Series on Democracy and Health

Democracy, Communism and Health Status: A Cross-National Study

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Introduction

It is now widely accepted that improving the health status in a given country entails more than just the provision of effective preventive and curative medical services. McKeown's thesis (1979) that biomedical interventions played a relatively minor role in the historical decline of mortality in the industrialized countries is well known. Gains in health status are the result of a long-term process - involving complex mechanisms and factors operating at a societal and collective level - which often requires changes in the nature of society and in the allocation of national resources (Caldwell and Caldwell, 1985; Halstead, Walsh and Warren, 1985). The determinants are, therefore, most appropriately analyzed using tools and techniques provided by the social sciences (Chen, 1992), rather than through the narrow application of clinical or public health perspectives.

In recent years there has been considerable research examining the various social, cultural and behavioral determinants of lower mortality (Caldwell et al., 1989). Important determinants that have been identified include the levels of female education and autonomy, nutritional adequacy and political priorities for health. By their very nature, issues related to such determinants are political. If so, achieving better health is inevitably a political process. As was concluded by the Rockefeller Conference in 1985, "political will" or "a sustained political commitment to universal health and well-being" is a major factor responsible for health success in poor developing countries ("Summary Statement", 1985).

There are also reasonable *a priori* grounds for expecting that differences in political system might influence health status, either positively or negatively. For example, it might be argued that communist regimes committed to an ideology, which especially emphasizes the elimination of material deprivation, are more likely "to create national health services based on the principle of universal entitlement to care" (Cereseto and Waitzkin, 1986a), and thus improve the health status of their populations. On the other hand, one may argue that representative and open forms of government are more likely to allow individuals and their organizations to work for those changes that will enable them to meet their own health needs. This is clearly an important issue. If the first argument holds, then the "dismantling of

socialist health and welfare infrastructures [following the collapse of communism] may well lead to a deterioration of health outcomes in the formerly socialist countries of Eastern Europe″ (Lena and London, 1993). On the other hand, the second view would suggest that these very same events are beneficial for health status by creating new possibilities for meeting basic needs, including health (Grant, 1993).

Despite the significance of politics and the political system, there has been relatively little work done specifically examining the relationship between political economy and health status (Reich, forthcoming; Birdsall, forthcoming). On the other hand, considerable work has been done on examining the relationship between political systems and economic development. The effects of differing regime types and political mechanisms on the process and rate of economic development have been most widely analyzed. However, as it has increasingly been accepted that development amounts to more than just raising income levels, analysis has been extended to the relationship between political systems and social development. In particular, there have been efforts to link basic needs provision to variations in political characteristics. These have uncovered some correlations between performance in social development, including health, and political variables, although the exact relationships seem complex and their identities remain controversial.

This paper attempts to explore, through a quantitative cross-national analysis (using both parametric and non-parametric methods), the effect of certain types of political systems -specifically political democracies and communist regimes - on health status. A democracy is defined as a state having regular, competitive multiparty elections for executive and legislative office. This definition resembles Dahl′s (1971) definition of polyarchy and one recently used by Alesina and Rodrik (1991) in analyzing the effects of democracy on distributive policies and economic growth. This definition of democracy was considered appropriate because it is our belief that a real (or potential) opportunity for governments to be voted out of power through the ballot box is the critical defining element of a functioning democracy. Communist regimes are defined as those states guided by the doctrine of Marxism/Leninism or one of its derivatives. Beyond ideology, its important defining characteristic is a totalitarian system of government in which a single authoritarian party controls the state-owned means of production (with active discouragement of private economic activity) with the professed aim of establishing a classless society. Thus, countries of the former Soviet Union are clearly communist. Socialist countries that may have leftist leanings but where either

there is no restriction on private enterprise (e.g., India); or where, even though a Marxist/Leninist party may currently be in power, more than one political party exists and can potentially gain power (e.g., Zimbabwe) are, however, not classified as communist regimes.

These two categories of regimes were chosen because they represent distinct political systems, which, given the potentially differing approaches of each to health care provision, are likely (as noted above, and discussed further in the methods section) to have differing effects on the health status of their citizens. Further, these categories of regimes have been examined in previous studies for their impact on basic human needs and, more specifically, on health status. Finally, the implications of these two types of political regimes on differences in health status are of immediate relevance, given the collapse of many of the communist regimes in the recent past and the increased worldwide interest in democratization.

Interestingly, while the consensus of previous studies on this subject (detailed in the review of literature) seems to be that democratic regimes also perform better in terms of health status, authors have attached much greater significance to the performance of the socialist/leftist regimes (equivalent to our definition of communist regimes) compared with their alternatives. It is important to note, however, these two characteristics, although they represent different political attributes, rarely coexist in practice (see 2x2 table of page 7).   If such a divergence exists (and we believe it does), i.e., if the level of democracy is inversely correlated with being leftist in political orientation, then direct comparison between these two types becomes important. But no such comparison has been made by previous authors, and scant attention has been given to the fact that few socialist/leftist regimes were very democratic. The main goal of this paper is to undertake precisely this comparison, thereby empirically testing the superiority of one political regime over the other. A second goal is to rigorously test previous work using more recent and comprehensive data. The final goal of this endeavor is to identify potential areas for future research on the political determinants of good health.

The paper is organized as follows: Section II sets the conceptual and empirical context for the analysis by reviewing previous studies on this subject; Section III outlines the materials and methods used in the present analysis; Section IV presents the main results; and Section V provides a detailed discussion of the results and a comparison with previous analyses, along with the key conclusions and issues towards which future research might be directed.

Literature Review

There have been a limited number of published cross-national studies which have examined the effects of political system on health, either in conjunction with the effect on other social indicators or on health status alone. While few in number and appearing in a diverse selection of academic journals, they have each attempted to build on one another in an incremental manner. They represent a succession of studies which are characterized by a common and cumulative set of conclusions. It is therefore useful to review these studies in a chronological manner.

Moon and Dixon (1985) examined the relationship between basic needs achievement and the political orientation of the regime, level of democracy, and government "strength" proxied by the size of central government spending. Their study consisted of a cross-national regression analysis using data from 116 countries for the period 1960-75. Their dependent variable, the Physical Quality of Life Index (PQLI) proposed by Morris (1979), is an aggregate index which combines the infant mortality rate, life expectancy at birth and the literacy rate. Regimes were classified as being left or right in their political orientation. The level of political democracy was based on an ordinal index, developed by Bollen (1980), which is a composite measure of six indicators: freedom of the press, government sanctions, tolerance of political opposition groups, fairness of elections, methods of selecting executives, and methods of selecting legislative officials. Central government expenditures as a proportion of GNP was used as the measure of state strength. In their analysis, which controlled for income level, they found that the level of state spending was positively correlated with the level of basic needs, and that strong regimes that were right-wing did worse while strong regimes that were left-wing performed better in achieving basic needs. In addition, the level of democracy was positively correlated with basic needs achievement.

The work of Moon and Dixon (1985) was subsequently replicated by London and Williams (1990). This second study was essentially similar, but the authors, taking the approach of dependency theory, added variables which reflected international and intra-national political

factors. These consisted of measures such as the level of economic penetration by multinationals, commodity concentration in exports, and world-system position.[1] This study was again in the form of a multiple regression analysis, using data for the period 1965-70, in which the dependent variables were PQLI, as well as the Index of Net Social Progress (INSP). The INSP is another measure of basic needs achievement, which combines 41 different indicators of social development (Estes, 1984). In the results, penetration by multinationals was significantly correlated with lower levels of basic needs, while left or right-wing political orientation was significant in several of the regressions. The level of democracy was again consistently and significantly related in a positive manner to the level of basic needs.

While the previous studies concentrated on the effects of political and economic factors on social development in general, Cereseto and Waitzkin (1986a; 1986b) examined the relationship between political system and the levels of health status in particular, as well as measures of health infrastructure. Health status was represented alternately by the infant mortality rate, child death rate and life expectancy at birth. In this analysis, political-economic system was classified on the basis of two categories: "socialist" and "capitalist". The classification as capitalist or socialist corresponded to the United Nations classification of countries as market economies or as centrally-planned economies. The sample consisted of all the 123 countries with populations more than one million, and the data used was for the period around 1981. A number of analytical methods were used, including cross-tabulation by differing income groups and multiple regression. The results revealed that health status was strongly correlated with income level as is to be expected. In the cross-tabulation analysis by income groups, socialist countries were found to do better than capitalist at equivalent levels of economic development, except in the high income group which contained no socialist countries.

In a subsequent paper, Lena and London (1993) applied the model developed by London and Williams to the health indicators examined by Cereseto and Waitzkin. The multiple regression model used deliberately replicated that first used by London and Williams. The reason, according to the authors, was to allow meaningful comparison with the previous studies. It should be noted that their study did not use Cereseto's and Waitzkin's categorization of socialist nations. However, despite using a different definition, those countries defined by them as leftist/strong leftist regimes were equivalent to Cereseto's and Waitzkin's socialist nations. The other independent

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1/   World-system position is a concept, used by followers of the dependency approach, which is supposed to reflect the structural and essentially unalterable position of countries in the world economy in relation to the developed countries. The economically advanced countries represent the core and the semiperiphery, while the less developed countries comprise the periphery. Meaningful economic development in the periphery is considered impossible without

variables were identical to those of London and Williams, and for the same time period: 1965 to 1970. The dependent variables were infant mortality rate, child death rate and life expectancy at birth for the year 1983. Infant mortality rate and child death rate (but, inexplicably, not LEB) were logged in order to correct for skewness. The independent variables were lagged in an attempt to capture the "processual nature" of the relationships examined. It is reasonable to expect that social and political factors do not have an immediate effect on health status, and that instead their impact, if any, would take place over a number of years or decades. The results confirmed the previous studies. They indicated that strong left regimes generated significantly better health outcomes than strong right regimes (except in the case of infant mortality rates, which were lower but not significantly so). More democratic regimes also significantly and without exception did better than less democratic regimes.

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the express support of the core (dependent development). The validity of the theory and such a classification can be gauged from the following. Taiwan, which is now a major capital-exporting, technologically advanced economy, has typically been classified as being in the periphery, while South Africa, which is essentially a primary commodity exporting economy of low technological sophistication, has been classified as belonging to the semiperiphery.

Methods and Materials

The objective of this paper is to examine the relationship between political systems and health status, controlling for levels of income per capita. Although, beyond examining the association of health status with political regimes, we venture certain preliminary hypotheses regarding the possible directions of the causal relationships, and about possible mechanisms by which the causality might be mediated, we do not, in this paper, offer any empirical substantiation. This could be a fertile area for future research.

It is our general hypothesis that certain political systems (i.e., democracies and communist regimes) have a significant and differential impact, over a period of time, on health status. More specifically, we propose that democracies should enjoy better health status relative to their income than non-democracies, although this claim needs to be tested empirically. This is because, in a democracy, governments face greater incentives to meet the demands of their population for better health and other basic needs. Where this process results in improved educational and nutritional provision, it should act indirectly to improve health status. Where, however, this leads to improved health care provision, its effects on health status should be more direct. Given that democracies are also more pluralistic, it is further likely that individuals and organizations have a greater freedom to work towards improving their own health status when public intervention fails or is insufficient.

In the case of communist regimes, the governments may not face significant pressures from their populations to improve their health status, may resist such pressures, or may fulfill some pressures (e.g., in the case of Cuba). On the other hand, these regimes are based on an ideology - Marxism-Leninism - which claims unique understanding of the causes of poverty and material deprivation and of the solutions to these problems. Some observers (such as the authors of previous studies cited above) have also claimed that communist regimes have been especially successful in meeting the basic needs of their populations. Although they may lack significant external incentives to meet the basic needs of their populations, it can be argued that they face significant internal motivations to do so. Testing of this claim is thus warranted.

It is our contention that the factors that would lead democracies to perform better (given a certain income level) than non-democracies are likely to be stronger than those that would lead communist regimes to perform better than other states. This is because the longevity of the government in power in a democratic system is, to an extent, contingent on their being responsive to the demands of the health care consumers. Communist regimes, though they may be guided by ideology in providing health care to their populations, do not face the same pressures to deliver. In the interest of clarity of exposition, it is useful to present the classification of countries, according to political regime, in the form of a 2x2 table. The horizontal axis of the table consists of democratic and non-democratic countries, while the vertical axis consists of communist and non-communist regimes. Theoretically, one can conceive of four different regime types according to this classification. In the table below, however, the

	Democracies	Non-Democracies
Communist	--	II
Non-Communist	I	III

cell corresponding to democratic and communist regimes is empty, since the two characteristics, although they represent different political attributes, are, in practice, incompatible with each other. Thus, for all practical purposes, our sample consists of three categories: democracies (I), communist regimes (II),   and non-democratic, non-communist regimes (III).

It is our hypothesis that direct comparisons of the performance of democracies (I) with communist regimes (II), vis-à-vis health status will confirm the superiority of democratic regimes. Further, we hypothesize that democracies (I) are likely to perform significantly better than all non-democratic regimes (i.e., II + III). Finally, we propose that communist regimes (II) are likely to produce better health status (controlling for income level) only in comparison to non-communist states that are also non-democratic (III), but not compared to all non-communist countries (i.e., I + III).

This analysis is carried out for the year 1990. The sample consists of all countries in existence in that year for which comparable data were available (a total of 166 countries -see data sources). The countries included in the sample account for more than 99% of the world's population. All income variables are expressed in 1990 constant (US and PPP) dollars.

Dependent Variables

Infant Mortality Rate (IMR) and Life Expectancy at Birth (LEB) are used as dependent variables. There is a general consensus in the literature that both variables are good aggregate indicators of health status. Life expectancy is the most widely used indicator of health status and has been called "theoretically the best indicator of health" (Interim Guide on Levels of Living, UN, 1961). The IMR has similarly been characterized as an outcome variable summarizing multiple health and nutritional afflictions of very young children (Field and Ropes, 1980), and an extremely sensitive indicator of human health and well-being (McGranahan et al., 1972; UN Secretariat, 1982). In fact, the two variables offer slightly different perspectives on health status of populations, IMR reflecting only child health status, while LEB reflects both adult and child health status. We therefore decided to test each separately as dependent variables. Some researchers have suggested that indicators such as 5Q0 or 45Q15 might, at least theoretically, be better indicators of health status (e.g., Feachem et al., 1992). However, the argument is moot since data are not avail- able on these variables for a large number of countries, and even when they are, these are often derived from models, instead of from empirical data.

Health status indicators, such as life expectancy or the infant mortali- ty rate, have asymptotic limits, reflecting physical and biological maxima (or minima). As the overall health status reaches progres- sively higher levels, equal incremental improvements represent much higher levels of achievement than similar ones from a lower base. In other words, the relationship between achievement and the values of the indicators is not linear (see Sen, 1981). Therefore, the observed absolute differences in the levels of the health indicators do not re- flect comparable differences in the achievement of countries. There- fore, using the approach suggested by Sen and others, logged vari- ables of the form -Ln(80-LEB) for life expectancy and Ln(IMR-3) were used as dependent variables. Eighty years represents the maximum attainable life expectancy as of 1990, while 3 per 1000 is the lower

limit for infant mortality rates. The requirement to log all these variables arises not only from the necessity to deal with heteroscedascity (which is eliminated when LEB and IMR are expressed in the above form), but also from the underlying nature of the variables. The failure of London and Williams (1993) to log LEB in their analysis is, therefore, particularly problematic.

Independent Variables

We have taken the position in this analysis that income and political regime are the key independent variables explaining variations in health status across countries. In other words, it is our contention that the political variables, along with income, represent the right combination of the various factors that could conceivably affect health status. It is generally accepted that the nature of the political regime is an important determinant of the kinds of social policies and development strategies implemented in a country, whether the motivation is provided by ideology (as in communist countries) or competition (real or potential) for political power (as in democracies). The political variables that we use in this analysis, thus, represent not only the political regime in a particular country, but also the choices that the country makes in formulation and implementation of social programs (besides direct health care programs). These programs (along with income), in turn, affect the factors (such as literacy, food supply, levels of environmental degradation, etc.) that have been cited in the literature as determinants of health status. This assertion is supported by a number of previous studies that have examined relationships between type of political regime and the various factors mentioned above (e.g., Moon and Dixon, 1985; London and Williams, 1990; World Bank, 1991). The relationship between health status indicators and political regimes was therefore examined, controlling for aggregate income levels, since richer countries may be expected to have better health status. We claim that the political regime variables, along with the income variable, are sufficient in modeling variations in health status across countries. Inclusion in the model of the other explanatory variables (such as literacy, nutritional levels, etc.) noted above would dilute the true effect of political regime that we are trying to capture.

GDP per capita in US dollars (which is the traditional numeraire for national income) was used as a continuous variable in the regression specification to control for the aggregate income level of a country. Since estimates of income levels controlled for local purchasing power are considered a more appropriate basis for comparison

between countries, the analysis was repeated using purchasing-power parity (PPP) adjusted estimates of income levels expressed in PPP dollars. We were particularly interested in testing whether adjustment of aggregate income for purchasing power made a significant difference to the results, specifically the effect of political regime on health status. As reported in previous studies, we found that the double logged form of the relationship between income and health status fit better than the semi-logged form; the income variables were therefore logged. It should be noted that although it can be plausibly argued that the income distribution in a country will have a significant bearing on health status, and, therefore, should be included in the model, this was not attempted. The reasons were several. The most important reason, as noted by Alesina and Rodrik (1991), is that income distribution is measured "infrequently and imperfectly". Thus, it is practically impossible to get data on income distribution measures for the countries in our sample for the year 1990. Further, these measures are often very imprecise and fraught with technical and other problems. We, therefore, did not include income distribution in our model.

Political regime was represented in our models by a dummy variable for democracies and another dummy variable for communist regimes. The categorization of countries as democracies or communist states is generally straightforward, and the full listing is given in Table 1. The classification was completed before running the regressions and was not changed subsequently so as to avoid any potential for bias in the analysis. The definition of countries as democracies, and as communist, was based on their having exhibited consistency in their political regime (i.e., democracy or communism as defined above) for more than ninety per cent of the 20 years prior to 1990. The justification for defining political regime over a twenty-year time period, while examining other variables for only the year of the analysis, was that there was likely to be a time-lag between the establishment of a political system and its effect on the health status of the population. For similar reasons, continuity in the political regime is also important, as frequent change in political regimes is likely to obfuscate the effect of regime on health outcomes. This definition was also applied to countries gaining their independence after 1970, when there was substantial continuity before and after independence in the constitutional and political arrangements (e.g., Dominica, Lithuania).

In the literature, there has been some debate centered around the appropriate specification of the political regime variables for this kind of analysis. In most previous studies, the variables for political system

have been generally ordinal in nature. This has been feasible because of the existence of several cross-national political indices compiled by independent authors. Some of these are measures of political characteristics (e.g., Bollen and Jackman, 1985); others measure civil rights; while yet others are a combination of both (e.g., Freedom House index, Humana index). The indices differ in their underlying concepts, definitions and coverage. None of these have gained universal or even common acceptance (UNDP, 1991). The index that offers the most extensive and systematic coverage was designed by Charles Humana. However, this only covers 88 countries (that is half of the total number of countries in our data set). Further, information is only available for certain years in the 1980s. Most relevant to our analysis, many of the other indices are compiled on an annual basis, and reflect the political/civil characteristics of a particular country in the year for which the indices were compiled.

$$(1) \quad -\text{Ln} (80\text{-LEB})_i = \beta_0 + \beta_1 \text{LnY}_i + \beta_2 \text{Demodum} + \epsilon_i$$
$$\qquad\qquad\qquad\qquad (+) \qquad\qquad (+)$$

$$(2) \quad -\text{Ln} (80\text{-LEB})_i = \beta_0 + \beta_1 \text{LnY}_i + \beta_2 \text{Commdum} + \epsilon_i$$
$$\qquad\qquad (+) \qquad\quad (+/-)$$

$$(3) \quad -\text{Ln} (80\text{-LEB})_i = \beta_0 + \beta_1 \text{LnY}_i + \beta_2 \text{Demodum} + \beta_3 \text{Commdum} + \epsilon_i$$
$$\qquad\qquad\qquad (+) \qquad\qquad (+) \qquad\qquad (+)$$

where $-\text{LEB} (80\text{-LEB})_i$ = Ln of the Shortfall in Life expectancy at birth in country i;

Y_i =   Real GDP per capita in country i (alternatively measured in US$ and PPP$);

Demodum = Dummy variable for democratic states;

Commdum = Dummy variable for communist states;

and ϵ_i = Stochastic disturbance term.

The index for any particular year, thus, does not capture changes in political regime over time. Since we have argued that regime type has an impact on health status only over a number of years, the index for any one year is probably irrelevant. Arguably, one could take the average score over a number of years, but this still leaves the problem of determining what weight to attach to each individual year. Therefore, this paper uses dichotomous, dummy variables to represent each political regime.

Sources of Data

Income levels expressed as GDP per capita in US dollars were obtained from the World Bank data files. Data on PPP-adjusted income (PPP GDP) were also obtained from the World Bank, which has generated its estimates through regression analysis of data originally obtained from Summers and Heston's International Comparisons Project (ICP Phase IV and V, 1980 and 1985). Data on population, and the health status indicators (IMR, LEB) were obtained from the World Development Report (WDR) 1993 published by the World Bank. Information on certain countries for which data were not available in the WDR was obtained from UNICEF's State of the World's Children, 1993, and from UNDP's Human Development Review, 1993. Mortality data for Taiwan were obtained from the 1991 Taiwan-Fukien Demographic Fact Book, Republic of China (Ministry of the Interior, Republic of China, Taipei, Taiwan, 1992).

Regression Model

Based on the above discussion, multiple regression models of the following three forms were fitted for LEB and for IMR. Only the LEB models are shown due to limitations of space. The signs below the equations indicate the expected direction of the relationship.

Our interest is in a) testing the magnitude and statistical significance of the parameters estimated in each model and b) comparing the magnitudes of the estimated β_2 and β_3 from equation 3, using an F-test to assess whether the coefficient on the democracy variable is significantly different from the coefficient on the communist variable.

Analysis of Residuals

We also estimated the size of the residuals of health status variables in a regression against income per capita measured both in US dollars and PPP (purchasing power adjusted) dollars. This was done in order to identify and rank the countries with the maximum positive and negative deviation from predicted life expectancy (infant mortality) based on their income levels. These deviants represent countries that have attained "good health at low cost" (Halstead et al., 1985), or what is strictly speaking "good health relative to income".

Non-Parametric Testing

Parametric tests that are the basis of regression analysis make strong assumptions about the distribution of the error terms (e.g., that the errors are normally distributed). These distributional assumptions, although they increase the power of parametric tests, may or may not hold in practice. In order to corroborate our results, without the restrictions imposed by the distributional assumptions that parametric methods make, we therefore carried out non-parametric testing to examine the correlation between the political variables and ranks of the residuals of health status indicators, controlling for income. As noted, non-parametric tests, in general, have lower power compared to the corresponding parametric tests. A confirmation of the results of the parametric tests, through non-parametric testing, thus, lends considerable support to the robustness of the results.

We undertook a Two-Sample Wilcoxon rank-sum test to test whether the median values of the ranks of residuals for health status indicators (regressed on income per capita), for the democracies (I) (or communist regimes - II) were significantly different from the median values for the non-democracies (II + III) (or non-communist regimes - I + III). Further, we tested whether democracies (I) performed significantly better than communist regimes (II). The health status indicators were initially regressed against income. The residuals from this regression, which are a measure of the positive (indicating better than expected performance given a certain income level) and negative (indicating worse than expected performance) deviations from the health status predicted by the income level of the country were obtained and ranked in such a way that the maximum positive deviation got the highest rank, and the maximum negative deviation got the lowest rank. Comparisons between the medians of these ranks for the 0 and 1 values, respectively of each political dummy variable were undertaken, which amounts to a non-parametric comparison of the average performance of democracies (I) with non-democracies (II + III), and, likewise, communist regimes (II) with non-communist regimes (I + III). Similarly, the median rank of the democracies (I) was compared with the communist regimes (II). The null hypothesis in each instance was that there is no significant difference between the medians of the ranks (i.e., equality of medians) for each pair of comparison groups. A significant z-statistic for the Wilcoxon Rank-Sum test, enabling the null to be rejected, would indicate that the medians of the ranks of the two groups are significantly different from each other, thereby suggesting that the average performance of one group is significantly better than that of the other, controlling for income.

Results

Examination of univariate relationships between the logged version of the health status variables (noted above) and each of the three independent variables (i.e., Ln of income per capita, the dummy variable for democracy, and the dummy variable for communist regimes) showed strong positive relationships for Ln of income per capita (Adj. R^2 for LEB for income in US$ and PPP $ = 0.72$; Adj. R^2 for IMR for income in US$ and PPP $ = 0.69$), and for the democracy variable (Adj. R^2 for LEB and IMR $ = 0.38$). The relationship between health status variables and the communist regime variable was weak, and not statistically significant even at the 0.1 level.

Tables 2 and 3 present the main regression results for equations 1, 2, and 3 above in terms of LEB and IMR. The income variable in Table 2 is in 1990 US dollars and in Table 3 in 1990 PPP dollars. As expected, in each of the three models for LEB and IMR, the sign on the income variable is positive and negative respectively, and the coefficient is highly significant (p-value $ < 0.001$), thereby confirming the key role played by income per capita in explaining the variance in health status indicators. The adjusted R^2 for the model in Equation 3 is 0.76, i.e., the model very significantly (p-value of the model F-statistic $<< 0.0001$) explains the variation in the dependent variables (LEB and IMR). Equation 3 implies that for a hypothetical country at income level US$ 1000, which is both non-democratic and non-communist, an increase in income per capita of US $100 is associated with approximately a 0.6 year increase in life expectancy. Similarly, for the same country, the same increase in income per capita is associated with a fall in infant mortality of 2.4 per 1000. The corresponding results for income in PPP dollars can be obtained from Table 3.

Table 2 also shows that, in line with our prediction, the dummy variable for democracies is either positive (LEB) or negative (IMR) and highly significant (p-value $ < 0.001$) for both health status variables in equation 1, thereby suggesting that democratic regimes (category I in 2x2 table above), on average, do better than non-democracies (inclusive of communist countries, i.e., II + III), controlling for income. In fact the Adjusted R^2 of the model in Equation 1 (inclusive of the

democracy dummy variable) is significantly higher than the R^2 for the univariate model with just income per capita as the independent variable (0.75 versus 0.72). The dummy variable for the communist regimes, however, is not statistically significant (equation 2), which shows that these regimes (II) do <u>not</u>, on average, do better than non-communist regimes (inclusive of democracies, i.e., I + III). The communist variable only becomes significant ($p<0.01$) when we simultaneously control for democracies and income levels, suggesting that communist regimes (II) perform better than non-democratic, non-communist regimes (III) (see equation 3). Even in this model, though, the coefficient on the democracy variable (I) is highly significant ($p<.001$), and, more importantly, significantly greater (at   = 0.05) than the coefficient on the communist variable (II). This clearly demonstrates that, controlling for income, democracies (I) have significantly better health status than communist regimes (II), as well as all the other countries (III, i.e., non-democratic <u>and</u> non-communist regimes) in our sample. The corresponding results for the PPP dollar specification, although they vary slightly in the size of the coefficients, are comparable. More importantly, the interpretation of the results is basically the same, regardless of the numeraire for income level comparisons. Our results are, thus, robust to the health status variable used and the functional forms of the specifications.

Cereseto and Waitzkin (1986a), in their analysis, excluded countries that had only recently (less than twenty years before the year of their analysis) become communist (e.g., Vietnam). They argued that these countries had not had the opportunity for their policies to be implemented for the critical period that is necessary for health status to be significantly affected. Further, they predicted that these countries would be likely to considerably improve their health status with the passage of time. To test this prediction (since a significant period of time has elapsed since these countries converted to communism), and to assess whether our results were significantly affected by the inclusion of these countries (even though they do not fall into the twenty-year time horizon that we have used for classifying political regimes), we repeated our regressions with these countries classified as communist regimes. Table 1 indicates which countries were classified as recent communist regimes. We found that our results were not significantly altered by their inclusion, and, further, that these "recently revolutionary states" have not done better in terms of health status, controlling for income,than other countries in our sample.[2]

In order to further test the robustness of results, and to make the sample of countries in our study broadly comparable to previous

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2/   Due to limitations of space, we do not present these results but they are available upon request.

studies (e.g., Cereseto and Waitzkin, 1986a), we aggregated the Newly Independent States (NIS) into the former Soviet Union and dropped Cuba from our sample. These results are summarized in Tables 3 (for income in US $) and 4 (for income in PPP $). We found that the results and their interpretations, for the univariate relationships and for the models specified in equations 1 and 2 did not change materially from the results for the main regressions (except that the communist variable for the LEB regression 2 was now significant at the 0.05 level). The only significant change was in the findings for equation 3. We now found that though the coefficient on the democracy variable (I) was still higher than that on the communist regime variable (II), the two were not significantly different from each other. This means that, statistically speaking, we cannot say that democracies have better health status than communist countries (although, in actuality, that may indeed be the case). However, our previous findings that democracies (I) do better than non-democracies (inclusive of communist regimes, i.e., II + III), while communist regimes (II) do not do better than non-communist regimes (inclusive of democracies, i.e., I + III), still hold.

Table 6 provides listings of the 20 best performing countries, ranked according to the residuals of our dependent variables regressed against income per capita and total health expenditures per capita, respectively. These represent the good health performing countries whose actual life expectancies and infant mortality rates deviate most from those values expected on the basis of their income levels. It is interesting to note that regardless of which health status indicator is used, the form in which income is measured, and whether income or health expenditure is used in the model, we find that a number of countries cluster together at the top (i.e., Japan, Cuba, Sri Lanka, Jamaica, China, Hong Kong, and Iceland). What is more relevant to this paper is the fact that the representation of democracies among the best performing countries (compared to the total number of democracies in the world) is remarkably high, and that they represent all income groups and geographical regions. In fact, almost all the democratic countries in our sample seem to have a better than average health status, controlling for their income levels. The one notable exception is the USA.

The results of the non-parametric tests essentially confirm the validity and robustness of our regression findings. We found that democracies (I) were significantly more likely to have a higher rank on the health status variables than the non-democracies (II + III) (p-value = 0.0001). However, the communist regimes (II), as in the regressions,

did not, on average, do better (p-value> 0.05) than non-communist countries (I + III), controlling for income per capita. Since, as explained above, the power of a non-parametric test to detect significant differences between two samples is, in general, lower than its parametric counterpart, we were not able to demonstrate a significant difference (seen in the regression analysis) between democracies (I) and communist regimes (II) in our sample compared to non-democratic, non-communist countries. Table 7 shows the results of these non-parametric tests.

Discussion and Conclusions

This study has analyzed the correlations between certain types of political systems and health status. We find that, controlling for income, democracies on average have better health status than non-democracies; that communist regimes do not have better health status, on average, compared to non-communist regimes; and, finally, that democracies have a significantly better health status compared to communist regimes. Findings of significant correlations, though, do not imply causality nor do they give leads to the direction of any causal relationships. The correlations between health status and political system can be explained in at least three different ways: (1) good health status may make the establishment of certain political systems more likely or increase the probability of their continued existence; better health status might itself be a cause of a type of political system; (2) there are other factors which are independent determinants of both political system and of health status over the longer term; or (3) the political system itself influences health status.

It seems implausible that health status itself would significantly determine the type of political system in a country. There is no theoretical or empirical support for such a contention. Therefore, we can probably reject that explanation. The second explanation is more difficult to reject. It is indeed possible that some third variable independently influences both health status and the political system (such as factors related to national temperament, genetic factors, or culture). In practice, however, it is difficult to find many possible candidates for such influential factors in the established work on the determinants of political systems e.g., democracy (see Lerner, 1958; Lipset, 1959; Lenski, 1966; Huntington, 1984; Bollen and Jackman, 1985), or that on the determinants of good health (see Halstead et al., 1985; Caldwell et al., 1989). There appears to be little commonality between the factors that are known to be correlated with good health status and those that are correlated with democratization, with the possible exception of income. Even here, though, the exact nature of the relationships are not the same. In any case, we have controlled for income in our analysis. Furthermore, as rightly pointed out by Cereseto and Waitzkin (1985), since the countries represented in each political regime category span the globe, each with a variety of genetic mixes, cultures and social organization, it seems unlikely that any

one common variable could be identified that explains both political system and health status across these countries.

However, in a very recent publication, *"Making Democracy Work"*, Putnam (1993) has described the results of a long-term project examining the performance of regional governments in Italy. Much of this need not concern us here, but Putnam and his collaborators demonstrate that the strongest long-term determinants, and thus predictors, of the effective functioning of democratic institutions across Italian regions are aspects of society that he terms "civic consciousness". Using an index of "civic consciousness", they demonstrate that civic consciousness around 1900 is a very powerful predictor of civic community in the 1980s in Italy's regions, in fact far better than indicators of socioeconomic development, while the levels of socioeconomic development in 1900 have no relationship with civic consciousness in the 1980s. More importantly from our perspective, they then also demonstrate that civic traditions as measured in 1860-1920 predict infant mortality in the late 1970s much better than does infant mortality in 1901-1910. In other words, the best predictor of health status in the 1980s are not previous social and economic indicators, but "civicness". Although this work does not actually examine differences in political system across countries, it is strongly suggestive that there are certain characteristics of society, loosely proxied by Putnam's civic consciousness, which are long-term determinants of the survival of democratic institutions in individual countries. These characteristics are also importantly powerful predictors of health status over very long periods of time.

If Putnam's conclusions can be generalized to the rest of the world (this awaits further analysis), it suggests that the superior health performance of democracies may be partly due to some fundamental characteristics of their societies, which are somehow related to what Putnam terms "civic consciousness". Since Putnam offers an operational definition of civic consciousness which can be related to some objective measures, this might be the fruitful subject of future research. Even if it transpires that it is not particularly relevant, this will only reaffirm that there are some aspects of democratic governance which are powerful influences on health status over the longer term, and which have not been investigated thoroughly before as possible major determinants of good health.

This leaves us with the third explanation as the most plausible direction of the causal relationship. This conclusion is in concert with the basic reasoning behind our hypotheses laid out above. At the very least, this suggests that political regime cannot be ignored as an

important determinant of health status. We discuss this and other relevant issues below in relation to the two types of regimes that are the subject of this analysis.

Impact of Communism on Health Status

Despite the inferior economic performance of most of the communist regimes during the past five decades, it is widely perceived that these regimes at least did much better in the alleviation of poverty and meeting basic physical needs than other countries. A number of empirical studies, mentioned above, have examined the impact of leftist/socialist regimes on social and health indicators. These studies have utilized data from the period from the late 1960s to 1983, and have in general concluded that these regimes perform better than non-communist regimes in terms of health status. All those studies which also examined the impact of democracy have revealed a significant and positive impact of democracy, but this has generally been treated as a less important finding. In fact, as Lena and London (1993) argue, the apparent superior performance of communist regimes is independent of the level of democracy.

Using a much more recent and comprehensive data set and a more rigorous statistical analysis, we have failed to demonstrate parallel results. Critically, we found that communist regimes do not perform better than other countries in terms of health status, having controlled for income. However, they do perform significantly better than other countries, when the democracies are excluded. In short, communist regimes do not do better than the average of all countries, but do perform better than non-democracies. This partly explains the findings of Lena and London, who found that communist regimes do better than average when controlling for level of democracy. Although they used an ordinal index for democracy, unlike in our study where we use a categorical variable, the effect of including a separate variable for democracy in the model translates into a comparison between communist regimes and non-communist countries exclusive of democracies. This substantially underrates the performance of the non-communist countries, since many of the better performing non-communist states happen to be democracies. In our analysis, none of the communist regimes are also classified as being democratic, and visa versa. In fact, the two categories are mutually exclusive - despite emphasizing different political characteristics - which, we maintain is a more accurate representation of reality. We have argued that the appropriate question to ask is: do communist countries

(which in the real world are never democracies), on average, perform better or worse than democracies in terms of health status indicators, controlling for income levels? Our results clearly show that democratic regimes do indeed perform better than communist regimes.

There may be a number of other reasons why our results are different from previous studies. The most important one may be the difference in time periods chosen. Most of the previous studies have examined health outcomes data for various times between 1965 and 1983. It may be that the health performance of the communist regimes may have systematically worsened over the past two decades. What we now know about mortality trends in many of these countries supports this view. The mortality experience of East European communist states in recent decades is remarkable. For various population groups, particularly for adult males, age-adjusted mortality rates have been rising. For example, in the 1950s, life expectancy at age 15 in Czechoslovakia was similar to that of West Germany and higher than in Austria. Since that time it has declined for men, while it has stagnated for women, and is now worse than in either of the two mentioned democracies (Bobak and Feachem, 1992). This is an extraordinary phenomenon, which has no parallels in modern times. In this century, health status almost everywhere else has improved along with general economic development and also with time. In fact, globally rising levels of health status have occurred in many places despite falls in average living standards, as for example, in the 1980s in Sub-Saharan Africa. While much attention has been paid to the negative trends in the individual countries of Eastern Europe (Cooper et al., 1984; Forster and Jozan, 1990; Orosz, 1990; Rychtarikova et al., 1989; Rywik and Kupsc, 1985), little attention has been focused (except by Eberstadt, 1988) on the fact that these mortality trends are common to all the communist states of Eastern Europe, and all commenced at about the same time (i.e., the mid-1960s).

In the case of the Newly Independent States, similar trends are apparent over the same period. This would have been obscured to some extent during the 1970s when these trends first became evident, since starting around 1974, the Soviet authorities stopped publishing routine population, health and mortality data. Basic data only started to reappear around 1986, some years after the dates chosen in previous analyses. These data indicated that the infant mortality rate in the Soviet Union was higher in the mid-1980s than in the early 1970s, while life expectancy was lower (Eberstadt, 1988).

While it is possible to explain some of these trends partly on the basis of known differences in known risk factors, such as alcohol, smoking, diet, and stress, it seems likely that some other factors operating at a more aggregate level and common to all these East European regimes, both in time and place, are important in explaining the divergences in mortality between Western Europe and Eastern Europe. Since the mid-1960s were some twenty years after the imposition of communist regimes on the peoples of Eastern Europe (which, we have proposed in our analysis, is the approximate lag phase between the start of a regime and its reflection on health status indicators), it seems reasonable to hypothesize that factors related to the nature of these political regimes are responsible for the deterioration in health status of these populations. In fact, the increasing divergence of Eastern Europe from their Western counterparts with the continuation of communist rule might even suggest that the duration of such regimes are inversely correlated with health status. Given that 1990 represents the end-point of most of these regimes, the lackluster health performance of these Eastern European countries represents a serious indictment of the ultimate failure of these regimes to meet even their own self-acclaimed goals of providers' basic needs.

Similar deteriorations in health status, however, do not appear to have occurred in the communist states in the other parts of the world - China, Cuba and Mongolia.[3] In fact, the first two countries are well known for their apparently superior health performance (Halstead et al., 1985). These exceptions, however, do not detract from the generally poor record in health terms of the communist countries. In fact, the significant coefficients on the variable for communism in some of the regressions are largely explained by the superior performance of two countries: Cuba and China.[4] However, before drawing any prescriptive conclusions about the health impact of communism in these two countries, the following should be noted.

Firstly, while China does extremely well in all the regressions, so in general do all the other territories from North-East Asia in the sample - Hong Kong, Taiwan, Japan and South Korea. These countries represent diverse political and economic systems, which suggests that there may be regional factors, in addition to the type of political regime, that significantly explain their superior health performance. The performance of China in the US $ regressions also differs greatly from its performance in the PPP $ regressions. When income levels are adjusted for purchasing power, China drops from seventh to twenty-fifth place in the regressions for IMR, while it drops from

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3/   We know so little about conditions in North Korea, that we cannot draw any objective conclusions.

4/   In a separate analysis, the regressions were repeated having removed Cuba and China from the main data set. The coefficient on Commdum remained significant only in one regression.

fourth to seventeenth place in the LEB regressions. Interestingly, taking into account PPP-adjusted income levels, Hong Kong (the antithesis of communism) does considerably better than China (see Table 6). The discrepancy between US $ income level and PPP-adjusted income level in the case of China is unusually great. For a number of reasons related to the process by which the World Bank and the Government of China calculate and publish their GDP per capita estimates, the official GDP per capita estimates for China are grossly misleading. Given that Hong Kong and Taiwan are not nor-mally thought of as superior health performers, these results indicate that more attention should be directed to these other two states with Chinese populations.

Cuba's performance must also be placed in perspective. Firstly, its superior health performance is not necessarily unusual in the context of its region. Most of the democracies in the Caribbean also do extremely well in all the regressions, in particular Jamaica, Dominica, Barbados and St. Lucia. What must also be noted is that not only do these Caribbean democracies enjoy relatively good health status relative to their income levels, but they have also enjoyed much stronger economic growth in recent decades. Consequently, the rates of improvement in their health indicators have been much bet-ter than Cuba's in recent decades (Eberstadt, 1988). Also, historical-ly, in the early 1960s, immediately after the revolution in 1959, Cuba had probably the best health indicators in tropical Latin America, and in fact these were better than Spain's, Portugal's, and Japan's at that time. Not only do these latter countries now have better health indicators, but several other countries in the Caribbean now have comparable health indicators with Cuba.

Another possible reason why we might have obtained different re-sults from previous studies might be related to changes in the quality of health statistics over time. Cereseto and Waitzkin (1986a; 1986b) believed that the mortality data for communist countries were proba-bly better, and certainly not worse, than for other low-income and middle-income countries, and are thus less likely to be underreport-ed. This leads them to imply that if data quality was better then their results would be strengthened. Over the past decade, the accuracy of mortality data reported for most developing countries has certainly improved, although it still leaves much to be desired. However, it is unlikely that improved data reliability would alter the superior perfor-mance of the democracies in our sample, since most of developing country democracies (e.g., Barbados, Costa Rica, Cyprus, Malaysia, Mauritius, Singapore, Sri Lanka, St. Kitts and Nevis) in our sample

also happen to have the best quality mortality data in the developing world (Lopez, 1989; Bulatao and Stephens, 1992).   It is also questionable whether the mortality data in communist countries is particularly reliable, or less subject to problems of under reporting (Eberstadt, 1988).

Impact of Democracy on Health Status

There is a highly significant correlation between good health status and having been a political democracy for most of the previous twenty years. This finding is highly robust to the type of statistical test used, the functional form specified, the method by which income level is measured, and the exact choice of countries in the sample. The performance of democracies is also substantially better than that of the communist regimes. The effect of being democratic is substantial. A hypothetical democracy at an income level of US$ 500 per capita (a typical low-income country), can expect to have a life expectancy of 65.2 years compared with 58.5 years if it was not democratic, while its infant mortality rate would be 43.6 per 1000 live births compared with a rate of 75.5 per 1000 live births if it was not democratic. To express this in another way, a democracy at an income level of US$ 500, can expect to have the life expectancy of a non-democracy at an income level of US$ 1330, and the infant mortality rate expected by a non-democracy at an income level of US$ 1450.[5]

These results strongly suggest that the existence of a democratic regime over long periods of time has positive and significant impacts on health status. We have argued that political competition in the presence of strong social demand provides a strong motivating influence for governments to try to improve the health status of the population; that this might serve as greater motivation than ideology; and, that the kind of political regime determines the types of social programs that are instituted, which determines the levels of achievement of basic needs such as literacy and nutritional status that ultimately influence health status.

Of course, a possible criticism of these findings, based on the cross-sectional nature of the analysis, is that they do not take into account the initial conditions of the countries. It may have been that those countries which were classified as democracies in our analysis already had better-than-expected health indicators more than twenty years ago. Paucity of comparable data prevented us from examining this further. Nevertheless, we are reassured by some recent work by

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5/   Similarly, a democracy at an income level of US$ 2000 can expect to have a life expectancy of 71.2 years compared with 67.3 years if it was not democratic, while its infant mortality rate would be 22.1 per 1000 live births compared with a rate of 37.1 per 1000 live births if it was not democratic. In effect, it can expect to have the same life expectancy as a non-democracy at an income level of US$ 5250, and the infant mortality rate in a non-democracy at an income level of US$ 5800.

Kakwani (1993), which looked at changes in infant mortality rate and life expectancy for a number of countries over time. The analysis was carried out for 80 developing countries for which data were available from World Bank Data Files (using the ANDREX system). Aggregate weighted achievement indices for both these health status indicators were calculated for the two time periods 1971-1980 and 1981-1990. These achievement indices were formulated in such a way that they allow direct comparison between countries at different levels of life expectancy and infant mortality. Changes in achievement indices between the two time periods were taken, and then expressed as improvement indices.

In terms of improvements in the achievement index for infant mortality rate, the ten best figures were recorded by (in descending order): Chile, Barbados, Costa Rica, Israel, Jamaica, Botswana, Sri Lanka, Mauritius, Fiji and Tunisia. For life expectancy, the ten best performances were achieved by (in descending order): Botswana, Costa Rica, Chile, Israel, Barbados, South Korea, Panama, Tunisia, Malaysia and Honduras. The fact that seven out of ten in the first list and five out of ten in the second are democracies is strongly suggestive that the superior health performances of democracies in the year 1990 are the product of more rapid rates of improvement than in other countries during the period 1971-1990.

The implications of the findings of this study for democratic regimes, in particular, are clear. The test-case for our conclusions are the countries of Eastern and Central Europe, which have recently undergone a dramatic transition from communist regimes to fledgling democracies. The radical political transformations now underway in these countries will likely have a major impact on their health care systems and, in the longer term, possibly on their health status. If the findings of this study (tempered by the lack of proof of causality) hold true, the long-term health of these countries seems assured.

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Table 1

List of Countries

Democracies	*Established Communist Regimes*	*Recent Communist Regimes*	*Other Countries*
Antigua & Barbuda	Albania	Nicaragua	Algeria
Australia	Armenia	Ethiopia	Argentina
Austria	Azerbaijan	Laos	Bahrain
Barbados	Belarus	Mozambique	Bangladesh
Belgium	Bulgaria	Vietnam	Benin
Belize	China		Bhutan
Botswana	Cuba		Bolivia
British Virgin Islands	Czechoslovakia		Brazil
Canada	East Germany		Burkina Faso
Cayman Islands	Estonia		Burundi
Columbia	Georgia		Cameroon
Costa Rica	Hungary		Cape Verde
Cyprus	Kazakhstan		Central African Republic
Denmark	Kirghizstan		Chad
Dominica	Latvia		Chile
Finland	Lithuania		Comoros
France	Moldova		Congo
Greece	Mongolia		Cote d'Ivoire
Iceland	Poland		Dominican Republic
India	Romania		Ecuador
Ireland	Russia		Egypt
Israel	Tadzhikistan		El Savador
Italy	Turkmenistan		Equatorial Guinea
Jamaica	Ukraine		Fiji
Japan	Uzbekistan		Gabon
Luxembourg	Yugoslavia		Gambia
Malaysia			Guinea-Bissau
Malta			Ghana
Mauritius			Grenada
Netherlands			Guatemala
New Zealand			Guinea
Norway			Guyana
Papua New Guinea			Haiti
Portugal			Honduras
Singapore			Hong Kong
Solomon Islands			Indonesia
Spain			Iran
Sri Lanka			Jordan (E.Bank)
St. Kitts & Nevis			Kenya
St. Lucia			Kuwait
St. Vincent			Lesotho
Sweden			Liberia
Switzerland			Madagascar
Trinidad & Tobago			Mali
UK			Mexico
USA			Malawi
Vanuatu			Morocco
Venezuela			Mauritania
Western Samoa			Namibia
West Germany			Nepal
			Niger
			Nigeria
			Nigeria
			Oman
			Pakistan
			Panama
			Paraguay
			Peru
			Philippines
			Qatar
			Rwanda
			Sao Tome & Principe
			Saudi Arabia
			Senegal
			Seychelles
			Sierra Leone
			Somalia
			South Africa
			South Korea
			Sudan
			Suriname
			Swaziland
			Syria
			Taiwan
			Tanzania
			Thailand
			Togo
			Tonga
			Tunisia
			Turkey
			Uganda
			United Arab Emirates
			Uruguay
			Yemen
			Zaire
			Zambia
			Zimbabwe

Table 2

Main Regression Results For Complete Sample of Countries with Income Level Measured in 1990 US$

Health Status Variable	US$ GDP Per Capita	Demodum/1	Commudum/2	Constant	Adj. R2	Sample Size
Life Expectancy	0.379 ***	0.374 ***		-5.424 ***	0.76	165
(Eq. 1)	(0.024)	(0.077)		(0.171)		
Life Expectancy	0.442 ***		0.084	-5.800 ***	0.72	165
(Eq. 2)	(0.021)		(0.088)	(0.163)		
Life Expectancy	0.354 ***	0.479 ***	0.285 **	-5.312 ***	0.77	165
(Eq. 3)	(0.025)	(0.082)	(0.087)	(0.170)		
Infant Mortality	-0.544 ***	-0.580 ***		7.664 ***	0.72	166
(Eq. 1)	(0.039)	(0.123)		(0.274)		
Infant Mortality	-0.643 ***		-0.139	8.255 ***	0.69	166
(Eq. 2)	(0.034)		(0.139)	(0.258)		
Infant Mortality	-0.505 ***	-0.749 ***	-0.454 **	7.487 ***	0.74	166
(Eq. 3)	(0.039)	(0.130)	(0.139)	(0.271)		

Standard errors are reported in parentheses

*   Coefficient is significant at p<0.05 level

**   Coefficient is significant at p<0.01 level

***   Coefficient is significant at p<0.001 level

1   Demodum is the dummy variable denoting democracy

2   Commdum is the dummy variable denoting communism

Table 3

Main Regression Results For Complete Sample of Countries with Income Level Measured in 1990 PPP$

Health Status Variable	*PPP GDP Per Capita*	*Demodum*	*Commdumm*	*Constant*	*Adj. R2*	*Sample Size*
Life Expectancy	0.519 ***	0.370 ***		-6.841 ***	0.75	165
(Eq. 1)	(0.034)	(0.079)		(0.268)		
Life Expectancy	0.607 ***		0.083	-7.459 ***	0.72	165
(Eq. 2)	(0.030)		(0.089)	(0.247)		
Life Expectancy	0.485 ***	0.477 ***	0.284 **	-6.630 ***	0.76	165
(Eq. 3)	(0.035)	(0.084)	(0.089)	(0.269)		
Infant Mortality	-0.751 ***	-0.568 ***		0.741 ***	0.72	166
(Eq. 1)	(0.054)	(0.124)		(0.423)		
Infant Mortality	-0.886 ***		-0.137	10.701 ***	0.69	166
(Eq. 2)	(0.047)		(0.139)	(0.386)		
Infant Mortality	-0.696 ***	-0.736 ***	-4.448 **	9.410 ***	0.74	166
(Eq. 3)	(0.055)	(0.132)	(0.140)	(0.424)		

Standard errors are reported in parentheses

*   Coefficient is significant at p<0.05 level

**   Coefficient is significant at p<0.01 level

***   Coefficient is significant at p<0.001 level

Table 4

Regression Results For Sample of Countries, Excluding Cuba and Newly Independent States, with Income Level Measured in1990 US$

Regression results for health outcome measures for whole sample with income level measured in 1990 US$

Health Status Variable	US$ GDP Per Capita	Demodum	Commdum	Constant	Adj. R2	Sample Size
Life Expectancy	0.377 ***	0.393 ***		-5.421 ***	0.78	150
(Eq. 1)	(0.025)	(0.082)		(0.176)		
Life Expectancy	0.450 ***		0.264 *	-5.855 ***	0.75	150
(Eq. 2)	(0.021)		(1.130)	(0.163)		
Life Expectancy	03.64 ***	0.459 ***	0.425 **	-5.379 ***	0.79	150
(Eq. 3)	(0.025)	(0.081)	(0.122)	(0.170)		
Infant Mortality	-0.537 ***	-0.599 ***		7.626 ***	0.75	151
(Eq. 1)	(0.040)	(0.128)		(0.275)		
Infant Mortality	-0.650 ***		-0.601 **	8.308 ***	0.73	151
(Eq. 2)	(0.033)		(0.200)	(0.259)		
Infant Mortality	-0.512***	-0.733***	-0.859***	7.541***	0.78	151
(Eq. 3)	(0.037)	(0.123)	(0.185)	(0.258)		

Standard error are reported in parentheses

*   Coefficient is significant at p<0.05 level

**   Coefficient is significant at p<0.01 level

***   Coefficient is significant at p<0.001 level

Table 5

Regression Results For Sample of Countries, Excluding Cuba and Newly Independent States, with Income Level Measured in 1990 PPP$

Health Status Variable	PPP GDP Per Capita	Demodum	Commdum	Constant	Adj. R2	Sample Size
Life Expectancy (Eq. 1)	0.5130*** (0.035)	0.405 *** (0.082)		-6.820 *** (0.272)	0.77	150
Life Expectancy (Eq. 2)	0.615 *** (0.055)		0.11 (0.133)	-7.527 *** (0.249)	0.74	150
Life Expectancy (Eq. 3)	0.495 *** (0.035)	0.461 *** (0.084)	0.302 ** (0.127)	-6.712 *** (0.271)	0.78	150
Infant Mortality (Eq. 1)	-0.732 *** (0.055)	-0.618 *** (0.128)		9.615 *** (0.425)	0.75	151
Infant Mortality (Eq. 2)	-0.886 *** (0.046)		-0.38 (0.206)	10.697 *** (0.382)	0.71	151
Infant Mortality (Eq. 3)	-0.691 *** (0.054)	-0.745 *** (0.128)	-0.691 *** (0.194)	9.368 *** (0.145)	0.76	151

Standard errors are reported in parentheses

* Coefficient is significant at p<0.05 level

** Coefficient is significant at p<0.01 level

*** Coefficient is significant at p<0.001 level

Table 6

Top Twenty Countries Ranked According to their Residuals When Health Status Variables are Regressed Against Income

Dependent Variable	Infant Mortality Rate		Life Expectancy At Birth	
Income Measure	US$	PPP$	US$	PPP$
Rank	Country	Country	Country	Country
1	Japan	Japan	Japan	Japan
2	Cuba	Cuba	Cuba	Cuba
3	Cyprus	Burma	Cyprus	Greece
4	Sri Lanka	Albania	China	Hong Kong
5	Albania	Tonga	Hong Kong	Soa Tome & P.
6	Burma	Sri Lanka	Sri Lanka	Iceland
7	China	Jamaica	Costa Rica	Sweden
8	Vietnam	Lithunia	Greece	Dominica
9	Bulgaria	Singapore	Dominica	Switzerland
10	Czechoslovakia	Vietnam	Iceland	Costa Rica
11	Jamaica	Iceland	Albania	Jamaica
12	Poland	Finland	Sweden	Spain
13	Lithunia	Sweden	Jamaica	Cape Verde
14	Tonga	Malasysia	Soa Tome & P.	Albania
15	Singapore	Cape Verde	Vietnam	Sri Lanka
16	Hong Kong	Ireland	Spain	Burma
17	Malasysia	Hong Kong	Panama	China
18	Tanzania	Ethiopia	Switzerland	Tonga
19	Costa Rica	Dominica	Burma	Ethiopia
20	Iceland	Switzerland	Nicaragua	Panama

Table 7

Two-Sample Wilcoxon Rank-Sum Test For Equity of Medians Residuals of Regressions By Political System

Dependent Vaiable	Income Measure	Democracy Compared with Non-Democracy	Communist Compared with Non-Communist	Democracy Compared with Communist
Life Expectancy	US $	3.86	0.55	-1.53
		(0.0001)	(0.5824)	(0.1271)
Life Expectancy	PPP $	3.95	0.86	-1.45
		(0.0001)	(0.3904)	(0.1483)
Infant Mortality	US $	-4.26	-0.6	1.06
		(0.0001)	(0.5467)	0.2908
Infant Mortality	PPP $	-4.35	-0.4	1.61
		(0.0001)	(0.6861)	(0.1080)

P-values are reported in parentheses