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HOW DOES DEMOCRATIZATION IMPACT PUBLIC HEALTH OUTCOMES IN
DEVELOPING STATES?

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ABSTRACT

Although the relationship between democracy and development has been widely debated and has produced an abundant literature, few if any firm conclusions have been reached about how one impacts the other. This paper seeks to investigate whether democratization produces improved health outcomes in developing states. Examining a broad range of countries across multiple years, this paper finds little correlation between levels of democracy and levels of public health. In fact, some of the strongest evidence points to the possibility that in some ways, democratization may have a negative health impact. This paper discusses the preceding literature surrounding the topic, methods and results, and potential explanations.

Contents

1. Introduction

Democratization of developing countries is a widely cited goal of numerous developed democracies and non-governmental organizations (Bueno de Mesquita & Downs , 2005; Papaioannou & Siourounis, 2008). It is widely assumed that through democratization the needs of the people, particularly the median voter, will be better met through increased representation (Besley & Kudamatsu, 2006). Through my research I hope to find whether or not democratization in the developing world is associated with improved population health.

This question is increasingly pressing as in recent months the world has witnessed what some have called the beginnings of the "fourth wave of democratization" underway in the Middle East (Grand, 2011). Research into democratization's impact could contribute to a better understanding of what is happening in that region, the effects it might have, and what if any actions should be taken in response. This paper hopes to contribute to the large and growing body of literature dealing with the relationship between democracy and development, particularly in the field of public health.

To this end, this thesis will begin with a review of the theories surrounding the relationships between democracy and development and democracy and public health as well as a discussion of existing empirical studies and the methodologies behind them.

2. Literature Review

2.1 Democracy and Development

Many scholars have investigated the relationship between democracy and other political, economic, and societal factors (Kudamatsu, 2007). Much of this research focuses on the impact of democracy on development (Kudamatsu, 2007). Despite numerous efforts, the nature of this relationship and the direction of causality among these various factors associated with them have been difficult to establish. As such, the impact of democratization on the lives of the everyday citizen remains unclear. As Baum and Lake (2001) put it: "scholars have found scant evidence—and none on the domestic policy side—that democracy matters for the material conditions of everyday life" (p. 589).

There are three major schools of thought in regards to democracy's impact on development (Zweifel & Navia, 2000). Lipset (1959), Coleman (1960), Rodrik & Wacziarg (2005), Papaioannou & Siourounis (2008) and others contend that development and/or economic growth are positively correlated with democracy. The second school argues that autocracies are more suited to promoting development (Doucouliagos & Ulubaşoğlu, 2008). Arat (1988) and Przeworski and Limongi (1993) in a review of the existing literature find little support for any positive relationship.

Recent literature has more narrowly defined the elements of political democracy, seemingly limiting the criteria to "multiparty and free elections" (Doucouliagos & Ulubaşoğlu, 2008, p. 64). While it may be difficult to draw a direct link from contested elections to development, participatory democracy has been shown to be highly correlated to economic freedoms (private property rights, access to credit, regulation in the labor market), "market-supporting institutions," more equal distribution of income, and human capital accumulation; all of which have been shown to promote development

and economic growth (Doucouliagos & Ulubaşoğlu, 2008, p. 64). Democracies are also associated with greater political stability which is considered to promote development (Papaioannou & Siourounis, 2008). Additionally, scholars often point to the ways in which autocracies can hinder development. Rulers will often use government resources for their own gain, rather than to promote development and the welfare of the people. Democratic institutions can act as a check on these "potential looters" by limiting their power and providing means for their removal from office (Doucouliagos & Ulubaşoğlu, 2008, p. 63).

Conversely, some scholars argue that autocracies are more suited to fostering economic growth and development. In poor countries where income inequality is high, the majority would likely demand higher levels of income redistribution during elections. Under a democracy this would then lead to "high taxes, lower investment and consequently slower growth" while an autocracy would be free to ignore these demands (Papaioannou & Siourounis, 2008, p. 1524). Similarly, an autocracy is free to pursue economic policies which are unpopular but necessary for economic development, emphasizing the market and production over social welfare. They can also suppress "social instabilities due to ethnic, religious, and class struggles" more effectively than democracies (Doucouliagos & Ulubaşoğlu, 2008, p. 63). Proponents of this view often point to the economic successes of authoritarian regimes in Taiwan, Hong Kong, South Korea, and Singapore which took place in the 1950s and 1960s (Doucouliagos & Ulubaşoğlu, 2008). It is important to remember however, that authoritarian regimes will not always act in the best interest of their constituents and as Zweifel & Navia (2000) put it: "Benevolent dictators are rare" (p. 101).

Scholars who contend that regime type is immaterial to development claim that institutions and policies which foster development can exist in either autocracies or

democracies (Doucouliagos & Ulubaşoğlu, 2008). Przeworski & Limongi (1993) point to the many contradictory examples of democracies and autocracies which have succeeded economically and those which have failed , concluding that "political institutions do matter for growth, but thinking in terms of regimes does not seem to capture the relevant differences" (p. 51).

2.2 Democracy and Public Health
"*In spite of the inexorable march of democracy around the globe, just how democratic institutions affect human well-being is open to debate. The evidence that democracy promotes prosperity is neither strong nor robust. Moreover, which aspects of policy making and human well-being are promoted by democracies is still a subject of debate*" (Besley & Kudamatsu, 2006, p. 313).

This paper seeks to move beyond the debate over the effects of democracy on development and focus more specifically on how democracy impacts public health. As was the case with democracy and development, there exists a sizable and divergent literature. While much of this literature supports the existence of a positive relationship between levels of democracy and levels of public health (e.g. Baum & Lake, 2001; Besley & Kudamatsu, 2006; Franco, Alvarez-Dardet, & Ruiz, 2004; Kudamatsu, 2007; and Zweifel & Navia, 2000), Gauri & Khaleghian (2002), Mulligan, Gil, & SalaiMartin (2004), and Ross, (2006) find evidence that there is little positive correlation.

Positive Relationship
Democracy fosters improved public health outcomes through increased representation, greater restraints on government, improved leadership, and better communication between a government and its people.

Through democratization the median voter, previously marginalized under an

autocratic regime, comes to be better represented. With representation, these constituents demand improved healthcare provision, which the new government is then increasingly obliged to provide (Besley & Kudamatsu, 2006).

Selectorate theory (Bueno de Mesquita, Smith, Siverson, & James, 2003) describes in part how an autocracy can largely ignore the needs of the population and remain in power by providing private goods to the small coalition who keeps it in power. As a government democratizes, it becomes responsible to a much larger segment of the population and can no longer afford to remain in power through the provision of private goods. In order to remain in power, the government begins to respond to voter needs with the increased provision of public goods, one of which is often improved healthcare systems (Baum & Lake, 2001) (Bueno de Mesquita, Smith, Siverson, & James, 2003).

Improved health provisions may also arise from new leadership and improved communication. Greater representation and increased levels of government accountability described by the previous two theories also tend to result in the selection of better leaders through electoral processes (Besley & Kudamatsu, 2006)This improved leadership in a democratized country is likely to result in higher levels of well-being amongst that country's population (Besley & Kudamatsu, 2006).

In addition, Sen (2000) proposes that democracies are better at delivering information to the poor because of greater freedom of the press. Furthermore democratic institutions, particularly those valuing universal suffrage, result in increased government awareness of all segments and regions of the population and their problems. These two factors, a free press and government awareness, can contribute to improved levels of public health (Sen, 2000).

Non-relationship between Democracy and Health
Conversely, many theories support that there is little correlation between

increasing levels of democracy and improved public health outcomes or even the existence of a negative relationship, particularly among developing states. One theory proposes that typically a population will be more demanding of curative care than preventive care and that a democratic government will be more responsive to this demand than an autocratic one. Because of this, autocracies might more often pursue successful prevention strategies amongst their populations than democracies (Gauri & Khaleghian, 2002). Also, public health workers in autocracies might have more control and autonomy to pursue positive policies, and autocracies are better able to push forward health policies and enforce compliance irrespective of political opposition and infighting. In the instance of immunizations, an autocratic regime can simply mandate that all children receive a certain vaccine, a cheap and widely effective measure (Gauri & Khaleghian, 2002). In states where the levels of public health are already low, this increased level of control could have dramatic impacts on the overall health of a population. Finally, Ross suggests that the positive effects of democratization cited by others might be concentrated solely among the upper classes, leaving the lower classes, which make up the majority of the population in developing states, in no better a situation than before (Ross, 2006).

In summary, the positive relationship is a result of greater levels of popular representation in government (Besley & Kudamatsu, 2006), the requirement that democratic regimes provide public goods to stay in power (Baum & Lake, 2001; Bueno de Mesquita, Smith, Siverson, & James, 2003), improved leadership selection through fair and contested elections (Besley & Kudamatsu, 2006), and better communication between governments and their people through universal suffrage and freedom of the press (Sen, 2000). The argument for no relationship is supported by the contentions that any health benefits produced by democratization are concentrated exclusively among the wealthy (Ross, 2006) and autocracies have greater freedom than democracies to pursue

positive health policies irrespective of popular opinion (Gauri & Khaleghian, 2002; Walker, 2010).

2.3 Empirical Results

Just as many of the theories of the impact of democratization on public health diverge in different directions, so too do the empirical findings on the relationship between these two variables. As mentioned previously, some studies find a positive relationship others find a negative one (e.g. Baum & Lake, 2001; Besley & Kudamatsu, 2006; Franco, Alvarez-Dardet, & Ruiz, 2004; Kudamatsu, 2007; and Zweifel & Navia, 2000), and others no relationship (Gauri & Khaleghian, 2002; Mulligan, Gil, & SalaiMartin, 2004; and Ross, 2006). Often these differences are explained as a result of methodological differences.

Methodological Differences

In investigating the relationship between health and democracy, scholars have employed a wide variety of indicators, examining variation across countries, within countries, or in one instance within families. A positive relationship has been found for multiple indicators when the relationship has been studied across multiple countries, over time (Baum & Lake, 2001; Besley & Kudamatsu, 2006; Zweifel & Navia, 2000) or for particular health outcomes, such as life expectancy, maternal mortality, and infant mortality in one year (Franco, Alvarez-Dardet, &Ruiz, 2004), and pre-post democratization (Kudamatsu, 2007). For example, Kudamatsu (2007) examines variation in the infant mortality rate within families in Sub-Saharan Africa during its wave of democratization during the 1990s, comparing the survival rates of those babies born before democratization to that of those born after. He concludes that democratization reduced infant mortality in Sub-Saharan Africa during that time period by 1.8 percentage points.

Empirical support for a positive relationship is not consistent however. The positive effects are not consistent across developed and underdeveloped states (Ross, 2006) or health indicators (Baum & Lake, 2001). For example, Gauri & Khaleghian (2002) examine immunization rates in exclusively low and middle income states from 1980-1997, finding that democracies provide poorer coverage rates than autocracies with the exception of the very poorest countries. Baum & Lake (2001), who as mentioned earlier found positive correlations for multiple indicators, found negative correlations between level of democracy and DPT immunization coverage in certain years.

In addition, Ross (2006) cites selection bias, ignored global trends (downward trend in infant mortality rates and trend toward democracy since 1970), and country-specific effects as reasons that prior studies found democracies to produce improved public health outcomes. Controlling for these factors, Ross employs two separate measures of democracy to examine its effect on infant and under-five mortality rates across countries from 1970 to 2000. This study finds no positive effect of democracy. Ross postulates that this lack of correlation is likely because the positive effects of democratization on health are concentrated among the upper classes, leaving the poor and middle class unaffected. He claims that an increase in government health spending would cause the middle and upper classes to switch from private to public health services but would leave the poor still unable to afford healthcare access. As such, the amount of healthcare goods distributed would remain the same and despite democratization, levels of public health would remain unchanged (Ross, 2006).

2.4 What's Missing?

This paper will attempt to check Ross's theory that the reason democratization does not correlate with superior health outcomes is that it provides inadequately for the poor. Using public health indicators collected under the Demographic and Health Survey

(DHS) divided by economic quintile, I investigate if level of democracy is correlated with level of public health in developing countries to investigate:

RQ1: Do higher levels of democratization generate better public health outcomes across each economic quintile?

Secondly, I will examine the possibility that the effects of democratization can be accounted for by the country's level of economic development. Wealthier nations and wealthier households are presumably better able to provide healthcare, nutrition, sanitation, and other necessities (Baum & Lake, 2001). Any potential relationship discovered previously could ultimately be discounted if improvements in public health were driven by economic factors rather than regime type (Baum & Lake, 2001). Thus I also ask:

RQ2: Does a country's GDP per capita account for any previously discovered relationships between democracy and public health outcomes?

3. Methods

3.1 Sample

The sample consists of 58 developing countries targeted by the Demographic and

Health Surveys between 1993 and 2007 (DHS, 2010). Between these 58 countries there

are 128 country-years of DHS data in the dataset used for this paper. Because not all

DHS surveys are conducted concurrently, the years available for each country vary

(DHS, 2010). Data for most countries exists for two or three years between 1993 and

2007; however there are some countries with only one year available, two countries

(Ghana and Colombia) with four available, and one (Bangladesh) with five. The

nationally representative DHS household surveys are implemented by ICF Macro, an ICF

International Company and funded by the United States Agency for International

Development (USAID) along with support from the host country (DHS, 2010). The data

obtained in these surveys was divided beforehand by the economic quintile of each

household by Cesar Victora, Professor at the Bloomberg School of Public Health, Johns

Hopkins University. To my knowledge this dataset is not available online. It was

forwarded to me by Neff Walker, Senior Scientist at the Bloomberg School of Public

Health, Johns Hopkins University.

The sample includes the following countries: Armenia, Azerbaijan, Bangladesh,

Benin, Bolivia, Brazil, Burkina Faso, CAR, Cambodia, Cameroon, Chad, Colombia,

Comoros, Congo (Brazzaville), the DRC, Cote D'Ivoire, Dominican Republic, Egypt,

Ethiopia, Gabon, Ghana, Guatemala, Guinea, Haiti, Honduras, India, Indonesia, Jordan,

Kazakhstan, Kenya, Kyrgyz Republic, Lesotho, Liberia, Madagascar, Malawi, Mali,

Moldova, Morocco, Mozambique, Namibia, Nepal, Nicaragua, Niger, Nigeria, Pakistan,

Peru, Philippines, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Tanzania,

Togo, Turkey, Uganda, Ukraine, Uzbekistan, Zambia, and Zimbabwe. Of these countries,

6 are located in Eastern Europe, 35 in Africa, 9 in Latin and South America, 4 in the

Middle East, 3 in East Asia, and Turkey lying in between Europe and Asia.

3.2 Variable Definitions

Democracy

Democracy will be defined by average Polity IV score of each given country over

the previous 5 years. Because the measure of public health, the Demographic and Health

Surveys, require approximately 2.5 years to conduct and publish, a measure of

democracy representing a five-year period will best capture both the lag and concurrent

effects (DHS, 2011; Walker, 2010). Polity IV measures democracy on an institutional

level, rather than an individual level, contending that individual freedoms are a product of

the institutions (Marshall & Jagger, 2009). Polity scores run from -10 to 10, -10 being the

most authoritarian and 10 being the most democratic. States are evaluated based a scheme

which "consists of six component measures that record key qualities of executive

recruitment, constraints on executive authority, and political competition" (Marshall &

Jagger, 2009). This definition fits well with the theory under contention that increased

representation and more publicly accountable leadership result in improved health

outcomes. All Polity scores were obtained online from systemicpeace.org (Marshall &

Jagger, 2009).

Polity IV is a widely used measure of democracy and appears in multiple studies

(e.g., Baum & Lake, 2001; Gauri & Khaleghian, 2002; Mulligan, Gil, & SalaiMartin,

2004). Other papers (e.g., Besley & Kudamatsu, 2006; Zweifel & Navia, 2000) employ a

dichotomous classification of either democracy or non-democracy. For my purposes this

is less useful as there are many degrees of authoritarian and democratic rule and much

space in between them as well. Of available democracy measures, the Polity IV most

closely captures the many degrees of regime type.

Public Health

Public health will be measured using 19 indicators collected as a part of the DHS surveys in the sample countries between 1993 and 1997. These indicators represent some of the standard measures in the field of public health (Walker, 2010). Public health data from DHS surveys divided into quintile were forwarded to me by Neff Walker, Senior Scientist, Bloomberg School of Public Health, Johns Hopkins University. For the purpose of this paper, these widely used indicators have been divided into 5 groups:

Immunizations:

DPT	Proportion of children aged 12-23 months immunized against diphtheria/tetanus/pertussis
BCG	Proportion of children aged 12-23 months immunized against tuberculosis
Measles	Proportion of children aged 12-23 months immunized against measles
Polio	Proportion of children aged 12-23 months immunized against polio
ORT	Proportion of children aged 0-5 who received oral rehydration therapy and continued feeding following diarrhea
Full	Proportion of children aged 12-23 months who received BCG, 3 polio, 3 DPT, 1 measles

Natal and antenatal care:

SBA	Proportion of births attended by a skilled birth attendant
Antcare1	Proportion of women attended at least once during pregnancy by skilled health personnel for reasons related to pregnancy
Antcare4	Proportion of women attended at least four times during pregnancy by skilled health personnel for reasons related to pregnancy

Women's health:

Pncare	Proportion of babies born outside a health facility who received postnatal check-up within two days of birth
Pncare2	Proportion of babies born outside a health facility who received postnatal check-up within two days of birth plus babies born in a health facility
Ebreast	Proportion of babies with early initiation of breast feeding (w/in 1 month of birth
Contracmo	Proportion of women employing modern method of contraception

Children aged 0-5:

Itnchild	Proportion of children aged 0-5 who slept under an insecticide treated bed net the previous night
Vita	Proportion of children aged 0-5 receiving vitamin A supplementation in the previous 6 months
Uweight	Proportion of children aged 0-5 underweight
Stunt	Proportion of children aged 0-5 experiencing stunted growth

Sanitation:

Water	Proportion of households with access to improved water source
Toilet	Proportion of households with access to improved sanitation facilities

GDP per capita

Level of economic development will be defined by a nation's GDP per capita as measured in US dollars. GDP per capita for each country will be taken from the same year as the DHS data.

All GDP per capita data was obtained from the World Bank online (World Bank, 2011). The GDP per capita was standardized.

4. Analysis Plan

To investigate RQ1, each DHS public health indicator is regressed onto the level of democracy. The regressions are run for each economic quintile separately and for the overall populations. To investigate RQ2, the regressions are run a second time, with public health indicators as the dependent variables and polity scores and GDP per capita as independent variables.

V. Results

RQ1 asks if higher levels of democratization generate better public health outcomes across each economic quintile. The regressions appear in tables 1-5. Statistically significant relationships at $p < .10$ are marked with *, while those at $p < .05$ are marked with **.

Table 1: The beta weights and standard errors for polity scores on public health indicators

Indicator	Poorest	2d	3d	4th	Richest	All
Immunization						
Dpt	-0.004	-0.002	-0.001	0.002	0.002	-0.001
se	0.004	0.004	0.004	0.004	0.003	0.004
Polio	-0.004	-0.003	-0.002	0.000	0.000	-0.002
se	0.004	0.004	0.004	0.003	0.003	0.003
Bcg	0.001	0.003	0.002	0.004	0.003	0.002
se	0.004	0.003	0.003	0.003	0.002	0.003
Measles	-0.002	-0.001	-0.001	0.001	-0.001	-0.001
se	0.004	0.004	0.003	0.003	0.002	0.003
Ort	0.001	0.001	0.002	0.004	0.005	0.002
se	0.004	0.004	0.004	0.004	0.004	0.004
Full	-0.004	-0.002	-0.003	-0.001	0.000	-0.002
se	0.004	0.004	0.004	0.004	0.004	0.004
Natal and antenatal care						
Sb	0.000	0.004	0.006	0.007	0.003	0.003
se	0.005	0.005	0.005	0.005	0.003	0.005
Antcare1	-.0335	-0.001	0.000	0.000	0.001	-0.001
se	0.005	0.004	0.004	0.003	0.002	0.004
Antcare4	0.000	0.003	0.005	0.006	.007*	0.004
se	0.005	0.005	0.005	0.005	0.004	0.004
Women's Health						
Pncare	0.002	0.003	.006*	0.005	0.006	0.003
se	0.003	0.003	0.003	0.005	0.004	0.003
Pncare2	0.013	**.018***	**.021****	**.018****	0.009	**.015***
se	0.008	0.009	0.009	0.009	0.006	0.008
Ebreast	**.007***	**.007****	**.007****	**.059***	0.005	**.006****
se	0.003	0.003	0.003	0.003	0.003	0.003
Contracmo	0.004	0.006	**.007***	0.007	**.006***	**.006***
se	0.003	0.004	0.004	0.004	0.003	0.004
Children aged 0-5						
Itnchild	**.011****	**.012***	**.012****	0.011	0.000	0.010
se	0.005	0.006	0.005	0.006	0.009	0.006
Vita	0.010	**.011***	**.011***	**.011****	**.012****	**.011***
se	0.006	0.006	0.006	0.006	0.005	0.006
Uweight	0.004	0.003	0.003	0.001	0.001	0.003
se	0.003	0.003	0.003	0.002	0.002	0.002
stunt	0.003	0.003	0.000	-0.001	-0.003	0.001
se	0.002	0.003	0.003	0.003	0.002	0.002
Sanitation						
Water	0.009	0.010	**.01***	0.008	0.006	**.006***
	0.008	0.007	0.006	0.005	0.004	0.003
toilet	-0.006	-0.007	-0.003	0.000	0.000	-0.004
	0.010	0.010	0.008	0.006	0.002	0.004

The results showed few statistically significant relationships between polity scores and public health indicators. Of the indicators measuring immunizations (and use of oral rehydration therapy), no statistically significant relationships were found overall or among any of the individual quintiles. Similarly, only one statistically significant

relationship (greater than four visits during pregnancy by skilled healthcare personnel for reasons related to pregnancy, fifth quintile) was found at any quintile or overall among all natal and antenatal care indicators. This appeared in the fourth quintile of the greater than four antenatal care visits indicator.

Statistical significance was found overall and among multiple quintiles for three of the four measures of women's health: prenatal care for babies born at home, early initiation of breastfeeding, and prevalence of modern contraceptive methods. Statistical significance for exposure to prenatal care for all babies was found only in the third quintile. Of the indicators measuring the health of children aged zero to five, statistical significance was among four of five quintiles and overall for vitamin A supplementation and among the lower three quintiles for use of an insecticide treated bed net. No significant relationships were found for proportions of children underweight or experiencing stunted growth. Finally, statistically significant relationships were found in the third quintile and overall for access to clean water while none were found for access to improved sanitation facilities.

RQ2 asked if economic development could account for relationships between polity and public health. The regressions when GDP per capita is controlled for appear in Table 2.

Table 2: The beta weights and standard errors for polity scores on public health indicators while controlling for GDP per capita

Indicator	Poorest	2d	3d	4th	Richest	All
Immunization						
Dpt	-.008*	-0.005	-0.003	0.000	-0.001	-0.004
se	0.003	0.003	0.003	0.003	0.003	0.003
Polio	-0.006	-0.005	-0.004	-0.001	0.000	-0.004
se	0.004	0.004	0.004	0.004	0.004	0.004
Bcg	-0.001	0.005	0.001	0.003	0.003	0.001
se	0.006	0.007	0.006	0.007	0.010	0.007
Measles	-0.005	-0.004	-0.004	-0.002	-0.002	-0.004
se	0.003	0.003	0.003	0.003	0.003	0.003
Ort	0.000	0.000	0.002	0.003	0.005	0.002
se	0.002	0.002	0.001	0.002	0.001	0.002
Full	-0.005	-0.003	-0.004	-0.002	0.000	-0.003
se	0.006	0.006	0.006	0.005	0.005	0.006
Natal and antenatal care						
Sb	**-.008***	-0.005	-0.003	0.000	-0.001	-0.004
se	0.004	0.004	0.004	0.004	0.003	0.004
Antcare1	-0.006	-0.004	-0.004	-0.003	0.000	-0.004
se	0.004	0.004	0.004	0.004	0.003	0.004
Antcare4	-0.004	-0.003	-0.001	0.000	0.003	-0.002
se	0.003	0.003	0.003	0.005	0.004	0.003
Women's Health						
Pncare	0.003	0.004	**.006***	0.005	**.007***	0.004
se	0.008	0.007	0.007	0.008	0.006	0.007
Pncare2	0.006	0.009	0.011	0.010	0.004	0.007
se	0.004	0.004	0.004	0.004		0.004
Ebreast	0.005	0.005	0.005	0.005	0.004	0.005
se	0.005	0.004	0.004	0.003	0.002	0.004
Contracmo	0.000	0.001	0.002	0.002	0.002	0.001
se	0.004	0.004	0.004	0.003		0.003
Children aged 0-5						
Itnchild	**.012***	0.012	**.014****	**.013***	0.006	0.012
se	0.002	0.002	0.002	0.002	0.002	0.002
Vita	0.010	**.011***	**.012***	**.012****	**.013****	**.011***
se	0.004	0.003	0.003	0.003		0.003
Uweight	**.007****	**.006****	**.005****	**.004****	**.003****	**.005****
se	0.008	0.007	0.006	0.005	0.004	0.003
Stunt	**.005****	**.006****	0.003	0.002	-.001	**.004****
se	0.009	0.009	0.008	0.005	0.001	0.004
Sanitation						
Water	.008	.009	.009	.007	.006	.004
	.004	.003	.003	.003		.003
Toilet	-.008	-.009	-.005	-.002	-.000	**-.009****
	.00398	.00414	.00402	.0041		.0038

Once GDP per capita was introduced as a control variable, a number of non-

relationships still remained. No statistically significant relationships were found for

indicators measuring immunizations. Similarly, no significant relationships were found among natal/antenatal care indicators with the exception of the presence of a skilled birth attendant in the lowest quintile.

Of the relationships initially discovered, only two remain. Statistically significant positive relationships were initially found in the first, second, and third quintiles for the use of ITNs and were then found among the first, third, and fourth quintiles once GDP per capita was controlled for. Vitamin A supplementation remained significant and positive overall and across all quintiles but the poorest.

Among women's health indicators, all previously discovered relationships disappear with the exception of access to prenatal care in the third quintile. Additionally, any significant relationships between access to clean water and level of democracy disappear.

New statistically significant relationships were found for access to prenatal care in the middle and highest quintiles. In addition to the persistence of significant relationships for access to ITNs and vitamin A supplementation, among indicators for children aged zero to five, statistically significant relationships appeared across multiple quintiles and overall for underweight and stunted growth. For all quintiles and overall, increases in the level of democracy are associated with statistically significant increases in the proportion of underweight children. Amongst the two lowest quintiles and overall, increases in democracy are associated with statistically significant increases in the proportion of children experiencing stunted growth. Additionally, a significant negative relationship was found overall between access to improved sanitation facilities and democracy.

As a check on the surprising negative impact of democracy on proportions of children underweight and experiencing, the scatter plot of the regression of proportion underweight and level of democracy is pictured below to see if any countries serve as

significant outliers which could pull the association in that direction. Beyond that is a box

plot of the z-scores of the proportion underweight. These results will be discussed in the

following discussion section.

Graph 1: Scatterplot of level and democracy and beta weights for polity scores on public health indicators, GDP per capita not controlled for

Graph 2: Box plot of z-scores of proportion of children underweight

Zscore of proportion uweight

6. Discussion

This analysis began with the expectation that a positive relationship would exist between levels of democracy and public health. I also wanted to check the argument of Ross (2006) that poorer segments of the population experienced less of the positive effects of democracy than the wealthier ones. Once GDP per capita was controlled for, there was little evidence for a positive correlation between democracy and health. Furthermore, there was virtually no variation among the economic quintiles that could not be explained by chance.

Based upon the initial regressions run without controlling for level of economic development, it seemed that democracy might have a positive impact on women's health and health interventions among children aged zero to five. For the most part, the indicators used in this study are more specific than those used by other scholars: infant mortality rate, crude death rate, life expectancy at birth, measles immunization coverage, DPT immunization coverage, attended births, population per physician, and clean water access by Baum & Lake (2001); access to sanitation, access to clean water, DPT and measles immunization coverage, health spending, infant mortality rate, and life expectancy at birth by Besley & Kudamatsu (2006); DPT, measles, and Hepatitis B coverage by Gauri & Khaleghian (2002); life expectancy and maternal and infant mortality by Franco, Alvarez-Dardet, & Ruiz (2004); and solely infant mortality rate by Kudamatsu (2007), Zweifel & Navia (2000), and Ross (2006). While I have not found any studies investigating the effects of democratization which employ similar measures of women's and children's health (insecticide-treated bed nets, vitamin A supplementation, postnatal care, early initiation of breast feeding, or contraceptive prevalence), Baum & Lake (2001) found that level of democracy is positively correlated with the proportion of attended births and improved infant mortality rates. Besley &

Kudamatsu (2006), Franco, Alvarez-Dardet, & Ruiz (2004), Kudamatsu (2007), and

Zweifel & Navia (2000) also found that democratization reduces infant mortality rates.

Once GDP per capita was introduced as a control, evidence for significant positive

relationships between level of democracy and women's health disappeared. Evidence for

positive impact in the increased use of insecticide-treated bed nets and vitamin A

supplementation remained. This positive relationship between democracy and bed net

usage and vitamin A supplementation could potentially be a driving factor for the

positive effects of democratization on infant mortality rates previously mentioned.

Negative Effects and Bangladesh

Surprisingly, the results indicated that increases in levels of democracy bring

increases in the proportion of children who are underweight and of who are experiencing

stunted growth. With the exception of Gauri & Khaleghian (2002), who found that

among low and middle income countries democracies have lower immunization coverage

rates than autocracies, I have found no other studies where democracy is shown to have a

statistically significant negative impact on health. One potential explanation is that, with

only 128 country years available as a sample, one or two countries could exert

disproportionate influence on the direction of the relationship if they proved to be

significant outliers. Examining the data in a scatter plot in Graph 1, it is difficult to

discern any potentially significant outliers. However, the z-scores of the weight indicator

do reveal that one country, and one country year in particular, is a significant outlier.

Bangladesh in 1996, with a standard deviation of 2.77 is the country year pictured

in Graph 2 completely outside of the box plot, suggesting that the difference between this

country year and the others is too significant to have occurred by chance. For the weight

indicator in the subsequent three surveys (1999, 2004, and 2007), Bangladesh lies almost

two standard deviations away from the mean as well. Because Bangladesh was rated very

high on the democratic scale for each of these years, it is plausible that Bangladesh influenced the negative direction of this correlation.

**Economic Quintiles: Underweight and Stunted Height**

In regards to Ross's theory, based upon these results it would not seem that the lower economic quintiles are unfairly burdened as countries democratize. Comparing the coefficients found for each quintile to the confidence intervals for the coefficients of the overall population, only three fell outside of these confidence intervals for the overall population, and of these only one was a statistically significant coefficient. This suggests that virtually none of the differences found between the coefficients at each quintile and overall cannot be attributed to chance.

We can take this a step further though by examining the indicators where the most significance was found while controlling for GDP per capita. Pictured below are bar graphs for the coefficients as each quintile for proportion underweight and proportion stunted:

Graph 3: Beta weights for polity scores on proportion underweight by quintile
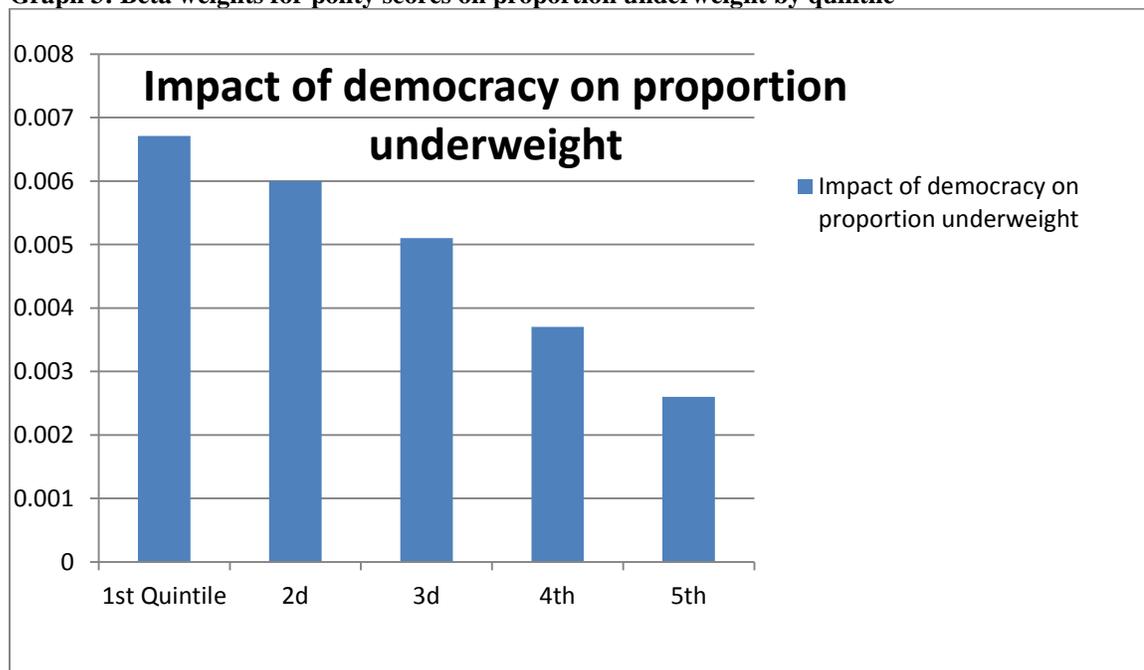
Graph 4: Beta weights for polity scores on proportion stunted across quintiles
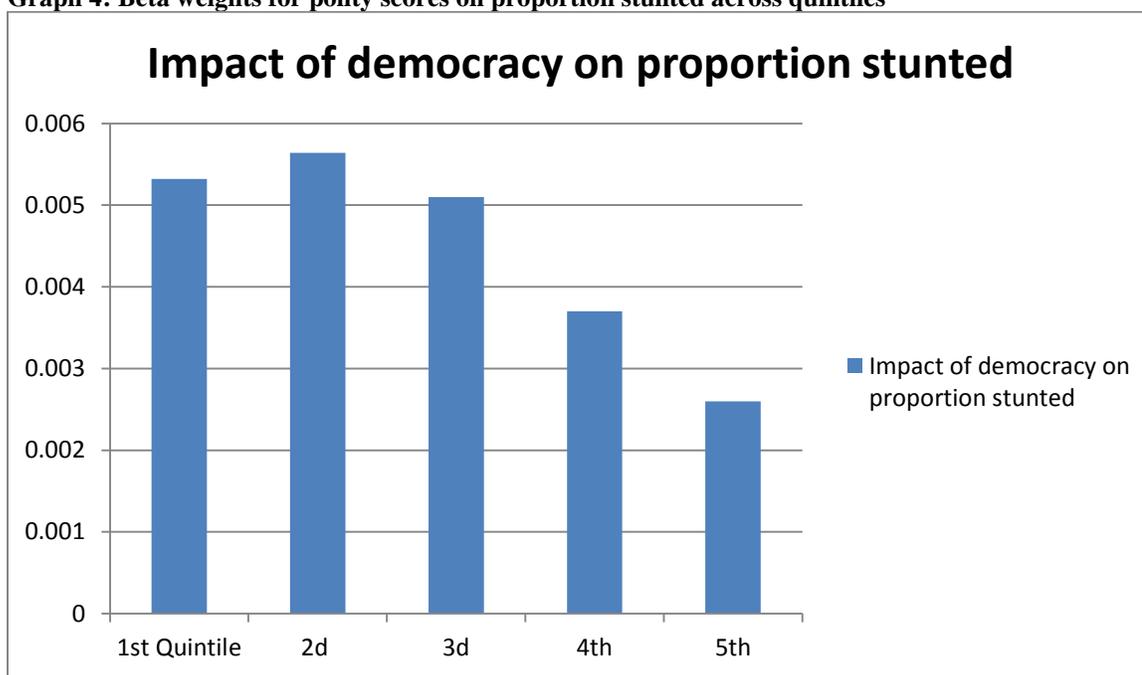
Of the indicators where the most statistical significance was found, only the two pictured above closely fit the model proposed by Ross where the poorer segments of society experience the positive effects of democracy least (or in this case experience the negative effects of democracy most). Vitamin A supplementation and use of ITNs do not fit Ross's model as the positive effects of democracy are not concentrated among the wealthy.

There are several possible reasons why only these two negative relationships fit the model proposed by Ross. The first deals with the economics of food security. These relationships appear only once wealth is controlled for and these indicators, perhaps more than any others, are closely tied to wealth: the wealthier a family is the more food they can afford to provide to their children.

Also, most of the other indicators can be satisfied by a one-time public health intervention. Proportions underweight and stunted represent chronic conditions, which a one-time intervention, perhaps provided by an outside government or NGO, can't permanently solve. Reducing the percentages of these indicators requires persistent and

long term effort. This raises the question of how much of the health interventions and coverage measures described by these indicators are provided by outside forces and what degree of influence outside NGOs or governments might have on these outcomes.

Eradication of malaria has been a major goal of NGOs and outside governments in recent years. ITNs, the indicator most strongly and positively coordinated with democracy, are an important and widely used tool in that effort (Newman, 2010). In 1998 the WHO, UNICEF, UNDP, and the World Bank launched the Roll Back Malaria campaign, an effort which continues today (Fischer, 2002) (Roll Back Malaria Campaign, 2011). One of the key elements in this fight is the distribution of ITNs. Between 2006 and 2008 alone, the WHO estimates that is distributed more than 140 million bed nets (Newman, 2010). On the other hand, "global food aid volumes have declined steadily since 1999" (Blas, 2008, p. 9). If, of the major health indicators included in this study, the proportion of underweight children and the proportion of children experiencing stunted growth are the two indicators outside governments and organizations contribute to least, then perhaps they are the truest indicators of how well governments are providing for their people.

Democracy's Impact

Of the statistically significant relationships found, it is important to consider how great democracy's actual impact on these indicators is. The greatest potential impact of a shift of one unit towards democracy across the 20 point Polity scale is 5.9%. This occurs in the fourth quintile of the early initiation of breast feeding indicator when GDP per capita is not controlled for. However, the impact of a single unit shift in democracy is generally less than one percent, the mean impact in statistically significant relationships being .964 percent.

This does not mean that level of democracy cannot be said to have an important

effect on the lives of large numbers of people. For instance, examining the impact of democracy on the proportion of underweight children across the entire population while controlling for GDP per capita, the regression indicates that a shift towards democracy of 10 units would result in a 5.08% increase in the proportion of underweight children in that country. While that figure may sound small for such a dramatic shift in governance, in a large country like India it represents the lives of potentially millions of children.

Limitations

When considering these results it is also important to consider the limitations of this study. This analysis was limited to 128 country years, the number of country years available where complete DHS surveys had been conducted and the data had been divided by economic quintile. DHS surveys represent the most complete and reliable public health surveys and because of that were chosen as the sole source of public health data for this study (Walker, 2010). Other studies, like that of Ross (2006), have employed statistical software to draw inferences about country's public health data from the countries surrounding them. However, this is often unreliable as the very reason that these countries do not have any data available is because they are different in some significant way from their neighbors (be it the existence of an armed conflict, a recent natural disaster, or some other factor) (Walker, 2010). As more surveys are conducted in the coming years, it is likely that a more thorough analysis with a wider sample will be possible.

Data availability also limited this study's ability to control for some additional factors. Health spending, malaria prevalence, HIV prevalence, and other factors might play a significant role in the interplay of health and democracy. While these indicators are available for more recent years through the World Bank, most since 2005, that data is not available for earlier years and thus could not be included in this study (World Bank,

2011). Future studies including these and other factors as control variables while studying

additional country years will likely be able to gain a better understanding of the

relationship between health and democracy.

7. Conclusion

Based upon the data used in this study, there is limited correlation between levels of democracy and levels of public health. Once GDP per capita is controlled for, the positive impact of democracy is limited to increased use of insecticide treated bed nets and vitamin A supplementation among certain segments of society. In addition to these positive effects, once GDP per capita was controlled for, democracy was found to have significant negative impacts on the proportion of children underweight and the proportion experiencing stunted growth at most economic quintiles. Ross (2006) proposed that as a country democratizes, any improvements in health would be concentrated among the upper classes. While none of the other statistically significant relationships followed Ross's model, proportion underweight and proportion experiencing stunted growth followed it closely, only rather than the improvements being experienced more heavily among the upper classes, the negative impacts were felt more keenly among the lower classes. With the data available, it is difficult to describe with any confidence the exact nature of the relationship between health and democracy. Based on these findings, there is little evidence to support the claim that democracy improves public health outcomes in developing states.

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- Dean's List every semester
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LEADERSHIP EXPERIENCE

MASHAVU, *Team Member,* Nyeri, Kenya; University Park, PA   January 2010-Present

- Selected to be a part of a multidisciplinary team designing a widely accessible telemedicine program in rural Kenya
- Spent four weeks traveling throughout Kenya conducting telemedicine clinics and demonstrating the system to interested government officials, non-governmental organizations, and potential investors
- Received grants from the John D. Martz Memorial Fund, the Political Science Department, and Honors College
- Designed and implemented a comprehensive program evaluation that produced thousands of data points on the effectiveness of the biomedical devices and response interviews of clinic participants and medical professionals

MALARIA AND FOOD SECURITY PROJECT, *Research Assistant* University Park, PA   June 2010-Present

- Summarize and analyze interviews of Mozambiquan farmers regarding their agricultural practices and health
- Employ SPSS statistical software to compare trends and identify patterns across regions and villages

SCHREYER HONORS THESIS, *Author,* University Park, PA   September 2009-Present

- Investigating the relationship between government type and public health outcomes in developing states through a large-scale statistical analysis across a 25 year period and individual case studies

AMERICAN RED CROSS, *Blood Supply Driver,* State College, PA   February 2009- April 2010

- Organize setup of blood drive locations and provide transportation for necessary supplies and equipment
- Check in blood donors and ensure they are eligible to give blood

THON 2010 RULES & REGULATIONS COMMITTEE, PENN STATE UNIVERSITY   October 2009- February2010
Committee Member & Fundraising Chair

- Work as part of a 30 member team to maintain safety and security of participating families, 700 dancers, and over 15,000 student volunteers throughout 48 hour dance marathon fundraiser for combating pediatric cancer
- Coordinate fundraising trips and mail solicitation; total THON fundraising of $7.838 million in 2010

ATHLETIC EXPERIENCE

PENN STATE MEN'S ICE HOCKEY   August 2007- Present

- 42 game Division I ACHA schedule, 30+ hour per week athletic commitment, significant leadership role

OTHER WORK EXPERIENCE

SHANDYGAFF SALOON, *Bouncer*, State College, PA   January 2011- Present

- Responsible to check patrons' IDs, ensure a safe and orderly environment, and maintain cleanliness in bar

NATURE AND SCIENCE IMAGES, *Landscaping and Maintenance Worker,* Boalsburg, PA   September 2008 - Present

- Provide landscaping and general maintenance services on a private ten-acre property

CONFERENCES AND PUBLICATIONS

- Bell, C., Dzombak, R., Sulewski, T., Mehta, K., "Institutional Review Board Compliance Issues on Research Aspects of International Entrepreneurial Ventures", NCIIA Annual Conference, Alexandria, March 2011
- Sulewski, T., Bell, C., Dzombak, R., "Systemic Assessment Methodology for a Social Entrepreneurship Venture", poster, NCIIA Annual Conference, San Francisco, CA, March 2010.