CHAPTER FIVE
DEVELOPING AN INDEX FOR THE SOCIOECONOMIC SETTING AT THE LEVEL OF THE GOVERNORATE

Broadly speaking, development can be viewed as a multi-dimensional phenomenon; some of its major dimensions include level of economic production, level of education, level of health services, degree of urbanization, woman status, level of nutrition, quality of housing, distribution of goods and services, and access to communication (UN, 1987)

Socioeconomic setting (SES) is regarded as the level of standard of living in a society as measured by the degree of achievements in the economic and social aspects of life. Socioeconomic indices aim to summarize the degree of achievement in these aspects of life.

An attempt is made in this chapter to develop an index for the socioeconomic setting at the level of the governorate. It comprises three sections. Section 1 focuses on methodological issues related to the development of the socioeconomic development indices. Section 2 is devoted to the construction of a governorate based development index and a description of its components. The validity and reliability of the index is examined in Section 3. The values of the index by governorate are given in Section 4.

5.1 SOCIOECONOMIC DEVELOPMENT INDICES:

Methods of the construction of such indices are presented below.

5.1.1. Adelman and Moriss Development Indicators:

Adelman and Moriss (1967) used forty indicators of socio-cultural, political and economic development to analyze the process of development in seventy-four

developing countries. Some of these indicators are traditional, such as per capita GNP, but some of them are definitely non-traditional. Adelman and Morris study emphasize the importance of non-economic factors in explanation of growth within and between different stages of development. However this index includes many indicators which can explain the variations between countries but its calculation needs a very sophisticated and complicated economic measures which may not be available easily in many countries. If it is available there will be a doubt about its reliability. A simple index may be more acceptable.

5.1.2. Physical Quality of Life Index (PQLI):

Morris and McAlpin (1982) developed a measure that can help policy makers determine the extent to which their policies actually do benefit greater or smaller proportions of their societies. The measure is called the Physical Quality of Life Index (PQLI). The PQLI has three components:

a) Infant mortality;
b) Life expectancy at age one; and
c) Literacy rate.

For each indicator, the performance of individual countries is evaluated on a scale of 0 to 100 where 0 represents an absolutely defined 'worst' performance and 100 represents 'best' performance. The overall value of the index is calculated by averaging the three indicators giving equal weight to each of them.

Morris and McAlpin computed the PQLI for 150 countries. The literacy index ranged from 0 literacy to 100 per cent literacy for the population aged fifteen years and over, the infant mortality rate from 229 to seven per thousand births, and the life expectancy at age one from thirty-eight to seventy-seven years. They argued that the PQLI measures the combined effect of nutritional status, public health facilities, family income, and social relations.

PQLI avoided the complexity of the previous index, but it seems to be a very

rough index. It does not include any economic measure (Singh, 1986). The life expectancy at age one is not a good representative of the mortality level in a country. Life expectancy at birth is preferred (Shryock & Siegel, 1976).

5.1.3. Singh's Development Indicators:

Singh (1986) determined nine indicators to measure the socioeconomic development. He calculated these indicators for fourteen developed and developing countries. These indicators are:

1. Per capita GNP.
2. Per capita daily intake calories.
3. Economically active population in agriculture as percent of total Population.
4. Per capita arable land.
5. Fertilizer consumption per hectare of arable land.
6. Annual compound growth rate of population.
7. Expectation of life at birth.
8. Annual growth rate of agricultural production.
9. Annual growth rate of industrial production.

Most of Singh's development indicators seem to be pure economic measures. The social indicators - like education and other services - were ignored in this set of indicators. A simple and comprehensive set of indicators are still required.

5.1.4. Todaro's Development Indicators:

Todaro (1985) suggested a set of economic and social indicators of development. These indicators are:

1. Per capita GNP.
2. Per capita GNP growth rate.
3. Physical Quality of Life Index.
4. Crude birth rate.
5. Crude death rate.

6. Life expectancy at birth.
7. Infant mortality rate.
8. Per capita military expenditures
9. Literacy.
10. Per capita public education expenditures.
11. Total exports.
12. Total imports.

Todaro's indicators are somewhat more comprehensive than the PQLI indicators. This may be due to introducing many demographic and social indicators. The introducing of PQLI as an indicator may not be accepted because the components of this index are already introduced separately in Todaro' set of indicators. Todaro did not suggest a way to arrange these indicators into a composite index.

5.1.5. UN Development Index:

The UN (1987) developed a simple index for socioeconomic development depending on data obtained from 38 countries. Four components were used in this index:

(a) Gross domestic product (GDP) per capita;
(b) Education based on the gross enrolment ratio for males and females in the primary and secondary level of schooling combined;
(c) Health based on the infant mortality rate; and
(d) Communication based on ownership ratios of passenger motor cars, television sets and radios.

GDP per capita is transformed into an index with values from 0 to 100. The lowest observed GDP per capita was chosen as the lower limit of the index (=0) and the highest as the upper limit (=100).

For the education component of the index, two types of indicators are available. One type is cumulative and measures the proportion of the population literate or the percentage with primary schooling completed. The other type of indicator measures

the proportion of the student-age population currently enrolled in school. The second measure was used in the UN index, but it measure (Gross Enrolment Ratio) is regarded as a crude measure. It represents the total number of students enrolled at the primary and secondary level - regardless of age - divided by the population within the age group normally attending these schooling levels. The index of enrolment ratio takes values between 0 - for the lower enrolment ratio - and 100 - for the highest one.

As suggested by the World Health Organization, the infant mortality rate (IMR) is regarded as the most relevant indirect health indicator because it reflects the health care accessibility, nutritional level, general sanitation, access to transport, traditions and norms, and cultural practices. The index takes values between 0 and 100, the highest observed IMR was chosen as the lower limit of the index (=0) and the lowest as the upper limit (=100).

The fourth component of the UN development index is related to the extensiveness of communications infrastructure. It measures the distribution of goods and services through the society. The index measure derived was a composite of two or three items (Radios, TVS, and Cars per 1000 populations) for which data were available with equal weight assigned to each. The index took values between 0 and 100.

In the final index, each of the four components - production, education, health, and communications - was given equal weight, with a possible range of values from 0 to 400.

Within this range countries were divided into four development categories:

Development Category	Score
High	225-400
Upper Middle	175-224
Lower Middle	125-174
Low	0-124

In reality the highest score was (370) and the lowest one was (15).

This index is considered the best of the above described indices because it has both simplicity and conclusiveness. Its input data are generally available and its calculation is very simple. It has one disadvantage that is the value of each index refers to the degree of achieved development in the subjects related to this index. An index that is built on the difference between the achieved development and the maximum possible development will be much preferable.

5.1.6. UNDP Human Development Index:

United Nations Development Program (1990) introduced the "Human Development Index". This aggregate indicator is derived from three socioeconomic variables: (a) life expectancy, (b) adult literacy, and (c) GNP per capita.

Life expectancy is measured by life expectancy at birth. This variable reflects the nutrition and the quality of health services available in the society.

Adult literacy variable, as measured by adult literacy rate, reflects the stock of education embodied in the population. The adult literacy rate is regarded as one of the most important indicator of human development.

GNP per capita is viewed as the economic component of the human development index. It reflects the standard of living in the society from the economic view.

Three steps were followed to calculate the value of HDI for each country:

First; calculate what the so-called deprivation rate for each variable. The deprivation rate is the difference between the maximum possible and the observed value of the variable as related to the difference between the maximum possible and the minimum possible for the country in each variable. The deprivation rate takes values between 0 and 1.

The deprivation rate is calculated by the following equation:

$$DR_{ij} = \frac{(Max\ X_i - X_{ij})}{(Max\ X_i - Min\ X_i)} \qquad (5.1)$$

Where:

DR_{ij} = Deprivation rate for country (j) in variable (i);
Max X_i = The maximum value of variable Xi;
X_{ij} = The observed value of variable Xi for the country j; and
Min X_i = The minimum value of the variable Xi.

Second; calculate the overall deprivation rate by averaging the values of the deprivation rate for the three variables included in the index.

The overall deprivation rate is calculated by the following equation:

$$ODR_j = \sum DR_{ij} / n \qquad (5.2)$$

where:

ODR_j = The overall deprivation rate for country j;
DR_{ij} = Deprivation rate for variable i in country j; and
n = Number of variables.

Third; calculate HDI. The overall deprivation rate is subtracted from (1), which is the maximum possible of the index. HDI ranges between 0 and 1.

The value of HDI index is calculated by the following equation:

$$HDI_j = 1 - ODR_j \qquad (5.3)$$

The HDI can not be used as a measure of the socioeconomic setting because it is best seen as a measure of people's ability to live a long and healthy life, to communicate and to obtain a decent living (UNDP, 1993).

To conclude, it can be noticed from the above presentation that most of the indices introduced some common indicators such as per capita income, literacy, infant mortality, and life expectancy. Some of these indices introduced the degree of urbanization and sectoral economic structure. Some of them ignored the main social indicators. All of these indices depend on equal weights for all variables.

5.2 SOCIOECONOMIC INDEX BY GOVERNORATE:

There are different strategies for the construction of composite indices. It may follow any of the following methods: (1) using factor loading from factor analysis; (2) using standardized scores with equal weights; and (3) using standardized scores multiplied by selected weights. The factor loading approach ignores the theoretical bases for constructing composite indices and is based only on the statistical criteria as the principle for selecting the indicators (Raslan, 1989).

In this study, the second strategy is used. Accordingly, the standardized score for each indicator is computed as follows:

$$Z_i = \frac{X_i - \overline{X_i}}{S_{x_i}} \qquad (5.4)$$

where:

Zi = standardized score for indicator i;

Xi = observed value of indicator i;

$\overline{X_i}$ = mean value of the indicator values; and

S_i = standard deviation of the indicator values.

The overall value of the SES index by governorate is calculated as follows:

$$SES_x = \sum Z_i / (k) \qquad (5.5)$$

where:

SES_x = Socioeconomic setting index for x governorate, and

k = The number of indicators.

5.2.1. Development Indicators:

The availability of comparable and reliable data is the main constraint for the construction of any development index. In view of the above findings and the availability and reliability of a comparable data at the level of the governorate, many combinations of the available variables were sorted to select a combination of variables which give the highest correlation with contraceptive prevalence rate. Seven indicators have been selected to construct a governorate based index for the socioeconomic setting. These indicators are as follows:

1. Literacy rate for population 10 years and more;
2. Primary and secondary school enrollment.
3. Life expectancy at birth;
4. Infant mortality rate;
5. Per capita income;
6. Percent working in agriculture; and
7. Percent urban.

5.2.2. Measurement and Definition of the Variables:

Tables (5.1) presents the values of the variables by governorate. A statistical description of the variables is given in Table (5.2). The following is a simple description of each variable:

1. Literacy rate for population 10 years and more:

   Literacy is defined as the ability of a person to both read and write , with understanding , a simple statement on his every day life (UNESCO, 1981). The higher the literacy rate the higher the development in any country. From Table (5.1) it is noticed that the highest literacy rate is found in Port-Said governorate (68.2%), while the lowest one is found in Fayoum governorate

(33.9%). It is noticed also from the table that the literacy rates are lower in upper Egypt governorates than lower Egypt governorates and these are lower than literacy rates in urban governorates.

2. Primary and secondary school enrolment:

School enrolment refers to enrolment in any regular educational institution at any level of education during a well defined and recent time period (UNESCO, 1981). The enrolment ratio for primary and secondary schools (PSSE) was selected as the process of enlarging the stock of population literacy. Table (1.5) shows that the highest PSSE is found in the urban governorates and Ismailia. It exceeds 90% of the female population in the school age. The lowest ERF is found in Fayoum governorate. This may be due to the agricultural nature of this governorate.

3. Life Expectancy at Birth:

Life expectancy at birth (e_0)is defined as the mean length of life of individuals who have been subjected since birth to a specific set of age specific mortality rates (IUSSP, 1982). It reflects the nutrition status and quality of health services available in the society (UNDP, 1990). Table (1.5) shows that the highest e_0 is found in Port-Said (67.5 years), followed by Alexandria and Damitta (65.8 & 65.3 years respectively). The lowest is found in Souhag (60.3 years) and Beni-Suef (60.7 years).

4. Infant Mortality Rate:

Infant mortality rate (IMR) is defined as the number of deaths of infants under 1 year of age in a given year per 1,000 live births in the same year. The infant mortality rate deserves special consideration because it is in this rate that the greatest improvement in mortality has taken place, mainly through public health measures and medical discoveries (Pollard et al, 1981). It is noticed from Table (5.1) that the lowest IMR is found in Damitta governorate (21%.), while the highest IMR is found in Aswan governorate. The highest IMR values are found in Upper Egypt governorates in general.

TABLE (5.1):SOCIOECONOMIC INDICATORS FOR THE EGYPTIAN GOVERNORATES.

Governorate	Literacy Rate Pop. 10+ (1)	Gross Enrolment Ratio 1990 (2)	Life Expectancy 1989 (3)	Infant Mortality Rate 1989 (4)	Per Capita Income LE (5)	Percent working in Agricult. (6)	Percent Urban (7)
Cairo	69.0	90.00	64.6	37	1223.6	4.8	100.0
Alexandria	66.2	88.20	65.8	26	1089.9	9.8	100.0
Port Said	68.2	84.80	67.5	26	1718.1	12.7	100.0
Suez	65.5	93.80	63.6	38	1032.3	11.1	100.0
Damietta	55.5	86.70	65.3	21	1392.6	33.1	25.2
Dakahlia	50.9	80.70	64.6	26	1697.1	41.6	26.2
Sharkia	46.9	71.60	63.3	35	905.5	50.2	21.1
Kalyubia	54.2	78.90	63.7	44	773.2	25.3	43.8
Kafrel-Sheikh	39.7	68.80	63.7	24	1181.8	57.3	22.8
Gharbia	52.4	79.30	65.5	35	923.6	37.2	32.7
Menoufia	51.9	82.90	64.9	41	756.7	44.7	20.1
Behera	42.5	73.50	63.2	33	765.3	53.9	23.4
Ismailia	58.2	87.60	63.8	30	1038.9	30.0	48.8
Giza	54.9	73.00	62.7	43	1060.5	19.7	57.5
Beni Suef	36.8	58.60	60.7	54	736.0	57.3	25.1
Fayoum	33.9	65.50	62.8	45	773.3	59.4	23.2
Menya	35.3	65.70	61.0	52	730.2	61.4	20.8
Assuit	38.2	67.10	61.7	55	742.2	58.6	27.9
Souhag	35.3	64.80	60.3	47	764.9	55.5	22.0
Qena	36.6	70.20	62.0	48	818.3	47.3	23.4
Aswan	53.1	82.90	61.4	64	766.1	34.1	39.6

Sources of Table (5.1):

(1) Calculated from: CAPMAS, (1989):"1986 Population Census".
(2) Calculated depending on data obtained from:Minstry of Education, (1992). "Education Statistical Year Book, 90/91" and CAPMAS, "Statistical Year Book".
(3) Institute of National Planning (1994):"Egypt:Human Development report, 1994".
(4) CAPMAS, Vital Statistics.
(5) Calculated from: CAPMAS, (1993) " Income and Expenditure Survey, 1990/91 " Vol. II, Part I, Table (1), and Vol. III, Part I, Table (1).
(6) CAPMAS, (1989) "1986 Population Census", Table (18).
(7) Calculated from: CAPMAS, (1989) "1986 Population Census".

5. Per Capita Income:

Per capita income is defined as the average income of a citizen in a country. It is used as a measure of the economic welfare. PCI by governorate was calculated from the results of Income and Expenditure Survey which was carried out by CAPMAS. As reported in Table (5.1) that the highest PCI is found in Port-Said governorate. This may be due to the commercial nature of this governorate and the transit trade in its port. The lowest PCI is found in Menya governorate.

6. Percent Working in Agriculture:

The percent working in agriculture (PWA) is considered as an indicator of the prevalence of traditional and fatalistic thoughts in the society. It reflects also the structure of the economy. The higher the percent working

TABLE (5.2):STATISTICAL DESCRIPTION OF SOCIOECONOMIC VARIABLES.

Variable V1 (Literacy Rate for Population 10+):			
Mean	49.771	Std err	2.540
Median	51.900	Range	35.100
Std dev	11.639	Variance	135.457
Minimum	33.900	Maximum	69.000

Variable V2 (Gross Enrollment Ratio, 1990):			
Mean	76.886	Std err	2.156
Median	78.900	Range	35.200
Std dev	9.880	Variance	97.607
Minimum	58.600	Maximum	93.800

Variable V3 (Life Expectancy, 1989):			
Mean	63.433	Std err	.404
Median	63.600	Range	7.200
Std dev	1.850	Variance	3.424
Minimum	60.300	Maximum	67.500

Variable V4 (Infant Mortality Rate, 1989):			
Mean	39.238	Std err	2.540
Median	38.000	Range	43.000
Std dev	11.640	Variance	135.490
Minimum	21.000	Maximum	64.000

Variable V5 (Per Capita Income, 1990/91):			
Mean	994.767	Std err	66.123
Median	905.500	Range	987.900
Std dev	303.014	Variance	91817.245
Minimum	730.200	Maximum	1718.100

Variable V6 (Percent Working in Agriculture 15+):			
Mean	38.333	Std err	4.049
Median	41.600	Range	56.600
Std dev	18.555	Variance	344.299
Minimum	4.800	Maximum	61.400

Variable V7 (Percent Urban):			
Mean	43.029	Std err	6.549
Median	26.200	Range	79.900
Std dev	30.010	Variance	900.596
Minimum	20.100	Maximum	100.000

in agriculture the lower the economic performance. Table (5.1) shows that the lowest the PWA are found in the urban governorates, while the highest PWA are found in Menya, Assuit, and Souhag governorates: 61.4%, 59.4%, and 58.6% respectively.

7. Percent urban:

The most clear measure of extent of urbanization is the percent of the total population living in urban areas. People who are living in urban territory more able to accept new thoughts and they are more exposed to western life styles. Four Egyptian governorates are totally urban, namely, Cairo, Alexandria, Port-Said, and Suez. The percent urban in the other governorates ranges between 57.5% in Giza and 20.1% in Menoufia.

5.3. TESTING THE VALIDITY OF THE INDEX:

More important than constructing a composite index is the testing of its validity and reliability. Therefore this section is devoted to examine the validity and reliability of the Socioeconomic Index by governorate.

5.3.1 Validity:

Validity is defined as the extent to which any measurement instrument measures what it is intended to measure, i. e. validity is concerned with the relationship between the concept (socioeconomic setting) and the indicator (socioeconomic setting index). There are two major types of validity, (1) criterion-related validity , and (2) construct validity. The first type of validity is based on empirical confirmation, while the second type is based on conceptual confirmation. In contrast to criterion-related validity, construct validation has generalized applicability in the social sciences. Thus, construct validation focuses on the extent to which a measure performs in accordance with the theoretical expectations. Specifically, if the performance of the measure is consistent with theoretical expectations, then it is concluded that the measure is construct valid. On the other hand, if it behaves inconsistently with theoretical expectations, then it is usually inferred that the empirical measure does not represent its intended theoretical concept (Carmines & Zeller, 1979). Construct validity is applied to the socioeconomic setting index.

Construct Validity:

The indicators that are used in the construction of the socioeconomic setting index are consistent with what is found in the demographic literature. Cutright (1983) in his study about the ingredients of recent fertility decline in developing countries found that the most important socioeconomic factors that affect fertility reduction are (1) GNP per capita; (2) percent urban; (3) percent literate; and (4) life expectancy. In addition to Cutright's findings, Lapham & Mauldin (1985) found that (1) infant mortality; (2) school enrolment; and (3) percent working in agriculture have a significant effect on contraceptive prevalence rate in developing countries. reflecting these findings the socioeconomic setting index is considered valid.

Also, the Human Development Index was applied to the Egyptian governorates by the Institute of National Planning using the three variables that used by UNDP (INP, 1994). The rank of governorates according to the values of this index versus the researcher's index is given in Figure (5.1). However the two indices are theoretically differ but they are highly correlated. The correlation coefficient between the two indices is 0.93. This may strengthen the findings of the researcher.

5.3.2 Reliability:

Reliability is concerned with the extent to which any measuring procedure yields the same results on repeated trials. Thus the more consistent the results given by repeated measurements, the greater the reliability of empirical measurements. There are four basic methods for estimating the reliability of empirical measurements. These are (1) the retest method; (2) the alternative-form method; (3) the split-halves method; and (4) the internal consistency method. A full description of each method is out of the interest of this work. However , the fourth method, which is the most relevant one to the data is described below (Carmines & Zeller, 1979).

The internal consistency technique to asses reliability provides a unique estimate of reliability for a given test. The calculation of the reliability coefficient (α) depends on the correlation matrix among the variables introduced in the construction of the index. α can be expressed as follows:

$$\alpha = \frac{N\bar{\rho}}{1 - \bar{\rho}(N-1)} \qquad (5.6)$$

where:

α = reliability coefficient;

N = number of items (indicators); and

$\bar{\rho}$ = mean inter-item correlation.

The value of α ranges between zero and unity. The closer to unity the more reliable the indicator (the SES index) and vice versa.

The mean inter-item correlation ($\bar{\rho}$) is equal to the absolute values of the inter-item correlation coefficients divided by their number. In the present case, the mean inter-item correlation is 13.54 divided by 21, 0.645. (See Table 3.5).

The calculated α for the SES index ingredients is equal to 0.93. That is the degree of reliability of this index is about 93%. It is relatively high. As a general rule, we believe that reliabilities should not be below 0.80 for widely used scales. At that level, correlations are attenuated very little by random measurement error (Carmines & Zeller, 1979).

5.4 INDEX VALUES BY GOVERNORATE:

The values of the SES index by governorates are given in Table (5.4). They are calculated using equation (5.5). The values of SES by governorate are clustered in three groups according to the level of socioeconomic development. This can be noticed easily from the frequency of the SES where the difference between the lowest value of each group and the highest value of the presiding group is higher than the intra-group differences. The highest development category values ranged between .91 and 0.27, and it includes five governorates, the second category lies between 0.19 and -0.05, and the third category values ranged between -0.23 and -0.58.

TABLE (5.3):CORRELATION MATRIX OF THE SOCIOECONOMIC VARIABLES:

	V1	V2	V3	V4	V5	V6	V7
V1	1.0000	.9158**	.7373**	-.4697	.5748*	-.9542**	.8463**
V2	.9158**	1.0000	.7026**	-.4814	.5042*	-.8393**	.6868**
V3	.7373**	.7026**	1.0000	-.7896**	.7042**	-.6144*	.5144*
V4	-.4697	-.4814	-.7896**	1.0000	-.7338**	.3529	-.2788
V5	.5748*	.5042*	.7042**	-.7338**	1.0000	-.5008	.4433
V6	-.9542**	-.8393**	-.6144*	.3529	-.5008	1.0000	-.8998**
V7	.8463**	.6868**	.5144*	-.2788	.4433	-.8998**	1.0000

* Significant at p < .010
** Significant at p < .001
Note:
V1=Literacy rate for population 10 years and more;
V2=Primary and secondary school enrollment. V3=Life expectancy at birth;
V4=Infant mortality rate; V5=Per capita income;
V6=Percent working in agriculture; and V7=Percent urban.

TABLE (5.4):SOCIOECONOMIC SETTING INDEX FOR THE EGYPTIAN GOVERNORATES.

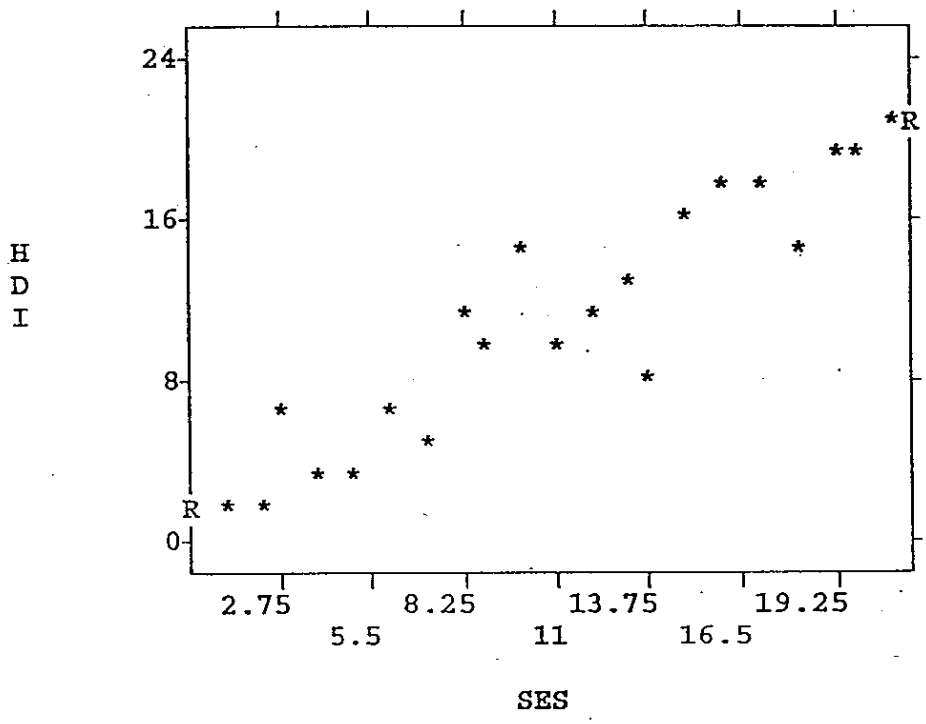
Governorate	Index Value	Rank
High:		
Port Said	0.91	1
Cairo	0.61	2
Suez	0.51	3
Alexandria	0.48	4
Dakahlia	0.27	5
Moderate:		
Damietta	0.19	6
Ismailia	0.16	7
Aswan	0.12	8
Gharbia	0.08	9
Menoufia	0.08	10
Kalyubia	0.04	11
Giza	-0.05	12
Low:		
Sharkia	-0.23	13
Kafrel-Sheikh	-0.27	14
Assuit	-0.26	15
Behera	-0.31	16
Fayoum	-0.37	17
Qena	-0.37	18
Menya	-0.42	19
Beni Suef	-0.51	20
Souhag	-0.58	21

Urban governorates - in addition to Dakahlia - ranked first in the level of development. They comprise the first category which is characterized by the highest development. The second category includes Damietta, Kalyubia, Gharbia, Menoufia, Ismailia, Giza, and Aswan. Sharkia, Kafrel-Sheikh, Behera, Beni Suef, Fayoum, Menya, Assuit, Souhag, and Qena are classified in the lowest level of development.

After developing an index for the socioeconomic setting at the level of the governorate the next Chapter is devoted to development of an index for the family planning program effort to be used also as an explanatory index for the variations in contraceptive prevalence between governorates.

Figure (5.1)

PLOT OF THE RANK OF GOVERNORATES IN HUMAN DEVELOPMENT INDEX VERSUS SOCIOECONOMIC SETTING INDEX



Correlation Coefficient = .93247