve. The robustness of the results can then be checked by carrying out a rank correlation between the two z-sum indicators.

WEIGHTED FACTOR SCORE

This type of composite indicator is derived after carrying out a principal components analysis on the development indicators and using weights derived from this analysis. Basically, factor analysis in its principal components form is represented by,

$$Z = A.F.$$

where Z is the 27 x 46 matrix of observations on the 27 indicators for the 46 districts. A is the 27 x 3 matrix[2] of factor loadings and F is the 3 x 46 matrix of unobserved factor scores on each of the three factors for each of the 46 districts.

The objective is to determine the factor loading matrix A and the factor scores F. The factor loadings are the coefficients that make a linear combination of the indicators and these coefficients are chosen so as to maximize the explained variation in the data by the first factor.

The diagonal elements of A'A contain the contribution of the jth factor to the explanation of the unit variance of the N variables Z_i, i.e.

$$\sum_{i=1}^{27} a_{ij}^2 = \lambda_j$$

where λ_j is the eigenvalue of the jth factor.

Also the total variance to be explained is trace R (where R is the correlation matrix) = trace (AA') = trace (A'A).

The proportion contributed by the jth factors is λ_j/N of the total variance to be explained.

It is clear therefore that the sum of the square of the coefficients down a column of the factor loading matrix is the eigenvalue and also the sum of the squares of the loadings along a row – known as the communality – represents the amount of variation in the variable explained by the three factors. It is therefore analogous to R^2 in regression analysis.

[2] The number of factors was constrained to three, firstly, because the objective was to obtain a sufficient degree of clustering of the indicators, and secondly, because the eigenvalue of factors beyond the third factor was relatively small. The latter reason tends to justify the constrained procedure.

Varimax rotation was used in the factor analysis. Quartimax rotation was also tried but did not materially change the results.

Since the number of factors has been constrained, the factor scores matrix F is obtained in the following manner:

$$(A'A)F = A'Z$$

implying

$$F = (A'A)^{-1}A'Z$$

Finally, the composite indicator is simply the weighted factor score of each district. The weights correspond to the eigenvalue of each factor.

V. Results of Principal Components Analysis

Table 2 displays the factor loading matrix of development indicators with the communality coefficients, eigenvalues and proportion of variation explained. As mentioned earlier, the number of factors has been constrained to three to facilitate their economic interpretation. These three factors explain 63.5 percent of the total variation in the data. A description of each factor is given below.

Factor 1: This factor explains 36.5 percent of the variation. It includes most of the indicators from the housing, health and education sectors. Also included are banks (BANKS), industrial value added per capita (INDVAD) and two indicators of transport sector development, metalled road mileage (METROAD) and PASLOAD, passenger load carrying capacity per capita. The number of telephones per 1,000 population (TELPHON) and female-to-male literacy ratio (SEXLIT) also fall in this factor. Altogether, factor 1 is interpreted as capturing the effects of modernisation and urbanisation. Of particular significance is that it includes indicators of social and economic infrastructure like water supply, electricity, gas, education and health facilities, roads, telecommunications, banking, etc., which are generally the responsibility of governments in developing countries.

A possible description of the process of development described by factor 1 is that cities and large towns begin to discharge functions of service centres to the rural hinterland. Also, due to agglomeration economies, industry tends to locate in such areas. As a result of the performance of these functions, urban areas acquire a certain dynamism which attracts other services, viz., banking, doctors, etc., to these areas.

Factor 2: The second factor accounts for about 18 percent of the variation and is somewhat more difficult to interpret. Along with factor 3 it captures variation in the magnitude of development indicators not explained

TABLE 2

Factor loading matrix of development indicators

Variable	Factor 1	Factor 2	Factor 3	Commu-nality
Doctors per 10,000 population (DOCTOR)	0.958	0.059	0.062	0.926
% of dwelling units with water connections (WATHSE)	0.901	0.243	0.150	0.894
% of pucca dwelling units (PUCCA)	0.869	0.142	−0.129	0.777
% of dwelling units with gas connections (GASHSE)	0.860	0.210	−0.139	0.804
Hospital beds per 10,000 population (HOSPBED)	0.826	−0.153	−0.013	0.706
Passenger carrying capacity per capita (PASLOAD)	0.823	0.017	0.027	0.678
% of dwelling units with electricity (ELECHSE)	0.803	0.387	0.056	0.798
Telephones per 1,000 population (TELPHON)	0.796	0.083	0.002	0.641
Mettalled roads to geographical area (METROAD)	0.768	0.325	−0.122	0.710
Female-to-Male literacy ratio (SEXLIT)	0.721	0.444	0.239	0.775
Literacy rate (LITRATE)	0.717	0.526	−0.131	0.810
Bank branches per 100,000 population (BANKS)	0.682	0.380	−0.377	0.753
Industrial value added per capita (INDVAD)	0.678	0.393	−0.225	0.665
Rate of primary enrollment (PRIMARY)	0.572	0.332	−0.350	0.560
Rate of college enrollment (COLLEGE)	0.556	0.435	0.153	0.522
Rate of secondary school enrollment (SECONDARY)	0.416	0.748	−0.270	0.806
Railway Mileage to geographical area (RAILWAY)	0.154	0.744	0.158	0.603
% of industrial employment in capital goods (CAPEMP)	0.084	0.677	0.108	0.478
Female-to-male school enrollment ratio (SEXENRL)	0.526	0.677	0.079	0.742
% of farmers using tractors (TRACTOR)	0.183	0.579	0.307	0.464
Unmetalled roads to geographical area (UNMTROAD)	0.351	0.455	0.254	0.395
% of urban labour force in industry (INDEMP)	0.135	0.401	−0.079	0.186
Livestock units per capita (LIVSTK)	−0.263	0.360	0.099	0.209
% of cultivated area irrigated (IRRIGATE)	−0.076	0.437	0.714	0.708
Crop cash value per capita (CASHV)	−0.157	0.027	0.616	0.405
Extent of commercialization of agriculture (COMMAG)	0.176	−0.082	0.613	0.414
% of cropped area fertilized (FERTILIZ)	0.062	0.565	0.598	0.679
EIGENVALUES	9.850	4.880	2.400	–
VARIATION EXPLAINED (%)	36.500	18.100	8.900	–

by factor 1. It may be noted that many of the indicators, like LITRATE, INDVAD, PRIMARY, COLLEGE, which have maximum loading on factor 1 also have a relatively high loadings on factor 2. Similarly, indicators like SECONDARY, SEXENRL and UNMTROAD which have maximum loading on factor 2 also have relatively high loadings on factor 1. Therefore, this factor also appears to reflect the same underlying phenomenon as factor 1.

However, in view of the high loadings of variables like share of employment in capital goods in total industrial development (CAPEMP), share of industrial employment in total urban labour force (INDEMP) and the extent of tractor use (TRACTOR), a possible interpretation of factor 2 is that it referes to a more capital-intensive stage of development.

Factor 3: This factor accounts for a relatively minor portion of the variation in the data, of about 9 percent. Clustered in it are the indicators of agricultural development, IRRIGATE, CASHV, COMMAG, FERTILIZ. In addition, as expected, TRACTOR and UNMTROAD (primarily farm-to-market roads) also have relatively high loadings on this factor. Therefore, it is clear that this factor monitors the level of agricultural development of a district. It appears to emphasize, firstly, the extent of diffusion of modern technology through development of the irrigation network and by use of mechanical and chemical inputs, secondly, the growth of intersectoral links resulting from the commercialisation of agriculture and, thirdly, the crop sector in relation to livestock activities in agriculture.

Analysis of the variation explained by the three factors reveals clearly the greater importance of modernisation, resulting from urbanisation and industrialisation, in relation to agricultural development in determining the overall level of development of a region. It also emphasizes the role governments can play in influencing the regional pattern of development.

VI. Relatively Developed and Underdeveloped Districts

Before the relatively developed and underdeveloped districts of the country can be identified, it is necessary to test for the robustness of the development ranking of the districts with respect to the technique of constructing the composite indicator. Rankings of individual districts with the different techniques are presented in Table 3.

The correlation between ranks obtained by standardizing the development indicators and their logarithmic values is extremely high at 0.986. Therefore, only one set of rankings generated by the ZSUM technique can conveniently be included in the analysis and the other excluded. The invariance of the rankings is also highlighted by the fact that the rank correlation between ZSUM and WFS is very high at 0.968. A further indication of robustness is that both these techniques identify the same districts

TABLE 3

Individual factor scores, weighted factor scores, z-score sum and ranks of districts

District	Score on Factor I (F_1)	Score on Factor 2 (F_2)	Score on Factor 3 (F_3)	Weighted Factor Score (WFS)	Rank	Z-Score Sum (Z)	Rank
Karachi	4.763	0.604	0.677	48.233	1	67.118	1
Hyderabad	1.061	−0.202	1.318	12.617	6	14.255	7
Thatta	−0.448	−0.536	1.006	−4.612	30	−8.692	35
Sanghar	−0.223	−0.225	1.308	−0.161	18	−2.346	23
Dadu	−0.407	0.368	−0.173	−2.631	25	−1.768	21
Tharparkar	−0.212	−0.309	1.333	−0.404	19	−2.607	24
Khairpur	−0.377	−0.347	0.954	−3.117	26	−5.506	30
Nawabshah	−0.056	−0.615	1.000	−1.314	22	−1.647	20
Sukkur	−0.004	−0.121	0.061	−0.481	21	−1.958	22
Larkana	−0.214	−0.254	0.043	−3.240	27	−5.709	31
Jacobabad	−0.460	−0.400	−0.198	−6.959	37	−11.728	37
Rawalpindi	2.230	0.634	−2.003	20.254	3	31.411	3
Campbellpur	−0.494	0.650	−1.883	−6.209	33	−3.487	26
Jhelum	0.018	1.164	−2.387	0.135	16	7.156	12
Gujrat	−0.575	1.242	−1.110	−2.270	23	1.745	16
Sargodha	−0.476	0.936	−0.145	−0.473	20	7.576	11
Mianwali	−0.390	−0.246	−0.520	−6.284	34	−7.681	32
Jhang	−0.484	0.460	0.043	−2.417	24	−1.506	19
Faisalabad	−0.576	2.299	0.737	7.306	7	16.487	5
Lahore	1.734	1.500	1.520	28.032	2	37.105	2

Sheikhupura	−0.710	1.443	0.479	1.194	12	5.027	13
Gujranwala	−0.274	1.356	0.967	6.234	8	9.504	8
Sialkot	−0.536	1.749	−0.272	2.597	10	8.236	10
Multan	0.002	0.682	0.951	5.622	9	8.429	9
Sahiwal	−0.598	1.033	0.692	0.798	14	2.971	15
Muzaffargarh	−0.815	0.605	−0.113	−5.352	31	−4.721	27
Dera Ghazi Khan	−0.475	−0.264	−0.156	−6.339	35	−11.241	36
Bahawalpur	−0.130	−0.089	0.675	−0.097	17	−3.329	25
Bahawalnagar	−0.525	0.147	0.507	−3.242	28	−5.226	29
Rahimyar Khan	−0.314	0.384	0.699	0.454	15	1.066	17
Peshawar	1.132	0.177	0.775	13.871	5	20.281	4
Hazara	−0.008	−0.525	−1.743	−6.818	36	−7.911	33
Mardan	−0.343	0.718	0.392	1.055	13	4.418	14
Kohat	−0.169	0.151	−1.866	−5.937	32	−4.828	28
Dera Ismail Khan	0.649	−1.193	0.400	1.530	11	−0.231	18
Bannu	0.196	−0.834	−0.969	−4.457	29	−7.950	34
Quetta	2.118	−1.452	1.184	16.620	4	16.288	6
Sibi	−0.544	−0.827	−0.039	−9.480	41	−17.169	42
Loralai	−0.234	−1.499	0.895	−7.468	39	−12.382	38
Chagai	0.069	−1.499	−0.850	−8.691	40	−15.483	40
Kalat	−0.485	−1.296	−0.341	−11.979	43	−19.704	44
Kacchi	−0.748	−0.717	−1.843	−15.276	46	−22.236	46
Mekran	−0.303	−1.606	0.439	−9.764	42	−17.113	41
Kharan	−0.420	−1.632	0.046	−11.985	44	−21.752	45
Lasbella	−0.445	−1.284	−0.719	−12.368	45	−18.905	43
Zhob	0.010	−1.556	0.065	−7.330	38	−14.231	39

as the top ten and bottom ten districts of Pakistan in terms of the level of development.

Given the high degree of stability of the rankings it is now possible to identify the relatively developed and backward districts of the country and of each province separately. Districts which are considered as developed are defined as those which account for the top 25 percent of the population. Similarly, backward districts are taken as those in which the bottom 25 percent of the population lives.[3] The remaining districts are characterized as being at an intermediate level of development.

According to the WFS rankings, the top 25 percent of population lives in six districts as shown in Table 4. These districts include all the provincial capitals as well as the federal capital. It also indicates that provinces which are considered to be relatively underdeveloped, viz., Baluchistan and NWFP, do have pockets of development like Quetta and Peshawar which are ahead of the bulk of the country. As shown in Table 5, the provincial distribution of the top quartile of population corresponds more closely to the overall population distribution than the other quartiles. However, Sind appears to have a disproportionately high share because two of its districts – Karachi and Hyderabad – are in the top six districts. The picture changes significantly under the ZSUM ranking and the distribution of the top quartile of population corresponds even more closely to the overall population distribution by province.

The second quartile of population, in terms of level of development, appears to reside in six districts. The bulk of these districts are in Punjab. It appears that second level growth centres like Gujranwala, Multan, Sialkot, Sheikhupura, Jhelum and Sargodha have emerged in this province.[4] This demonstrates the relatively broad based character of regional development in Punjab. It can be expected that in years to come these second level centres will probably grow relatively fast and play a major role in the diffusion of growth impulses throughout the province.

The third quartile of population lives in 11 districts. The provincial distribution of these districts is more or less in line with their population shares. In this category are included districts of Sind like Sanghar, Tharparkar, Sukkur and Nawabshah and Mardan from NWFP.

[3] It is clear that the assumption is that districts are homogeneous units. In reality, there could be significant differences in the standard of living of population within a district.

[4] It is perhaps a hypothesis worth examining that the dynamism is the consequence of the backward and forward linkages between industry and agriculture which have generated a rapid growth momentum due to the primary impetus provided by the gains in agricultural productivity from the green revolution. These linkages can perhaps best be characterized by the development of capital goods industry for manufacture of agricultural implements and the establishment of agro-based units for the processing of sugarcane, cotton, rice and tobacco crops.

TABLE 4

Distribution of districts by level of development
(According to weighted factor score*)

Relatively developed districts (top quartile of population)	Districts at intermediate level of development (second quartile of population)	(third quartile of population)	Relatively underdeveloped districts (bottom quartile of population)
Karachi	Faisalabad[b]	Mardan	Jhang[e]
Lahore	Gujranwala	Sahiwal	Dadu[e]
Rawalpindi/	Multan	Rahim Yar Khan	Khairpur
Islamabad	Sialkot	Jhelum[d]	Larkana
Quetta[a]	Dera Ismail Khan[c]	Bahawalpur	Bahawalnagar
Peshawar	Sheikhupura	Sanghar	Bannu
Hyderabad[a]		Tharparkar	Thatta
		Sargodha[d]	Muzaffargarh
		Sukkur	Kohat
		Nawabshah	Campbellpur
		Gujrat	Mianwali
			Dera Ghazi Khan
			Hazara
			Jacobabad
			Zhob
			Loralai
			Chagai
			Sibi
			Mekran
			Kalat
			Kharan
			Lasbela
			Kacchi

*Name of districts in each quartile is given in descending order of level of development
[a]According to the ZSUM ranking this district is in the second quartile
[b]According to the ZSUM ranking this district is in the first quartile
[c]According to the ZSUM ranking this district is in the third quartile
[d]According to the ZSUM ranking this district is in the second quartile
[e]According to the ZSUM ranking this district is in the third quartile

The most underdeveloped districts of the country fall in the bottom quartile.[5] As indicated in Table 4, there are 23 such districts – 9 from Baluchistan, 6 from Punjab, 5 from Sind and 3 from NWFP. As expected, bulk of the districts of Baluchistan are highly underdeveloped in relation to the rest of the country and have the lowest rankings. What is perhaps not so expected

[5] If the objective is to identify for each province separately districts accounting for the lowest quartile

is the relatively large number of underdeveloped districts from Punjab. These districts – Jhang, Bahawalnagar, Muzaffargarh, Campbellpur, Mianwali and Dera Ghazi Khan – collectively account for over 15 percent of the population of Punjab. Similarly, Sind has some very underdeveloped districts like Dadu, Khairpur, Larkana, Thatta and Jacobabad. These districts have a share of over 27 percent in the total population of the province.

TABLE 5

Share of provinces in population quartiles by level of development
(According to weighted factor score)

	Punjab	Sind	NWFP	Baluchistan	Total
Top Quartile	41.8	42.1	12.4	3.6	100.0
Second Quartile	96.8	0.0	3.2	0.0	100.0
Third Quartile	64.9	27.6	7.5	0.0	100.0
Bottom Quartile	45.4	23.5	19.4	11.7	100.0
Total[a]	62.0	23.2	10.8	4.0	100.0

[a]These percentages do not correspond to the provincial distribution of total population because of the exclusion of Malakand Division and Centrally Administered Tribal Areas

Therefore, the development rankings obtained from the indicators show that statements about inter-provincial levels of development hide major intra-provincial disparities. Provinces that are considered underdeveloped like the NWFP and Baluchistan do have some highly developed areas like Peshawar, Dera Ismail Khan and Mardan in the former and Quetta in the latter. As opposed to this, a significant part of Punjab and Sind is relatively underdeveloped. Nevertheless, the relative backwardness of the province of Baluchistan appears to be confirmed. Excluding Quetta, the remaining nine districts have systematically the lowest ranking among all the districts included in the study.

of population in terms of level of development, then the names of these districts are given below (in descending order of level of development with respect to the WFS).

Punjab:	Bahawalpur, Gujrat, Jhang, Bahawalnagar, Muzaffargarh, Campbellpur, Mianwali, Dera Ghazi Khan
Sind:	Dadu, Khairpur, Larkana, Thatta, Jacobabad
NWFP:	Hazara
Baluchistan:	Kalat, Kharan, Lasbela, Kacchi

VII. Lagging Sectors in Underdeveloped Districts

Following the identification of the relatively underdeveloped districts of the country it is possible to determine the respects in which they are backward. This is done by correlating the individual and group indicators with the composite indicator of level of development, results of which are shown in Table 6. Several potentially important conclusions follow from the results. However, it needs to be emphasized that no causal significance should be attached directly to these correlations. In particular, determination of the sectoral profile of backwardness in this manner does not necessarily imply that in future allocations of investment funds to underdeveloped areas higher priority should be attached to these sectors. Arriving at this conclusion would require an understanding of the development impact of different types of investments which is not the objective of the research of this paper. Only to the extent that regional equity is an important goal with regard to the access to basic services, and considerations of efficiency are of secondary importance can the results be of some use in guiding investment allocations to different regions of the country.

The first significant finding is the apparently low correlation between income and wealth indicators and the overall composite development indicator of about 0.6. Therefore, indiscriminate use of per capita income of different regions as the development indicator is likely to lead to fundamentally wrong conclusions about the relative level of development of different parts of the country. The only income indicator which has a relatively high correlation is INDVAD.

The powerful association between literacy and level of development which has been observed in other studies is also highlighted by the results. The correlation between LITRATE and WFS is as high as 0.833. Other indicators which are highly correlated with the composite indicator are the housing, transport and sexual equality indicators. The level of provision of basic municipal services like water and electricity to households in a district has perhaps the highest correlation with the overall level of development of the district, with correlation coefficients as high as 0.933 and 0.883 respectively. These two indicators could act perhaps as the best proxies of the level of development. The high degree of association of sexual equality with the level of development demonstrates clearly the basic changes that are likely to occur in the status of women during the process of development.

Altogether, it seems fair to conclude that the relatively backward districts are characterized by relatively poor quality of housing stock with low access to municipal services like water and electricity and with relatively low

TABLE 6

Correlation between individual, group and composite (weighted factor score) indicators

Individual indicator	Correlation with WFS	Croup* indicator	Correlation with WFS
CASHV	–0.005	Income & wealth	0.599
INDVAD	0.720	Housing	0.931
BANKS	0.683	Health	0.807
LIVESTK	–0.051	Education	0.808
IRRIGATE	0.268	Agriculture	0.483
TRACTOR	0.460	Transport and communications	0.855
FERTILIZ	0.415	Sexual equality	0.873
COMMAG	0.251	Employment	0.409
INDEMP	0.267		
CAPEMP	0.388		
LITRATE	0.833		
PRIMARY	0.572		
SECONDARY	0.626		
COLLEGE	0.702		
DOCTOR	0.882		
HOSPBED	0.656		
PUCCA	0.828		
ELEHSE	0.883		
WATHSE	0.933		
GASHSE	0.825		
METROAD	0.793		
UNMETROAD	0.445		
RAILWAY	0.487		
PASLOAD	0.729		
TELEPHON	0.731		
SEXLIT	0.876		
SEXENRL	0.763		

* Indicators in each group are as follows:
Income and wealth – CASHV, INDVAD, BANKS, LIVESTK; Housing – PUCCA, WATHSE, ELECHSE, GASHSE; Health – DOCTOR, HOSPBED; Education – LITRATE, PRIMARY, SECONDARY, COLLEGE; Agriculture – IRRIGATE, FERTILIZ, TRACTOR, COMMAG; Transport – METROAD, UNMTROAD, RAILWAY, TELEPHON, PASLOAD; Sexual equality – SEXLIT, SEXENRL; Employment – INDEMP, CAPEMP

standards of provision of health, education and transport services (especially of metalled roads).

VIII. Trends in Development Ranking of Districts

An earlier study by Helbock and Naqavi (1976) had attempted to establish a development ranking of districts of Pakistan in the '60s. However, the choice of indicators was somewhat different from this study. But the same techniques of normalization of indicators and principal components analysis were also used in their study. Therefore, given the relative paucity of research of this type in Pakistan and the substantial similarity of methodology, an attempt has been made to compare the results of Helbock and Naqavi with the findings of our study. Such a comparison can also give an indication of the trend in development ranking over time as the latter relates primarily to the '70s and the former to the '60s.

Table 7 presents the two sets of rankings. It is clear that at either end of the scale the rankings have proved to be quite robust. There is close correlation in the lowest eight rankings (all districts of Baluchistan) and near perfect correlation in the top nine rankings. The overall rank correlation coefficient is 0.84. However, there appears to be some volatility in the intermediate rankings. This implies that many districts have significantly altered their relative position over time. It is possible, therefore, to identify districts which appear to have performed exceptionally well and others which have lagged behind.

Examples of districts that have shown a high degree of dynamism are Tharparkar (change in rank from 34 to 19) in Sind province, Sheikhupura (21 to 12), Sialkot (26 to 10) and Jhang (33 to 24) in Punjab and Dera Ismail Khan (35 to 11) in the NWFP. While it is not possible from this study to establish the casual factors behind this dynamism, these districts are excellent potential case studies of fast regional development in Pakistan. It is recommended that further research should be undertaken to quantify the growth performance of these districts and to identify the sources of this growth. It is possible that lessons learned from the growth experience of areas could be replicated in other parts of the country.

Districts which have deteriorated most in terms of their relative level of development appear to be Jacobabad (change in rank from 24 to 37) in Sind, Dera Ghazi Khan (25 to 35), Bahawalnagar (18 to 28) and Mianwali (23 to 34) in Punjab, and Bannu (11 to 29) in the NWFP. Perhaps research of the type indicated above could also be undertaken in these districts to determine the particular bottlenecks to development which have emerged in these areas.

TABLE 7

Comparison of development ranking of districts from different studies

District	Rank in Helbock & Naqavi	Rank in Pasha & Hasan	District	Rank in Helbock & Naqavi	Rank in Pasha & Hasan
Karachi	1	1	Multan	8	9
Hyderabad	6	6	Sahiwal	17	14
Thatta	37	30	Muzaffargarh	31	31
Sanghar	10	18	Dera Ghazi Khan	25	35
Dadu	30	25	Bahawalpur	20	17
Tharparkar	34	19	Bahawalnagar	18	28
Khairpur	28	26	Rahim Yar Khan	12	15
Nawabshah	22	22	Peshawer	3	5
Sukkur	19	21	Hazara	36	36
Larkana	32	27	Mardan	15	13
Jacobabad	24	37	Kohat	29	32
Rawalpindi/Islamabad	4	3	Dera Ismail Khan	35	11
Campbellpur	27	33	Bannu	11	29
Jhelum	9	16	Quetta	5	4
Gujrat	13	23	Sibi	40	41
Sargodha	15	20	Loralai	43	39
Mianwali	23	34	Chagai	38	40
Jhang	33	24	Kalat	42	43
Faisalabad	7	7	Kacchi	45	46
Lahore	2	2	Mekran	44	42
Sheikhupura	21	12	Kharan	39	44
Gujranwala	14	8	Lasbela	46	45
Sialkot	26	10	Zhob	41	38

IX. Summary and Conclusions

This study represents an attempt at the quantification of the level of development attained by the different districts of Pakistan. Development has been seen as a multi-dimensional and not a purely economic phenomenon. Twentyseven development indicators have been included in this study. An attempt has been made to achieve as wide a sectoral coverage as possible. However, lack of adequate secondary data has constrained the choice of indicators and led in some cases to the selection of relatively crude proxies and resort to unconventional sources of data.

Two techniques – the ZSUM and the WEIGHTED FACTOR SCORE – have been used to arrive at a composite measure of the level of development. The first involves the standardization of the individual development indicators and their summation for each district. The second is based on principal components analysis which clusters indicators into factors and generates individual factor scores which are weighted by the respective eigenvalues and then summed to give the overall level of development.

Development rankings of districts appear to be quite robust with respect to the choice of ranking technique. Both techniques, in fact, identify the same districts as the top ten and bottom ten districts of Pakistan in terms of level of development.

Relatively developed and underdeveloped districts have been defined somewhat arbitrarily as the districts accounting for the top and bottom quartile of the national population respectively. The former consists of six districts which include all the provincial capitals and the federal capital. Twentythree districts fall in the latter category. Nine districts are from Baluchistan, six from Punjab, five from Sind and three from the NWFP. Bulk of the districts of Baluchistan appear to be highly underdeveloped in relation to the rest of the country and consistently have the lowest rankings. However, it is interesting to note that about 15 percent of the population of Punjab and 27 percent of Sind lives in the relatively underdeveloped districts.

Therefore, the development rankings indicate that statements about inter-provincial levels of development hide major intra-provincial disparities. Provinces that are considered relatively underdeveloped like Baluchistan and the NWFP do have some highly developed pockets like Quetta, Peshawar, Mardan and Dera Ismail Khan. As opposed to this, a significant part of Punjab and Sind appears to be relatively underdeveloped.

Analysis of the magnitude of the development indicators in the relatively underdeveloped areas indicates that the profile of backwardness is primarily of a poor quality of housing stock with low access to municipal services

like water and electricity and with relatively low standards of provision of health, education (particularly secondary and college levels) and transport (especially metalled roads). An important conclusion also is the apparently low correlation between the group of income and wealth indicators and the composite development indicator of 0.6. It is likely, therefore, that use of per capita income as the indicator of development is likely to lead to fundamentally wrong conclusions about the level of development of different parts of the country.

This study has also attempted a preliminary analysis of the trend in development ranking of the districts over time. The basic conclusions seems to be that at either end of the scale the rankings have proved to be quite robust. However, there appears to be considerable volatility in the intermediate rankings. As such, districts that have shown exceptional dynamism and those that have lagged behind have been identified. These districts constitute excellent case studies of regional development in Pakistan and it is recommended that further research be undertaken on them.

Finally, it needs to be emphasized that one of the basic objectives of this study was to identify the nature of the existing data base for research on regional development in Pakistan. A number of basic data constraints have been identified. It is recommended that henceforth the various censuses of population, manufacturing (large scale and small scale), agriculture, livestock and housing should give data on the key magnitudes at the district level. In addition, the periodic surveys on population growth, labour force, household income and expenditure, etc., should also provide district data wherever possible.[6] Following the next round of censuses and surveys in the early '80s, results of this study could be further updated.

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Statistical Appendix

Described below are the sources of data for and the methodology construction of the 27 individual development indicators used in the study.

1. CASHV: Crop Cash Value Per Capita

This indicator is based on a valuation of the output of 33 major and minor crops, including fruits and vegetables.

[6] Publications from the census of population, large-scale manufacturing and agriculture do provide most of the data at the district level. This is, however, not the case with the small-scale manufacturing census and the housing survey. In the case of periodic surveys of population growth, labour force, household income and expenditure, etc., generation of data would at the district level probably require a significant enlargement in the size of samples if the sampling errors are to be restricted.

$$\text{Total Cash Value of Crops} = \sum_{i=1}^{33} P_i Q_i$$

where P_i = Post-harvest wholesale price of ith crop
Q_i = Output of ith crop.

Wholesale prices were used for the nearest market either in the relevant district or in a neighbouring district as there is no published data on farm-gate prices. Post-harvest prices were used to make this consistent with the procedure adopted in the National Income Accounts. The postharvest period ranges from two to five months with due allowance made for double cropping. In the case of vegetables, due to multiple cropping in the case of a number of vegetables, actual acreage was taken.

Some adjustments were made, where possible, in the case of commodities where a quality-wise price differential existed. Here the typical proportions were used to construct a weighted average of prices where only quality-wise price data was available at the district level while where only quality-wise output data was available, the weighted aggregate of output was obtained using the typical quality-wise price ratio and the given district-wise prices applied to this.

Rice and sugar cane posed special problems in the computation of prices. In the case of rice, data related to milled rice and appropriate conversions were used to obtain the weight of paddy and an estimate for the price of paddy.

In the case of sugar cane, the price of sugar cane in the manufacture of *gur* is not known. However, this was estimated by using data on sugar cane used in the non-mill sector and the output of *gur* to obtain the extraction ratio. The price of sugar cane for *gur* was thus obtained using this extraction ratio, i.e., dividing the price of *gur* by the inverse of the extraction ratio, and introducing a markup for 10 percent value added.

The cash value of crops indicator does not include any deduction for inputs used and is therefore not a measure of value added.

The cash value of fisheries catch was included in this for the coastal districts of Sind and Baluchistan to reflect more accurately income from agriculture.

Since the cotton crop in 1975-76 suffered from floods and pest attack, the value of the crop in a normal year, 1973-74 valued at 1975-76 prices was spliced onto the index.

The final index was obtained by dividing district-wise cash value by the estimated 1975-76 rural population for the district, obtained by projecting the 1972 population, using the intercensal (1961-72) growth rate for the district.

2. INDVAD: Industrial Value Added Per Capita

This index was constructed directly from the 1975-76 *Census for Manufacturing* figures for "gross value added in manufacturing." This was simply divided by estimated total urban population for the district, by using district-wise intercensal growth rates in the 1960s.

3. BANKS: Commercial Bank Branches Per 100,000 Population

Lists of branches of each commercial bank by location are given in *Banking Statistics of Pakistan*. Branches were allocated to districts on the basis of the location. The latest available data was for 1975-76. The number of branches was then divided by the projected population of the district for the year.

4. LIVSTK: Livestock Per Capita

This index was calculated from 1972 *Agricultural Census* to obtain a stock measure for livestock. Weights suggested by the FAO to reflect the capital value of various animals and poultry were used to obtain a weighted aggregate of livestock population using the figures for livestock population in the Census.

These weights are:

Buffaloes, Horses and Mules	= 1.00
Camels	= 1.10
Cattle and Donkeys	= 0.80
Sheep and Goats	= 0.10
Poultry	= 0.01

1972 rural population figures were used to obtain per capita values.

The following three indices were constructed directly from the 1972 *Agricultural Census.*

5. IRRIGATE: Percentage of Cultivated Area Irrigated

All types of irrigation, canal, tubewell, etc., were included in the numerator.

6. TRACTOR: Percentage of Farmers Using Tractors

Both farm households owning tractors and farm households reporting use of tractors were included in this measure.

7. FERTILIZ: Percentage of Cropped Area Fertilized

Only farms reporting any area fertilized were included and therefore the indicator does not measure amount of fertilizer use.

8. COMMAG: Extent of Commercialization of Agriculture

This indicator involved a calculation of amount of wheat marketed to obtain a measure of commercialization. The wheat marketing includes wheat marketed from rural to urban areas as well as wheat marketed within rural areas.

Firstly, the size distribution of farms was determined for each district in the following categories: less than 5 acres, 5-12.5 acres, 12.5-25 acres, 25-50 acres, over 50 acres. An average income for each of the farm categories was estimated by dividing the total value added in agriculture in 1972 by the total acreage. Thus income = (income per acre) (average size in size category i).

The production of wheat in each size category for the district in 1972 was calculated as: output = (area in size category i under wheat) (yield in district).

The consumption of wheat in each size category for the district in 1972 was calculated using *Household Income and Expenditure Survey* data. Household consumption in each income (farm size) category can be taken directly from the survey. In addition, an allowance was made for wheat consumption and for wastage.

Wheat marketed = output – consumption.
If output $<$ consumption, marketing = 0.

Total wheat marketed in district = Σ amount marketed by all size categories.
Percentage marketed = (output marketed)/(production).

This percentage was then applied to the district-wise wheat value of production figures for 1975-76.

The COMMAG index was calculated on the assumption that all other crops except fodder crops were totally marketed. It therefore tends to over-estimate the percentage of output marketed.

9. INDEMP: Percentage of Urban Labour Force in Industry

The urban labour force for 1975-76 in each district was estimated using the province-wise figures for labour from participation rates in urban areas in the 1974-75 *Labour Force Survey* and applying it to the estimated urban population for 1975-76.

Figures for industrial employment were obtained directly from the *Census of Manufacturing Industry* (CMI), (1975-76).

10. CAPEMP: Share in Industrial Employment of Intermediate and Capital Goods Industry

This was obtained directly from the CMI by dividing employment in capital and intermediate goods industries by total industrial employment. However, estimation of the former required a detailed examination of the original census computer printouts by unit showing level of employment and location.

11. LITRATE: Literacy Rate

This is taken directly from the *Population Census.*

12. PRIMARY: Primary School Enrollment Rate

The index involved the estimation of 1975-76 (for Sind) and 1976-77 (for other provinces) population in the 5-9 year bracket. This was done by using the intercensal growth rate for total population in the district and applying it to the 1972 figures for 5-9 years. Data on level of enrollments was obtained from the *Development Statistics* of each province.

13,14. SECONDARY, COLLEGE: Enrollment Rates

The same procedure was followed for projecting populations in the 9-14 and 15-19 year age brackets.

Since published data on enrollment for the required year was not available for NWFP, unpublished data was obtained directly from the provincial government.

15. DOCTOR: Number of Doctors Per 10,000 Population

Data on doctors were obtained for 1977-78 from the mailing list of the pharmaceutical company, *Glaxo*, the second largest pharmaceutical company in Pakistan. This was divided by the population in 1977-78. Data on doctors in government hospitals was available in the provincial *Development Statistics* for 1975-76 and this was divided by

the 1975-76 population. On the assumption that the ratio of government doctors did not change much over two years, the two ratios were added to obtain the DOCTOR indicator.

16. BEDS: Hospital Beds

Data on hospital beds per 10,000 population was obtained from the provincial governments for 1975-76 and from the *Development Statistics.*

17,18,19,20. HOUSING

The same methodology outlined below was followed for all four indicators: PUCCA, ELECHSE, GASHSE, WATHSE.

Data on the distribution of each of these indicators is available for different town sizes by province in the 1973 *Housing, Economic and Demographic Survey.*

The town size categories are: less than 10,000 population, 10,000-25,000, 25,000-50,000, 50,000-100,000, over 100,000. For the last category the survey reports the relevant magnitudes for each city with population above 100,000. The procedure adopted was to assume the similarity of the distributions between towns in each size category. The total population in each size category for a district was taken from the 1972 *Population Census.*

$$\text{The \% of pucca houses in the district} = \sum_i P_i W_i$$

i refers to the ith town size category.

P_i refers to the % of pucca houses in category i.

W_i is the weight, representing the proportion of total houses in the district in category i. W_i was calculated by taking (*Total pop. in i/Av. no. per house in i*)/(Total pop. in district/Av. no. per house in district).

21,22. METROAD and UNMTROAD: Metalled and Unmetalled Road Mileage Per Unit of Geographical Area

Metalled road mileage and unmetalled road mileage to geographical area was obtained directly from the 1972 district *Population Census Reports* and also by examination of district maps of road network made available by the Provincial Highways Departments.

23. RAILWAY: Railway Mileage Per Unit of Geographical Area

Data on railway mileage was obtained from the Pakistan railway maps. A weighting system was developed to aggregate track mileage whereby double track = 2 single track and broad gauge = 1.7 meter gauge.

24. PASLOAD: Passenger Load Carrying Capacity Per Capita

Data on vehicle registrations for each district was aggregated into a single measure of vehicles, the weights reflecting the passenger load carrying capacity of the vehicle. The weights used are as follows:

Scooters and motorcycles	= 1.5
Motor cars, jeeps and station wagons	= 2.5
Taxis	= 3.0
Autorickshaws	= 2.0
Buses	= 55.0

Vehicle registration data for each district of Baluchistan was not available. It was assumed, therefore, that 60% of Baluchistan vehicles were registered in Quetta with the remaining 40% being apportioned amongst districts according to road mileage.

25. TELPHON: Telephones Per 1,000 Population

Number of telephones in each district was determined by going through each page of the different regional directories and determining the number of domestic telephone connections by location and then allocating to districts on the basis of location. Industrial, commercial and government connections were excluded.

26,27. SEXLIT and SEXENRL: Female to Male Literacy Ratio and School Enrollment Ratio

The ratios were obtained by dividing the female rate by the male rate.

TABLE S.1

Magnitude of development indicators by districts of Pakistan.

PROVINCE/ DISTRICT	CROP CASH VALUE PER CAPITA	INDUSTRIAL VALUE ADDED PER CAPITA	COMMERCIAL BANK BRANCHES PER 100,000 POPULATION	LIVESTOCK PER CAPITA	% OF CULTIVATED AREA IRRIGATED	% OF FARMERS USING TRACTORS	% OF CROPPED AREA FERTILIZED	EXTENT OF COMMERCIALIZATION OF AGRICULTURE	% OF URBAN LABOR FORCE IN INDUSTRY	% OF INDUSTRIAL LABOR FORCE IN CAPITAL AND INTER-MEDIATE INDUSTRIES	LITERACY RATE	PRIMARY SCHOOL ENROLLMENT RATE	SECONDARY SCHOOL ENROLLMENT RATE	COLLEGE ENROLLMENT RATE
	1975-76	1975-76	1975-76	1972	1972	1972	1972	1975-76	1975-76	1975-76	1972	1976-77	1976-77	1976-77
	Rs.	Rs.	No.	No.	%	%	%	%	%	%	%	%	%	%
SIND:	0570.0	299.8	06.4	0.55	90.0	05.7	49.0	84.2	13.4	24.8	30.1	38.6	20.9	2.5
Karachi	0250.6	908.2	16.3	0.24	69.8	14.9	56.0	94.2	16.8	29.5	51.2	73.3	48.6	2.8
Hyderabad	0691.1	177.1	01.9	0.42	86.8	06.7	64.0	88.5	13.6	03.4	27.0	28.2	11.4	4.2
Thatta	0748.2	076.9	03.0	0.50	90.0	06.5	18.0	98.7	06.2	32.2	20.0	18.2	03.3	0.4
Sanghar	0984.6	002.3	04.4	0.63	92.7	06.4	84.0	82.7	01.0	00.0	19.5	34.7	11.3	2.4
Dadu	0360.0	278.2	03.5	0.54	78.1	00.3	48.0	80.1	23.4	47.8	24.2	26.7	09.8	1.3
Tharparkar	0885.1	020.8	03.7	0.88	89.6	15.4	79.0	78.4	04.1	02.2	15.4	31.9	09.9	2.0
Khairpur	0792.1	045.7	03.5	0.61	95.7	07.6	67.0	86.2	10.7	03.4	17.6	34.0	12.5	2.3
Nawabshah	0517.4	077.4	03.7	0.46	91.6	09.3	82.0	79.2	02.9	00.0	22.7	23.7	10.6	1.8
Sukkur	0341.3	022.3	02.5	0.54	92.4	02.6	21.0	79.5	02.1	15.9	26.0	32.0	18.3	2.1
Larkana	0275.2	001.4	02.6	0.53	93.2	00.2	34.0	84.9	00.3	00.1	21.7	35.4	10.8	2.6
Jacobabad	0240.1	101.6	02.6	0.45	93.3	02.0	03.0	72.9	02.6	00.0	16.3	20.7	06.6	1.3
PUNJAB:	0584.9	115.8	06.5	0.85	74.6	20.4	43.0	81.3	08.3	32.3	21.5	31.5	32.8	2.9
Rawalpindi	0262.2	324.9	14.1	0.59	05.7	11.4	06.0	61.2	07.6	23.1	42.5	41.2	57.7	4.7
Campbellpur	0493.4	105.8	07.8	0.66	02.8	18.3	04.0	60.3	12.7	03.6	19.6	36.1	34.8	1.4
Jhelum	0425.5	419.9	10.2	0.49	07.2	06.1	03.0	70.9	15.5	05.3	32.8	49.9	50.5	4.9
Gujrat	0462.4	070.4	07.6	0.55	65.6	16.1	21.0	67.6	09.1	39.2	22.4	40.8	38.3	2.0
Sargodha	0814.2	071.3	06.3	2.60	58.3	12.1	20.0	82.0	06.5	01.5	19.9	32.2	31.0	2.4
Mianwali	0734.5	142.5	04.4	0.63	26.9	07.4	12.0	77.2	12.5	00.0	15.5	26.1	22.8	1.2

Jhang	0556.0	057.0	04.5	0.82	92.1	08.1	43.0	77.3	05.1	13.9	15.3	26.9	24.1	2.4
Faisalabad	0555.0	137.2	05.7	1.44	97.7	37.5	82.0	86.5	13.9	47.7	21.4	33.4	28.2	2.7
Lahore	0626.7	133.1	09.7	0.66	95.8	30.0	55.0	85.3	05.2	50.3	32.5	38.6	48.3	6.8
Sheikhupura	0618.0	291.3	05.0	0.63	98.1	24.5	55.0	85.9	21.4	45.0	17.0	29.4	28.6	1.6
Gujranwala	0723.0	046.8	06.1	0.62	90.7	38.2	52.0	87.0	04.9	46.0	21.8	32.4	33.0	2.7
Sialkot	0482.7	028.9	05.1	0.39	64.7	28.9	45.0	83.0	05.4	69.4	20.4	39.9	38.6	2.4
Multan	0739.8	071.9	06.4	0.60	94.8	23.7	73.0	84.9	09.5	05.1	16.1	26.7	26.0	2.4
Sahiwal	0683.4	039.4	05.0	0.63	97.3	34.8	63.0	82.5	07.7	10.3	15.4	27.2	26.4	1.9
Muzaffargarh	0488.4	073.4	03.9	0.68	74.1	13.6	31.0	75.4	29.5	47.5	11.8	24.6	19.7	1.2
Dera Ghazi Khan	0381.5	004.2	03.1	0.56	80.1	03.4	17.0	64.3	00.6	05.3	10.6	21.5	19.6	1.3
Bahawalpur	0537.3	003.3	05.2	0.51	95.5	10.6	50.0	70.4	01.3	09.7	13.0	18.5	26.6	3.0
Bahawalnagar	0688.0	048.0	04.3	0.68	87.7	11.9	27.0	82.2	01.9	00.0	12.7	23.2	26.6	2.0
Rahim Yar Khan	0831.8	219.8	06.3	0.54	95.7	14.9	61.0	82.3	12.1	02.2	13.8	20.5	27.4	1.9
NWFP:	0420.1	161.7	07.5	0.32	54.6	17.2	33.0	81.1	29.1	08.6	16.5	45.0	14.9	2.0
Peshawar	0612.2	273.9	10.3	0.26	77.9	26.3	71.0	92.6	50.2	14.1	18.3	37.1	16.1	2.1
Hazara	0128.8	058.8	06.2	0.30	13.1	02.8	20.0	74.8	16.0	00.0	17.8	32.6	14.7	1.5
Mardan	0593.7	267.1	07.7	0.36	69.0	45.7	70.0	89.1	40.0	09.4	12.1	30.7	15.1	1.9
Kohat	0269.0	168.9	07.5	0.40	18.8	23.1	10.0	46.1	23.9	00.0	20.4	38.3	20.5	1.3
Dera Ismail Khan	0951.1	025.0	04.7	0.54	51.8	06.2	04.0	78.7	02.4	02.2	14.2	42.1	14.9	2.8
Bannu	0420.8	064.8	05.5	0.27	30.5	04.4	04.0	50.2	11.5	04.1	13.8	25.1	14.0	2.2
BALUCHISTAN:	0409.8	011.3	04.2	0.39	40.1	07.5	10.0	84.7	01.3	00.0	09.4	23.7	07.5	1.9
Quetta	0426.9	054.1	05.0	0.07	47.3	46.7	11.0	91.3	02.8	00.0	23.9	39.0	15.8	4.7
Sibi	0240.1	000.0	03.2	0.36	85.7	10.3	31.0	60.2	00.0	00.0	05.9	11.3	03.7	0.7
Loralai	1376.9	000.0	03.0	0.73	29.2	00.6	00.0	93.0	00.0	00.0	06.5	24.9	06.4	1.6
Chagai	0035.4	000.0	07.1	0.29	07.2	00.4	01.0	90.5	00.0	00.0	11.1	24.6	07.0	1.0
Kalat	0387.6	000.0	03.2	0.47	33.1	00.0	00.0	84.9	00.0	00.0	07.7	22.2	04.6	0.8
Kacchi	0332.6	000.0	03.7	0.48	26.4	00.0	00.0	20.5	00.0	00.0	05.6	30.1	10.4	0.9
Mekran	0893.4	000.0	05.0	0.41	30.7	00.0	00.0	99.5	00.0	00.0	05.8	15.5	04.0	0.6
Kharan	0388.2	000.0	02.4	0.44	05.4	00.0	00.0	99.0	00.0	00.0	05.7	11.2	02.3	0.1
Lasbela	0353.6	000.0	07.0	0.70	10.2	00.0	00.0	89.6	00.0	00.0	05.6	26.2	04.9	0.5
Zhob	0443.9	000.0	03.9	0.30	34.1	06.7	00.0	90.3	00.0	00.0	07.1	16.3	04.6	0.5

TABLE S.1

Magnitude of development indicators by district of Pakistan.

PROVINCE/ DISTRICT	NUMBER OF DOCTORS PER 10,000 POPULATION	HOSPITAL BEDS PER 10,000 POPULATION	% OF PUCCA DWELLING UNITS	% OF DWELLING UNITS WITH ELECTRICITY	% OF DWELLING UNITS WITH INSIDE WATER CONNECTIONS	% OF DWELLING UNITS USING GAS	METALLED ROAD MILEAGE PER 100 SQ. MILLES OF GEOGRAPHICAL AREA	UNMETALLED ROAD MILEAGE PER 10 SQ. MILES OF GEOGRAPHICAL AREA	RAILWAY MILEAGE PER 100 SQ. MILES OF GEOGRAPHICAL AREA	PASSENGER CARRYING CAPACITY PER 1,000 POPULATION	TELEPHONES PER 1,000 POPULATION	RATIO OF FEMALE TO MALE LITERACY RATE	RATIO OF FEMALE TO MALE SCHOOL ENROLLMENT RATE
	1977-78	1975-76	1973	1973	1973	1973	1972	1972	1972	1972	1975-76	1972	1972
	No.	No.	%	%	%	%	Miles	Miles	Miles	No.	No.		
SIND:	2.54	07.00	23.7	21.3	13.5	04.64	007.22	11.31	04.10	31.9	08.5	37.2	47.7
Karachi	6.15	15.25	77.1	51.8	35.5	15.75	117.47	36.71	06.24	80.4	19.3	80.7	86.0
Hyderabad	2.59	07.84	13.1	20.8	14.9	03.61	012.22	33.32	05.24	47.5	07.2	46.5	46.4
Thatta	0.72	02.54	02.7	06.1	02.8	00.10	003.97	02.40	02.73	00.9	02.1	30.6	12.2
Sanghar	0.84	02.61	05.8	13.7	06.3	00.83	007.56	03.93	03.60	03.9	02.8	24.8	16.7
Dadu	0.89	04.32	04.8	07.6	03.6	00.52	003.19	14.25	03.59	01.8	05.5	27.1	19.5
Tharparkar	1.20	03.91	07.4	09.2	04.1	00.50	001.44	00.80	01.77	14.4	03.7	32.4	21.4
Khairpur	0.74	03.09	04.0	08.5	04.0	00.50	002.60	01.04	01.88	05.7	03.5	14.6	12.2
Nawabshah	0.70	01.46	10.6	08.0	03.5	00.39	005.52	28.38	12.68	04.8	03.3	25.7	13.1
Sukkur	1.26	04.61	07.3	14.5	08.0	01.63	003.72	17.65	06.29	10.1	07.5	29.0	13.0
Larkana	0.40	04.52	08.0	09.6	04.6	00.53	006.28	24.15	04.80	07.4	04.0	24.9	17.9
Jacobabad	0.75	03.29	07.5	09.1	04.1	00.51	004.96	08.24	09.29	04.1	02.5	18.4	06.7
PUNJAB:	1.13	06.33	04.7	16.5	07.4	01.42	009.43	12.19	05.29	16.1	06.8	37.4	53.1
Rawalpindi	3.74	11.85	20.0	31.2	18.5	09.90	026.26	35.37	06.37	71.6	22.2	42.5	67.1
Campbellpur	0.99	04.27	01.4	08.3	02.6	00.19	010.97	25.00	05.93	04.7	03.7	21.0	41.3
Jhelum	0.98	04.17	02.5	10.5	03.7	00.80	011.18	30.01	04.43	07.3	05.4	28.4	49.7
Gujrat	0.44	02.77	01.5	10.4	02.4	00.09	010.20	22.87	04.47	08.8	04.5	31.5	50.9
Sargodha	0.93	07.74	02.1	13.3	04.7	00.09	015.79	23.72	05.45	15.0	03.7	27.4	41.2
Mianwali	0.69	03.89	01.9	11.5	03.8	00.19	009.98	09.23	03.74	09.8	01.4	17.9	29.0

Jhang	0.44	03.44	02.0	11.2	03.3	00.57	014.38	25.96	03.61	11.0	03.4	25.9	34.0
Faisalabad	0.53	02.42	04.0	16.7	06.3	01.44	015.07	21.30	10.69	20.2	06.6	36.8	70.3
Lahore	3.38	12.52	18.6	46.8	29.2	04.34	015.58	00.04	13.30	37.4	13.0	61.9	88.8
Sheikhupura	0.45	01.77	02.3	10.1	03.5	00.68	012.20	00.04	08.48	05.2	01.9	33.6	47.4
Gujranwala	0.57	01.47	03.7	19.9	08.6	00.80	009.56	01.17	06.25	09.9	07.8	40.6	70.8
Sialkot	0.51	03.56	01.9	11.7	05.1	00.09	013.88	32.60	07.34	05.7	06.6	38.6	56.0
Multan	1.17	03.92	03.2	18.8	06.3	01.17	011.28	20.74	08.60	14.9	13.5	32.2	42.2
Sahiwal	0.51	02.71	02.3	09.9	04.0	00.41	009.94	23.39	07.18	09.4	02.6	31.7	46.2
Muzaffargarh	0.42	01.82	01.3	06.3	02.2	00.13	006.79	00.37	03.10	03.8	05.8	23.2	36.5
Dera Ghazi Khan	0.58	03.29	02.4	09.5	03.4	00.82	003.11	00.01	02.93	11.9	02.8	26.0	57.3
Bahawalpur	1.52	05.39	02.0	12.7	04.5	00.18	002.98	00.60	02.03	10.9	05.0	36.3	48.6
Bahawalnagar	0.40	02.80	02.3	10.2	03.6	00.64	007.29	00.73	07.17	05.4	02.3	27.4	36.3
Rahim Yar Khan	0.74	03.22	02.3	09.9	03.6	00.69	007.54	12.62	04.25	11.8	04.2	32.7	39.8
NWFP:	1.23	05.94	05.4	24.3	04.6	01.23	009.24	06.43	02.70	46.0	06.4	20.1	23.9
Peshawar	2.89	07.71	08.3	32.0	08.9	00.29	022.97	09.51	05.72	90.7	12.2	31.3	43.5
Hazara	0.60	04.95	02.4	12.7	01.9	00.60	006.11	07.13	00.84	19.9	04.4	21.8	15.8
Mardan	0.53	02.28	04.6	15.3	03.0	00.09	017.84	04.13	05.93	33.2	02.8	14.2	23.0
Kohat	0.80	05.58	05.8	25.0	01.2	00.80	007.46	07.24	05.10	22.0	06.1	14.9	18.2
Dera Ismail Khan	0.97	10.80	04.4	25.6	03.9	00.97	006.53	05.78	00.47	57.1	06.4	26.2	29.6
Bannu	0.64	08.20	04.7	22.0	04.7	00.64	008.67	03.07	04.22	46.7	08.5	12.5	20.0
BALUCHISTAN:	1.32	06.98	03.4	05.3	04.9	00.16	000.99	04.33	01.04	17.8	09.2	23.8	19.0
Quetta	4.37	20.77	09.8	14.4	13.9	00.41	003.46	12.21	03.36	55.6	26.1	42.4	51.6
Sibi	0.29	03.10	01.8	02.9	02.5	00.10	001.31	07.98	01.07	18.5	05.4	18.5	27.9
Loralai	0.53	04.63	01.3	02.4	01.9	00.08	001.45	04.35	00.00	18.7	03.4	18.6	12.8
Chagai	1.29	10.81	01.7	03.6	03.4	00.09	000.86	02.79	02.72	17.9	00.0	14.8	21.1
Kalat	0.40	02.01	01.5	02.5	02.0	00.09	001.25	02.83	00.72	00.0	04.5	16.4	11.0
Kacchi	0.24	03.53	01.3	02.6	02.2	00.08	002.64	01.70	02.19	00.0	06.1	18.4	10.4
Mekran	0.82	01.63	03.3	05.3	05.2	00.15	000.05	05.55	00.00	00.0	03.1	11.3	05.1
Kharan	0.11	02.39	01.2	02.5	02.1	00.08	000.00	01.97	00.00	00.0	00.7	38.0	01.6
Lasbela	1.13	01.07	01.3	02.4	01.9	00.08	001.66	02.19	00.00	00.0	02.1	16.7	07.3
Zhob	0.59	07.57	02.5	03.6	03.3	00.12	001.23	07.13	02.43	18.8	11.2	13.7	23.6

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