Socioeconomic Correlates of Poverty- An Application of Multivariate Normal Distribution

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Abstract

Among the various impediments to peace and security as mentioned in the report of the High Level Panel of Experts of the UN Secretary General(Documents, 2005:595), this paper is concerned with the poverty component, defined as the percentage of population living on less than $2 per day. The aim of this paper is to identify socioeconomic correlates of poverty by analyzing aggregate level data collected from the following sources: World Population Data Sheets, 2011 and 2013 (Population Reference Bureau, 2011, 2013); World Fertility Data 2012 (United Nations, Department of Economic and Social Affairs, Population Division, 2013); and Adult Literacy Rate, Female by Country (United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics 2003-2013). On the basis of the percentages of people living in poverty, 82 countries have been classified into 3 groups: low poverty, medium poverty, and high poverty. The 'canonical discriminant analysis' technique based on the multivariate normal distribution has been used to identify the variables that discriminate among the groups most. The adequacy of the technique is judged by using eigenvalues, canonical correlations, and Wilk's lambda. To determine the relative weights of the discriminating variables, standardized canonical coefficients, as well as, the structure coefficients have been used. The analysis identified the 'percentage of dependent population' as the most influential variable in discriminating among the groups. The second most influential variable is the 'use of modern methods of contraception. Other important variables are 'gross national income', 'percent urban', and 'children ever born'. Policy implications have been discussed.

Keywords: Poverty; Multitvariate normal distribution; Wilk's lambda; Canonical correlation; Standardized and Structure coefficients

Introduction

The list of reasons for undertaking a study on poverty is quite long. The report of the High-Level Panel of Experts of the United Nations Secretary General on Threats, Challenges, and Change (Documents, 2005:595) was in consideration in the 2005 September World Summit of the United Nations. In the report, poverty, infectious diseases, and environmental degradation figured prominently as a cluster of existing and potential threats to peace and security. The panel, in their report, while attempting to portray a global picture of poverty, mentioned that since 1990, the number of people living in extreme poverty increased by more than 100 million people in some regions, although there has been an increase in the per capita income of an average of 3 percent annually in the developing countries. In the same period, as reported by the panel, the average per capita income decreased in at least 54 countries, and the gap between the rich and poor increased in many countries. As an example, they mentioned that in some parts of Latin America, the richest twenty percent of households earned thirty times more income than the poorest twenty percent of the households.

Among the various impediments to peace and security, mentioned in the report, this paper is concerned with the poverty component. It is a common knowledge that one of the principal goals of every government is to reduce poverty of its people as much as possible, given its economic and other relevant parameters.

As such, an important function of the social researchers is to analyze the socioeconomic correlates of poverty to identify their relative weights necessary for ascertaining priorities while formulating social and economic policies with a purpose to ensure an egalitarian distribution of the national wealth. The analysis in this paper involves aggregate level data on a number of countries, and has been conducted with the use of a technique which is based on the multivariate normal distribution.

Data and Methods

Variables and their Measures

In this paper data on all the relevant variables have been collected from secondary sources. These sources are: World Population Data Sheets, 2011 and 2013 (Population Reference Bureau, 2011, 2013); World Fertility Data 2012 (United Nations, Department of Economic and Social Affairs, Population Division, 2013); and Adult Literacy Rate, Female by Country (United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics 2003-2013).

The main variable to be analyzed, as mentioned before, is POVERTY, defined as the percentage of population living on less than $2 per day. The percentage values have been employed to yield three groups of countries – low poverty (L: 1-20 percent: 30 countries), medium poverty (M:21-60 percent: 26 countries), and high poverty (H:greater than 60 percent: 26 countries).Although there is an element of arbitrariness in this procedure which is, in any case, inherent in all such classifications, and may be construed as a limitation of the present study, the classification was done to ensure more or less equal frequencies of the three groups. However, except at the borderlines, there are strong grounds for broadly differentiating the three groups on the basis of poverty percentage values. This paper attempts to identify those variables that contribute most in discriminating among the three groups of countries. In general, the different variables do not contribute equally in differentiating the groups – the groups may differ more on some variables than on others. In this case, the variables that contribute most in discriminating among the groups merit more attention from the governments seeking to improve the poverty level in their respective countries.

The discriminating variables are: UMM (X_1): percentage of currently married or in-union women of reproductive age who are currently using modern methods of contraception; URBAN (X_2): percentage of population living in urban areas; GNI (X_3): gross national income converted to 'International' dollars using a purchasing power parity conversion factor where the 'International' dollars indicate the amount of goods and services one could buy in the United States with a given amount of money; DENSITY (X_4): population per square kilometer; FLR (X_5): female literacy rate defined as the percentage of females aged 15 and above who can, with understanding, read and write a short, simple statement on their everyday life; DEPPOP (X_6): percentage of the dependent population defined as the sum of the percentages of population aged less than 15 years and more than 65 years; CEB (X_7): number of children ever born to a woman in a particular age group (usually 45-49 which is viewed as the end of the reproductive period of women) which is a cumulative measure of fertility, and is the mean number of children born alive to women in that age group; and RWS (X_8): ratio of the percent share of income of the wealthiest fifth to the poorest fifth.These variables and their measures can be found in the sources mentioned above. Data on the above nine variables were available for analysis only for 82 countries. The appendix shows the list of these countries along with their values on these nine variables.

The discriminating variables have been selected on the basis of their theoretical relationships with poverty. One important measure of income growth is the per capita income which has been found to be strongly negatively related to poverty ((Iceland, 2003; Gundersen and Ziliak, 2004; Aaron, 1967; Anderson, 1964; Blank and Blinder, 1986; Blank and Card, 1993; Cain, 1998). It is also necessary to ensure that the benefit of income growth does not reach only a select few, since otherwise its positive impact may be well mitigated by the income inequality which affects the pattern of poverty. Efforts must be made to reduce the widening gulf between the few rich and the many poor to ensure that the wealth trickles down to the majority. To this end, the ratio of the percent share of income of the wealthiest fifth to the poorest fifth has been included in this analysis.

The relationship between income and fertility has also been found to be negative ((Jiang, 1986; Rubin-Kurtzman, 1987).The use of modern methods of contraception by currently married or in-union women of reproductive age has a direct negative relationship to fertility in a given society – the higher the use the lower the fertility.

The fact that in a high fertility society, usually, a family is more likely to use a given income on a larger number of members than in a low fertility society implies that in a high fertility society, families may face more economic strains that may eventually lead them to face poverty. As such, the variables ‘use of modern methods of contraception’ and ‘children ever born’ have been used in the analysis. Reasoning in the same manner we may argue that the size of the ‘dependent population’ may also influence poverty.

Usually, most of the resources are concentrated in urban areas since the urban areas are the epicenters of political, economic, and other activities, and as such, the urban dwellers are exposed to a spectrum of conditions that provide more sources to earn better income compared to ruralites. Consequently, the urbanites are, in general, better off economically than ruralites, and hence are less likely to face poverty.

Another factor that may influence poverty is the population density (Burkett, Humblett, and Putterman, 1999). For example, in China, the highest-income area is the most densely populated area (the coastal region) and the lowest-income area is the western region which is the least densely populated area (Johnson, 2001). One reason may be that in a densely populated area people can run their businesses and other activities with a greater number of potential consumers in a relatively smaller area, and hence can earn better with less investment than in a sparsely populated area.

Education plays a very important role in the reduction of poverty. A higher level of education enhances the probability of higher economic gains. As Johnson aptly states that if people are to be pulled out of poverty, the most appropriate way is to increase the level of their education (Johnson, 2001).Education of the females creates more opportunities for their involvement in income generation that raises the total income of the family, and consequently the probability that the family may face material deprivation is lessened. As such, ‘female literacy rate’ has been included in this analysis as a discriminating variable.

It follows from the above arguments that the variables ‘use of modern methods of contraception’,‘percent urban’, ‘gross national income’, ‘population density’ and ‘female literacy rate’ may be expected to have negative relationships with POVERTY, while, ‘children ever born’, ‘percent of dependent population’, and ‘ratio of wealth share’ will have positive relationships with POVERTY.

Analytical Technique

The 'canonical discriminant analysis' technique is used in this paper to discriminate among the groups.Since the aim in this paper is to identify the variables that discriminate among the three groups most, the technique is very appropriate for this analysis (Nie et al., 1975; Bennett and Bowers, 1976; Klecka, 1980).

The discriminating variables are assumed to follow the multivariate normal distribution, given by

$$f(X,\mu,\Sigma) = \frac{1}{(2\pi)^{p/2}|\Sigma|^{1/2}} e^{-\frac{1}{2}(X-\mu)'\Sigma^{-1}(X-\mu)}$$

where X' = vector of discriminating variables (X_1, X_2, …..,X_8)

μ' =(μ_1, μ_2,….. μ_8) = mean vector of the discriminating variables

Σ = covariance matrixof the discriminating variables which is assumed to be common for all the groups

p = number of discriminating variables

The canonical discriminant functions to be derived are of the form

$$D = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots\ldots + \beta_8 X_8 \quad \ldots\ldots(1)$$

where βs are the unstandardized coefficients. The standardized coefficients are given by $\gamma_i = \beta_i \sqrt{\frac{w_{ii}}{n-g}}$

where w_{ii} = within sum of squares of the variable X_i

g = number of groups

n = total number of cases over all the groups.

We can derive at most two discriminant functions which is the smaller of the two numbers: 2 (=g-1) and 8 (=p). To obtain the first function we have to derive the coefficients such that they maximize the difference of the group means on the function. The difference among the group means should also be maximum on the second function but on condition that its values are uncorrelated with those of the first function.

Analysis

Findings

Table 1 shows the mean values of the discriminating variables for the three groups of countries.

Table 1: Mean Values of the Eight Discriminating Variables for the Three Groups of Countries

Group 1		*Group 2*	*Group 3*
Variable	Low Poverty	Medium Poverty	High Poverty
Use of Modern Contraception (X_1)	66.333	47.111	30.120
Percent Urban (X_2)	48.767	44.889	19.520
Gross National Income (X_3)	10979.000	3818.889	1537.200
Population Density (X_4)	111.033	92.889	145.360
Female Literacy Rate (X_5)	91.855	78.674	47.056
Dependent Population (X_6)	32.967	38.444	45.840
Children Ever Born (X_7)	3.254	4.607	6.230
Ratio of Wealth Share (X_8)	7.762	10.836	8.040

The table shows that the mean values of the discriminating variables are substantially different for different groups, in some cases, quite markedly. For example, the mean values of 'gross national income' for the three groups are 10979.000, 3818.889, and 1537.200 respectively which are highly different from each other. Consequently, these variables may be expected to considerably discriminate among the groups. However, these univariate statistics are unlikely to provide multivariate group differences. To this end, the standardized canonical coefficients are examined to know the relative importance of variables as discriminators among the groups. These coefficients are presented in table 2.

The associated discriminant functions are

$Y_1 = 0.737Z_1 – 0.093Z_2 + 0.300Z_3 + 0.005Z_4 + 0.264Z_5 - 0.810\ Z_6 + 0.327\ Z_7 - 0.237\ Z_8$
$Y_2 = 0.092Z_1 - 0.493\ Z_2 + 0.799Z_3 + 0.471\ Z_4 - 0.488\ Z_5 + 0.321Z_6 - 0.219\ Z_7 - 0.348Z_8$

where Zs are Xs expressed in standardized forms.

Table 2: Standardized Canonical Coefficients

Variables	First discriminant function	Second discriminant function
Use of Modern Contraception (X_1)	0.737	0.092
Percent Urban (X_2)	-0.093	-0.493
Gross National Income (X_3)	0.300	0.799
Population Density (X_4)	0.005	0.471
Female Literacy Rate (X_5)	0.264	-0.488
Dependent Population (X_6)	-0.810	0.321
Children Ever Born (X_7)	0.327	-0.219
Ratio of Wealth Share (X_8)	-0.237	-0.348

Diagnosis of the Discriminant Functions

The multivariate measure of group differences, Wilk's lambda, is given by

$$\Lambda = \prod_{i=r+1}^{q} \frac{1}{1+\lambda_i}$$

where r is the number of discriminant functions already derived, q is the maximum number of discriminant functions, and λ_i is the eigenvalue associated with the ith discriminant function. The value of Λ when r = 0, that is, before any functions have been derived, is 0.146. Since Λ is an inverse measure of group differences, this small value, 0.146, implies that the selected variables are very effective in discriminating among the groups.

The 82 countries used in this analysis have not been selected randomly, and hencedonot constitute a random sample of countries from all countries of the world. However, hypothetically, if we can assume that it is a random sample, then we can employ a statistical test to measure the significance of the Wilk's lambda. The χ^2 statistic for testing the significance of Λ is given by

$$\chi^2 = -[n - \frac{p+g}{2} - 1]\log_e \Lambda$$

with (p – r)(g –r – 1) = 16 degrees of freedom for r = 0

The value of χ^2, 145.189, indicates that the total set of discriminating information is highly significant before the derivation of any discriminant function (r = 0), and hence we can safely assume that the population has significant differences between groups.

Table 3 shows the eigenvalues, as well as, the canonical correlations. The larger the eigenvalue the greater the discrimination. The eigenvalue 3.742 for the first discriminant function is more than eight times greater than the eigenvalue 0.443 for the second function. Also, the two discriminant functions, Y_1, and Y_2, account for 89.4% and10.67% respectively of the total discriminable variance 4.185 ($=\lambda_1 + \lambda_2$). The implication is that Y_1 is highly efficient in discriminating among the groups. An examination of the canonical correlations lends support to this contention - Y_1 is strongly related to the groups (R_1 = 0.888), while Y_2 has a much weaker relationship (R_2 = 0.554) with the groups.

Table 3: Eigen Values and Canonical Correlations

	Discriminant function	Eigen value	Relative percentage	Canonical correlation
$i\lambda_iR_i$				
	1	3.74289.4	0.888	
	2	0.44310.6	0.554	

It is to be noted that a centroid is a point which has coordinates that are a group's mean scores on the discriminant functions. A plot of the group centroids can also be used to gauge the effectiveness of the variables in differentiating the groups. The p(=8)dimensional space of the discriminating variables is transformed into q(=2)dimensional space of the discriminant functions by equation (1). The relative positions of the centroids are shown in the 2- dimensional space in figure 1.Table 4 presents the mean discriminant function scores.

Table 4: Mean Discriminant Function Scores

Functions	Group 1 (low)	Group 2 (medium)	Group 3 (high)
First discriminant function	2.231	-0.254	-2.404
Second discriminant function	0.388	-0.928	0.537

The wide separation among the centroids of the three groups in the plot implies that the variables have been selected quite appropriately for discriminating among the groups.

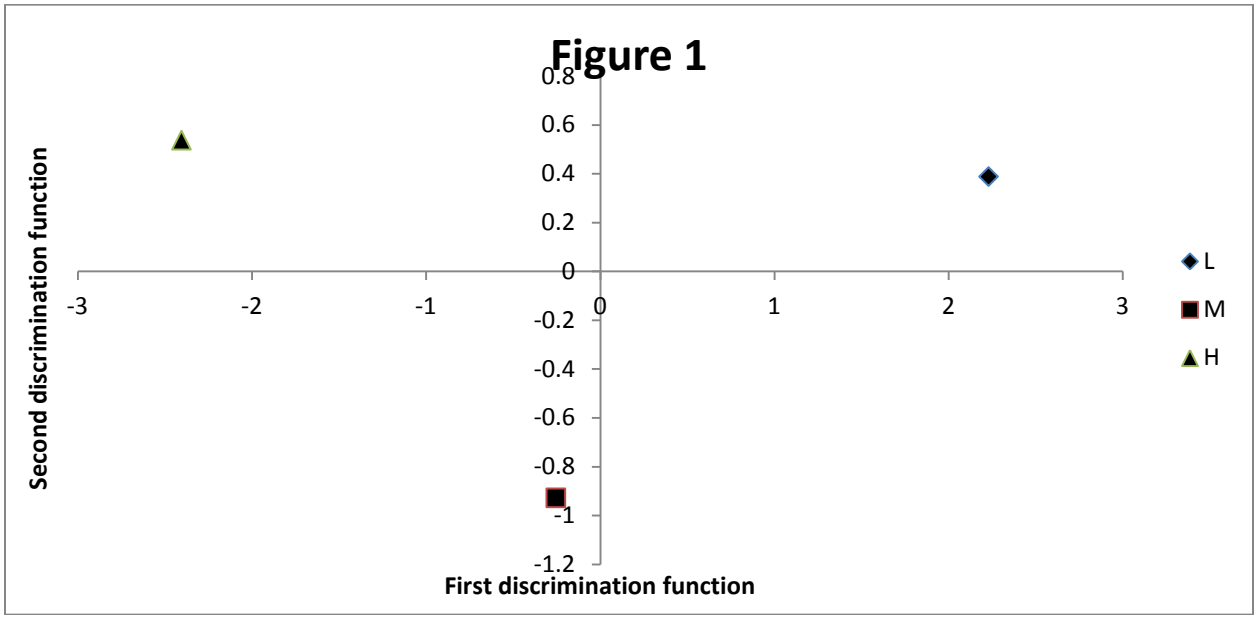
Interpretation of the Standardized Canonical Coefficients

Having judged the adequacy of the discriminant functions, the interpretation of the coefficients of the functions is in order. A positive contribution of a variable to a function score is indicated by the positive sign of the associated coefficient for that variable, while a negativesign of a coefficient for a variable indicates that it contributes negatively tothe function score.

In table 2, the largest magnitude (-0.810) of the coefficient of the variable 'dependent population' implies that it is the most influential variable to discriminate among the groups.

The negative sign of this coefficient indicates that as the 'dependent population' increases the first discriminant function decreases, and the likelihood that the corresponding country will belong to medium or high poverty group increases, as is evident from figure 1. The second most influential

Figure 1: (Group 1- Upper Right Quadrant; Group 2- Lower Left Quadrant; Group 3-Upper Left Quadrant)



variable is the 'use of modern methods of contraception' (0.737). The plot of the group centroids also shows that because of the positive sign of the coefficient, as the 'use of modern methods of contraception' increases the corresponding country stands a greater chance to belong to the group 1 of the low poverty countries. The positive coefficients of gross national income ',' female literacy rate and 'population density' can be interpreted in the same manner. The positive sign of the 'children ever born' (0.327) is, however, counter to our expectation. The negative sign of the coefficient of the ' ratio of wealth share' (-0.237) indicates that as the disparity between the rich and poor increases the likelihood for the country to belong to medium or high poverty group increases. However, the negative sign of the coefficient of 'percent urban' is not in consonance to our hypothesis.

Since the second discriminant function accounts only for 10.6% of the total discriminable variance, our interest mainly centers on the first discriminant function, and hence the second function will not be pursued.

Interpretation of the Total Structure Coefficients

Two highly correlated discriminating variables, actually, share their contributions to the discriminant function scores. In this case, to retain the balance of the contributions, it is possible that a standardized coefficient will be smaller than when one of the variables is used, or may be larger but with opposite signs. It is from such considerations that the need for investigating the structure coefficients grows. A structure coefficient is a measure of the bivaritate correlation between a single discriminating variable and a discriminating function, and as such, is unaffected by its (the variable's) relationship with other discriminating variables. In this sense a structure coefficient is free of the limitations the standardized coefficients suffer from. Table 5 presents the structure coefficients.

Table 5: Total Canonical Structure Coefficients

Variables	*First discriminant* function	*Second discriminant* function
Use of Modern Contraception (X_1)	0.534	-0.009
Percent Urban (X_2)	0.310	-0.434
Gross National Income (X_3)	0.568	0.409
Population Density (X_4)	-0.037	0.147
Female Literacy Rate (X_5)	0.529	-0.436
Dependent Population (X_6)	-0.595	0.221
Children Ever Born (X_7)	- 0.494	0.135
Ratio of Wealth Share (X_8)	-0.024	-0.392

As can be seen from table 2, the standardized coefficient of 'percent urban'is small and negative (-0.093), while its structure coefficient is large and positive (0.310) on the first discriminant function. This may be because of its correlation with other discriminating variables. The most noteworthy contrast appears in the magnitude and direction of 'children ever born' (-0.494) on the first discriminant function. The standardized coefficient of 'children ever born' is 0.327 which is counter to our hypothesized positive relationship of this variable and poverty. The negative sign of the structure coefficient implies that an increase in 'children ever born' decreases the first discriminant function score, and hence the corresponding country approaches the medium or high poverty group of countries which is in resonance to our hypothesis (see figure 1). The use of the standardized coefficient only could not manifest this influence of 'children ever born'. The 'dependent population' still remains the most influential discriminator followed by 'gross national income', 'use of modern methods of contraception', and 'female literacy rate' in that order.

Summary and Conclusions

One of the principal goals of every government is to reduce poverty at its minimum possible level. In this paper poverty is defined as the percentage of population living on less than $2 per day. These percentage values of 82 countries for which the relevant data were available were classified into three groups: low poverty (30 countries), medium poverty (26 countries), and high poverty (26 countries). The aim of this paper is to identify socioeconomic variables that discriminate among the groups most. The discriminating variables, selected on the basis of theoretical reasoning are: UMM (X_1): percentage of currently married or in-union women of reproductive age who are currently using modern methods of contraception; URBAN (X_2): percentage of population living in urban areas; GNI (X_3): gross national income converted to 'International' dollars using a purchasing power parity conversion factor where the 'International' dollars indicate the amount of goods and services one could buy in the United States with a given amount of money; DENSITY (X_4): population per square kilometer; FLR (X_5): female literacy rate defined as the percentage of females aged 15 and above who can, with understanding, read and write a short, simple statement on their everyday life; DEPPOP (X_6): percentage of the dependent population defined as the sum of the percentages of population aged less than 15 years and more than 65 years; CEB (X_7): number of children ever born to a woman in a particular age group (usually 45-49 which is viewed as the end of the reproductive period of women) which is a cumulative measure of fertility, and is the mean number of children born alive to women in that age group; and RWS (X_8): ratio of the percent share of income of the wealthiest fifth to the poorest fifth. Data on all these variables have been taken from the following secondary sources: World Population Data Sheets, 2011 and 2013 (Population Reference Bureau, 2011, 2013); World Fertility Data 2012 (United Nations, Department of Economic and Social Affairs, Population Division, 2013); and Adult Literacy Rate, Female by Country (United Nations Educational, Scientific and Cultural Organization (UNESCO), Institute for Statistics 2003-2013).

The technique used in this paper to analyze data is the 'discriminant analysis technique' based on the multivariate normal distribution.Since there are three groups and eight discriminating variables, only two possible discriminant functions can be derived. The fact that the first discriminant function accounts for 89.4% of the total discriminable variance and that the associated canonical correlation is very high (R_1 = 0.89) imply that this function can effectively discriminate among the groups.

Since the second discriminant function accounts only for 10.6% of the discriminable variance, and its associated correlation is low (R_2 = 0.554) our main interest lies in the first discriminant function. Also the plot of the group centroids (figure 1) reveals that the groups are widely separated from each other lending support to the appropriateness of the selection of the discriminating variables, as well as to the technique employed to discriminate among the groups.

An examination of the standardized coefficients shows that the 'dependent population' (-0.810) is the most influential variable in discriminating among the three groups (table 2) - the higher the percentage the lower the score on the first discriminant function so that the corresponding country approaches the medium or high poverty groups of countries (figure 1). The table shows that the 'use of modern methods of contraception' (0.737) is the second most influential variable in discriminating among the groups – countries having higher levels of use are more likely to have lower levels of poverty. This variable is followed by 'gross national income', 'female literacy rate', and 'ratio of wealth share' in that order. All these variables have expected relationships with poverty, as hypothesized.

Because the variables – 'children ever born' and 'percent urban' – have demonstrated relationships contrary to what have been hypothesized, the structure coefficients have been examined. This examination of the structure coefficients shows that the 'dependent population' still retains its position as the most influential variable, and although 'gross national income' has replaced the 'use of modern methods of contraception' as the second most influential variable, the 'use of modern methods of contraception' still remains a very significant discriminator (0.529). The most noteworthy shifts are observed in the roles of''children ever born' and 'percent urban' in discriminating among the groups. The structure coefficients of these variables on the first function are quite large and have the expected signs. This indicates that the contributions of 'children ever born' and 'percent urban' to the function scores, as were measured by standardized coefficients, were heavily shared by other correlated variables. Obviously, the contribution of 'population density' to the function score is low since its standardized coefficient, as well as, the structure coefficient are both small (0.005, and -0.037 respectively), and hence probably may be dropped out of consideration.

One limitation of the study is the element of arbitrariness that was allowed to operate in classifying the groups. However, this problem is inherent in all such classification procedures. The second limitation is that both the standardized and structure coefficients are very low for the variable 'population density' and hence could be dropped out of the analysis, and the functions recomputed. This is because how other variables will behave in the absence of 'population density' is not known. The third limitation is that the assumption that the discriminating variables follow the multivariate normality has not been checked. However, the technique is very robust and a strong adherence to the assumptions is not necessary (Nie et al., 1975; Lachenbruch, 1975).

The policy implications of the study are many. The 'dependent population' has been found to be the most influential discriminator among the three groups. This variable is the sum of the percentages of population aged less than 15 years and more than 65 years. For the developing countries, it is known, that the children less than 15 years largely outnumber the other component, implying that the higher the existing fertility level of a country the more it moves leftward on the first discriminant function, and consequently approaches the territory of the medium or high poverty groups of countries (figure 1). The variable 'children ever born' (structure coefficient -0.494) which is a measure of cumulative fertility, as well as, the variable 'use of modern methods of contraception' (structure coefficient 0.534) strongly support this contention. The study suggests that a government seeking to improve the poverty level of its people needs to focus on its existing fertility level, and for that matter, on the 'use of modern methods of contraception' both of which demand massive socioeconomic changes. The variables 'gross national income', 'female literacy rate', and 'percent urban' have been found to be very effective in lowering the poverty level. The variables 'population density' and 'ratio of wealth share' do not appear to be as strong discriminators ashave been previously thought. In particular, for 'the ratio of wealth share', probably it is not the ratio that matters but the absolute amount of wealth in the hands of the poorest fifth that counts.

It is obvious that a univariate approach to uncover the differences among the groups would be too simplistic. In this paper, we have gone far beyond the simplistic approach to identify the multivariate differences among the three groups of countries with low, medium, and high levels of poverty.

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Appendix

Country	Poverty Level	X1	X2	X3	X4	X5	X6	X7	X8
Jordan	L	83	41	5,730	74	88.9	40	5.35	5.5
Syria	L	54	43	4,620	122	77.2	41	5.95	5.5
Bangladesh	H	25	48	1,550	1,046	49.8	36	4.86	4.56
Bhutan	M	33	65	5,290	15	38.68	36	4.5	6.43
India	H	29	47	3,280	378	50.82	38	3.48	4.78
Kazakhstan	L	54	49	10,320	6	99.5	31	2.74	4.22
Kyrgyzstan	M	35	46	2,200	28	99.1	34	3.8	5.13
Maldives	L	35	27	5,250	1,091	98.43	33	6.3	6.29
Nepal	H	17	44	1,180	207	45.4	41	4.57	5.13
Pakistan	H	35	19	2,680	222	99.97	40	6.31	4
Sri Lanka	M	15	53	4,720	318	89.07	32	2.52	5.63
Tajikistan	M	26	32	1,950	53	99.5	42	5.61	4.88
Uzbekistan	H	36	59	2,910	64	98.9	34	4.31	6.29
Cambodia	M	20	35	1,820	81	70.86	37	4.46	5.5
Indonesia	M	43	57	3,720	125	88.97	34	3.82	6.57
Philippines	M	63	34	3,540	319	93.9	40	4.2	8.33
Thailand	M	31	77	7,640	135	91.53	30	2.2	6.71
Vietnam	M	30	68	2,790	265	90.2	32	2.61	6.14
China	M	50	84	6,890	141	90.5	26	2.09	9.4
Mongolia	M	61	61	3,330	2	97.8	32	4.53	6.29
Estonia	L	68	56	19,120	30	99.8	32	2.01	6.14
Latvia	L	68	56	17,610	34	99.8	31	1.81	6
South Africa	M	62	60	10,050	41	88.1	35	3.46	22.67
Swaziland	H	22	48	4,790	69	85.6	41	5.5	14.25
Costa Rica	L	65	72	10,930	92	96.2	31	3.1	14
El Salvador	L	65	66	6,420	296	81.36	40	4.7	13.25
Guatemala	M	50	44	4,570	135	68.7	45	4.8	20
Honduras	M	52	56	3,710	69	83.45	40	5.47	30
Mexico	L	78	66	14,020	59	91.45	35	3.31	10.6
Nicaragua	M	58	69	2,540	45	77.92	39	5.22	7.83
Dominican Republic	L	66	70	8,110	207	88.28	37	3.56	10.6
Argentina	L	93	64	14,090	15	97.7	36	3.05	12.25
Bolivia	M	67	34	4,250	9	85.99	41	5.17	29.5
Brazil	L	87	77	10,160	23	90.23	32	2.92	19.67
Colombia	M	75	73	8,600	41	93.44	35	2.94	20
Ecuador	L	68	59	8,100	52	81.68	36	3.39	13.5
Peru	L	77	51	8,120	23	84.65	37	3.8	13.25
Suriname	M	70	45	6,730	3	88.4	35	3.48	19
Uruguay	L	93	75	12,900	19	98.46	36	2.56	10.2
Armenia	L	64	27	5,410	105	99.4	30	2.53	4.44
Azerbaijan	L	54	13	9,020	106	99.22	29	2.52	5.25
Iraq	M	67	33	3,330	75	69.2	46	5.93	4.44
Morocco	L	56	52	4,400	72	44.1	34	4.69	6.86
Tunisia	L	68	52	7,810	65	69.6	31	4.61	6.14
Benin	H	43	6	1,510	81	28.1	47	6.74	6.57
Burkina Faso	H	24	13	1,170	62	21.58	47	5.46	6.71
Cote d'Ivoire	M	51	8	1,640	70	44.3	45	6.15	8
Ghana	M	52	17	1,530	105	59.3	42	5.59	9.8
Guinea	H	28	6	940	42	26.4	46	6.55	7.67
Guinea-Bissau	H	30	14	1,060	45	36.5	44	6.58	6.14
Liberia	H	47	10	290	37	53	46	6.56	7.5
Mali	H	33	6	1,190	12	18.19	51	7.23	5.13
Mauritania	M	42	8	1,940	3	49.5	43	6.52	7.83
Niger	H	17	5	680	13	15.08	51	7.83	5.38
Nigeria	H	51	10	2,070	176	48.8	46	6.86	7.67
Senegal	M	43	10	1,810	65	32.99	46	6.07	7.83
Sierra Leone	H	39	7	790	75	28.9	46	7.02	5.5
Burundi	H	11	18	390	367	59.9	49	7.05	4.78
Ethiopia	H	17	14	930	79	22.8	47	7.25	5.25
Kenya	M	18	39	1,570	72	82.8	45	6.29	10.6
Madagascar	H	31	29	990	36	65.26	46	4.82	10
Mozambique	H	31	12	880	29	40.1	48	5.37	10.2
Rwanda	H	19	45	1,130	415	66.1	45	6.37	11.4
Tanzania	H	27	26	1,360	49	66.3	48	6.35	6.43
Uganda	H	15	18	1,190	143	66.8	51	7.36	8.5
Zambia	H	36	27	1,280	18	61	49	6.75	15.5
Angola	H	59	5	5,190	16	57	50	7.07	9.8
Cameroon	M	59	12	2,190	42	67.8	45	6.5	6.57
Central African Republic	H	39	9	750	8	41.1	45	4.88	20.33
Chad	H	28	2	1,160	9	21.9	48	6.92	7.83
Gabon	L	86	12	12,450	6	83.2	39	6.1	8
Sao Tome & Principe	M	63	33	1,850	187	83.3	47	6.14	11.2
Belarus	L	75	56	12,740	46	99.7	29	1.79	4
Bulgaria	L	73	40	13,260	67	97.5	32	1.95	4.11
Hungary	L	68	71	19,090	107	98.9	31	1.91	5
Moldova	L	42	43	3,010	121	97.8	27	2.39	5.13
Poland	L	61	28	18,290	122	99.3	29	2.82	5.13
Russia	L	74	65	18,330	8	99.4	28	1.93	7.83
Ukraine	L	69	48	6,180	76	99.6	30	1.7	3.6
Albania	L	50	10	8,640	111	98.7	32	2.95	5.38
Bosnia-Herzegovina	L	46	11	8,770	75	95.9	29	3.37	6.14
Slovenia	L	50	63	26,470	101	99.7	31	1.82	4.88