THE ASSOCIATION OF HEALTH INSURANCE COVERAGE AND HEALTH INDICATORS: A COMPARISON OF STATES OVER TIME

By

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I. INTRODUCTION

In the past 15 years, an expanding volume of empirical research, published in professional journals, has been directed at explaining differences in health outcomes across the United States. Many of these studies have been ecological analyses in which the independent and dependent variables are measured at the state level. Some of this research has focused on the social determinants of maternal and child health, though few studies have examined the "structural" determinants or the policy characteristics that may impact health. In general, these studies have several common characteristics. First, only a limited number of maternal and child health outcomes have been explored in a given study. Second, for most studies, a single year of cross-section data has been utilized in the statistical models employed to explain the variation in health outcomes across the 50 states. Third, state level research on social determinants of health has generally been limited to a small number of demographic and social variables. Further, many of these studies have been particularly concerned with of the impact of income inequality on health, especially in terms of its impact on infant mortality. Finally, as mentioned above, policy variables have been largely ignored.

The present study seeks to build upon the existing evidence base, while also addressing some of the weaknesses inherent in the above-mentioned research through a longitudinal, ecological analysis that assesses the relationship between a wide array of determinants and numerous maternal and child health outcomes across states. Consistent with this research thrust, the present study utilizes seventeen maternal and child health indicators that have been reported annually for each state through KIDS COUNT which is sponsored by the Annie E. Casey Foundation. In addition to social and demographic independent variables, economic and policy variables thought to be related to maternal and child health are included in the statistical models. One major proposition explored through this study is that differences in health insurance coverage—private insurance, Medicaid and State Children's Health Insurance Programs (SCHIP)—across states explain the considerable variation in the selected health outcomes. Therefore, a central focus of the analysis uses data on the 50 states to test hypotheses about the impact of the extent of health insurance coverage on the selected health outcomes over an eleven year period from 1995 to 2005. The overall purpose of this study is to contribute to our understanding of the reasons for, or determinants of, the variations in maternal and child health outcomes that are observed across states.

The remainder of this report is comprised of the following sections. First, the selected maternal and child health outcomes are described. Next, a brief discussion of the social determinants of health is included and past research on the determinants of maternal and child health outcomes conducted at the state level is reviewed. This section includes a summary of socio-demographic determinants as well as a discussion of policy variables, and selected references to the evidence base that provides a rationale for exploring the impacts of health insurance variables on the outcomes of interest. Third, the report outlines the methodology for the analysis, including data elements, units of observation, variable measurement and statistical techniques. Fourth, the findings are presented, and a summary and conclusions are offered.

II. HEALTH OUTCOMES

The states are the chosen units of observation because of the availability of consistent health outcome data reported for all 50 states over time by the Annie E. Casey Foundation. The health outcomes and their measurement selected for the present study are listed on Table 1. The time span for most of these outcomes covers an 11 year period from 1995 to 2005. These outcomes are indicators of the extent of child and maternal well-being within a state. In general, with the exception of immunizations, a higher value of an outcome indicates a lower level of child or maternal welfare. A data profile was prepared for the 17 health outcomes listed on Table 1. This profile takes two forms. One, measures of central tendency and dispersion for each outcome were calculated to investigate the patterns of prevalence of an outcome and its changes among states over time. Second, a histogram of each outcome has also been also compiled for the period of available data. The profile can be found in Appendix A.

TABLE 1: DEPENDENT VARIABLES – HEALTH OUTCOMES FROM KIDS COUNT

Variables	Years	Description	Sources*
Negative Birth Outcomes			
Infant Mortality	1995-2005	Deaths occurring to infants under 1 year of age per 1,000 live births	Centers for Disease Control and Prevention, National Center for Health Statistics
Prenatal Care	1995-2005	Births that occurred to mothers who reported receiving prenatal care only in the third trimester of their pregnancy, or reported receiving no prenatal care (1989 standard birth certificate): Percent	Child Trends analysis of 1990-2005 Natality Data Set, National Center for Health Statistics
Pre-term Births	1995-2005	Percent of babies born with a gestational age of less than 37 completed weeks	Child Trends analysis of 1990-2005 Natality Data Set CD Series, National Center for Health Statistics
Low Birth-Weight	1995-2005	Percent of live births weighing less than 2,500 grams (5.5 pounds)	Centers for Disease Control and Prevention, National Center for Health Statistics
Very Low Birth-Weight	1995-2005	Percent of live births weighing less than 1,500 grams (3.4 pounds)	Centers for Disease Control and Prevention, National Center for Health Statistics
Social Dimensions of Pregnancy			
Teen Births	1995-2005	Births to females less than 20 years of age is the number of births to women under age 20 divided by the total number of births to women of all ages.	Child Trends analysis of 1990-2005 Natality Data Set CD Series 21, National Center for Health Statistics
Teen Births by Age Group 15-17	1995-2005	Births (per 1000 females) by age group 15-17 Rate is per 1,000 females in each age group.	PRB analysis of Centers for Disease Control and Prevention. National Center for Health Statistics
Teen Births by Age Group 18-19	1995-2005	Births (per 1000 females) by age group 18-19. Rate is per 1,000 females in each age group.	PRB analysis of Centers for Disease Control and Prevention. National Center for Health Statistics
Teen Births by Age Group 15-19	1995-2005	Births (per 1000 females) by age group 15-19. Rate is per 1,000 females in each age group.	PRB analysis of Centers for Disease Control and Prevention. National Center for Health Statistics
Births to Unmarried Women	1995-2005	Percent of births occurring to women who were unmarried at the time of the birth	Child Trends analysis of 1990-2005 Natality Data Set CD Series 21, numbers 2-9, 11-12, 14-16 (SETS versions), and 16H and 17Ha (ASCII version), National Center for Health Statistics.

TABLE 1: DEPENDENT VARIABLES – HEALTH OUTCOMES FROM KIDS COUNT			
Variables	**Years**	**Description**	**Sources***
Births to Teen Mothers	1995-2005	Percent of births that were second or higher order births to mothers who were under the age of 20 at the time of the birth	Child Trends analysis of 1990-2004 Natality Data Set CD Series 21, National Center for Health Statistics
Births to Mothers Who Smoked During Pregnancy	1995-2005	Percent of births to women who smoked during pregnancy. Data for the U.S. includes only those states that are still using the 1989 version of the birth certificate. Data for some states for certain years will be missing due to an adoption of different birth certificate format.	Child Trends analysis of 1990-2005 Natality Data Set CD Series 21, numbers 2-9, 11-12, 14-16 (SETS versions), and 16H and 17Ha (ASCII version), National Center for Health Statistics.
Children's Health Issues			
Children Deaths	1995-2005	Deaths to children between ages 1 and 14, from all causes, per 100,000 children in this age range	Death Statistics: Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS).
Teen Deaths	1995-2005	Deaths to teens between age 15 and 19 per 100,000 teens in this age group	United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Office of Epidemiology Analysis and Health Promotion.
2 Year Old Immunizations	1998-2005	Percentage of children age 2 who have 4:3:1 Series Coverage. 4:3:1 Series Coverage is four or more doses of diphtheria and tetanus toxoids and pertussis (DTP) vaccine, diphtheria and tetanus toxoids (DT) vaccine, and diphtheria and tetanus toxoids and acellular pertussis (DTaP) vaccine; three or more doses of poliovirus vaccine; and one ore more doses of measles-containing vaccine.	Centers for Disease Control and Prevention, National, State, and Urban Area Vaccination Levels Among Children Aged 19-35 Months - United States reports from 1998-2006
Overweight children	2003	The share (percent) of children and teens age 10 to 17 who are overweight and obese	Child Trends analysis of data from the National Survey of Children's Health.
Children With Asthma	2003	The share of children under age 18 affected by asthma during the past year.	Child Trends analysis of data from the National Survey of Children's Health.

** All dependent variables were downloaded from the Annie E. Casey Foundation Kid's Count Data Center. Sources listed are those cited by the Kid's Count web site. http://www.kidscount.org/datacenter/compare.jsp?s=1*

III. LITERATURE REVIEW

Social Determinants of Health – The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1946). This definition is important in its breadth and in that it emphasizes assets and capacities which are substantively different from a lack of health problems or illness. Similarly, this definition represents a departure from a biomedical conception of health that generally dominates the health policy discourse in the U.S. Social determinants of health (SDOH) are "the economic and social conditions that influence the health of individuals and communities," (Raphael, 2006). The availability, accessibility and quality of medical care is but one determinant of health and is generally thought to contribute only about 15-25% to overall population health outcomes (McGinnis et al., 2002; O'Hara, 2005).

In general, it is widely held that poverty is associated with poor health and is the strongest determinant of health. Moreover, the relationship is a relative one, such that individuals that experience extreme poverty are worse off than those that have even slightly more resources, and those at the highest socioeconomic level are generally the healthiest (Marmot, 2005a). This social gradient in health is generally thought to result from a combination of material disadvantage and the effects of insecurity, stress and lack of social integration (Wilkinson & Marmot, 2003). Related to poverty and income is the issue of class. In the landmark Whitehall Studies, Marmot and colleagues have examined the relationship between employment grade and health among British civil servants since 1967. The studies have documented a significant relationship between grade levels of civil servant employment and a range of health outcomes, illustrating an obvious gradient among social divisions as well (Marmot et al., 1991). Other research has demonstrated a similar relationship generally for education, such that the lower educated are less healthy than the more educated (Deaton, 2002; RWJF, 2008).

Other social determinants of health supported by a large body of research include, but are not limited to, race, housing, food security, neighborhood characteristics including social capital and racial segregation, as well as access to social services and medical care. Income inequality within a society, beyond absolute poverty, has also been linked to poor health for individuals all along the income spectrum, and this will be explored in more detail below. Of particular concern is the finding that social disadvantage is cumulative and has a cumulative effect on health. For example, Bauman and colleagues (2006) studied how cumulative disadvantage affects child health by analyzing four known social risk factors—poverty, low

parental education, single-parent household and minority race/ethnicity. The study found that for three of the four risk factors, the odds ratios for poor health increased consistently as the number of risk factors increased (from 1.95 for one risk to 4.06 for three risks). Notably, health insurance was not found to be protective in this study. Other studies have found similar relationships between gradients in health and the combined influences of social problems or risk factors (Stevens, 2006; Marmot, 2005a; Marmot 2005b). A related concept concerns the dose-response relationship of poverty over time, such that long-term or persistent poverty is more detrimental to health than short bouts (Geronimus, 2000).

It is generally accepted that social determinants of health overlap with one another and interact in different ways to impact health. Halfon and Hochstein (2002) have argued that health is a consequence of multiple determinants operating in multiple ways over time as a person develops, and that early life experiences—both positive and negative—are important determinants of later health. Much research now focuses on the intersection and complex interrelationships between the various determinants of health and how different population groups may be more or less vulnerable to these influences. It should be noted that much debate exists in the literature regarding the causal pathways or mechanism by which these determinants influence health, and arguments have been raised as to whether some of these specific determinants are proxies for each other or something else entirely (e.g. Deaton, 2002). A detailed discussion of these issues is beyond the scope of this review, but is touched upon in the conclusion as it relates to the findings of the present study.

State Level Analyses – Research on the determinants of health outlined above draws upon a number of studies, using different methodologies, and varies in the attention given to different population groups and different geographic scales. Heretofore, research on the determinants of maternal and child health and well-being at the state level within the U.S. has been limited. In a few recent empirical studies, an array of such health outcomes has been assessed for their sources of variation among states (Mcleod et al., 2004; Mellor & Milyo, 2001; Koenen et al., 2006). The purpose of many of these inquiries has been to verify income inequality as a major determinant of population level health outcomes. In this respect, the basic hypothesis, sometimes referred to as the inequality hypothesis, is that as income inequality rises, health status in society declines. Since the proliferation of these studies in the 1990s, two main approaches to hypotheses testing have been taken: cross-country comparisons for one year period, and cross-state comparisons within the U.S. in a single year. Since the latter units of observation are used in

the present study, comments on prior research will be confined to state level analyses.

There have been several rationales offered for explaining a negative relationship between income inequality and health outcomes. These different justifications of the inequality hypothesis are consistent in their appreciation of the various social pathways through which inequality is thought to influence the health of individuals. One view is that health inequities in developed societies are strongly influenced by citizens' interpretations of their standing in the social hierarchy. At the individual level, the perception and experience of unequal status lead to psychosocial stress that directly impacts health as well as the adoption of health threatening coping behaviors such as taking on additional employment, or excessive use of alcohol or tobacco. At the communal level, this hierarchy weakens social cohesion, which itself is a determinant of health (Raphael, 2006). An alternative view is that inequality erodes social capital which, in turn, creates a political climate that is less supportive of policies that would improve health. In line with this rationale, it is argued that communities, as well as low income individuals themselves, make less investment in education, health, and social services with the consequence that this human capital disinvestment fosters mistrust, stress and related social ills and health problems (e.g., Kaplan et al., 1996).

Irrespective of the rationale underlying the inequality hypotheses, research on the predicted relationship between health outcomes and income inequality has generally used a common approach. For instance, most previous ecologic studies at the state level utilized single year data of the 50 states for the years of 1980, 1990 or the early 1990s. The basic methodology employed to evaluate the inequality hypothesis has been to test the relationship between a selected health outcome and a specific measure of income inequality using a regression model. Over time, however, these studies have differed in two ways. First, the number of maternal and child health indicators considered as dependent variables has varied. Secondly, the studies have differed in their specification of the measure used for income inequality and their inclusion of other independent variables in the regression equations.

Recent reviews of the literature regarding the income inequality hypothesis at the state level have revealed mixed support for the inequality hypothesis (Mellor & Milyo, 2001; Wilkinson & Pickett, 2005). More specifically, the findings have been inconsistent in terms of the effect of income inequality on health. A similar conclusion has been rendered for studies using multi-level models that incorporate both individual and aggregate level data to test the hypothesis (Mellor & Milyo, 2001; Subramanian & Kawachi, 2003; Wilkinson & Pickett, 2005). A major source of this inconsistency arises from the

different specifications of both independent and dependent variables in the models, making it difficult to reach any general conclusions regarding the role of income inequality in explaining differences in maternal and child health outcomes across states.

The initial income inequality studies investigated the impact of income inequality on several health outcomes, of which few represented maternal and child health. Most commonly, the following indicators were employed: infant mortality, low birth weight, aggregate death rates, age-specific morality rates, age-adjusted mortality for health disease and malignant neoplasm, and homicide. However, all these outcomes were not utilized in every early study. In the early cross-state comparisons, a selected health indicator has generally been regressed on a measure of income inequality solely or together with a few other independent variables, generally median family income and poverty rates. Nevertheless, as mentioned above, these studies have not produced consistent findings. The following brief review provides additional details.

Kennedy, Kawachi, Prothrow-Smith (1996a) tested the inequality hypothesis with two different measures of income inequality, the Robin Hood index and Gini Coefficient for household income. The Robin Hood index was found to be positively associated with age adjusted mortality and infant mortality, age-adjusted mortality for heart disease, malignant neoplasm, and homicide after controlling for median family income and state poverty rates. With these two controls specified, no statistically significant relationships were verified with the Gini coefficient. However, in a correction issued in a follow-up article, the same authors in (1996b) reported the Gini coefficient to be a statistically significant determinant of all the previous cited dependent variables except malignant neoplasm; but the analysis did not control for any other factors. Kaplan et al. (1996) found that, when median family income is controlled for in the model, the share of income received by 50% of households manifest a statistically significant negative relationship with child health indicator of low birth weight (less than 2,500 grams) as well as age adjusted mortality rates, homicide, violent crimes, disabilities, per capita spending medical care and protection, sedentary lifestyles, and smoking. With control variables of median household income and state poverty rates in the equation, Kawachi and Kennedy (1997b) confirmed the statistical significance of nine different state-level measures of income inequality with age-adjusted mortality rates across states. Shi et al. (1999) verified that, with median household income included as an independent variable, the Gini coefficient had a statistically significantly association with age-adjusted mortality; but this income inequality relationship vanished when control measures of income and education at the state

level were added to the model. Although no maternal and child health outcomes were used, the finding does demonstrate the importance of specifying the health outcome models with possible confounding factors as more recent studies have employed.

More recent studies have expanded the number of independent variables to include a few social and/or demographic determinants such as percentage of Blacks, percentage of Hispanics, percentage of urban population, and poverty rates (Koenen et al., 2006; Mcleod et al., 2004; Mellor & Milyo, 2001). Moreover, two of these inquires have evaluated an array of maternal and child health outcomes, with the data drawn from Kids Count (Ibid.). The analyses clearly demonstrate the importance of societal factors beyond income inequality and median household income as determinants of maternal and child well-being. The additional independent variables that were introduced, as well as the health outcomes evaluated, are identified below in the review of the following three studies.

With data on 48 states, Mellor and Milyo (2001) evaluated the inequality hypothesis with nine dependent variables, several of which were not included in previous studies. Beside the maternal and child health indicators of infant mortality rates, low birth weight, the other dependent variable included were aggregate death rates, death rates from cardiovascular disease, malignant neoplasm, liver disease, and accidents, as well as homicides and suicides. In addition to the Gini coefficient, the other independent variables included in the model were (a) variables measuring of the percentage of the population in different age categories in order to age adjust state-level death rates, (b) median family income, (c) percentage of high school education, (d) percentage of college education, (e) percentage of population in urban areas, and (f) percentage of Black population. The regressions confirm that, after adding the determinants of age composition and median family income in the separate equations, there are statistically significant associations between the Gini coefficient and the dependent variables except death from cardiovascular disease, liver disease, malignant neoplasm, and suicide. However, when the other demographic variables mentioned above were entered as controls into the equation, the relationship between inequality and all the dependent variables except homicide disappeared. Unfortunately the statistical significance of the impacts of the demographic variables on infant mortality and low birth weights were not reported.

Mcleod et al. (2004) employed 1995 data on 50 states to evaluate the effects of income inequality and racial and ethnic composition on health outcomes measuring child well-being. The health outcomes,

drawn from the Urban Institute and Kids Count data sets, were infant mortality, teen mortality, low birth weight, teen birth rate, and high school dropout rate. The independent variables were the Gini coefficient, median family income, proportion Black, and proportion Hispanic. With these four independent variables included in the regression equation, their effects were found to be inconsistent across the health outcomes. The Gini coefficient was not a statistically significant determinant of any dependent variable. The proportion of Black population was confirmed as having a positive statistically significant impact on infant mortality, low birth weight, teen birth rate, and high school dropout rate but not on teen mortality. That is, states with a larger percentage of Black population were associated with poorer heath outcomes. The proportion of Hispanic population was not verified as a determinant of teen mortality and low birth weight, but shown to have a statistically significant negative relationship with infant mortality, teen birth rate, and high school dropout rates. Thus states with larger Hispanic populations are associated with greater child well being indicated by these three outcomes. In addition, as shown by its statistical significance, higher median family income among states was found to be a determinant of lower infant mortality, teen mortality, teen birth rate and high school dropout rate, but not low birth weight.

Koenen et al. (2006) evaluated the relationship between women's status and child well-being among 50 states with five child health outcomes taken from the Kids Count Data book. The five indicators for the year 2001 were infant mortality, low birth weight babies, teen mortality, high school drop-out rate, and teen birth rate. In this state-level ecologic analysis, women's status was measured by four separate composite indices (women political participation, economic and social autonomy, employment and earnings, and reproductive rights) extracted from 1998-2000 data. In addition to the women status determinants, the following other independent variables were specified: income inequality (measured as a ratio of the incomes of the top 20% to the bottom 20% of families), median family income, percentage of the population in poverty, and state racial composition (percentage black population and percentage Hispanic population). Four classes of models were estimated, with a separate one for each status index. For each class of models, separate equations were tested for each health outcome. Initially, the four classes of models were estimated only with the women's status index as an independent variable. Then the other independent variables were phased into the equations to evaluate whether the initially estimated impact of the selected women status index changed with the addition of potential confounders. Subsequently, the individual indicators that comprised an index were substituted into the fully specified equation for the index itself.

There are several considerations about the methodology and findings of this study that have implications for present inquiry. First, the testing of the fully-specified models did reveal statistically significant impacts of women's status on health outcomes. These impacts were most consistent for infant mortality and teen birth rate. Second, after the non-status variables were entered into the various equations, the statistical significance and the size of the initially estimated coefficients changed. These results are indicative of the important role of confounders as determinants of health outcomes. However, the statistical significance or signs of the coefficients of the other independent variables were not reported. Third, when the individual indicators of a status index were substituted for the index, only a one or two of the subcomponents were statistically significant and others were not. The consequence is that the indices may obscure the separate effects of important factors. Fourth, it is unclear why the four separate indices were not included in one model to assess the separate health outcomes. It could be argued that the separate independent effects of each index cannot be estimated accurately without inclusion all the admittedly declared relevant status dimensions.

Three basic observations can be drawn from the above literature review. First, the studies that have addressed the determinants of a wide array of maternal and child health outcomes have been few. Thus, little is known about what societal forces, measured at the state level, account for maternal and child health and how these forces operate to cause changes in health status. Second, where multiple independent variables have been employed in statistical models, the same determinants have been found to have differential impacts on the same health outcomes, including the different health outcomes. Put differently, the effect of a determinant varies across societal indicators of maternal and child well-being. Given these findings, it could be expected that a common set of determinants does not prevail for maternal and child health. Third, although the assessment of health outcomes has been extended to some other potential determinants, aside from income inequality, median family/household income, and poverty rates, the additional variables explored has been few and confined to limited number of demographic variables. Generally the introduction of other independent variables, especially ones pertaining to racial and ethnic composition, resulted in (a) the attenuation of at least the regression coefficient of income inequality, and (b) the additional hypothesized determinants having differential association with various health outcomes.

This consequence is indicative of a more general problem of specification error involving the omission of relevant independent variables in the regression models that could result in the estimation of biased

coefficients. Some researchers of the determinants of health have suggested that the early ecological studies have omitted potential confounders as determinants (Daly et al., 1998; Judge et al., 1998; Koenen et al., 2006; Mcleod et al., 2004; Mellor & Milyo, 2001). That is, the prior ecological studies of health outcomes have omitted both "social" factors included in the inequality pathways as well as other potential confounding factors that would induce or mitigate income inequality and/or contribute directly to the improvement of health outcomes. More specifically, there have been omission of relevant economic forces, and social welfare and health policies in the studies focused upon the impact of income equality on health outcomes. Advocates of the income inequality hypothesis have argued explicitly (or if not, it is implied) for income redistribution and that public actions should be undertaken to address the social and economic policies that are (hypothesized to be) detrimental to public health (Daniels et al., 2000; Kawachi & Kennedy, 1998; Kawachi & Kennedy 1999; Soobader & LeClere, 1999; Wilkinson 1996, 1997a; 1997b). In fact, some supporters of the income inequality hypothesis are explicit about the important role of public policy to overcome the negative effects of poor income distribution. Kawachi and Kennedy (1999) claim that while the U. S. policy instruments such as the minimum wage, child care credits, and the earned income tax credit (EITC) have been implemented in this regard, their scope has been too restrictive.

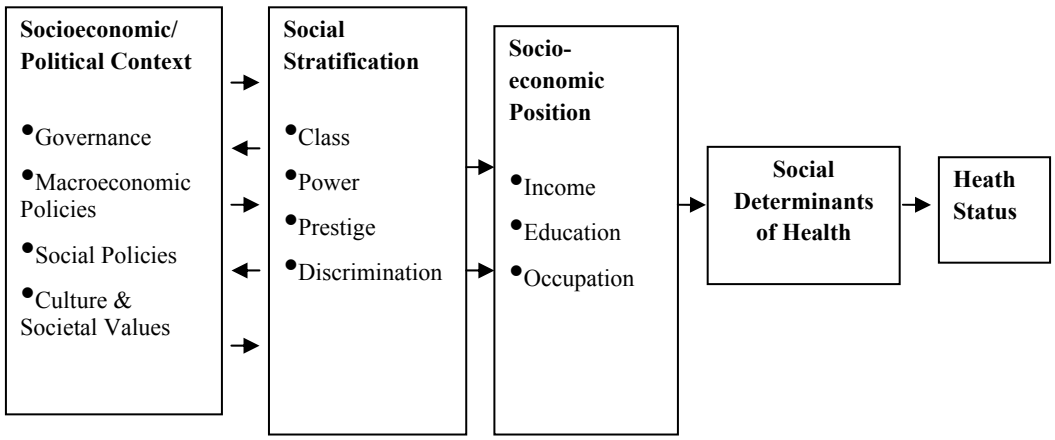
In the current study, inclusion of the Gini index as a measure of income inequality does not necessarily reflect adherence to any particular rationale regarding the underlying mechanisms suggested for income inequality, as this approach has been criticized for its ambiguity in formulation, especially over the lack of clarity about the chain of societal events, or the sequences of societal forces that link inequality to detrimental health outcomes (e.g., Coburn, 2004; Mcleod et al., 2004; Mellor & Milyo, 2002, 2004). Other criticism of the hypotheses include the position that while there are social pathways in which income inequality is involved, it is not the root cause or initial social generator of societal ills but rather a consequence of demographic forces, as well as social, economic, and public policy activities (Burkhauser et al., 1996; Husted, 1991; Leverenier et al., 1995; Mellor & Milyo, 2001). Therefore, in the present study, independent variables representing many of these, and other related, characteristics are included and assessed as determinants of maternal and child health outcomes.

Structural Determinants of Health– As is implied by the above discussion of income inequality, there is growing recognition that social determinants of health are no longer considered the "causes of the causes" of poor health as once thought, but rather intermediary factors along the causal chain. The recent report

issued by the WHO Commission on the Social Determinants of Health (WHO, 2007) argues that structural determinants—defined as governance structures, macroeconomic policies and social policies, and societal values—generate or reinforce stratification in society that define individual socioeconomic position. As is depicted in the model below, these factors are then thought to impact the social determinants of health and ultimately health outcomes.

***Figure 1. Structural* Determinants of the *Social* Determinants of Health Inequities**

Adapted from WHO, Commission on SDOH Discussion Paper (2007)



Others have similarly argued that these structural determinants are related to health in that they reflect decisions made by societies that determine the allocation of resources that subsequently determine health (Hofrichter, 2003; O'Hara, 2005). In this way, one might view public policy as an "upstream" influence on the quality and distribution of the social determinants of health, such that health outcomes may ultimately be impacted through policy change. It is this perspective that underlies the small but growing research on how public policy—within and outside of health care—influences health directly or indirectly through its relationship to other broad health determinants such as income distribution, as well as through its impact on individual level determinants such as poverty, access to health care and other social services, and behavior.

A particular area of interest for the present study is the relationship between health care policies—namely those that provide access to health care for low income children and families—and maternal and child health outcomes at the state level. Past research shows that greater access and use of primary care is linked directly to positive health outcomes and well-being. This relationship has been verified irrespective of whether the research was conducted at the aggregate or individual level of analysis (Starfield and Shi, 2007). The central mechanism that provides access to primary care is health insurance coverage, which facilitates the utilization of health care services by individuals and families. Although other barriers to accessing health care exist, inadequate insurance coverage has been linked to delays in seeking care and other unmet medical care needs (Olson, Tang, & Newacheck, 2005). Further, health insurance coverage is an important factor in explaining racial and ethnic disparities in having a regular source of care, which is itself linked to positive health outcomes (Lillie-Blanton & Hoffman, 2005). For low income children and families, access to primary health care often comes in the form of Medicaid or SCHIP coverage, and these public programs are credited with providing access to care to millions of children in the U.S. and reducing the rate of uninsured across all states.

It has been argued that the state is the appropriate unit of analysis for studying health policy characteristics, as the states are the primary actors in this policy arena (O'Hare & Lee, 2007). Further, the devolution of policy-making over the past several years has resulted in wide variations in the design and implementation of public insurance programs (i.e. Medicaid and SCHIP) as well as in other relevant policy domains such as welfare and education across states (Holahan, 2007). For instance, 15 states originally implemented SCHIP as a stand alone program while 18 expanded eligibility for low income children through their existing Medicaid programs and 17 implemented combination programs. The decisions regarding the design and implementation of health policies reflect differences in states' resources and capacities, as well as different population characteristics, political ideologies and competing fiscal priorities, among other things (Miller, 2005). Regardless of the factors that influence state health policy making, the resulting policies related to Medicaid and SCHIP have implications for utilization of services, quality of care and related health outcomes. States are uniquely positioned in this regard to impact children's health (Smith, 2005).

Therefore, for the purposes of this study, it is hypothesized that variations in these policies—both in terms of the scope of coverage and the level of resource allocations—across states are related to maternal and child health outcomes, independent of the socio-demographic characteristics of the populations within the states. For instance, the relative generosity of state funded health insurance programs may help explain the variations in health outcomes (Starfield, 2004). While there is great variation in per capita spending across states, particularly for Medicaid, knowing the level of expenditures alone is not sufficient to understand variations in how the policies impact health outcomes (Becker & Teutsch, 2000). Spending varies due to differences in cost of care by region, the extent and mix of benefits and services covered, the case-mix of the covered population and demographics of the state, as well as things like the federal matching rate and cost-sharing policies imposed by the state (Holahan, 2007). Due to the range of factors associated with state health insurance coverage, the present study includes a range of health policy variables in addition to socio-demographic indicators in the regression equations for each health outcome of interest. The independent variables used to measure health insurance coverage and their sources are presented on Table 2.

The focus on SCHIP is timely because of the importance of evaluating the program's impact after 10 years of implementation, and the recent consideration of its reauthorization by the U.S. Congress. In addition, indicators of the extent of private health insurance coverage are also employed to evaluate the impact that this may have on enhancing children's health. As discussed above, differences in children's health outcomes across states are also likely to be influenced by a number of other societal factors. Social and demographic variables are included because they represent either need of or demand for health care and because of their direct, independent impact on health. Several variables that reflect family economic capacity and capability are posited as explanatory factors. Variables measuring economic forces and conditions of a state, which could influence state capability to finance health programs, are also included in the analysis.

Other policy variables have been studied in terms of their relationship to health status at the population level, but most of the literature in this regard involves cross-country comparisons. For instance, several studies over the last decade have sought to elucidate the effects of the political environment on population health by examining the role of the welfare state in promoting health. Many of these studies have revealed a positive association between a strong welfare state or supportive social policies and better health status, including reduced infant mortality (Coburn, 2000; Chung & Mutaner, 2007; Navarro & Shi,

2001). Few of these studies have examined variations social policies and related differences in health status across states within the U.S. A notable exception is a recent study by O'Hare and Lee (2008) that examined the relationship between state policies and an index of child well-being based upon KIDS COUNT indicators and found a significant relationship for a number of policy variables. For instance, when comparing the policy characteristics of states grouped into 3 categories based upon an index of KIDS COUNT indicators, the authors found that none of the states with the poorest health outcomes had a minimum wage that exceeded the federal minimum wage, nor did they offer a refundable Earned Income Tax Credit. This study also found that state spending for children's programs did not appear to be related to health outcomes once they controlled for purchasing power of the state (measured by the ratio of per child expenditures to per capita gross domestic product). O'Hare and Lee used a cross section of data (generally from 2002 or 2003) and aggregated states into 3 groups (top 10, bottom 10 and middle 30) to assess the role of both policy and demographic factors in explaining the variation on child well-being across states. The present study builds upon the research by O'Hare and Lee in a number of ways: (1) by expanding the list of potentially relevant policy variables, (2) by including a longer time frame for analysis and by (3) assessing the impact of the independent variables on individual outcomes (versus an index). The list of independent variables used in the present analysis which measure a number of welfare and educational policy characteristics of states, often regarded as supportive of low income and disadvantage groups, are listed in Table 2.

TABLE 2. COMMON INDEPENDENT VARIABLES					
Variable	**Description**	**Measurement**	**Expected Sign***	**Variance Inflation Factor**	**Source**
Gini Index	Gini Index of Inequality (interval)	Interval	+	2.05545	U.S.Bureau of the Census, http://www.census.gov/hhes/www/income/histinc/state/state4.html
Family Median Income	Real Family Median Income for a family of four	Interval	-	6.29791	U.S. Bureau of the Census, http://www.census.gov/hhes/www/income/4person.html Consumer Price Index (1982=100) was used to adjust for inflation. U.S. Department of Labor, Bureau of Labor Statistics
Children in Poverty	Percentage of children in poverty. Children defined as poor if family income is below the poverty threshold.	Interval	+	6.41202	National Center for Children in Poverty, Low-Income Children in the United States: National and State Trend Data, 1995-2005
Population under 18	Percent of Population Under 18	Interval	+	2.18486	U.S. Bureau of the Census, Estimates and projections.
Black Children	Percent Black Child Population	Interval	+	3.73093	U.S. Bureau of the Census, Estimates and projections.
Hispanic	Percent Hispanic Population	Interval	+	4.72078	U.S. Bureau of the Census, Estimates and projections.
Employed Population	Percent Employed Population	Interval	-	5.59325	U.S. Dept of Labor, Bureau of Labor Statistics ,Local Area Unemployment Statistics
Adults with a High School Diploma	Percent of Adults with a H.S. Diploma/GED	Interval	-	3.53191	Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data
Urban	Percent of population living in Urban Areas	Interval	?	5.80977	U.S. Bureau of the Census. Values were imputed for missing years.
Density	Density of population	Interval	?	5.23445	Population data divided by State's square mile area

TABLE 2. COMMON INDEPENDENT VARIABLES					
Variable	**Description**	**Measurement**	**Expected Sign***	**Variance Inflation Factor**	**Source**
Midwest	Midwest Region, (1,0), reference=West	Categorical	?	3.86106	U.S. Bureau of the Census
Northeast	Northeast region, (1,0), reference=West	Categorical	?	5.18695	U.S. Bureau of the Census
South	South region, (1,0), reference=West	Categorical	?	6.26029	U.S. Bureau of the Census
EITC	Earned Income Tax Credit (1=Yes, 0=No)	Categorical	-	1.56836	National Conference of State Legislatures
No Personal Tax	State has no personal income tax (1=Yes, 0=No)	Categorical	+	1.64093	U.S. Department of the Treasury, Internal Revenue Service
State Minimum Wage Higher	The State's minimum wage is higher than the Federal minimum wage (1=Yes, 0=No)	Categorical	-	1.95776	Calculated from wages from the U.S. Department of Labor, Bureau of Labor Statistics
Education Expenditures	percent state budget for education expenditures (interval)	Interval	-	1.262	National Association of State Budget Offices, State Expenditure Reports (annual)
Food Stamp Participation Rate	Food Stamp Rate	Interval	-	1.79276	Mathamatica Policy Research, Inc.
Adults Without Health Insurance	Percent of Adults 18-64 years old without health insurance	Interval	+	5.69984	Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey Data
Children Without Health Insurance	Percent of Children Without Health Insurance	Interval	+	5.11926	U.S. Census Bureau, Current Population Survey, downloaded from Kid's Count website, http://www.kidscount.org/datacenter/
Private Insurance	Percent of population with private insurance	Interval	-	4.37427	U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements.

TABLE 2. COMMON INDEPENDENT VARIABLES					
Variable	**Description**	**Measurement**	**Expected Sign***	**Variance Inflation Factor**	**Source**
Medicaid insured children	Percent of children insured through Medicaid	Interval	-	3.34663	U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplements.
Medicaid per capita	Medicaid expenditures per capita, real dollars	Interval	-	1.22194	National Association of State Budget Offices, State Expenditure Reports (annual) Consumer Price Index (1982=100) was used to adjust for inflation. U.S. Department of Labor, Bureau of Labor Statistics
Children covered by SCHP	Percent children covered by SCHIP program	Interval	-	4.1315	CMS Enrollment Reports (1999-2005)
SCHP per capita	State SCHIP expenditures per capita, real dollars	Interval	-	1.09308	National Association of State Budget Offices, State Expenditure Reports (annual) Consumer Price Index (1982=100) was used to adjust for inflation. U.S. Department of Labor, Bureau of Labor Statistics
SCHP share of State expenditures	SCHIP expenditures/State total expenditures	Interval	-	3.5216	National Association of State Budget Offices, State Expenditure Reports (annual)
**It is expected that the signs for Immunization will be the opposite because the higher value shows greater welfare.*					

IV. METHODOLOGY

Separate regression models were estimated for each of the selected maternal and child health outcomes. The individual dependent variables were regressed on a set of independent variables. The hypothesized determinants represent the policy variables of health insurance coverage as well as the selected social, demographic, economic forces, and social welfare policies. For each outcome, only demographic variables measuring age composition of the population that corresponds to the age grouping of the health outcome is placed in the equation in order to exclude irrelevant variables from the hypothesis testing. For example, for teen birth rate, the demographic age variables encompass the age brackets that span 12 through 18. The health outcome variables, their measurement, and their time frame are described in Table 1. All the outcomes were obtained from a download of Kids Count data compiled by the Annie E. Casey Foundation.

The present analysis is a longitudinal study (with most regression using 11 years of data). This approach avoids restricting the interpretation of the finding to a particular time frame as would occur with a single year cross-section of data from the 50 states. The central analysis of the present study focuses on the predicted impact of the scope of insurance coverage. This analysis covers the 11 years of data for 14 health outcomes and independent variables between 1995 and 2005 for all 50 U.S. states. The number of observations is 550. One health outcome entailed the testing of regression model for 1998 to 2005 data, for eight years with 400 observations. Two outcomes included one year cross-section data of all 50 states. The three outcomes of infant mortality rates, children death rates, and teen death rates were transformed into a log odds measurement. This transformation is common practice in the literature since the occurrence of the death in these categories is a rare event. The regression equations for these three outcomes were run for both the logs odds and the original ratio measurements.

The independent variables included in the separate models are given in Table 2. The table provides the measurement and sources of the hypothesized determinants. The sign of the predicted relationship is also given. The time frame of all the outcomes and independent variables were the same, as the literature did not reveal any strong theoretical bases for lagging any of the determinants behind the time period of the health outcomes.

The ordinary least squares (OLS) estimator was applied to test all the separate regression models. Hypotheses were verified at the .05 level of statistical significance. A one-tailed t-test was applied for

variables with the predicted sign. Some of the social and demographic variables that had similar measurements were dropped from the regression equations because of an assessment of multicollinearity. Variables were excluded through the application of Variance Inflation Factors (VIF), with a VIF score of greater than ten as the bases of exclusion. None of the independent variables in the estimated equations had a value that exceeded the VIF criterion. The equations were also checked for outliers, none of which were detected. Many of the variables that were related to population size were entered the equations as per capita measured factors. The evaluation for heteroscedasticity did not signify any confirmation of this problem. A sequential procedure was utilized to estimate each equation. First, both the income inequality and median family income variables are entered together into the equation. Next, all the socioeconomic variables are introduced as a group into the equation. Finally the economic (social welfare) and health policy (health insurance coverage) variables were added to the equation. These patterns of estimation are given in the tables showing the results of the hypothesis testing which are presented in the next section.

V. FINDINGS

The results of the estimation of the 17 OLS equations are presented in Tables 3 to 22. As stated earlier, each table shows three different models with the third model as the completely specified one. This format reveals the way in which the regression coefficients change in value and the statistical significance attenuates as the welfare and health policy variables enter the equations. Commentary on the statistical results of the equations is organized according to the categorization of health outcomes provided in Table 1: (a) negative birth outcomes, (2) social dimensions of pregnancy, and (3) child health issues. In the text, a tabular display for the adjusted R square and the parameters values of the regression coefficients is given in which the statistical significance of the estimated coefficients is noted by their shading. A presentation of the full estimates of the models, inclusive of standard errors, t-statics, and significance levels of the coefficients, is provided in the technical appendix.

Negative Birth Outcomes

Five health outcomes are considered under the category of negative birth outcomes: (1) infant mortality rate, (2) lack of prenatal care, (3) pre-term births, (4) births of infants with low birth weight, and (5) birth of infants with very low birth weight. These outcomes are defined more precisely in Table 1. The equations were estimated with 550 observations covering the 11 year time period from 1995 to 2005, except for lack of prenatal care which utilized 525 observations for the same period.[1]

For each of the five health outcomes, their final models explain a very large amount of the variation in the outcomes among states. The adjusted R squares of each final equation ranged from .60 to .86 and had F-values that are statistically significant at the .001 level.

- Income inequality had the predicted positive sign and was a statistically significant variable in each of the initial equations for all negative birth outcomes. In the final models, income inequality ceased to be a statistically significant variable for the outcomes except for the dependent variable of infants born with very low birth weight.

- In the final models, median family income is negatively associated with all the negative birth outcomes except infants born with very low birth weight. Thus states which have higher family income also have lower negative birth outcomes among their populations.

[1] The number of observations are lower the 550 because some states, - e.g., Washington, Texas, Vermont - had missing data.

- The statistical estimation of the regression models of the negative birth outcomes yielded inconsistent results across the five outcomes. Several general observations about all the negative birth outcomes follow:[2]

    - The percentage of Black children population is positively related to all the health indicators that measure negative birth outcomes. States with a greater percentage of Black children in the population have higher rates of infant mortality, pre-term births, births of infants with low birth weight and very low birth weight and women who receive limited pre-natal care.

    - While the percentage of Hispanic population within states is not associated with infant mortality, it is positively associated with pre-term births, births of infants with low birth weight and very low birth weight and women who receive limited pre-natal care.

    - Although the percent of children in poverty is positively associated with infant mortality, the independent variable proved to be negatively related to women receiving limited pre-natal care and pre-term births, and not a statistically significant determinant of both low birth weight indicators.

- The evaluation of the welfare and health policy variables (a) did not affirm many statistically significant relationships, and (b) where statistical significance was verified, some of the results were inconsistent with expectations.

    - Infant mortality was found to have a positive association with both the food stamp participation rate and with states that did not have a personal income tax.

    - The percent of children without health insurance had both a positive and negative statistically significant associations with the five different negative birth outcomes. That

[2] The estimations of both the log odds infant mortality and its original measurement produced the same results in terms of the statistical significance and signs of the regression coefficients.

is, states with a higher percentage of uninsured children had higher infant mortality rates and proportionally more women who gave birth with limited pre-natal care. In contrast, states with a higher percentage of uninsured children also had fewer births of infants with low birth weight and very low birth weight.

- States with a minimum wage above the federal minimum wage were negatively associated with women receiving limited pre-natal care, pre-term births, and births of infants with low birth weight. However, this independent variable did not have any statistically verifiable impact on the outcomes of infant mortality and infants of very low birth weights.

TABLE 3. INFANT MORTALITY						
Infant Mortality	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.169		0.704		0.716	
F value	56.66		101.30		54.32	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	6.704140	6.71	9.733700	5.22	7.753340	3.37
Gini Index	9.259460	4.43	-1.525560	-0.89	0.134330	0.08
Real Median Family Income	-0.000107	-9.75	-0.000032	-2.17	-0.000031	-1.94
Children living in poverty, percent			0.034690	2.66	0.029060	1.88
Population under 18, percent			4.012140	1.69	1.625380	0.64
Black Children, percent			6.030400	11.71	6.397830	11.85
Hispanic population, percent			-1.432640	-2.35	-0.713390	-0.90
Employed population, percent			-0.004230	-0.28	0.001710	0.09
Adults with a H.S. Diploma, percent			-0.029780	-2.05	-0.016380	-1.07
Urban population, percent			-0.005970	-1.31	-0.012480	-2.40
Density			0.000684	1.83	0.000959	2.51
Midwest region			0.574240	4.60	0.693370	4.70
Northeast region			-0.574510	-3.21	-0.507180	-2.70
South region			0.509490	3.01	0.485410	2.81
Earned Income Tax Credit					-0.314960	-3.43
No personal state income tax					0.250460	2.11
State's minimum wage higher then Federal					0.071400	0.61
Education expenditures, percent of total expenditures					0.546210	0.78
Food stamp participation rate					1.047740	2.79
Adults (18-64 years) without health insurance, percent					-0.020410	-1.30
Children without health insurance, percent					3.051750	1.85
Private insurance, percent of population covered					-0.000010	0.00
Children Insured by Medicaid, percent					-0.391640	-0.50
Medicaid expenditures per capita					-8.501460	-0.61
Children covered by SCHIP, percent					0.572630	0.34
SCHIP expenditures per capita, Real					0.450380	0.14
SCHIP expenditures as percentage of total State budget					3.140760	0.14
Shaded areas indicate variables that are significant at < p=.05						

TABLE 4. INFANT MORTALITY (LOGGED)						
Infant Morality (Logged)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.162		0.665		0.680	
F value	54.08		84.79		45.89	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	-4.988680	-34.95	-4.536830	-16.06	-4.904620	-14.10
Gini Index	1.242030	4.15	-0.291920	-1.13	-0.026360	-0.10
Real Median Family Income	-0.000015	-9.60	-0.000005	-2.31	-0.000005	-1.89
Children living in poverty, percent			0.005240	2.65	0.004620	1.98
Population under 18, percent			0.389500	1.08	0.004080	0.01
Black Children, percent			0.763130	9.78	0.823120	10.08
Hispanic population, percent			-0.197340	-2.14	-0.067010	-0.56
Employed population, percent			-0.001100	-0.48	-0.000160	-0.06
Adults with a H.S. Diploma, percent			-0.003620	-1.65	-0.001250	-0.54
Urban population, percent			-0.000467	-0.68	-0.001630	-2.08
Density			0.000127	2.24	0.000175	3.03
Midwest region			0.094430	4.99	0.105810	4.74
Northeast region			-0.096100	-3.55	-0.092690	-3.26
South region			0.081430	3.17	0.072850	2.79
Earned Income Tax Credit					-0.043440	-3.13
No personal state income tax					0.039890	2.22
State's minimum wage higher then Federal					-0.004330	-0.24
Education expenditures, percent of total expenditures					0.061140	0.57
Food stamp participation rate					0.189540	3.33
Adults (18-64 years) without health insurance, percent					-0.003010	-1.27
Children without health insurance, percent					0.484750	1.95
Private insurance, percent of population covered					0.000237	0.21
Children Insured by Medicaid, percent					-0.080530	-0.67
Medicaid expenditures per capita					-1.218560	-0.58
Children covered by SCHIP, percent					0.209320	0.82
SCHIP expenditures per capita, Real					0.140340	0.30
SCHIP expenditures as percentage of total State budget					-0.939850	-0.27
Shaded areas indicate variables that are significant at < p=.05						

TABLE 5. LACK OF PRENATAL CARE						
Prenatal Care (n=525)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.078		0.504		0.599	
F value	23.02		41.87		31.14	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.043650	4.14	0.028980	1.21	0.094750	3.43
Gini Index	0.040860	1.84	-0.018390	-0.83	-0.016380	-0.79
Real Median Family Income	-0.0000008	-6.58	-0.000001	-4.07	0.000000	-2.21
Children living in poverty, percent			-0.000125	-0.74	-0.000635	-3.46
Population under 18, percent			0.074330	2.42	0.098890	3.23
Black Children, percent			0.035650	5.30	0.033530	5.17
Hispanic population, percent			0.077490	9.71	0.080220	8.56
Employed population, percent			-0.000424	-2.17	-0.001410	-6.38
Adults with a H.S. Diploma, percent			0.000540	2.89	0.000634	3.51
Urban population, percent			0.000006	0.10	-0.000125	-2.02
Density			0.000004	0.77	0.000002	0.33
Midwest region			-0.006840	-4.20	-0.006400	-3.64
Northeast region			-0.010480	-4.40	-0.011510	-4.98
South region			-0.008650	-3.87	-0.010330	-4.98
Earned Income Tax Credit					0.003070	2.81
No personal state income tax					0.001120	0.79
State's minimum wage higher then Federal					-0.008120	-5.76
Education expenditures, percent of total expenditures					-0.035900	-4.23
Food stamp participation rate					-0.003090	-0.68
Adults (18-64 years) without health insurance, percent					-0.000927	-4.83
Children without health insurance, percent					0.126550	6.45
Private insurance, percent of population covered					-0.000023	-0.21
Children Insured by Medicaid, percent					0.011400	1.21
Medicaid expenditures per capita					-0.252410	-1.54
Children enrolled in SCHIP, percent					0.022180	1.08
SCHIP expenditures per capita					0.020030	0.55
SCHIP expenditures as percentage of total State budget					-0.581890	-2.14
Shaded areas indicate variables that are significant at < p=.05						

TABLE 6. PRE-TERM BIRTHS						
Pre-term Births	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.219		0.735		0.785	
F value	77.87		118.19		78.27	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.050780	4.23	0.210930	9.65	0.225420	8.99
Gini Index	0.233970	9.31	0.057950	2.89	0.024080	1.27
Real Median Family Income	-0.000001	-8.46	-0.000001	-5.43	-0.000001	-3.07
Children living in poverty, percent			-0.001070	-7.00	-0.000380	-2.28
Population under 18, percent			-0.092610	-3.33	-0.057650	-2.09
Black Children, percent			0.094130	15.59	0.081020	13.92
Hispanic population, percent			0.057690	8.07	0.027200	3.19
Employed population, percent			-0.001330	-7.46	-0.000775	-3.88
Adults with a H.S. Diploma, percent			0.000412	2.42	0.000030	0.18
Urban population, percent			-0.000190	-3.55	-0.000121	-2.14
Density			0.000012	2.80	0.000015	3.61
Midwest region			0.002970	2.03	0.000746	0.47
Northeast region			-0.014400	-6.87	-0.013710	-6.68
South region			0.003480	1.75	0.002050	1.11
Earned Income Tax Credit					-0.002580	-2.60
No personal state income tax					0.001470	1.15
State's minimum wage higher then Federal					-0.003810	-2.99
Education expenditures, percent of total expenditures					-0.004760	-0.62
Food stamp participation rate					0.005060	1.23
Adults (18-64 years) without health insurance, percent					0.000049	0.28
Children without health insurance, percent					-0.040670	-2.30
Private insurance, percent of population covered					-0.000457	-4.75
Children Insured by Medicaid, percent					-0.027760	-3.22
Medicaid expenditures per capita					0.087740	0.58
Children covered by SCHIP, percent					0.014390	0.79
SCHIP expenditures per capita, Real					-0.048020	-1.42
SCHIP expenditures as percentage of total State budget					0.989750	4.00
Shaded areas indicate variables that are significant at < p=.05						

TABLE 7. LOW BIRTH WEIGHT INFANTS						
Low Birth Weight Infants	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.175		0.724		0.742300	
F value	59.27		111.75		61.83	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.011460	1.28	0.125470	7.73	0.105950	5.36
Gini Index	0.183790	9.78	0.012990	0.87	0.009020	0.60
Real Median Family Income	-0.0000005	-4.94	-0.0000005	-3.75	0.000000	-2.24
Children living in poverty, percent			-0.000459	-4.04	-0.000120	-0.91
Population under 18, percent			-0.078630	-3.81	-0.095680	-4.39
Black Children, percent			0.075720	16.89	0.071790	15.47
Hispanic population, percent			0.031080	5.86	0.023320	3.42
Employed population, percent			-0.000585	-4.41	-0.000209	-1.32
Adults with a H.S. Diploma, percent			0.000200	1.59	0.000128	0.98
Urban population, percent			-0.000049	-1.23	-0.000014	-0.31
Density			0.000007	2.05	0.000009	2.74
Midwest region			-0.000311	-0.29	-0.002900	-2.28
Northeast region			-0.003570	-2.29	-0.004480	-2.77
South region			0.003760	2.55	0.002310	1.56
Earned Income Tax Credit					-0.001970	-2.50
No personal state income tax					-0.000467	-0.46
State's minimum wage higher then Federal					-0.003610	-3.56
Education expenditures, percent of total expenditures					0.014410	2.38
Food stamp participation rate					0.003360	1.04
Adults (18-64 years) without health insurance, percent					0.000256	1.90
Children without health insurance, percent					-0.044420	-3.14
Private insurance, percent of population covered					-0.000085	-1.34
Children Insured by Medicaid, percent					-0.010350	-1.53
Medicaid expenditures per capita					0.016570	0.14
Children enrolled in SCHIP, percent					0.008540	0.59
SCHIP expenditures per capita					-0.011440	-0.42
SCHIP expenditures as percentage of total State budget					0.168630	0.86
Shaded areas indicate variables that are significant at < p=.05						

TABLE 8. VERY LOW BIRTH WEIGHT INFANTS						
Very Low Birth Weight (N=500)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.166		0.852		0.858	
F value	50.47		221.69		117.01	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	-0.008500	-3.5	0.018770	5.77	0.013000	3.21
Gini Index	0.051030	10.05	0.003950	1.33	0.005280	1.74
Real Median Family Income	0.000000	-0.2	0.000000	0.62	0.000000	0.38
Children living in poverty, percent			-0.000037	-1.67	0.000004	0.16
Population under 18, percent			-0.011080	-2.73	-0.013050	-2.96
Black Children, percent			0.020360	23.4	0.020060	21.99
Hispanic population, percent			0.001860	1.78	0.003510	2.63
Employed population, percent			-0.000068	-2.62	-0.000029	-0.94
Adults with a H.S. Diploma, percent			-0.000029	-1.11	-0.000011	-0.41
Urban population, percent			-0.000004	-0.47	-0.000009	-1.05
Density			0.000002	2.5	0.000002	2.78
Midwest region			0.000982	4.66	0.000725	2.91
Northeast region			0.000475	1.56	0.000253	0.78
South region			0.001410	4.93	0.001450	5.00
Earned Income Tax Credit					-0.000580	-3.74
No personal state income tax					-0.000348	-1.68
State's minimum wage higher then Federal					0.000173	0.85
Education expenditures, percent of total expenditures					0.000904	0.75
Food stamp participation rate					0.000157	0.24
Adults (18-64 years) without health insurance, percent					0.000027	0.96
Children without health insurance, percent					-0.006920	-2.48
Private insurance, percent of population covered					0.000028	1.82
Children Insured by Medicaid, percent					-0.001700	-1.27
Medicaid expenditures per capita					0.020560	0.91
Children covered by SCHIP, percent					0.000591	0.21
SCHIP expenditures per capita, Real					-0.002750	-0.54
SCHIP expenditures as percentage of total State budget					0.062500	1.67
Shaded areas indicate variables that are significant at < p=.05						

Social Dimensions of Pregnancy

Subsumed under the category of social dimensions of pregnancy are seven health outcomes: (1) teen birth rate, (2) teen birth rate 15-17 years old, (3) teen birth rate 15-19 years old, (4) teen birth rate 18-19 years old, (5) births to unmarried women, (6), additional births to teen mothers, and (7) births to mothers who smoked during pregnancy. Again, the full definition of these outcomes can be found in Table 1. Every equation has been tested with 550 observations with data encompassing the 11 years from 1995 to 2005.

With respect to all teen birth rate outcomes and births to mothers who smoked during pregnancy, their final models produced sizeable adjusted R squares of greater than .80 and F-values that were statistically significant at the .001 level. The adjusted R squares are slightly lower for the final models of additional births to teen mothers (.66) and births to unmarried women (.77) with both having F-Values that are statistically significant at the .001 level.

- In the initial model for all the child health outcomes, the Gini index manifested statistical significance but this relationship disappeared in the final models that included the policy variables as well as the social and demographic determinants.

- There was considerable consistency as well as inconsistency across the seven health indicators regarding social, economic and demographic variables.

    - Median family income across states was negatively associated the social dimensions of pregnancy except the health outcome of births to unmarried women. In states with higher median family income, teen birth rates, additional births to teenage mothers, and births to mothers who smoked during pregnancy was lower.

    - Not surprising, the teen birth rate was greater in the states where their percentage of the population 18 years or younger is larger. This population characteristic was also positively associated with additional births to teen mothers, but negatively related to births to unmarried women, and births to mothers who smoked during pregnancy. These

two outcomes, however, measure births by both teenagers as well as adults.

- States that have a higher percentage Black population also had a higher teen birth rate, as well as higher rates of additional births to teenage mothers and births to unmarried women. In contrast, the variable of the percentage of Black population is positively related to births to mothers who smoked during pregnancy. That is, states with larger Black populations manifest a greater proportion of births by women who smoked during pregnancy. Again, this outcome measured births by both teenagers as well as adults.

- States with larger Hispanic populations were associated with higher teen birth rates and births to unmarried women. This demographic factor was not related to additional births to teen mothers, and positively associated with births to mothers who smoked during pregnancy. Again, this outcome measured births by both teenagers as well as adults.

- Employment among the population in states was negatively related to all the negative pregnancy outcomes. That is, better child health outcomes related to pregnancy were realized in states in which the population has higher levels of employment.

- With the exception of births to unmarried mothers, the greater the percentage of the population with a high school level of education was negatively related to poor pregnancy related outcomes. In fact, the education variable was positively associated with births to unmarried mothers, which included births by both teens and adults.

- Compared to the other regions of the U.S., the Northeast consistently manifests lower levels of negative pregnancy outcomes. The exception is that the Northeast region has a higher rate of teen mothers who have additional births than the other U.S. regions.

- There are some similarities but also differences in the association of the policy variables with the selected health outcomes.

- States that spend more on education as percent of their state budget realized lower negative pregnancy outcomes except for additional births by teen mothers.

- An unexpected finding is that higher rates of all the negative pregnancy outcomes occurred in states where a larger percentage of children are without health insurance.

- Lower teen birth rates and additional births to teen mothers prevailed in states with a higher percentage of children enrolled in SCHIP. This relationship is reversed for both births by unmarried women and births by women who smoke, both of which encompasses outcomes of both teens and adults.

TABLE 9. TEEN BIRTH RATE						
Teen Birth Rate	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.517		0.783		0.834	
F value	295.08		153.20		106.73	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.208860	12.35	0.272770	7.68	0.319730	8.07
Gini Index	0.133530	3.77	-0.059530	-1.83	0.001810	0.06
Real Median Family Income	-0.000004	-24.06	-0.000002	-5.36	-0.000002	-5.81
Children living in poverty, percent			0.001650	6.65	0.000540	2.05
Population under 18, percent			0.195490	4.33	0.123740	2.85
Black Children, percent			0.055720	5.68	0.076130	8.28
Hispanic population, percent			-0.004950	-0.43	0.021900	1.62
Employed population, percent			0.000095	0.33	-0.001260	-3.99
Adults with a H.S. Diploma, percent			-0.001720	-6.24	-0.001100	-4.24
Urban population, percent			-0.000170	-1.96	-0.000385	-4.32
Density			0.000009	1.21	0.000005	0.73
Midwest region			-0.007300	-3.07	-0.000981	-0.39
Northeast region			-0.024320	-7.15	-0.021060	-6.5
South region			-0.002130	-0.66	-0.002410	-0.82
Earned Income Tax Credit					0.000594	0.38
No personal state income tax					0.004200	2.08
State's minimum wage higher then Federal					0.001940	0.96
Education expenditures, percent of total expenditures					0.006400	0.53
Food stamp participation rate					-0.000406	-0.06
Adults (18-64 years) without health insurance, percent					-0.000406	-1.49
Children without health insurance, percent					0.144770	5.17
Private insurance, percent of population covered					0.000056	0.37
Children Insured by Medicaid, percent					-0.013100	-0.96
Medicaid expenditures per capita					-0.012870	-0.05
Children covered by SCHIP, percent					-0.079930	-2.76
SCHIP expenditures per capita, Real					0.039770	0.74
SCHIP expenditures as percentage of total State budget					-1.073840	-2.75
Shaded areas indicate variables that are significant at < p=.05						

TABLE 10. TEEN BIRTH RATE, AGES 15-17						
Teen Birth Rate (Ages 15-17)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.279		0.728		0.828	
F value	107.29		114.09		102.34	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	32.292300	5.46	53.232650	4.68	68.171200	5.91
Gini Index	53.650530	4.33	-29.619460	-2.84	-5.225110	-0.60
Real Median Family Income	-0.000914	-14.06	-0.000353	-3.94	-0.000328	-4.12
Children living in poverty, percent			0.590410	7.42	0.087790	1.15
Population under 18, percent			30.001300	2.08	18.696830	1.48
Black Children, percent			26.900550	8.57	31.908420	11.92
Hispanic population, percent			2.165880	0.58	19.372560	4.93
Employed population, percent			0.398560	4.29	-0.149650	-1.63
Adults with a H.S. Diploma, percent			-0.652380	-7.38	-0.425610	-5.61
Urban population, percent			0.143430	5.16	0.026820	1.03
Density			0.000359	0.16	-0.001280	-0.68
Midwest region			-3.784120	-4.97	-2.271150	-3.10
Northeast region			-5.836170	-5.36	-5.931970	-6.28
South region			-2.049040	-1.98	-1.923990	-2.25
Earned Income Tax Credit					-0.021000	-0.05
No personal state income tax					0.064280	0.11
State's minimum wage higher then Federal					-0.520780	-0.89
Education expenditures, percent of total expenditures					-11.212190	-3.19
Food stamp participation rate					4.718830	2.49
Adults (18-64 years) without health insurance, percent					-0.499350	-6.30
Children without health insurance, percent					77.076040	9.45
Private insurance, percent of population covered					0.077830	1.76
Children Insured by Medicaid, percent					6.579680	1.66
Medicaid expenditures per capita					-46.224120	-0.67
Children covered by SCHIP, percent					-29.960140	-3.55
SCHIP expenditures per capita, Real					-2.237710	-0.14
SCHIP expenditures as percentage of total State budget					-89.716680	-0.79
Shaded areas indicate variables that are significant at < p=.05						

TABLE 11. TEEN BIRTH RATE, AGES 15-19						
Teen Birth Rate (Ages 15-19)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.370		0.765		0.821	
F value	162.02		138.27		97.65	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	66.87108	8.43	103.621820	6.83	128.132990	7.60
Gini Index	67.74172	4.08	-27.777020	-2.00	-3.881460	-0.31
Real Median Family Income	-0.00153	-17.6	-0.000630	-5.28	-0.000535	-4.59
Children living in poverty, percent			0.476100	4.49	-0.114730	-1.02
Population under 18, percent			55.889100	2.90	43.700440	2.36
Black Children, percent			30.384290	7.25	34.281260	8.75
Hispanic population, percent			7.299790	1.47	17.012180	2.96
Employed population, percent			0.171770	1.39	-0.387340	-2.88
Adults with a H.S. Diploma, percent			-0.799410	-6.78	-0.619750	-5.58
Urban population, percent			0.159180	4.29	0.067870	1.79
Density			-0.002620	-0.86	-0.004690	-1.69
Midwest region			-4.860480	-4.78	-2.194760	-2.05
Northeast region			-10.321370	-7.10	-9.275780	-6.72
South region			-0.530380	-0.38	-0.352110	-0.28
Earned Income Tax Credit					-0.617300	-0.93
No personal state income tax					0.327030	0.38
State's minimum wage higher then Federal					-0.969700	-1.13
Education expenditures, percent of total expenditures					-13.136010	-2.56
Food stamp participation rate					4.291710	1.55
Adults (18-64 years) without health insurance, percent					-0.521110	-4.50
Children without health insurance, percent					94.157660	7.90
Private insurance, percent of population covered					-0.039590	-0.61
Children Insured by Medicaid, percent					10.214160	1.76
Medicaid expenditures per capita					-96.061890	-0.95
Children covered by SCHIP, percent					-38.194040	-3.10
SCHIP expenditures per capita, Real					-0.421790	-0.02
SCHIP expenditures as percentage of total State budget					-116.14466	-0.70
Shaded areas indicate variables that are significant at < p=.05						

TABLE 12. TEEN BIRTH RATE, AGES 18-19						
Teen Birth Rate (Ages 18-19)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.402		0.766		0.806	
F value	185.52		139.11		88.83	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	117.179400	10.06	185.722940	8.14	216.293020	8.18
Gini Index	90.055810	3.69	-26.921130	-1.29	-0.646830	-0.03
Real Median Family Income	-0.002430	-18.96	-0.001010	-5.61	-0.000774	-4.23
Children living in poverty, percent			0.302340	1.89	-0.431940	-2.46
Population under 18, percent			94.885960	3.27	76.524660	2.64
Black Children, percent			37.079690	5.88	40.052130	6.52
Hispanic population, percent			14.175590	1.90	16.143420	1.79
Employed population, percent			-0.160830	-0.86	-0.790940	-3.75
Adults with a H.S. Diploma, percent			-1.113810	-6.28	-0.942430	-5.41
Urban population, percent			0.200410	3.59	0.112210	1.89
Density			-0.007620	-1.67	-0.009980	-2.30
Midwest region			-6.819610	-4.46	-2.497130	-1.49
Northeast region			-17.125800	-7.83	-14.804470	-6.84
South region			0.951020	0.46	1.067700	0.55
Earned Income Tax Credit					-1.325330	-1.27
No personal state income tax					1.481330	1.10
State's minimum wage higher then Federal					-1.745450	-1.30
Education expenditures, percent of total expenditures					-17.849570	-2.22
Food stamp participation rate					6.280530	1.45
Adults (18-64 years) without health insurance, percent					-0.596470	-3.28
Children without health insurance, percent					131.937330	7.06
Private insurance, percent of population covered					-0.136170	-1.34
Children Insured by Medicaid, percent					16.024710	1.76
Medicaid expenditures per capita					-208.057350	-1.31
Children covered by SCHIP, percent					-51.177450	-2.65
SCHIP expenditures per capita, Real					-1.459070	-0.04
SCHIP expenditures as percentage of total State budget					-40.679860	-0.16
Shaded areas indicate variables that are significant at < p=.05						

TABLE 13. BIRTHS TO UNMARRIED MOTHERS						
Unmarried Mothers	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.224		0.694		0.767	
F value	80.30		96.95		70.60	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.042540	1.06	0.676890	8.61	0.577350	6.67
Gini Index	0.884200	10.54	-0.066350	-0.92	-0.090880	-1.38
Real Median Family Income	-0.000003	-7.21	0.000000	-0.53	0.000000	-0.19
Children living in poverty, percent			0.000628	1.14	0.000086	0.15
Population under 18, percent			-0.840890	-8.41	-0.668940	-7.01
Black Children, percent			0.400910	18.46	0.403250	19.86
Hispanic population, percent			0.359080	13.97	0.309080	10.35
Employed population, percent			-0.005500	-8.56	-0.004170	-5.99
Adults with a H.S. Diploma, percent			0.003070	5.02	0.002420	4.23
Urban population, percent			-0.001160	-6.02	-0.001060	-5.45
Density			-0.000019	-1.23	-0.000011	-0.77
Midwest region			0.013210	2.51	0.027440	4.95
Northeast region			-0.018250	-2.42	-0.014510	-2.05
South region			-0.032470	-4.54	-0.029770	-4.58
Earned Income Tax Credit					0.000497	0.14
No personal state income tax					0.015210	3.41
State's minimum wage higher then Federal					0.010050	2.27
Education expenditures, percent of total expenditures					-0.170780	-6.45
Food stamp participation rate					0.068760	4.86
Adults (18-64 years) without health insurance, percent					-0.000673	-1.14
Children without health insurance, percent					0.252070	4.07
Private insurance, percent of population covered					-0.000453	-1.63
Children Insured by Medicaid, percent					0.105670	3.56
Medicaid expenditures per capita					0.688860	1.31
Children covered by SCHIP, percent					0.146100	2.3
SCHIP expenditures per capita, Real					0.071270	0.6
SCHIP expenditures as percentage of total State budget					0.172500	0.2
Shaded areas indicate variables that are significant at < p=.05						

TABLE 14. ADDITIONAL BIRTHS TO TEEN MOTHERS						
Additional Births to Teen Mothers	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.123		0.644		0.665	
F value	39.33		77.04		42.72	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.15155	8.1	0.310300	8.24	0.427660	9.25
Gini Index	0.2076	5.29	-0.039990	-1.17	-0.032480	-0.94
Real Median Family Income	-0.00000149	-7.21	-0.000001	-3.85	-0.000001	-3.34
Children living in poverty, percent			0.000196	0.75	-0.000572	-1.86
Population under 18, percent			0.085840	1.8	0.088140	1.75
Black Children, percent			0.100760	9.65	0.105260	9.73
Hispanic population, percent			0.005260	0.43	-0.003720	-0.24
Employed population, percent			-0.000021	-0.07	-0.000906	-2.47
Adults with a H.S. Diploma, percent			-0.001680	-5.74	-0.001810	-5.89
Urban population, percent			0.000725	7.92	0.000730	7.09
Density			0.000001	0.09	-0.000005	-0.68
Midwest region			0.005180	2.06	0.007460	2.54
Northeast region			-0.013010	-3.63	-0.010240	-2.74
South region			-0.000847	-0.25	-0.001950	-0.56
Earned Income Tax Credit					0.002720	1.49
No personal state income tax					0.000792	0.34
State's minimum wage higher then Federal					-0.001680	-0.72
Education expenditures, percent of total expenditures					0.002240	0.16
Food stamp participation rate					-0.008010	-1.07
Adults (18-64 years) without health insurance, percent					-0.000554	-1.77
Children without health insurance, percent					0.067630	2.07
Private insurance, percent of population covered					-0.000506	-3.44
Children Insured by Medicaid, percent					0.000192	0.01
Medicaid expenditures per capita					0.048820	0.18
Children covered by SCHIP, percent					-0.126840	-3.78
SCHIP expenditures per capita, Real					-0.009350	-0.15
SCHIP expenditures as percentage of total State budget					0.141720	0.31
Shaded areas indicate variables that are significant at < p=.05						

TABLE 15. BIRTHS TO MOTHERS WHO SMOKE DURING PREGNANCY						
Births to Mothers Who Smoke (N=502)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.171		0.754		0.822	
F value	52.66		119.14		89.77	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.421380	12.02	0.882910	14.67	0.718010	11.14
Gini Index	-0.386000	-5.21	-0.131140	-2.41	-0.041840	-0.86
Real Median Family Income	-0.000003	-8.74	-0.000001	-2.10	-0.000001	-1.89
Children living in poverty, percent			-0.000683	-1.66	-0.001060	-2.50
Population under 18, percent			-0.142220	-1.93	-0.252800	-3.61
Black Children, percent			-0.215630	-13.42	-0.193740	-13.18
Hispanic population, percent			-0.255460	-13.17	-0.259300	-11.98
Employed population, percent			-0.002460	-5.21	-0.002730	-5.40
Adults with a H.S. Diploma, percent			-0.003510	-7.17	-0.002490	-5.56
Urban population, percent			-0.001340	-9.31	-0.001430	-10.04
Density			0.000065	5.49	0.000077	7.24
Midwest region			0.013430	3.42	0.019530	4.88
Northeast region			-0.029920	-5.05	-0.028080	-5.26
South region			-0.009080	-1.67	-0.011450	-2.40
Earned Income Tax Credit					0.000796	0.31
No personal state income tax					0.029870	8.62
State's minimum wage higher then Federal					-0.015380	-4.62
Education expenditures, percent of total expenditures					-0.010760	-0.56
Food stamp participation rate					0.017030	1.66
Adults (18-64 years) without health insurance, percent					0.000395	0.90
Children without health insurance, percent					0.095630	2.14
Private insurance, percent of population covered					0.000656	3.23
Children Insured by Medicaid, percent					0.074050	3.50
Medicaid expenditures per capita					-0.118230	-0.32
Children covered by SCHIP, percent					0.096440	2.06
SCHIP expenditures per capita, Real					0.106020	1.28
SCHIP expenditures as percentage of total State budget					-3.385260	-5.48
Shaded areas indicate variables that are significant at < p=.05						

Child Health Issues

Five child health outcomes are evaluated under the category of children's health issues: (1) children's death rate, (2) teen death rate, (3) the extent of immunizations of two year old children, (4) proportion of overweight teenagers, and (5) children with asthma. Table 1 provides a complete definition of these outcomes. The regression models for these outcomes varied in their number of observations. Children's death rates and teen death rates were estimated with 550 observations and 11 years of data covering the period of 1995 through 2005. The estimation of the immunization outcomes encompassed a shorter time frame of eight years from1998 to 2005 resulting in 400 observations. Data for both the proportion of overweight teenagers and children with asthma were available for only one year, 2003, and 50 observations.

The regression models for both children's asthma and overweight teenagers did not yield statistically significant F-Values. Thus none of the independent variables could be confirmed as statistically significant determinants of the two outcomes measured as dependent variables. Consequently the discussion focuses only on the remaining three outcomes involving child health issues. For the health outcomes of children's death rate and teen death rate, their final models explain a large amount of the variation in the outcomes among states. The adjusted R squares of each final equation ranged from .66 to .86 and had F-values that are statistically significant at the .001 level. The final model of the extent of immunizations of two year old children produced a more modest adjusted R square of .39 but with an F-value that is statistically significant at the .001 level.

- Income inequality had the predicted positive sign and was a statistically significant variable in each of the initial equations for children's death rate, teen death rate, and the extent of immunizations of two year old children. In the final models, income inequality was no longer statistically significant.

- In the final models, median family income was negatively associated with child deaths, but not related to teen deaths. Thus states which had higher family income also had fewer children deaths. Conversely, median family income had the appropriate positive sign and verified as a statistically significant determinant of the outcome of the percentage of two year old children who were immunized.

- The statistical estimation of the regression models of children's death rate, teen death rate, and the extent of immunizations of two year old children found some inconsistent results across the three outcomes. Several general observations about these findings is given immediately below:[3]

    - The percentage of Black population was positively related to the outcomes of children death rates and teen death rates. States with a greater percentage of Blacks in the population had higher rates of children's deaths and teen deaths. However, the Black population variable was not confirmed a statistically significant determinant of the percentage of two year old children who were immunized.

    - The percentage of Hispanic population within states was not associated with either teen death rates or the immunization outcome. But, the Hispanic population variable was negatively associated with the children's death rates.

    - Although the percent of children in poverty was positively associated with the immunization outcome, the independent variable was not confirmed as a statistically significant determinant of either children death rates or teen death rates.

- The evaluation of the welfare and health policy variables only verified a few statistically significant associations, and for these variables, some of the results were inconsistent with expectations.

    - States with a minimum wage above the federal minimum wage were confirmed as negatively associated with children's death rates and teen death rates, and also, as expected, positively related to the immunization outcome.

    - Education expenditures as a percent of total state expenditures was found to have a negative association with teen death rate, but the independent variable was not identified as a statically significant determinant of either the immunization variable or children

[3] The estimations of both the log odds children's deaths and teen deaths and their original measurements produced the same results in terms of the statistical significance and signs of the regression coefficients.

death rates. Thus, as states expend more of their budgets on education, the teen death rate falls.

- A finding consistent with expectations is the positive sign of the statistically significant variable of the percent of children without health insurance. States with a higher percentage of uninsured children were confirmed to have higher teen and children death rates.
- A puzzling finding is the negative statistically significant relationship of the percent of children without health insurance with pre-term births and very low birth weights.
- Findings more consistent with expectations include that where states allocate a larger proportion of their budgets to SCHIP, children death rates are lower, and the proportion of two year old children who receive immunizations is higher.

TABLE 16. CHILD DEATHS						
Child Deaths	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.443		0.637		0.711	
F value	219.59		75.11		52.83	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	59.276510	17.14	16.714050	1.91	16.340360	1.66
Gini Index	-19.163900	-2.65	-2.637010	-0.33	4.384920	0.59
Real Median Family Income	-0.000788	-20.74	-0.000477	-6.93	-0.000423	-6.16
Children living in poverty, percent			0.151360	2.48	0.038910	0.59
Population under 18, percent			94.081660	8.47	84.882120	7.82
Black Children, percent			11.860040	4.92	14.509600	6.29
Hispanic population, percent			-7.421600	-2.60	-9.100350	-2.68
Employed population, percent			0.072630	1.02	-0.079050	-1.00
Adults with a H.S. Diploma, percent			0.008510	0.13	0.083330	1.28
Urban population, percent			-0.101030	-4.73	-0.137470	-6.20
Density			0.005770	3.30	0.006650	4.08
Midwest region			-1.511390	-2.58	0.087030	0.14
Northeast region			-5.216280	-6.23	-4.555420	-5.67
South region			-1.830450	-2.31	-2.348010	-3.18
Earned Income Tax Credit					-0.185020	-0.47
No personal state income tax					3.364700	6.63
State's minimum wage higher then Federal					-0.487590	-0.97
Education expenditures, percent of total expenditures					-3.956250	-1.31
Food stamp participation rate					1.968800	1.23
Adults (18-64 years) without health insurance, percent					-0.111260	-1.66
Children without health insurance, percent					39.714280	5.64
Private insurance, percent of population covered					0.011150	0.35
Children Insured by Medicaid, percent					2.878010	0.85
Medicaid expenditures per capita					3.489100	0.06
Children covered by SCHIP, percent					15.873690	2.20
SCHIP expenditures per capita, Real					20.375720	1.52
SCHIP expenditures as percentage of total State budget					-322.61055	-3.29
Shaded areas indicate variables that are significant at < p=.05						

TABLE 17. CHILD DEATHS, LOGGED						
Child Deaths (Logged)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.474		0.657		0.724	
F value	248.58		81.89		56.26	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	-2.062530	-13.95	-3.814430	-10.21	-4.046390	-9.57
Gini Index	-1.038910	-3.35	-0.296340	-0.86	0.056280	0.18
Real Median Family Income	-0.000036	-21.99	-0.000023	-7.69	-0.000020	-6.73
Children living in poverty, percent			0.005410	2.07	0.001110	0.39
Population under 18, percent			3.688180	7.76	3.177500	6.81
Black Children, percent			0.473240	4.59	0.592520	5.97
Hispanic population, percent			-0.275140	-2.25	-0.276860	-1.9
Employed population, percent			0.002590	0.85	-0.002650	-0.78
Adults with a H.S. Diploma, percent			0.000228	0.08	0.004060	1.45
Urban population, percent			-0.003370	-3.68	-0.005160	-5.41
Density			0.000203	2.71	0.000260	3.71
Midwest region			-0.037340	-1.49	0.010300	0.38
Northeast region			-0.235360	-6.57	-0.224730	-6.5
South region			-0.055570	-1.64	-0.087470	-2.75
Earned Income Tax Credit					-0.005980	-0.35
No personal state income tax					0.136390	6.25
State's minimum wage higher then Federal					-0.053320	-2.46
Education expenditures, percent of total expenditures					-0.126100	-0.97
Food stamp participation rate					0.163900	2.37
Adults (18-64 years) without health insurance, percent					-0.004830	-1.67
Children without health insurance, percent					1.639400	5.42
Private insurance, percent of population covered					0.001020	0.75
Children Insured by Medicaid, percent					0.117920	0.81
Medicaid expenditures per capita					0.123220	0.05
Children covered by SCHIP, percent					0.889760	2.86
SCHIP expenditures per capita, Real					0.974590	1.69
SCHIP expenditures as percentage of total State budget					-16.051120	-3.81
Shaded areas indicate variables that are significant at < p=.05						

TABLE 18. TEEN DEATHS						
Teen Deaths	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.394		0.600		0.656	
F value	179.66		64.36		41.34	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	163.741150	14.97	79.226980	2.85	76.412020	2.35
Gini Index	-30.681520	-1.34	18.754170	0.73	29.204860	1.18
Real Median Family Income	-0.002270	-18.88	-0.000803	-3.67	-0.000321	-1.41
Children living in poverty, percent			0.193850	1.00	-0.035370	-0.16
Population under 18, percent			210.103520	5.94	195.198370	5.44
Black Children, percent			41.251280	5.37	40.388800	5.29
Hispanic population, percent			11.293880	1.24	-6.751450	-0.60
Employed population, percent			-0.169550	-0.75	-0.459950	-1.76
Adults with a H.S. Diploma, percent			0.105360	0.49	0.190740	0.89
Urban population, percent			-0.579500	-8.52	-0.640110	-8.73
Density			0.015780	2.83	0.016610	3.08
Midwest region			-9.166880	-4.92	-5.063280	-2.43
Northeast region			-23.646020	-8.87	-21.700640	-8.17
South region			-8.943420	-3.54	-10.435070	-4.27
Earned Income Tax Credit					-1.854530	-1.43
No personal state income tax					6.906050	4.12
State's minimum wage higher then Federal					-4.410670	-2.65
Education expenditures, percent of total expenditures					-30.336650	-3.05
Food stamp participation rate					5.687570	1.07
Adults (18-64 years) without health insurance, percent					-0.171410	-0.77
Children without health insurance, percent					113.427160	4.88
Private insurance, percent of population covered					-0.065690	-0.63
Children Insured by Medicaid, percent					12.699740	1.14
Medicaid expenditures per capita					-104.78523	-0.53
Children covered by SCHIP, percent					26.602470	1.11
SCHIP expenditures per capita, Real					41.965330	0.95
SCHIP expenditures as percentage of total State budget					-370.92314	-1.15
Shaded areas indicate variables that are significant at < p=.05						

TABLE 19. TEEN DEATHS, LOGGED						
Teen Deaths (Logged)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.410		0.615		0.664	
F value	191.55		68.51		42.68	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	-1.097730	-6.67	-2.398800	-5.77	-2.527770	-5.16
Gini Index	-0.631240	-1.83	0.151340	0.4	0.305910	0.82
Real Median Family Income	-0.000035	-19.46	-0.000013	-3.95	-0.000005	-1.59
Children living in poverty, percent			0.002070	0.71	-0.000773	-0.23
Population under 18, percent			2.717380	5.14	2.352220	4.35
Black Children, percent			0.620110	5.4	0.587650	5.11
Hispanic population, percent			0.256300	1.89	-0.022250	-0.13
Employed population, percent			-0.001890	-0.56	-0.005920	-1.5
Adults with a H.S. Diploma, percent			0.001900	0.59	0.003440	1.06
Urban population, percent			-0.008060	-7.92	-0.008980	-8.13
Density			0.000170	2.04	0.000185	2.27
Midwest region			-0.103680	-3.72	-0.050380	-1.6
Northeast region			-0.352150	-8.84	-0.327550	-8.18
South region			-0.098990	-2.62	-0.125160	-3.4
Earned Income Tax Credit					-0.031560	-1.61
No personal state income tax					0.096840	3.83
State's minimum wage higher then Federal					-0.075060	-2.99
Education expenditures, percent of total expenditures					-0.326280	-2.17
Food stamp participation rate					0.074460	0.93
Adults (18-64 years) without health insurance, percent					-0.002540	-0.76
Children without health insurance, percent					1.710560	4.88
Private insurance, percent of population covered					-0.000339	-0.21
Children Insured by Medicaid, percent					0.208120	1.24
Medicaid expenditures per capita					-1.402390	-0.47
Children covered by SCHIP, percent					0.406830	1.13
SCHIP expenditures per capita, Real					0.778280	1.17
SCHIP expenditures as percentage of total State budget					-4.185610	-0.86
Shaded areas indicate variables that are significant at < p=.05						

TABLE 20. IMMUNIZATION						
2 Year Old Immunizations (N=400)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.088		0.329		0.393	
F value	20.30		16.05		10.95	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.630700	14.43	0.663780	5.35	0.578030	3.85
Gini Index	0.199970	2.19	0.048650	0.45	0.017310	0.16
Real Median Family Income	0.000003	5.97	0.000002	2.32	0.000002	2.07
Children living in poverty, percent			0.001360	1.58	0.002690	2.78
Population under 18, percent			-0.581730	-3.91	-0.470270	-3.02
Black Children, percent			0.014930	0.48	-0.000983	-0.03
Hispanic population, percent			0.035410	0.93	0.058010	1.25
Employed population, percent			0.002530	2.69	0.003890	3.69
Adults with a H.S. Diploma, percent			0.000556	0.56	0.000025	0.02
Urban population, percent			-0.000805	-2.84	-0.001010	-3.23
Density			0.000012	0.52	0.000025	1.11
Midwest region			0.017140	2.31	0.011640	1.31
Northeast region			0.045570	4.19	0.039230	3.45
South region			0.019730	1.95	0.021080	2.11
Earned Income Tax Credit					-0.013210	-2.48
No personal state income tax					0.012630	1.7
State's minimum wage higher then Federal					0.015260	2.16
Education expenditures, percent of total expenditures					0.015270	0.35
Food stamp participation rate					0.038960	1.64
Adults (18-64 years) without health insurance, percent					-0.000723	-0.71
Children without health insurance, percent					-0.174950	-1.65
Private insurance, percent of population covered					0.000267	0.44
Children Insured by Medicaid, percent					-0.008140	-0.17
Medicaid expenditures per capita					0.400110	0.56
Children covered by SCHIP, percent					-0.105360	-1.19
SCHIP expenditures per capita, Real					-0.158590	-1.01
SCHIP expenditures as percentage of total State budget					5.462510	4.62
Shaded areas indicate variables that are significant at < p=.05						

TABLE 21. OVERWEIGHT TEENAGERS						
Overweight Teenagers (n=50)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.107		0.243		0.262	
F value	3.92		2.21		1.67	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	0.053610	0.41	0.314840	0.78	-0.510590	-0.71
Gini Index	0.686730	2.44	0.245880	0.60	0.903970	1.71
Real Median Family Income	-0.0000017	-1.44	0.000004	1.34	-0.000002	-0.45
Children living in poverty, percent			0.003680	0.95	0.006600	1.16
Population under 18, percent			-0.266620	-0.49	-0.650460	-1.04
Black Children, percent			-0.008300	-0.08	0.068010	0.58
Hispanic population, percent			-0.087610	-0.65	0.181160	1.02
Employed population, percent			-0.003710	-0.96	-0.000714	-0.15
Adults with a H.S. Diploma, percent			-0.000104	-0.03	0.003900	0.84
Urban population, percent			-0.000030	-0.03	-0.001840	-1.39
Density			-0.000015	-0.23	0.000106	1.34
Midwest region			-0.000189	-0.01	-0.033560	-0.90
Northeast region			-0.030700	-0.86	-0.076470	-1.56
South region			0.023460	0.74	-0.017040	-0.44
Earned Income Tax Credit					-0.026410	-1.31
No personal state income tax					0.033220	1.12
State's minimum wage higher then Federal					0.021790	0.84
Education expenditures, percent of total expenditures					0.198110	0.93
Food stamp participation rate					0.190190	1.81
Adults (18-64 years) without health insurance, percent					-0.001610	-0.39
Children without health insurance, percent					0.007820	0.02
Private insurance, percent of population covered					0.004660	1.21
Children Insured by Medicaid, percent					-0.319450	-1.36
Medicaid expenditures per capita					-1.267660	-0.14
Children enrolled in SCHIP, percent					0.696780	2.00
SCHIP expenditures per capita					0.422990	0.20
SCHIP expenditures as percentage of total State budget					-5.342540	-1.07
Shaded areas indicate variables that are significant at < p=.05						

TABLE 22. CHILDREN ASTHMA						
Children Asthma (N=50)	**Model #1**		**Model #2**		**Model #3**	
Adjusted R^2	0.044		0.276		0.307	
F value	2.14		2.44		1.83	
Variables	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**	**Parameter Estimate**	**t value**
Intercept	-0.007450	-0.18	0.162030	1.33	-0.001330	-0.01
Gini Index	0.178930	2.01	-0.025490	-0.21	-0.059770	-0.38
Real Median Family Income	0.000000	0.43	0.000000	0.50	0.000000	0.18
Children living in poverty, percent			-0.000367	-0.32	0.000591	0.35
Population under 18, percent			-0.095810	-0.59	-0.149630	-0.81
Black Children, percent			0.005390	0.18	-0.008870	-0.25
Hispanic population, percent			0.014550	0.36	0.015500	0.30
Employed population, percent			-0.002880	-2.50	-0.002210	-1.53
Adults with a H.S. Diploma, percent			0.001250	1.09	0.001860	1.35
Urban population, percent			0.000032	0.11	-0.000083	-0.21
Density			-0.000004	-0.21	0.000009	0.36
Midwest region			0.012020	1.67	0.012060	1.09
Northeast region			0.010140	0.95	-0.001190	-0.08
South region			0.014220	1.50	0.013950	1.22
Earned Income Tax Credit					0.002210	0.37
No personal state income tax					-0.007140	-0.81
State's minimum wage higher then Federal					0.010340	1.35
Education expenditures, percent of total expenditures					-0.024070	-0.38
Food stamp participation rate					-0.015210	-0.49
Adults (18-64 years) without health insurance, percent					0.000239	0.19
Children without health insurance, percent					-0.000289	0.00
Private insurance, percent of population covered					0.001410	1.23
Children Insured by Medicaid, percent					0.058230	0.84
Medicaid expenditures per capita					-1.663540	-0.62
Children covered by SCHIP, percent					0.111890	1.08
SCHIP expenditures per capita, Real					-0.402810	-0.64
SCHIP expenditures as percentage of total State budget					1.054930	0.71
Shaded areas indicate variables that are significant at < p=.05						

VI. CONCLUSIONS

Given the number of dependent variables, independent variables and the range of findings (indicated above) in this study, a detailed discussion of each of the estimated equations is not included in this report. Rather, trends in the data and common findings across the range of variables have been highlighted above. As is indicated by the detailed tables in the appendices, and referenced in the findings section, the analyses revealed a number of inconsistent and unexpected findings. Rather than speculate as to the implications of each of these findings, we offer a number of summary conclusions and caveats below that also have implications for further research:

1. Access to and participation in insurance does not ensure utilization by those that are insured. In this respect, a research concern arises over the need to investigate the variables that facilitate or limit medical care utilization. For instance, an analysis should be undertaken to evaluate the institutional characteristics of the SCHIP and Medicaid programs on the chosen maternal and child health indicators. Institutional factors of these programs can provide incentives that improve access of their programs' health care services or may be present barriers to utilization. Specifically, the impact of cost sharing arrangements of Medicaid and SCHIP on child health outcomes should be assessed. For both SCHIP and Medicaid, a focus on the role of co-payments for physician services and other types of services could yield fruitful results. Moreover, the premium burden of SCHIP should be considered for its fostering or constraining participation in the program and subsequently its effects on child health. In addition, the scope of the benefits covered under Medicaid and SCHIP may influence the amount and scope of medical care received, which in turn can have a positive or detrimental influence on child well-being. Likewise, research should be directed at the potential association of child health outcomes with the administration of SCHIP as either a Medicaid expansion or a stand alone program because their differential enrollment requirements and other administrative characteristics may hinder or enhance access and utilization among their child enrollees.

2. Another research focus should be on the extent to which child health status is affected by social, geographical, and institutional barriers and obstacles, such as transportation, configuration of

physician networks, medical care prices, and health care facility locations, to name a few. Further, quality of care generally, and disparities in the provision of quality care, are issues that likely impact maternal and child health outcomes and warrant further study.

3. Related to both of the items above is the issue of the availability and accessibility of high quality data that can be used to track changes over time and make comparisons across population groups or geographic regions. For instance, this study originally included additional variables related to the administration of Medicaid and SCHIP, however, these variables were eventually dropped due to concerns about data quality. As is called for by a number of expert panels and government agencies, consistency in data measurement and reporting would go a long way to facilitate research on the determinants of maternal and child health (Committee on Evaluation of Children's Health, 2004).

4. The aggregation of both the dependent and independent variables may mask the differential effects of the determinants on health that prevail among racial and ethnic groups, in particular. As the Mcleod et al. (2004) analysis shows, median family income has different impacts on the teen birth rate and infant mortality rate between Blacks and Whites. These associations were inconsistent with the relationships found with the aggregate measures of the health outcomes, implying that much more may be learned an assessment of determinants of child health outcomes that are disaggregated by race and ethnicity. Further, the unit of analysis (the state) may mask other differences, as health outcomes (and their determinants) often differ by county, city or even neighborhood (e.g. Kawachi & Berkman, 2003). Similarly, the independent variables measured at the state level may not be sensitive enough to elucidate significant findings. For instance, per student expenditures for education often differs greatly by municipality within a state and this may also be related to child well-being in those municipalities.

5. There is reason to believe that many of the variables used to explain differences in health outcomes may interact in ways that produce positive or negative health outcomes. Many social epidemiologists recognize and are beginning to study interactions of various determinants of health—most notably how demographics interact with behavior and lifestyle (e.g. McGinnis et al., 2002; Mikkelsen et al., 2007). Future analyses should also evaluate the interaction effects of

policy determinants, and policy variables with socio-demographic variables, as health outcomes may also vary because of the joint impact of two or more structural variables. For instance, while different dimensions of SCHIP and Medicaid may have separate and independent impacts on child health status, the combination of their values within a state—for example, the level of expenditures for each program or the total population covered by each program at the same time within a state—could produce or explain additional impacts on health outcomes.

6. As with the present study, most studies on the determinants of health have been conducted with dependent and independent variables for which the data are contemporaneous. That is, the time frame of the data for the health outcome and the determinants are the same. This approach assumes that the determinants have immediate impacts on the value of the outcome. Such a situation, however, is unlikely to be the case since it takes time for a given social force to exert its influence on another social force or outcome. Such temporal discontinuity means that the values of the determinants could precede an outcome by some amount of time, which means that there are lags in the effect on the outcome behind the independent variable. If so, lags of the determinants should be evaluated; but there is substantial lack of knowledge about the temporal relationship between independent variables, especially policy instruments and their implementation, and health outcomes. One approach is to conduct an inductive methodology in which a search technique is applied to ascertain the statistical significance of past values for the selected health outcome. Other approaches may exist and may be explored with the current data set.

7. This leads to an important implication of the "lag argument" and a weakness of much of the research on social and structural determinants of health. If lags prevail, then there must be a causal ordering of the independent and dependent variables. These causal pathways are likely very complex and may be characterized, for example, by one way (recursive relationships) and reciprocal chains of events (nonrecursive relationships). In either case, the OLS single form equation may be inadequate to assess such a complex relationship, and a causal modeling approach should be undertaken. However, this method requires that there be clear articulation of the pathways inclusive of their temporal nature in order to undertake the analysis, and consensus on, and/or specificity, of causal pathways for many of the determinants of health is lacking.

In conclusion, it is important to note that the KIDS COUNT data set provides a valuable resource for tracking changes in maternal and child well-being over time and across place, and for conducting research on the determinants of health. As the present study reveals, comparisons should be made with caution and with attention to the research issues raised above. In this regard, the Annie E. Casey Foundation is also commended for their increasing attention to city and county level KIDS COUNT indicators and are encouraged to enhance their efforts in this regard to support future research on determinants of maternal and child health and well-being. Further, while it appears that attention to the structural determinants of health is warranted, additional efforts are clearly needed to support the field's ability to conduct research on relevant policy characteristics and their relationship with maternal and child health. The database created for the present study, with support from the Annie E. Casey Foundation, provides a jumping off point for additional research in this area and we look forward to the opportunity to continue to contribute to the field's understanding in this regard.

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