

WORKING WITH STATISTICS OF QUALITY OF LIFE: PAKISTAN, 1960 TO 1983

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I. INTRODUCTION

A number of studies have been undertaken to assess a country's progress in terms of quality of life. Morris [6] constructed the physical quality of life index¹ (PQLI) for 150 countries combining three indicators—life expectancy, infant mortality, and literacy. Ram [12] has used data for nearly 100 countries to make indices for five basic need indicators—adult literacy rate, life expectancy at birth, number of physicians per thousand population, daily calory intake, and the percentage of population having access to safe water.

The studies mentioned above, however, constructed PQLI assigning equal weight to each component variable. In this paper, using principal component analysis² (PCA) and thus employing variable weights, we construct the PQLI for Pakistan from the early sixties to the early eighties. More specifically this study has the following objectives: to construct—for the first time—a PQLI for Pakistan for the period 1960–83;³ to observe any pattern or trend in the PQLI; and to compare the PQLI with per capita income⁴ (GDP—per capita gross domestic product at constant factor cost).

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¹ For concept and application of PQLI, see [5] [6] [12] [13]. For the precise review of different approaches for measuring development level see [3] [4]. Ram [13] has concluded that inter-country inequality in meeting basic needs appears much smaller than income inequality. Larson and Wilford [5] compared PQLI—a social indicator—with GNP per capita—an economic indicator. They have maintained that neither GNP nor PQLI are useful measures of welfare. Both are subject to similar theoretical criticism. Nevertheless, per capita income too is a summary of a measure of economic welfare and does not explain much about the standard of living in a particular level of rate of growth of GNP and improvement in amenities of life. So, there was a need to assess a country's progress in terms of human welfare, which PQLI does. Perhaps the most important feature of the PQLI is that it measures "results" of development effort as opposed to GNP per capita which measure "attempts" to improve living conditions.

² For simple and straightforward explanation and computer programming see [1, Chap. 7, pp. 238–50].

³ From 1960 to 1975 data have been given on a five-year basis due to non-availability of consistent data.

⁴ In our view, GDP (versus GNP) is an appropriate indicator of the attempt of governments to improve the quality of life of the people. The government is responsible for most of the social variables used in our analysis.

The scheme of the paper is as follows: Section II describes the indicators used for making the index of PQLI. A brief methodological note for constructing composite indices is also given in this section. Section III presents results of empirical analysis. The final section is devoted to concluding remarks.

II. CONSTRUCTION OF PQLI

Individual indicators used to create five components of the PQLI represent the following areas: (i) life expectancy at birth; (ii) health facilities and level of nutrition; (iii) labor force participation; (iv) education facilities; and (v) consumption of durable goods and energy. Housing standards and access to basic residential services, like access to safe water, electricity and gas availability, sanitation, etc., have not been included due to data constraints.⁵

A three-step procedure was adopted to create PQLI. First, individual indicators were converted into indices with a base of 1983. These indicators using PCA were then used to form sector-wise indices representing the components of the PQLI. Finally, overall PQLI was constructed combining sectoral indices, again with the help of PCA.⁶

The individual indicators chosen are described below.

Health and nutrition. To use a single measure of health facilities and the nutrition level, six variables were linearly combined using PCA. Out of the six, three were input measures: number of physicians per 10,000 population, number of nurses per 10,000 population, and hospital beds per 10,000 population. Two measures of results or effects were also chosen. These are inverse of child mortality rate and inverse of child (of one–four age) death rate. Nutrition levels were covered by the inclusion of per capita protein supply in the sectoral index.

Life expectancy. Life expectancy at birth was included as a separate sector from health and nutrition because we felt that it reflects—in addition to health

⁵ The first organized survey of housing facilities was conducted in 1973—Housing, Economic and Demographic Survey, 1973. Thus it was impossible for us to include housing statistics in our analysis. A brief description of changes in provision of water supply and electricity is given below:

	1973	1980	Growth Rates (%)
Urban areas:			
Percentage of households having access to water connections	54.9	58.3	0.86
Percentage of electrified households	54.4	71.0	3.90
Rural areas:			
Percentage of households having access to water connections	3.0	5.4	8.80
Percentage of electrified households	4.9	14.6	16.90

⁶ Due to the nature of data set, PCA could not be used to construct direct PQLI using all indicators simultaneously irrespective of sectors. Bumb has shown that spurious results may be obtained if the number of indicators is equal or greater than the number of observations. For a detailed discussion see [2].

TABLE I
INDICES OF PQLI AND ITS COMPONENTS
(BASED ON SUMMATION OF FACTOR SCORE)

	(%)					
	PQLI	LEX	HET	LAB	EDU	CON
1960	100	100	100	100	100	100
1965	122	105	110	104	172	148
1970	134	107	119	107	185	207
1975	148	110	127	112	213	250
1976	154	111	131	112	222	273
1977	160	112	133	113	266	259
1978	162	113	135	114	246	295
1979	162	114	139	114	230	303
1980	165	115	144	115	226	318
1981	165	116	149	115	235	295
1982	170	115	154	116	248	304
1983	174	115	160	117	267	304
LSQG (%)	2.3	0.6	1.9	0.7	3.6	5.0

Note: PQLI=index of overall physical quality of life
 LEX=composite index of life expectancy
 HET=composite index of health and nutrition
 LAB=composite index of labor force participation
 EDU=composite index of education
 CON=composite index of consumption

LSQG=least square growth rates. These rates are calculated by regressing annual values of the variables for each year using following logarithmic form:

$$\log X_t = a + b(\text{TIME}) + e.$$

Thus

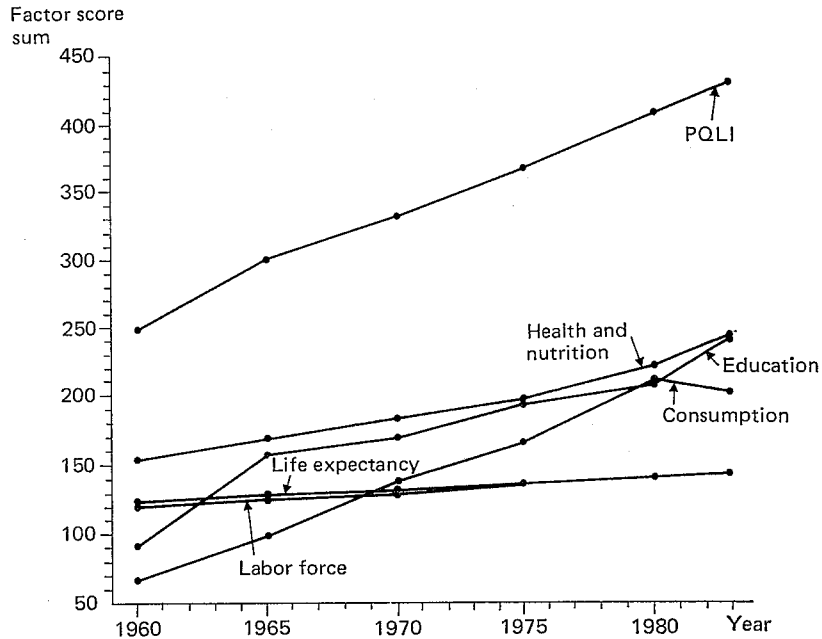
$$\text{growth rate} = \text{EXP}(b) - 1.$$

and nutrition—other social interaction, e.g., housing, sanitation, water supply, and shelter. Male life expectancy at birth and female life expectancy at birth were chosen separately for the purpose of making the composite index of life expectancy.

Labor force. The core indicator to measure progress in this sector is the proportion of labor force in industry (manufacturing, mining and quarrying, construction, and public utilities—electricity, gas, water, and sanitation). A generally accepted notion is that employment opportunities for women is an important factor which can be correlated with low fertility and better family health. Thus, female labor force as a percentage of total labor force has been further chosen in constructing the sectoral index.

Education. Educational structure, in Pakistan, comprises five levels: primary (grade I–V), middle (grade VI–VIII), high (grade IX–X), intermediate (college, grade XI–XII), and degree (college and university, grade XIII–XIV plus). The proportion of beneficiaries at three levels of education—primary, secondary (high), and university—have been chosen for this analysis. Due to the low level

Fig. 1. PQLI and Its Components



of female education as compared to male education, total and female enrollment ratios are separately considered. The six variables thus constituted were used in making the sectoral index of education.

One of the basic indicators is the literacy rate. However, this indicator could not be included in the analysis because of the differences in the definition of literacy in the population census of 1972 and 1981.

Consumption. Per capita energy consumption is a useful indicator for explaining a nation's standard of living. Further, consumption of durable goods have been considered to examine the consumption pattern of the peoples. These are, (i) cars per thousand population, (ii) radio receiver per thousand population, and (iii) TV receiver per thousand population.

III. RESULTS

Table I presents indices of PQLI and all its five components while summation of factor scores of the components obtained from PCA are plotted against time in Figure 1.

The evidence, based on available indicators suggests that in the improvement of the quality of life, Pakistan is not performing well. Although no comparable statistics of growth of other countries are available, the 2 per cent growth in PQLI over the period of twenty-three years seems to indicate no radical improvement in the peoples' quality of life.

TABLE II
ANNUAL COMPOUND GROWTH RATES
(OF PQLI, ITS COMPONENTS, AND GDP)

	(%)				
	1960-65	1965-70	1970-75	1975-80	1980-83
PQLI	4.06	1.89	2.01	2.20	1.79
Health and nutrition	1.92	1.58	1.31	2.54	3.57
Life expectancy	0.98	0.38	0.55	0.89	0.00
Labor force	0.79	0.57	0.92	0.53	0.58
Education	11.46	1.47	2.86	1.19	5.71
Consumption	8.15	6.94	3.85	4.93	-1.49
Per capita GDP	3.89	3.25	1.23	2.16	3.27

A look at Figure 1 reveals two phases in the trend of the PQLI. These are the 1960-65 period, which reflects substantive (4.1 per cent annual growth) increase in the PQLI, mainly due to high annual growth from a very low base in the consumption (8 per cent) and in the education (11.5 per cent) indices; and the 1965-83 period which shows, by and large, a constant (around 2 per cent annual growth) increase in the PQLI.

According to Table II which depicts the annual growth rate in the PQLI, its components, and in income, the indices of life expectancy and labor force participation have remained, by and large, stagnant. In both indices the annual growth has remained below 1 per cent during the period of our analysis. The highest annual growth rate in the index of health and nutrition was observed during 1980-83 period. Possible explanations for notable growth during this period include; substantive increase in protein supply due to bumper crops; greater emphasis on child immunization with the assistance of the World Health Organization; and the emergence of more doctors. Due to the very low base the highest (11.5 per cent) annual growth was observed during 1960-65 period in the index of education followed by 5.7 per cent during the period 1980-83. The index of consumption has shown a notable (around 4 to 8 per cent) annual growth during the 1960-80 period. Substantive (32 per cent) increase in number of TV licence holders has effected growth in the index of consumption during the 1960-70 period.⁷ A sharp increase in TV and radio licences in 1980 has affected growth in the consumption index during the 1980-83 period. The high base of 1980 has resulted in negative growth (-1.5 per cent) in the index of consumption during the last phase of our analysis.

⁷ Some of our colleagues were of the opinion that due to a very low base, indicator of TV might mislead and distort the overall PQLI. However, we tested this argument by making the PQLI without TV. No significant (2.44 per cent versus 2.23 per cent) difference in growth was observed. We also examined the year to year changes in both PQLIs by applying *t*-test. The *t*-test assumes that the observations are samples drawn from normal population with same variance. A significant *t*-value indicates a significant difference in both populations. The *t*-value in our case was 1.0 with the two-tailed probability level of 0.341. Because of low difference in growth rate and insignificant *t*-value we feel that the indicator of TV is not biasing our original results.

TABLE III
PQLI AND INCOME INDICES, 1960 TO 1983

	Overall PQLI (Factor Score Sum)	PQLI (1969=100)	Per Capita GDP (In Constant Rs.)	GDP (1960=100)
1960	247.64	100	373.66	100
1965	301.55	122	451.31	121
1970	332.70	134	541.64	142
1975	366.61	148	562.92	151
1976	381.07	154	564.32	152
1977	396.65	160	563.29	151
1978	401.10	162	588.17	157
1979	400.61	162	602.74	161
1980	407.47	165	627.39	168
1981	408.69	165	648.81	174
1982	420.05	170	671.14	180
1983	431.90	174	691.20	185
.....				
Least square				
growth rates (%)		2.30		2.44
Annual compound				
growth rates (%)		2.44		2.71

Table III and Figure 2 compare the trend in the PQLI and in the index of per capita GDP. A close look at Figure 2 reveals that at first, there is no gap between GDP and the PQLI during 1960–65 period. This is followed by a period in which the gap widens, after which it contracts in the next period. The period 1975–80 shows a constant difference between both indices. Finally, in the last phase (1980–83) the gap is again increasing between GDP and the PQLI.

Table IV is an attempt to gain some insight into the background of the movements of the PQLI and GDP. The time period of the analysis is spread over four distinct planning exercises done in Pakistan. The years between the military coup d'etat of October 1958 and the downfall of Ayub Khan in March 1969 are associated with the second and third five-year plans. The main feature of the development strategy pursued during the second and third plans (1960–70) included the policy of economic decontrol, pro-industrial bias in growth strategy, neglect of social sectors, low priority to equity and social justice, etc. Nevertheless, there is agreement on the fact that the sixties was a period of sound economic management as compared to the fifties and seventies.⁸ The second plan period registered, by and large, the highest growth in key economic sectors and in the PQLI. This was mainly due to the low base of the fifties, political stability and heavy foreign economic assistance. The third plan period (1965–70) was considerably different from the period of the early sixties. A combination of factors, such as the Indo-Pak war and, hence the increase in defence expenditure, a bad harvest, and a decrease in foreign assistance resulted in low growth in all sectors, especially in manufacturing. The PQLI, which was very high in the first half of

⁸ See [14, Chap. 6] for a detailed discussion.

Fig. 2. PQLI and GDP

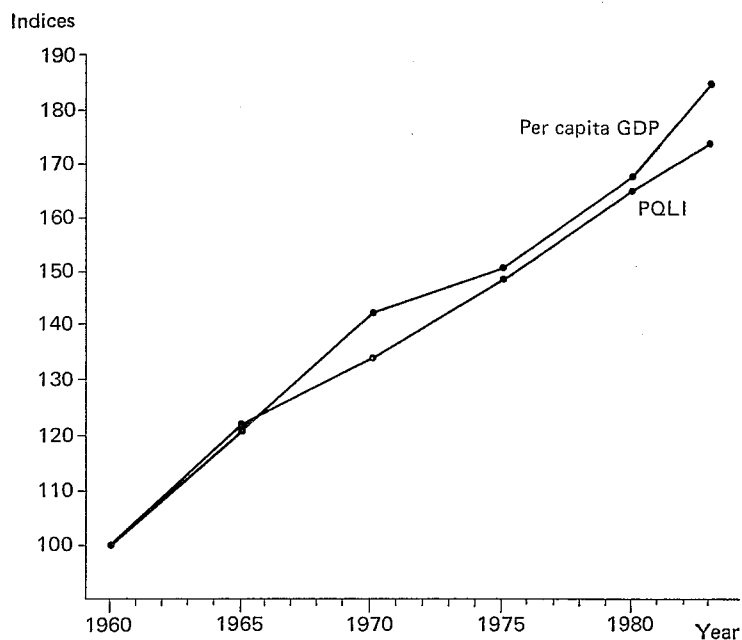


TABLE IV
MOVEMENT OF IMPORTANT ECONOMIC VARIABLES UNDER
DIFFERENT PLANNING PERIODS

(%)

	Second Plan (1960-65)	Third Plan (1965-70)	Non-plan Period (1970-78)	Fifth Plan (1978-83)
Sectoral growth rates:				
Agriculture	3.8	6.3	1.7	4.1
Manufacturing	11.7	8.1	4.6	10.2
Construction	19.2	5.7	6.5	7.1
Transport & communication	10.8	4.9	5.2	7.5
Per capita GDP	3.9	3.3	1.3	3.3
Share in public expenditure of:				
Health	1.6	2.1	3.2	3.0
Education & manpower	4.5	4.3	4.6	3.7
Physical planning & housing	9.0	5.3	7.5	5.9
Growth rate in PQLI	4.1	1.9	2.4	1.4

Source: [9].

Note: All growth rates are computed with values at constant factor cost.

the sixties decreased considerably in the second half. The important point to note here is that the decrease in per capita income was not as low as the decrease in PQLI. This was because of the development strategy pursued by Ayub's government. However, increasing disparities in regional income, concentration of industrial economic power, and a general belief of an increased income inequality resulted in the downfall of Ayub's regime and ultimately in the separation of Pakistan. After the breakup of the country, the elected People's Party government came into power on December 20, 1971 and remained in power till July 4, 1977. The main strategy of the government during this period was the emphasis on structural change, top priority to social services and a redistribution of income.⁹ The government managed the economy using annual development plans instead of making a five-year plan. The policy of nationalization, their labor policy, and the policy of economic control resulted in a decrease in the growth in manufacturing. Furthermore, bad crops and floods affected the growth in agriculture in this period. Because of these two important sectors, the growth in income was the lowest among all periods. However, the rate of growth in the PQLI during this period was quite high. The shares in public expenditure of health, education, and physical planning and housing were the highest among all periods. These figures are consistent with the policy of the government during the non-plan period. The fifth plan period covers the years between 1978 and 1983. The military government during this period has controlled the economy with its emphasis on growth, economic decontrol, deregularization, and the Islamization of the economy. The policies of denationalization resulted in the improvement of the rate of growth in manufacturing during the 1978-83 period. Bumper crops resulted in a high rate of growth in agriculture. A high rate in these two sectors made up for the fall in per capita income during the People's Party government. The social sector did not get much emphasis during this period, because of the government's development strategy. This phenomenon is confirmed with the low share of public expenditure, and hence for a low growth in the PQLI as compared to the period 1970-78.

IV. CONCLUSION

Perhaps the most important conclusion of this paper is that the performance of governments during the last twenty-three years in improving the quality of life of the people has remained poor. In general, annual growth in the PQLI and in per capita GDP has remained the same (2.30 per cent versus 2.44 per cent) during the period of the analysis. However, four distinct periods are observed with reference to growth in PQLI and per capita GDP. The evidence at best, suggests that low or high per capita income does not necessarily affect the improvement of the quality of life. Our analysis also supplements the argument that per capita income, alone, does not explain much about the social progress of a nation.

⁹ See [14, Chap. 7] for the discussion on this issue.

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APPENDIX TABLE I
MAGNITUDE OF INDICATORS USED IN THE ANALYSIS

Indicators	1960	1965	1970	1975	1976	1977	1978	1979	1980	1981	1982	1983	Growth Rates (%)
Health and nutrition:													
Physician per 10,000 population	1.36	1.88	2.36	2.56	2.60	2.67	2.73	2.78	2.90	3.18	3.46	3.77	4.53
Nurses per 10,000 population	0.51	0.64	0.76	0.88	0.93	0.97	1.01	1.06	1.12	1.18	1.22	1.24	3.94
Hospital bed per 10,000 population	4.91	4.95	4.85	5.21	5.43	5.45	5.54	5.62	5.83	5.78	5.82	5.85	0.76
Infant mortality rate ^a	161.50	149.50	143.00	135.60	133.80	132.10	130.10	127.80	125.50	123.20	121.00	119.00	1.34
Child death rate ^b	25.40	22.90	21.50	19.90	19.50	19.20	18.80	18.30	17.80	17.30	17.00	16.00	2.03
Protein supply per capita ^c	58.10	58.10	59.80	60.40	62.40	62.90	59.40	63.70	64.70	67.30	70.00 ^d	72.80 ^d	0.99
Life expectancy at birth:													
Male (years)	44.30	46.40	47.20	48.70	49.10	49.60	50.00	50.30	50.60	50.90	51.00	51.00	0.61
Female (years)	42.30	44.40	45.20	46.80	47.20	47.70	48.10	48.60	49.00	49.50	49.00	49.00	0.64
Labor force:													
Female labor force (% of total)	8.60	9.00	9.30	9.90	10.00	10.00	10.10	10.10	10.20	10.30	10.40	10.50	0.87
Labor force in industry (% of total)	18.00	18.50	19.00	19.50	19.60	19.70	19.80	19.90	20.00	20.00	20.10	20.20	0.50
Education:^e													
Primary enrollment ratio (total)	18.40	24.30	24.10	25.10	26.10	26.60	23.10	22.80	22.50	22.90	23.20	23.60	1.09
Primary enrollment ratio (female)	7.80	12.10	13.80	15.60	16.30	16.20	15.70	15.50	15.40	15.80	16.20	16.30	3.26

APPENDIX TABLE I (Continued)

Indicators	1960	1965	1970	1975	1976	1977	1978	1979	1980	1981	1982	1983	Growth Rates (%)
Secondary enrollment ratio (total)	4.20	5.40	6.80	7.60	7.80	7.70	7.40	6.70	6.40	6.60	6.70	11.20	4.36
Secondary enrollment ratio (female)	1.40	2.50	2.80	3.60	3.70	3.90	3.90	3.80	3.70	3.60	3.60	4.30	5.00
Enrollment in universities (total)	0.07	0.19	0.18	0.22	0.22	0.36	0.38	0.35	0.37	0.37	0.40	0.39	7.75
Enrollment in universities (female)	0.03	0.08	0.08	0.10	0.11	0.18	0.14	0.11	0.11	0.13	0.15	0.14	6.93
Consumption:													
Cars (per 1,000 population)	1.28	1.92	2.37	2.67	2.82	2.81	3.16	3.55	3.25	3.37	3.52	3.54	4.52
Radio receiver (per 1,000 population)	6.98	10.86	18.43	19.83	21.10	16.53	20.94	18.87	22.12	18.24	15.46	15.71	3.59
TV receiver (per 1,000 population)	0.10	0.20	1.55	4.34	5.76	6.31	7.13	7.37	8.16	6.95	8.17	7.59	20.71
Energy consumption per capita ^f	142.00	198.00	209.00	208.00	208.00	206.00	207.00	224.00	224.00	237.00 ^d	252.00 ^d	267.00 ^d	2.78

Sources: [7, 1978-79 and 1982-83 editions] [8] [10] [11, 1983 and 1984 editions] [15, 1984 and 1985 editions].

^a The rate in the annual number of deaths of infants less than 1 year old per thousand live births. Inverse of this rate is used.

^b The child death rate is the annual deaths per thousand children in the 1-4 year age group. Inverse of this rate is used.

^c This represents supply of protein grams per day per capita.

^d Estimated.

^e Enrollment ratios—primary (I-V) expresses enrollment as a percentage of the population of age 5-14 years. For secondary (IX-X) the relevant age group is 15-19. Enrollment at university level are shown as a percentage of population in 20-29 age group.

^f Kilogram of coal equivalent.