Measuring human wellbeing in Pakistan: objective versus subjective indicators

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Abstract

The concern for measuring wellbeing objectively and subjectively is found in modern political philosophy. This study explores objective indicators versus subjective perceptions of human wellbeing in ranking of survey data for districts of Pakistan. Data used for the analysis is 'The Pakistan Social and Living Standards Measurement Survey' for the year 2006-07. The human wellbeing is examined in four domains: education, health, living conditions and economic situation. Principal component analysis is employed for indexing human wellbeing for hundred districts, rated in five quintiles are generated. The paper demonstrates the importance of education domain in determining the human wellbeing. Objective indicators of education: literacy rate, net primary enrolment and gender equality in education are positively correlated with subjective satisfaction in education facilities. Economic status of the households and communities are important variables in subjective perception of wellbeing. The results indicate substantial variation in objective wellbeing among districts of Pakistan It may be considered that disparity in objective condition and in subjective perceptions are adequately depicting wellbeing differences.

Keywords: Well-being, objective indicators, subjective indicators, quality of life, ranking

Introduction

A challenging agenda laid down by recent trends in the social and behavioral sciences is to design scientific ways of measuring human wellbeing. During the last few decades, two new scientific approaches to measuring quality of life have been initiated – objective or social indicators, and the measurement of subjective wellbeing. The growth of the objective indicators movement coincided with the questioning of economic growth in terms of whether 'more' was always better (Land, 1996). These indicators reflect people's objective circumstances in a given cultural or geographic unit. The hallmark of social indicators is that they are based on objective, quantitative statistics rather than on individuals' subjective perceptions of their social environment. Subjective well-being research, in contrast, is concerned with individuals' subjective experience of their lives. It is argued that social indicators and subjective well-being measures are necessary to evaluate a society, and add substantially to the regnant economic indicators that are now favored by policy makers. Each approach to measuring wellbeing contains information that is not contained in the other measures.

Human wellbeing in a place can be analyzed in terms of two major dimensions objective and subjective dimensions (Campbell *et al*, 1976). Research that focuses on the objective dimension, for example considering socio-economic indices at regional or national levels, can be used to assess the level of living and to portray the achievement or failure in certain domains of quality of life for a place

(Diener and Suh, 1997). Studies that concentrate on the subjective dimension argue that an individual's cognitive perception or satisfaction with a place deserve equivalent attention because such a perception reveals the subjective evaluation of the life experience (Veenhoven, 2007).

However, the principal thrust of human wellbeing has been to supplement traditional economic indices of wellbeing with alternative indicators that capture non-economic or non-material dimensions of human life. In particular, it is now commonly accepted that human wellbeing should be treated as a multidimensional concept along the lines advocated by Sen (1993). He emphasizes on promotion of human wellbeing and development by adding another dimension of wellbeing research. He argues that quality of life does not depend merely on opportunities but is also determined by human capabilities. Classifying various wellbeing definitions, distinction between objective and subjective definitions of wellbeing is important which is based on the selection process of the criteria that are used to judge individuals' wellbeing. Objective definitions assume that the criteria can be defined without reference to the individual's own preferences, interests, ideals, values, and attitudes. The objective indicators of wellbeing are only proxies; these are indirect measures of true conditions that researchers try to evaluate. It is assumed that the objective circumstances influence satisfaction within specific life domain (Sumner, 1996). In contrast, subjective wellbeing 'is the scientific name for how people evaluate their lives' which is related to (a) life satisfaction, (b) the sense of happiness (c) a reduced level of anxiety and pessimism. It also depends on what meaning and purpose in life people attach to their sense of humility, equanimity, grace, perspective and lack of fear of death. These aspects help people to take care of hopelessness, depression, stress and negative affects of events: they lead to a better sense of wellbeing and help people manage their lives through difficult experiences. Its measurement involves self reports based on implicit criteria (Deiner, 1995).

Using both objective and subjective measures of quality of life, previous studies have examined the association between the two. Some studies claim no significant effects of the former on the latter, while others have found that improved socio-economic conditions contribute to higher quality of life (Bradshaw and Fraser, 1989). Despite the close relationship between objective and subjective quality of life, it is unclear whether differences among local communities and regions in one dimension are parallel to those in the other. Prescott-Allen (2001) uses both indicators to measures 'human wellbeing' in which all members of society are able to determine and meet their needs and have a large range of choices and opportunities to fulfill their potential that generates a more comprehensive picture of the state of the world.

Such an issue is important for Pakistan where recent high economic growth has resulted in disproportionate social development. Given the relatively, high population growth, high incidence of poverty, low literacy rate, low life expectancy, high infant and maternal mortality rates, poor basic civic amenities and residents' ability to afford such services have significantly differentiated objective wellbeing between districts. Lower quality of life may affect population redistribution and in turn influence resource allocation among areas. It is important to understand the consequences that various quality of life levels, both objective and subjective dimensions, have on places.

This study attempts to examine discrepancy in wellbeing in Pakistan under the conceptual umbrella of social indicators, variables representing a wide range of societal domains, education, health and living conditions. It also takes into account 'soft' issues of subjective perception of life i.e. satisfaction with facilities/services and perception of economic situation of household and community. However, in order to have a better understanding in differences among areas regarding quality of life, both objective and subjective dimensions are taken into account to measure human wellbeing.

Literature Review

The notion of wellbeing is receiving growing attention, both in academic research and policy-oriented analysis. Before making any proposal for the development of a system for the measuring wellbeing, literatures have been explored that have already been carried for measuring quality of life.

Schimmack *et al* (2008) defined wellbeing as preference realization which can be measured with affective and cognitive measures. The paper examined similarities and differences between cognitive measures of wellbeing and four items (happy, sad, angry, and afraid) as an affective measure of wellbeing.

Diener *et al* (2008) asserted that there are universal human needs and subjective appreciation of life depends on both living conditions. It was argued that objective conditions affect subjective perceptions indirectly through comparisons with other possible alternatives.

The distinction between objective and subjective definitions of wellbeing is provided by Sumner (1996). It is based on the selection process of the criteria that are used to judge individuals' wellbeing. Objective definitions assume that the criteria can be defined without reference to the individual's own preferences, interests, ideals, values, and attitudes while subjective definitions require that individuals' preferences, interests, ideals, values, and attitudes matter.

For cross country analysis a common framework consisting of (a) human dimensions, including health and population, national and household wealth, education and culture, community and social capital, and equity; and (b) ecosystem dimensions, including land and forests, water quality and diversity, air quality, species and genetic diversity, and energy and resources are prepared by Prescott-Allen (2001). The study ranks Pakistan at 167 out of 180 countries in wellbeing index. For ranking 74 underdeveloping countries in terms of qualitative and quantitative variables, Gaur and Sanjay (1997) employ factor score analysis. Pakistan rates at 32 in medium subgroup countries. In United Nation Human Development Index Pakistan ranks at 136 out of 177 countries in terms of education, life expectancy and Gross Domestic Product per capita (UNDP, 2007).

Measuring quality of life in Pakistan Akhtar and Sarwer (2007) employ two different techniques-Z sum and weighted factor scores and 12 indicators to quantify the intertemporally compared levels of social development at districts level. The study highlights that provincial capital, i.e. Karachi, Lahore and Quetta consistently appear in the top ten ranking under both techniques in 1998 and 2005. In regressive districts, 5 belong to Balochistan, 3 from Punjab and two districts are found from Sindh province.

The changes in human development status in districts of Pakistan are also highlighted during the period 1998 and 2005 by Jamal and Amir (2007).The estimates of districts level Human Development indices provide an indication of existing trends in regional disparities in terms of economic development as well as education and health status.

Uddin (2007) reviews social development in Pakistan with focus on the issues of access to and quality of social services and identified areas that should receive greater attention to enhance the public access to quality social services. It is observed that the demand for social services is expanding rapidly, mainly owing to high population growth and rapid urbanization.

Siddiqui (2008) tests whether direct provision of social services improve capabilities by estimating a basic need model for Pakistan. She views that government provision of social services affects human capabilities significantly. She analyzes that aggregate statistics at the national or provincial level hides region specific reasons of poverty and inequalities. The variations in these indicators across the districts within a province and across the provinces are an indicative of regional disparities in quality of life in terms of income, health and education.

UNDP (2003) estimates that variation in Human Development Indices between provinces and districts of Pakistan are indicative of regional disparities in both the level of economic growth as well as in terms of health, education and quality of life.

Midhet (2004) derives development ranking by applying composite indices of several district-level variables derives from factor analysis, which are then used to predict two important indicators of reproductive health; the child-woman ratio and maternal mortality rate. It is indicated that maternal mortality decreased with accessibility of hospitals and primary health facilities. The study also identified which districts are developing satisfactorily and which are stagnant or deterioration in terms of development.

Pasha and Naeem (1999) examine whether the low level of social indicators in the country is a consequence of poor initial conditions or has there been deterioration due to relatively low rate of improvement over time? The study concludes that Pakistan is a case of a country which not only started with low level of human endowment but the situation has been exacerbated by the low level of improvement in it over time.

Ghaus et al (1996) explore regional variation in the development of social infrastructure across districts of Pakistan. The study demonstrated the importance of education indicators in determining the overall level of social development in terms of female literacy and primary enrolment rates. However the analysis indicates substantial variation among districts within a province in the level of social development. Least developed districts within each province are identified as targets for special development.

Pasha et al (1990) demonstrate that there are marked changes in the development ranking of a number of districts from the early 1970's to the early 1980's,especially among districts at the intermediate level of development. The indicators are selected from diverse sectors like industry, agriculture, transport and communications with basic social indicators including education, health, gender equality and housing. Districts of Punjab have generally improved their ranking in the education sector, gender equality and labour force indicators while province of Balochistan continued to fall behind the rest of the country.

Pasha and Tariq (1982) indicate that districts development rankings hide major intra-provincial disparities. The analysis demonstrates that all the provincial capitals and federal capital are included in top quartile of the national population. Provinces that are considered relatively underdeveloped like Balochistan and NWFP to have some highly developed pockets while a significant part of Punjab and Sindh appeared to be relatively underdeveloped.

The above studies employ objective indicators to measure quality of life mainly based on the perspective of economic development or social development in Pakistan. The components of subjective quality of life are not examined to reveal various dimensions as well as the reliability of people's perceptions and evaluation of their lives. It is concluded that there is substantial variation among districts within a province in the level of social development across Pakistan.

Data and Methodology
Data

The study employs 'The Pakistan Social and Living Standards Measurement Survey' (PSLM) 2006-07 data which consists of Core Welfare Indicators Questionnaire (CWIQ) approach. It is one of the main mechanisms for monitoring the implementation of the Millennium Development Goals (MDGs) and Poverty Reduction Strategy Paper (PRSP). It provides a set of representative, population-based estimates of social indicators. An important objective of the PSLM Survey is to establish what is the distributional impact of different government programs carried out in social sector. PSLM Survey consists of data relating education, child health, maternal health, household assets /amenities. It also provides subjective perception of wellbeing education, health and public safety measured by police services, households are asked to give opinion about their satisfaction of the facilities/services provided by the government. For measuring perception about their economic situation of the household and community where they live, a self reported based on implicit criteria is applied to know the economic situation of the household and community as compared to previous year. The sample size for the 100 districts in four provinces Punjab(34 districts), Sindh (16 districts), North West Frontier Province (NWFP) (24 districts), and Balochistan (26 districts) has been fixed at 73953 households comprising 5198 sample villages/enumeration blocks, which is expected to produce reliable results at each district [Pakistan (2008)].

Choice of Indicators: Objective versus Subjective

Classifying various wellbeing definitions, distinction between objective and subjective definitions of wellbeing is important which is based on the selection process of the criteria that are used to judge individuals' wellbeing. To measure objective wellbeing three domains are taken, i.e, education, health and households living condition which also taken by [Siddiqui (2008), Jamal and Amir (2007), Akhtar and Sarwer (2007)] for districts rankings of Pakistan. In contrast to objective wellbeing the key features of dimensions of subjective wellbeing are based on people's perceptions of their quality of life and satisfaction with living conditions which are missing in literature on quality of in Pakistan. To fill this gap subjective perception of quality of life i.e., education, health and public safety measured by police services, households are asked to give opinion about their satisfaction of the facilities/services provided by the government. For analyzing perception about their economic situation of the household and community where they live, a self reported based on implicit criteria is employed to identify the economic situation of the household and community as compared to previous year. These indicators and statistics are given in Table 1, Table 2a and Table 2.b.

Table 1:   Variables Used in Factor Analysis

Objective indicators of wellbeing	
Education:	
1	Literacy rate age 10^+: Ability to read a newspaper and to write a simple letter.
2	Net enrolment rate at primary level: children age 5-9 years attending primary level.
3	Gender equality in education: the ratio of girls to boys in completed primary level or higher education level.
Health:	
4	Child health: measured through recall and record of full immunization course.
5	Prenatal consultation: Pregnant women that have received Tetanus Toxoid injection.
6	Safe delivery: health personals i.e, doctor or nurse that assisted in delivery.
7	Location of delivery: child birth taken place at government or private health units.
Living Conditions:	
8	Source of safe drinking water: tap water, motor pump and hand pump.
9	Sanitation facilities: access to improved sanitation ('flush' consists of flush connected to public sewerage /septic tank).
10	Source of lighting: households have electricity connections
11	Source of fuel: households using gas or kerosene oil as fuel used for cooking
Subjective perception of wellbeing	
1	Education: satisfaction with education facilities
2	Health: satisfaction with health facilities
3	Public safety: satisfaction with the police services
4	Households' perception of economic status: better off as compared to previous year.
5	Community: perception of economic status of the community where they live (better off as compared to previous year).

Source: Pakistan Social and Living Standards Measurement Survey, 2006-07

Table 2a: Statistics of Objective Wellbeing Indicators.

Indicators	Mean (%)	Minimum (%)	Maximum(%)	Coefficient variation
Literacy 10+	46	20	80	0.27
Net enrolment at primary level	51	20	88	0.27
Gender equality in education	42	3.2	90.32	0.50
Fully immunization	70	14	100	0.30
Prenatal care	56	6	93	0.64
Safe delivery	33	2	80	0.66
Place of delivery	22	1	78	0.51
Safe drinking water	69.8	5.74	100	0.42
Sanitation facilities	41.93	0.13	93.48	0.57
Source of lighting	78.72	7.34	99.84	0.28
Source of fuel	15.51	0	92.26	1.21

Source: Computations are based on Pakistan Social and Living Standards Measurement Survey, 2006-07.

Table 2b: Statistics of Subjective Perception of Wellbeing.

Indicators	Mean (%)	Minimum (%)	Maximum (%)	Coefficient variation
Education	61.23	21.18	84.32	0.21
Health	35.31	5.88	81.03	0.46
Public safety	6.61	0	29.2	0.95
Economic situation	24.37	5.32	47.93	0.40
Community situation	24.91	0.14	87.88	0.76

Source: Computations are based on Pakistan Social and Living Standards Measurement Survey, 2006-07.

Methodology

This study adopts a strategy for analyzing the question: a multivariate analysis on the form of Principal Component Analysis (PCA) (Murtag and Heck,1987). The procedure in which a set of correlated variables is transformed into a set of uncorrelated variables (called Principal Components) that are ordered by reducing variability. The uncorrelated variables are a linear combination of the original variables. The principal components are calculated as eigenvectors which, by construction, are orthogonal among themselves and, therefore, uncorrelated. The significance of each eigenvector is expressed as its eigenvalue. The first principal component is the combination of variables that explains the greatest amount of variance. The main use of the PCA is to reduce the dimensionality of the data set while retaining as much information as possible. It does not establish weights a priori. It computes a compact and optimal description of the data set. Five basic terms for factor analysis are: (1) factor loadings, (2) factor cosines, (3) factor weights, (4) factor scores and (5) factors.

The Principal Component Analysis- PCA developed in this study has the form:

$$X_i = \lambda_{i1} F_1 + \lambda_{i2} F_2 .... + \lambda_{ij} F_j \tag{1}$$

where,

X_i is the *ith* indicator

λ_{ij} is called the factor loading which represents the proportion of the variation in X_i which is accounted for by the *jth* factor.

$\Sigma \lambda_{ij}$ is called the communality and it is equivalent to the multiple regression coefficients in regression analysis. F_j symbolizes *jth* factor or component.

Principal Components Analysis (PCA) generates components in descending order of importance, that is, the first component explains the maximum amount of variation in the data, and the last component the minimum.

To compute weighted factor score (WFS), the individual factor scores are derived from the following equation:

$$(WFS)_k = \sum ke_j (FS)_{kj} \dots \dots \dots \dots \tag{2}$$

where

FS_{kj} represents factor score of the *kth* district and *jth* factor. e_j is the eigenvalue of the *jth* factor which depicts the proportion of variation in the data set. The WFS is used as an index for ranking districts on the basis of the objective and subjective indicators.

Empirical Results

In this section the results are based on the Principal Component Analysis in which a set of correlated variables is transformed into a set of uncorrelated variables that are ordered by reducing variability. The object of its use in this instance is to ' explain' most of the variation between the districts of Pakistan for its 16 objective and subjective indicators of wellbeing in terms of far fewer ' Factors', each of which is a linear combination of these 16 indicators but is not highly correlated with any other one of the Factors. These Factors are to be determined in such a way, that each of the 16 variables is strongly correlated with just one Factor and only weakly with the others. The 16 indicators can then be classified into a small number of clusters each of which is associated with just one of the Factors, and in this case the variables within any one cluster are likely to be quite strongly correlated with each other, but not, on the whole, so strongly correlated with variables outside that cluster.

Ways to Determine the Factorability of an Intercorrelation Matrix KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.842
Bartlett's Test of Sphericity	1394.090
Df	120
Sig	.00

First, the study employs KMO and Bartlett's test to see the strength of the relationship among variables. Large values for the KMO measure indicate that a factor analysis is a good idea. The measure of sampling adequacy is greater than 0.87, indicating the degree of common variance among the eleven variables is 'Meritorious' which characterized by Kaiser, Meyer, and Olkin. The value is large enough to precede a factor analysis for the data.

Bartlett's test of Sphericity is another indicator of the strength of the relationship among the variables that the population correlation matrix is uncorrelated. The observed significance level is .0000. In this study there are 16 original variables, which is standardized to have a variance of 1; the total variance will be 16.

Correlation Matrix of Wellbeing Indicators

Secondly, the cross-correlation of parameters can be seen in Table 2. Parameters labeled from A to I are highly correlated among themselves (>0.50). Parameters L, M, N, O and P are weakly or not correlated at all or even anti-correlated with other parameters. The parameters from A to K are usually taken as canonical indicators of objective wellbeing while H to P are taken as subjective wellbeing indicators. The subjective indicator of wellbeing i.e, satisfaction with education facilities are correlated with all three indicators of objective wellbeing i.e, literacy rate, net primary enrolment rate and gender equality in primary and above level education while others variables are weakly or not correlated at all or even anti-correlated with objective wellbeing indicators.

The small correlations between subjective perception and objective variables may be due to a number of factors. The first possibility is that people rapidly adapt to their levels of resources and experiences. Even dramatic life events, such as winning a lottery or experiencing a spinal cord injury, seem to have short-lived effects on people's SWB (Suh, Diener and Fujita, 1996). Another important reason for the low correlation between objective circumstances and subjective wellbeing is that the

experience of wellbeing is influenced not only by external life conditions but also by stable dispositional characteristics. Major personality traits that are associated with SWB are extraversion and neuroticism, optimism, and self-esteem. People's psychological adjustment strategies to objective conditions appear to be remarkably flexible (Campbell, 1981; Diener and Diener, 1995).

Table 3: Correlation Matrix of Objective and Subjective Indicators

Indicators	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A) Literacy+ 10	1															
B) Net enrolment	0.78	1														
C) Gender edu	0.80	0.77	1													
D) Immunization	0.56	0.69	0.6	1												
E) Prenatal care	0.72	0.62	0.74	0.54	1											
F) Delivery	0.72	0.48	0.64	0.37	0.5	1										
G) Place delivery	0.72	0.48	0.65	0.36	0.59	0.98	1									
H) Water	0.52	0.55	0.69	0.37	0.56	0.43	0.43	1								
I) Sanitation	0.78	0.65	0.79	0.60	0.69	0.73	0.73	0.6	1							
J) Electricity	0.62	0.55	0.55	0.42	0.47	0.47	0.47	0.62	0.70	1						
K) Fuel	0.66	0.38	0.60	0.26	0.57	0.65	0.67	0.37	0.64	0.4	1					
L) Satisfation Hth	-0.02	-0.05	-0.03	0.06	0.05	0.11	0.10	0.24	0.04	0.2	-.02	1				
M) Satisfation Ed	0.52	0.52	0.39	0.53	0.31	0.33	0.30	0.38	0.53	0.6	0..2	0.2	1			
N) Satisfation Saf	-0.1	-0.3	-0.3	-0.1	-0.1	-0.1	-0.1	-0.08	-0.16	0.09	-0.04	0.29	0.16	1		
O) HH better off	0.05	0.07	-0.02	0.14	0.07	0.05	-0.01	-0.03	0.13	0.26	-0.08	0.13	0.30	0.13	1	
P) Com better off	0.12	-0.01	0.01	0.06	-0.01	0.10	0.06	-0.05	0.09	0.25	-0.11	0.22	0.30	0.27	0.5	1

Source: Computations are based on Pakistan Social and Living Standards Measurement Survey, 2006-07

An Initial Solution Using the Principal Components Method

In this analysis, each variable is standardized to have a mean of 0.0 and a standard deviation of ±1.0. Thus the variance of each variable = 1.0. And the total variance to be explained is 16, i.e. 16 variables, each with a variance = 1.0, since a single variable can account for 1.0 unit of variance. A useful factor must account for more than 1.0 unit of variance, or have an eigenvalue $\lambda > 1.0$ Otherwise the factor extracted explains no more variance than a single variable as the goal of factor analysis is to explain multiple variables by a lesser number of factors. Since 16 components are extracted, the same as the number of variables factored.

Table 4: Correlation of Parameters with Principal Components

Indicators	Components			Communalities
	1	2	3	
Sanitation	*0.9164*	-0.0010	0.0084	0.8399
Literacy 10 years+	*0.9055*	-0.0372	0.0090	0.8213
Ratio of female to male in primary+	*0.8903*	-0.1954	-0.1321	0.8483
Net primary level enrolment	*0.8027*	-0.0742	-0.4107	0.8185
Delivery at health units	*0.8011*	-0.1521	0.4159	0.8378
Prenatal care	*0.8010*	-0.1193	0.0101	0.6559
Delivery by doctor and nurses	*0.8008*	-0.0996	0.4093	0.8187
Electricity as lighting	*0.7442*	0.3672	-0.0087	0.6887
Source of drinking water	*0.6959*	-0.0091	-0.0159	0.4846
Gas / kerosene as fuel	*0.6904*	-0.2573	0.3986	0.7017
Fully immunization recall/ record	*0.6743*	0.0706	-0.4649	0.6758
Satisfaction in education services	0.5940	*0.5059*	-0.2395	0.6662
Community better off	0.1026	*0.7505*	0.0236	0.5743
Household better off	0.1153	*0.6745*	-0.2105	0.5125
Satisfaction with police services	-0.1371	*0.5745*	0.4088	0.5159
Satisfaction in health facilities	0.1003	*0.5175*	0.3830	0.4246
Eigenvalues	*7.396*	*2.171*	*1.32*	*10.88*
% of Variance	*46.225*	*13.565*	*8.239*	*68.03*

Extraction Method: Principal Component Analysis. a. 3 components extracted.

In Table 4 eigenvalues are given which are the 'characteristic roots' of the principal components solution. There is one eigenvalue for each dimension which shows the amount of variance in a given factor explains in the correspondence table. Eigenvalues reflect the relative importance of the dimensions. The first dimension always explains the most variance and has the largest eigenvalue, the next the second-most, and so on. The sum of eigenvalues is total variance. Following is the discussion;

Factor I

The 1st factor has an eigenvalue = 7.396. Since this is greater than 1.0, it explains more variance than a single variable, in fact 7.396 times as much. The percent a variance explained:

(7.396 / 16 units of variance) (100) = 46.22%

Factor I includes 11 out of 16 indictors of objective wellbeing including sanitation facilities, literacy rate, gender equality in primary and above level education, net primary level enrolment, delivery at health units, prenatal care, delivery by doctor and nurses, electricity as source of lighting, source of drinking water, gas or kerosene oil as source of fuel and fully immunization on recall/ record bases. As such, access to education can be interpreted the most important facilities capturing variation in the level of objective wellbeing for districts of Pakistan.

Factor II

The 2nd factor has an eigenvalue = 2.171. It is also greater than 1.0, and therefore explains more variance than a single variable. The percent a variance explained:

(2.171 / 16 units of variance) (100) = 13.56%

This factor includes all 5 indicators of subjective wellbeing i.e, satisfaction with education facilities, perception of community economic status and perception of household economic status as compare to previous year, satisfaction with health facilities, satisfaction with polices services.

Factor III

The 3rd factor has an eigenvalue = 1.32. Like Factors I & II it is greater than 1.0, and therefore explains more variance than a single variable. The percent a variance explained:

(1.32 / 16 units of variance) (100) = 8.239%

This factor is weakly correlated with both objective and subjective indicators including two indicators of maternal heath (delivery at health units and delivery assisted by doctor and nurses), source of gas / kerosene as fuel, satisfaction with police services and satisfaction with health facilities.

The remaining factors

Factors 4 through 16 have eigenvalues less than 1, and therefore explain less variance that a single variable. The sum of the eigenvalues associated with each factor sums to 16.

Where, $(7.396 + 2.170 + 1.32 + 0.796 + \ldots + 0.0133) = 16$

The cumulative percent of variance explained by the first three factors is 68.03%. In other words, 68.03% of the common variance shared by the 16 variables can be accounted for by the 3 factors.

Factor Loadings

Factor loading is the correlation between the principal component score and the each of the original variable which is presented in Table.3 as;

The variable literacy rate 10 years and above: Correlates 0.9055 with Factor I, Correlates -0.0372 with Factor II, Correlates 0.0090 with Factor III

The total proportion of the variance in this indicator explained by the three factors is simply the sum of its squared factor loadings.

$(0.9055^2 - 0.0372^2 - 0.009^2) = 0.8213$

This is called the communality of the variable literacy rate 10 years and above. The communalities of the 16 variables are given in Table.4. Since this table is arranged so that variables with their highest loadings in Factor 1 are listed first, followed by variables with their highest loadings in Factors 2 to 3 consecutively. The boxes mark off the factor sets to which each indicator is assigned.

Table 5: Correlations of Factor1 and Factor2

	Objective	Subjective
Objective Pearson Correlation	1	.000
Sig. (1-tailed)		.500
N	100	100
Subjective Pearson Correlation	.000	1
Sig. (1-tailed)	.500	
N	100	100

Factor cosines

Factor cosines are also a correlation which relates one factor to another. Such correlations are important because they quantify the degree to which different factors are related preferably, the factors would be relatively uncorrelated, that is, that the factor cosines will be relatively close to zero. If this is so, each factor can be thought of as representing a distinctly different underlying component of information contained in the original set of variables. On the other hand, if two factors are very highly correlated, each would be describing essentially the same component of information: therefore only one of them would have to be considered. Table.5 shows zero correlation between the two wellbeing factors; objective wellbeing indicators measure 'hard facts' while subjective indicators focus on 'softer' issues. Thus, representing a distinctly different underlying component of information contained in the original set of variables.

Factor scores

Factor scores are like predicted scores for each individual score for each factor. It is formed as weighted sum of the values of the variables for that sampling unit. The weighted factor scores are used as an index for ranking districts on the basis of the objective and subjective wellbeing indicators in Appendix A.

Human Wellbeing: A district level analysis for Pakistan

Human wellbeing is a condition in which all members of society are able to determine and meet their needs and have a large range of choices and opportunities to fulfill their potential. Assessments of human wellbeing must include both objective and subjective indicators of life, since both capture different dimensions of wellbeing. Joint use of objective and subjective measures is mostly helpful to get a complete picture, while rigid restriction to objective indicators considerably narrows the perspective [Veenhoven, 2007].

The present study of wellbeing assessment captures three dimension in objective indicators and two dimensions in subjective indicators which are discussed here. It employs five rating of wellbeing as given by [Prescott-Allen, 2001] by making five quartiles of 100 districts of Pakistan in descending order of factor scores, each category have 20 districts. The districts which are ranked in descending order of weighted factor scores are rated as 'good, fair, medium, poor and bad' wellbeing. The population share of each district in respective category is sum up to show the performance of the three wellbeing measures.

The rank ordering of 100 districts located in four provinces of Pakistan i.e, Punjab, Sindh, North West Frontier Province (NWFP), and Balochistan having population share 55%, 24%, 16% and 5% respectively is presented in Appendix. The rankings are based on three notions of wellbeing i.e, objective, subjective and human wellbeing.

The ranking of objective wellbeing is based on first principal component which includes variables from education, health and living conditions and explained 46.22% variations in social indicators. Karachi, Islamabad, Rawalpindi, is rated 'good' in terms of objective wellbeing. All the variables of education are ranked in terms of importance in Table.4, indicating that access to education is the most important indicator in achieving high wellbeing. The top 20 districts having population share of 37 percent of total population of Pakistan, major districts of Punjab are concentrated in this category. Here all the provincial capitals and federal capitals are also located. The second and third quintiles are named as fair and medium level wellbeing, each have approximately 21.24%, and 21.67% share in total population. At the lower end of the distribution, the districts performance are rated as poor and bad wellbeing with population share of 13% and 5% respectively. Poor performance in education, housing and child and maternal health sectors are major contributor of disparities in these districts. The performances of these districts are unacceptable and undesirable. Seventeen out of twenty districts are from province of Balochistan which are deprived of basic facilities of education and health. It is concluded that Pakistan has not only started with low level of human endowment but the situation has been exacerbated by the low level of improvement over time. Provinces that are considered relatively underdeveloped like Balochistan and NWFP have some highly developed pockets while a significant part of Punjab and Sindh appeared to be relatively underdeveloped [Pasha and Tariq (1982)].

The second quality of life in terms of subjective wellbeing, takes into account 'soft' issues i.e, satisfaction, happiness or perception of economic situation. People evaluate their level of subjective wellbeing with regard to circumstances and comparison to other person, past experiences and expectation of the future. Measure of subjective wellbeing can thus serve as proxies for 'utility' since its item are subject to the law of diminishing utility [Veenhoven (2007)]. This study takes into account 13.56% of variations in subjective variables of wellbeing. The ranking of top twenty districts in subjective wellbeing is entirely different from objective wellbeing as the two dimensions measure different attributes of quality of life. Most of the districts performance which are rated as 'fair' or 'poor' in objective wellbeing are rated as 'good' performance in subjective wellbeing. The top twenty districts account 35% of total population and districts of Sindh and North West Frontier Province are dominated in the category of 'good'. It is also evident that economic perception of individual and community has improved as compared to previous year which is the major contributors in rating the performance of these districts. The households in these districts are more satisfied with education, heath and public safety facilities. At the lower end, the bottom twenty districts are rated as 'bad' and

accounts for 25.78 percent population share. Most of these districts are rated in 'good' performance in objective wellbeing. Previous research has also found that people living in economically-disadvantaged regions do not necessarily indicate lower satisfaction than those who live in more advantaged communities [Lewis and Lyo 1986].

The third measure is human wellbeing which is generated by first three principal components and contributes 68% variation in both objective and subjective indicators since both capture different dimensions of wellbeing. Veenhoven (2007) has recommended that objective indicators be supplemented by subjective ones to estimates the quality of life. This measure displays objective and subjective wellbeing together, combining the 'hard facts' and 'soft issues' of human life. The upper 20 districts with performance rated as 'good', enjoy high human wellbeing and have 35.6 percent population share. All the provincial and federal capitals are rated in 'good' human wellbeing. It is explored that social indicators and subjective wellbeing measures are complementary. Similarly, objective inputs are transformed by individuals and cultures to produce what is perceived by people as desirable or undesirable. What is good for people cannot be determined without taking their views into account. Being able to reflect the perspectives of individuals, subjective wellbeing measures allow people an input channel in which to voice their concerns and immediate demands for public funds and assistance. Measures that are based on objective standards, however, are also needed to judge the conditions of a society because people can be tolerably happy even in many undesirable circumstances. It can be concluded that people want to achieve happiness through obtaining things that they value.

Finally, the above discussions are summed up in Table.6; the population share of each district in respective category is sum up to show the performance of the three measures of wellbeing.

Table 6: Distribution of Population in Wellbeing Rating (%) : Pakistan

Rating / Wellbeing	Good	Fair	Medium	Poor	Bad
Objective Wellbeing	38.04	21.24	21.67	13.25	5.8
Subjective Wellbeing	13.39	17.98	20.97	21.52	25.78
Human Wellbeing	35.6	19.65	18.79	16.8	9.16

Source: Computations are based on 'Pakistan Social and Living Standards Measurement Survey, 2006-07'.

Conclusions

Wellbeing individually or collectively, is a main indicator of a good life. This paper attempts to implement empirically some of the multidimensional concepts of human wellbeing by utilizing data from the 'Pakistan Social and Living Standards Measurement Survey' 2006-07. The human wellbeing is examined in four domains: education, health, living conditions and economic situation. Principal component analysis is employed for indexing human wellbeing; subjective wellbeing and objective wellbeing for hundred districts, rated in five quintiles are generated.

The analysis reveals that objective indicators of wellbeing and subjective perception of wellbeing contribute approximately, 68 percent variation in human wellbeing. The paper demonstrates the importance of education domain in determining the human wellbeing. Objective indicators of education i.e., literacy rate, net primary enrolment and gender equality in education are positively correlated with satisfaction in education facilities. Economic status of the households and communities are important variables in subjective perception of wellbeing. The results indicate substantial variation in objective wellbeing among districts of Pakistan. It may be considered that disparity in objective conditions and in subjective perceptions are adequately depicting wellbeing differences. In a democratic world subjective wellbeing is as important as objective wellbeing in which people evaluates by themselves not simply judged by policy makers or experts.

In conclusion, it is hoped that the findings of this study serve as useful information for policy makers to target those districts which are in poor or bad wellbeing categories while designing polices for social development of Pakistan.

Acknowledgement

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Appendix
A.1:   Measuring Wellbeing in Pakistan: 2006-07

Objective wellbeing: Good		Subjective wellbeing:Good		Human Wellbeing: Good		
Name of Districts	Ranked by Principal Component 1	Name of Districts	Ranked by Principal Component 2	Name of Districts	Ranked by Principal Components 1,2,3	Rank ordering
Islamabad	20.42	Swat	5.34	Islamabad	19.71	1
Karachi	17.67	Chitral	5.11	Karachi	16.57	2
Rawalpindi	16.25	Shangla	4.31	Rawalpindi	15.95	3
Lahore	15.61	Malakand	4.31	Lahore	13.77	4
Gujranwala	11.91	Bannu	4.11	Swat	12.84	5
Jehlum	11.8	Lower Dir	4.09	Jehlum	11.22	6
Gujrat	11.23	Pashin	3.73	Gujranwala	10.76	7
Sialkot	10.67	Karak	3.72	Hyderabad	10.42	8
T.T.Sing	9.83	D.G.Khan	3.59	Faisalabad	10.14	9
Faisalabad	9.6	Lakki Marwat	3.52	Chakwal	9.75	10
Chakwal	9.38	Layyah	3.52	Quetta	9.63	11
Hyderabad	9.37	D.I.Khan	3.08	Gujrat	9.6	12
Quetta	8.44	Bonair	3.07	Nowshera	9.4	13
Sheikhupura	7.9	Vehari	2.81	Peshawar	9.36	14
Attock	7.65	Upper Dir	2.73	Chitral	8.35	15
Narowal	7.6	Charsada	2.71	T.T.Sing	8.29	16
Nowshera	7.21	Abbottabad	2.64	Sialkot	7	17
Multan	6.55	Nowshero	2.59	Sheikhupura	6.68	18
Mandi BD	6.5	Bahawalnagar	2.47	Malakand	6.36	19
Abbottabad	6.4	Peshawar	2.35	Hafizabad	6.27	20

Source: Computations are based on 'Pakistan Social and Living Standards Measurement Survey, 2006-07'

Appendix

A.2: Measuring Wellbeing in Pakistan: 2006-07

Objective wellbeing: Fair		Subjective wellbeing: Fair		Human Wellbeing : Fair		
Name of Districts	**Rank by Principal Component 1**	**Name of Districts**	**Rank by Principal Component 2**	**Name of Districts**	**Ranked by Principal Components 1,2,3**	**Rank ordering**
Hafizabad	6.23	Jhal Magsi	2.34	Nowshero	6.03	21
Sahiwal	5.99	Mardan	2.16	Attock	5.81	22
Haripur	5.97	Nowshera	1.95	Bannu	5.39	23
Peshawar	5.59	Tank	1.85	Vehari	5.36	24
Swat	5.41	Mastung	1.58	Mardan	5.05	25
Sargodha	5.4	Swabi	1.34	Karak	5.04	26
Khushab	4.82	Hangu	1.25	Sahiwal	5.01	27
Mianwali	4.69	Chakwal	1.17	Lower Dir	4.88	28
Chitral	4.43	Lodhran	1.01	Bahawalnagar	4.85	29
Kasur	3.94	Okara	0.98	Multan	4.85	30
Sukkhur	3.82	Hafizaba	0.86	Mandi BD	4.83	31
Bahawalnagar	3.61	Tharpark	0.78	Charsada	4.63	32
Layyah	3.36	Ziarat	0.61	Hangu	3.97	33
Mardan	3.15	Pakpatte	0.38	Layyah	3.85	34
Malakand	2.84	Ghotki	0.33	Abbottabad	3.76	35
Khanewal	2.83	Jafaraba	0.29	Haripur	3.73	36
Nowshero	2.25	Batagram	0.29	Sukkhur	3.61	37
Kohat	1.78	Faisalabad	0.28	Narowal	2.91	38
Jhang	1.76	Mandi Ba	0.12	Sargodha	2.55	39
Charsada	1.75	Qilla Abdulla	0.1	Kohat	2.5	40

Source: Computations are based on 'Pakistan Social and Living Standards Measurement Survey, 2006-07'.

Appendix

A.3: Measuring Wellbeing in Pakistan: 2006-07

Objective wellbeing: Medium		Subjective wellbeing: Medium		Human Wellbeing : Medium		
Name of Districts	**Rank by Principal Component 1**	**Name of Districts**	**Rank by Principal Component 2**	**Name of Districts**	**Ranked by Principal Components 1,2,3**	**Rank ordering**
Mansehra	1.5	Khairpur	0.02	Mianwali	2.28	41
Okara	1.48	Gwadar	-0.13	Jhang	1.91	42
Vehari	1.36	Kohat	-0.15	D.G.khan	1.8	43
Pakpatten	1.25	Jhang	-0.17	Khushab	1.45	44
Karak	1.1	Sanghar	-0.26	Lakki Marwat	1.32	45
Hangu	0.92	Jaccobabad	-0.33	Okara	1.31	46
Lower Dir	0.73	Bahawalpur	-0.36	Pakpatte	1.21	47
Bahawalpur	0.58	Sheikhupura	-0.39	Bahawalpur	0.78	48
Bhakhar	0.26	Quetta	-0.42	Sibbi	0.65	49
Lodhran	-0.03	Jehlum	-0.49	Kasur	0.63	50
Larkana	-0.11	Barkhan	-0.54	Mastung	0.59	51
Bannu	-0.13	Sahiwal	-0.59	Pashin	0.15	52
D.G.khan	-0.16	Rahim Y Khan	-0.59	Lodhran	0.15	53
Rahim Y Khan	-0.36	T.T.Singh	-0.65	Swabi	-0.07	54
Mastung	-0.52	Kharan	-0.66	Khanewal	-0.29	55
Khairpur	-0.99	Bhakhar	-0.67	Sanghar	-0.55	56
Swabi	-1.29	Ketch	-0.67	Khairpur	-0.62	57
Shikarpur	-2.17	Mir Pur	-0.75	Bonair	-0.63	58
Nawabsha	-2.19	Rajanpur	-0.82	Larkana	-1.16	59
Lakki Marwat	-2.19	Gujranwala	-0.86	Shangla	-1.34	60

Source: Computations are based on 'Pakistan Social and Living Standards Measurement Survey, 2006-07'.

Appendix

A.4: Measuring Wellbeing in Pakistan: 2006-07

Objective wellbeing: Poor		Subjective wellbeing: Poor		Human Wellbeing : Poor		
Name of Districts	**Rank by Principal Component 1**	**Name of Districts**	**Rank by Principal Component 2**	**Name of Districts**	**Ranked by Principal Components 1,2,3**	**Rank ordering**
Sanghar	-2.2	Khuzdar	-0.88	Rahim Y Khan	-1.51	61
Muzaffarghar	-2.41	Zhob	-0.92	Mansehra	-1.63	62
Mir Pur	-2.47	Muzaffar	-1.11	Nawabsha	-1.87	63
Dadu	-2.6	Musa Khel	-1.13	Batagram	-2.35	64
Gwadar	-2.69	Kasur	-1.19	Gwadar	-2.42	65
Ghotki	-2.89	Nasirabad	-1.21	D.I.Khan	-2.44	66
Bonair	-3.24	Mianwali	-1.28	Ghotki	-2.69	67
Batagram	-4	Haripur	-1.31	Tank	-2.72	68
Ketch	-4.05	Gujrat	-1.32	Upper Dir	-2.78	69
Badin	-4.34	Bolan	-1.35	Mir Pur	-2.83	70
Sibbi	-4.36	Rawalpindi	-1.44	Bhakhar	-2.96	71
Upper Dir	-4.36	Badin	-1.52	Shikarpu	-3.11	72
Tank	-4.71	Narowal	-1.54	Ziarat	-3.43	73
Ziarat	-4.78	Attock	-1.6	Dadu	-3.59	74
D.I.Khan	-4.87	Sukkhur	-1.61	Badin	-4.33	75
Pashin	-4.98	Dadu	-1.63	Muzaffarghar	-4.72	76
Kalat	-5.51	Larkana	-1.66	Jaccobabad	-5.79	77
Shangla	-5.76	Khanewal	-1.66	Ketch	-6.19	78
Jaccobabad	-6.45	Hyderabad	-1.75	Jafarabad	-6.43	79
Barkhan	-6.76	Nawabsha	-1.75	Jhal Magsi	-7.11	80

Source: Computations are based on 'Pakistan Social and Living Standards Measurement Survey, 2006-07'.

Appendix

A.5: Measuring Wellbeing in Pakistan: 2006-07

Objective wellbeing: Bad		Subjective wellbeing: Bad		Human Wellbeing : Bad		Rank ordering
Name of Districts	Rank by Principal Component 1	Name of Districts	Rank by Principal Component 2	Name of Districts	Ranked by Principal Components 1,2,3	
Rajanpur	-7.26	Shikarpu	-1.85	Qilla Abdulha	-7.61	81
Lasbilla	-7.41	Sialkot	-1.86	Lasbilla	-8.54	82
Zhob	-7.54	Multan	-1.96	Kalat	-8.64	83
Jafarabad	-7.76	Khushab	-1.97	Bolan	-8.86	84
Thatta	-7.83	Abbottabad	-2.03	Rajanpur	-9.01	85
Kharan	-8.15	Qilla Saifullha	-2.06	Barkhan	-9.18	86
Awaran	-8.32	Loralai	-2.15	Kharan	-9.22	87
Khuzdar	-8.37	Sargodha	-2.15	Thatta	-9.9	88
Qilla Saifullha	-9.08	Dera Bugti	-2.17	Khuzdar	-10.39	89
Chaghi	-9.33	Kalat	-2.17	Zhob	-10.72	90
Bolan	-9.39	Mansehra	-2.19	Qilla Saifullha	-11.13	91
Panjgur	-9.41	Panjgur	-2.22	Tharpark	-11.57	92
Loralai	-9.64	Lasbilla	-2.28	Panjgur	-11.86	93
Qilla Abdullha	-10.06	Kohistan	-2.38	Nasirabad	-11.99	94
Musa Khel	-10.52	Islamabad	-2.49	Musa Khel	-12.85	95
Jhal Magsi	-10.95	Chaghi	-2.65	Chaghi	-13.02	96
Kohistan	-11.67	Lahore	-2.98	Loralai	-13.25	97
Tharpark	-12.19	Awaran	-3.46	Awaran	-13.63	98
Nasirabad	-12.6	Thatta	-3.82	Kohistan	-14.07	99
Dera Bugti	-13.95	Karachi	-4.28	Dera Bugti	-14.23	100

Source: Computations are based on 'Pakistan Social and Living Standards Measurement Survey, 2006-07'