Religion and Infant Mortality in the United States: A Community-Level Investigation of Denominational Variations

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Abstract

A burgeoning body of scholarship has explored the influence of community-level religiosity (religious ecology) on various health outcomes. Religious ecology has been shown to influence adult mortality, suicide, and homicide, among other community health outcomes. To date, one lone study has examined the links between religious ecology and infant mortality in the United States. While significant religious effects surfaced, this investigation was hampered by noteworthy data limitations, including the use of a restricted sample and cross-sectional data. The present study seeks to advance this line of inquiry by using data collected from the full gamut of U.S. counties at multiple points in time. Our study employs both aggregate analyses of major faith traditions (conservative Protestant, mainline Protestant, Catholic, and other religions) as well as decomposition analyses that subdivide conservative Protestants into four subgroups: fundamentalist, evangelical, Pentecostal, and other conservative Protestant. Overall, we find that that counties with a greater share of Catholic churches exhibit lower rates of infant mortality. Higher rates of infant mortality are observed in counties with a greater share of conservative Protestant churches. Among conservative Protestant denominations, higher infant mortality rates are exhibited in counties with a larger share of Pentecostal congregations. Most of these religious effects are generally stable over time (1990-2000). This study provides further support for the value of cultural explanations of infant mortality in the United States.

Introduction

Infant mortality rates (IMR) are measured as the number of infant deaths among children one year-old and younger per 1,000 live births, and are consistently viewed as an indicator of nations' overall health and quality of life (Frisbie 2005; MacDorman and Mathews 2008; World Bank 2011). International and domestic governmental agencies, along with nonprofit organizations that focus on children's well-being, regularly utilize such measures to rank nations, regions, and states with respect to social development and children's well-being. The United States presents a paradox where infant mortality is concerned. The U.S. maintains a remarkably high per capita income, which could lead to the conclusion that the country would be marked by relatively low infant mortality rates. And yet, such a conclusion would be off the mark. IMRs in the U.S. are disproportionately elevated when compared with other developed nations in the West (MacDorman and Mathews 2008; Pampel and Pillai 1986).

Why are infant mortality rates in the U.S. quite high when compared with its national peers? The available evidence points to the striking degree of inequality in the United States (e.g., Dorsten 1994; Gortmaker and Wise 1997; Pampel and Pillai 1986; see Eberstein 1989). IMRs in the U.S. generally mirror overall patterns of inequality, such that more affluent sectors of the nation exhibit considerably lower infant mortality rates while significantly higher IMRs are observed in communities with a lower per capita income and higher proportion of minority groups (Guest et al. 1998; Macinko et al. 2004; Matteson et al 1998; Muhuri, MacDorman, and Ezzati-Rice 2004; Pampel and Pillai 1986). In short, concentrated socioeconomic disadvantage creates a standard of living that commonly undermines children's well-being (Alexander et al. 2008). Disparities in infant mortality rates across U.S. communities are significant enough that areas with considerably higher rates drive up the overall IMRs in the U.S.

The elevated rates of infant mortality in the United States have been a source of concern among public health officials and policymakers for some time, such that advocates of rate reductions have argued for redoubled efforts on this front (see MacDorman and Mathews 2008; Cramer et al. 2007). Although a number of initiatives have been undertaken in recent decades, they have generally produced lackluster results. The U.S. had initially aimed to reduce its infant mortality rate to 4.5 infant deaths per 1,000 live births by 2010 (U.S Department of Health and Human Services 2000). However, this goal proved to be overly ambitious, with little change in the nation's overall IMR observed during the first decade of the twenty-first century. The U.S. IMR, which had been 6.89 infant deaths per 1,000 live births in 2000, had been reduced just slightly to 6.86 in 2005 (MacDorman and Mathews 2008). Recognizing the size of the task before them, U.S. health policy experts have downgraded their 2020 IMR reduction objectives to the more modest 6.0 infant deaths per 1000 live births (U.S Department of Health and Human Services 2009).

Our investigation examines the influence of religious ecology on infant mortality rates. Following the lead of other sociologists and demographers of religion (e.g., Blanchard et al. 2008), we define religious ecology as the community-level market share of different types of denominational families. Market share is represented by the number of churches affiliated with particular denominational groupings in U.S. counties adjusted for population size. We define these denominational families broadly to include conservative Protestant, mainline Protestant, Catholic, and others. And, because recent work in the field has also demonstrated specific effects for different types of conservative Protestant denominations, we examine how variegated proportions of evangelical, fundamentalist, and Pentecostal churches influence infant mortality as well. We find that religious ecology does indeed produce significant variations in infant

mortality. Such effects are not only robust, they are consistent over time. We argue that cultural factors such as religion should receive additional attention in examining community-level health.

Why Religion and Infant Mortality? Making the Case for a Cultural Model

There are some very compelling reasons to study the effects of community-level religiosity on infant mortality. The pioneering study on the topic, self-described as a preliminary investigation, certainly indicates the fruitfulness of this endeavor (Bartkowski, Xu, and Garcia 2011). That initial study used cross-sectional data from the year 2000 on community religiosity, infant mortality, and various Census indicators to explore what effects, if any religious ecology exerts on infant mortality. That investigation revealed that counties characterized by a greater proportion of Catholic congregations featured lower infant mortality rates. And, when conservative Protestant faiths were decomposed into evangelical, fundamentalist, Pentecostal, and other conservative Protestant subgroups, these scholars found that communities with larger proportions of all but Pentecostal churches were associated with lower infant mortality rates. The researchers explained these findings by suggesting that conservative Protestant pronatalism makes these groups particularly sensitive to threats to the welfare of young children. Pentecostalism is characterized by less trust in conventional medicine, which might account for higher infant mortality rates in communities with a larger proportion of Pentecostal churches.

Despite the merits of that pioneering investigation, Bartkowski and colleagues' (2011) study was marked by three noteworthy shortcomings. First, given significant limitations associated with the Kids Count data source from which county-level infant mortality rates were drawn, Bartkowski et al. conducted their investigation using a restricted sample of counties for their study. More than one thousand counties were left out of their preliminary investigation.

Consequently, the authors of this initial study were quite cautious about drawing any definitive conclusions about the relationship between religious ecology and infant mortality. To the contrary, they were quick to recognize the need for follow-up examinations and suggested that such research utilize data from all U.S. counties.

Second, Bartkowski and colleagues used only cross-sectional data to examine the association between religious ecology and infant mortality. Hence, their investigation provided a one-time snapshot of the relationship between these variables and, most importantly, could not address issues of causal order. And, as it turns out, causal order is a rather thorny problem where religious ecology and infant mortality is concerned. Bartkowski et al. concluded their investigation by conceding that religious ecology could influence infant mortality by creating a pro-child community ethos. Alternatively, they recognized that communities marked by higher incidences of infant mortality may be less religious. Perhaps congregations have a more difficult time gaining and sustaining a foothold in communities facing elevated rates of infant death. One could imagine a fatalistic ethos in such communities that may create a less hospitable orientation toward religion. Longitudinal data on religious ecology and infant mortality are clearly needed to shed additional light into causal order.

Finally, some important control variables were left out of Bartkowski and colleagues' preliminary investigation. They controlled for region but not rural versus urban locales despite a good deal of prior evidence of rural-urban differences in infant mortality (e.g., Clarke et al. 1994; Matteson, Burr, and Marshall 1998; Morenoff 2003; Sampson 2003). They controlled for the percent of the population in poverty without using more refined measures of social class, namely, per capita personal income. They also featured limited controls for racial-ethnic variations by controlling for percent Black while failing to account for percent Hispanic. Given the abundance

of previous research which has revealed that economic and social disadvantage are associated with infant mortality (e.g., Dorsten 1994; Guest et al. 1998; Macinko et al. 2004; Matteson et al. 1998; Muhuri, MacDorman, and Ezzati-Rice 2004; Pampel and Pillai 1986; see Eberstein 1989), more refined covariates represent a significant advance over this preliminary investigation. Our study controls for such factors because their exclusion from models could invite spurious relationships.

Beyond this one study of religious ecology and infant mortality, there are other reasons to examine religious antecedents of this phenomenon. Community-level religiosity has been shown to influence adult mortality and morbidity patterns across the U.S. (Blanchard et al. 2008; Dwyer et al. 1990). Blanchard and colleagues (2008) demonstrated that greater proportions of civically oriented denominations (namely, mainline Protestant and Catholic churches) were associated with lower adult mortality rates, and that greater proportions of evangelical churches produce a similar protective effect. Moreover, religious institutions frequently serve as advocates for families and children (e.g., Bartkowski 2007; Bartkowski, Xu, and Levin 2008), and family ministry programs are vital components of much of the work that is done by local congregations (Wilcox, Chaves, and Franz 2004). Given such prior research, it seems logical to surmise that religious ecology could influence county-level infant mortality rates in the U.S.

Religious Ecology and Infant Mortality: Toward a Cultural Model

Taking a cue from the literature on religious ecology, we argue that religiosity can be conceptualized as a group property that affects the quality of life and social climate of a community. Thus, while the conventional sociological approach to the study of religion examines individual beliefs, convictions, and practices, there is plenty of evidence that the

community-level character and influence of religion produces discernible effects on a host of community outcomes (Bartkowski, Garcia, and Xu 2011; Bartkowski, Howell, and Lai 2002; Blanchard et al. 2008; Lee and Bartkowski 2003, 2004; see also Greenberg 2000). Religious ecology can be crudely operationalized as the raw number of congregations (e.g., churches, synagogues, and mosques) or congregants in a given community, adjusted for the population of that community. However, more sophisticated approaches examine the "market share" of different types of congregations (e.g., conservative Protestant vs. mainline Protestant vs. Catholic), the prevalence of civically engaged denominations (i.e., a combination of religious groups that are outreach-oriented), and even the presence of faith-based organizations (e.g., religious nonprofit social service agencies) in a community, again with respect to the local population.

Bartkowski and colleagues (2011) introduce a cultural model for the study of infant mortality rates which recognizes that religious congregations can influence collective norms that could reasonably be anticipated to affect health outcomes such as infant mortality rates (IMRs). In making a case for this cultural model, they point to the way in which congregations can create moral communities (see also Blanchard et al. 2008; Lee and Bartkowski 2004). Religious institutions are first and foremost generators and disseminators of moral orientations. Much of the work done in local religious organizations is motivated by conceptions of "the good," which is to say value systems that valorize service to others, care for the next generation, and so forth. Hence, congregations can create a moral ethos in communities that, in a very Durkheimian fashion, yields distinctive social outcomes, including those related to the health and welfare of community members. Moreover, a good deal of research has shown that, on an individual level, religion can promote physical health and longevity (Dupre et al. 2006; Huijts and Kraaykamp

2011; Hummer et al. 2004; Jarvis and Northcott 1987; Musick, House, and Williams 2004; Rogers et al. 2010; Sullivan 2010). Religious adherents are more likely to engage health-promoting behaviors, have access to valuable social support networks, and enlist coping resources provided by their faith traditions (e.g., Benjamins et al. 2011; Ellison and Levin 1998). To be sure, if such scholarship were the sole basis for developing a cultural model for the ecological study of infant mortality, it would provide a rather circumspect foundation. As many research methodologists would be quick to point out and as we would readily concede, survey-based studies of individual behavior are not sufficient warrants to anticipate ecological effects. Patterns that are observed among individuals cannot be presumed to operate among whole populations. This erroneous presumption, the opposite of the ecological fallacy, is sometimes called the fallacy of composition. How can we avoid the fallacy of composition? As it turns out, there is additional evidence to justify an ecological investigation of religion and infant mortality.

First, as discussed in detail above, there is prior empirical evidence which reveals that religious ecology exhibits a demonstrable correlation with infant mortality (Bartkowski et al 2011). The limitations of that initial study aside, that investigation provided preliminary support for a cultural—and, in fact, religious—model for explaining variations in infant mortality, even in the face of controls for economic disadvantage and racial-ethnic diversity. In that investigation, communities with a larger proportion of Catholic, evangelical, fundamentalist, and other conservative Protestant congregations exhibited significantly lower infant mortality rates. Counties with a larger proportion of Pentecostal churches exhibited significantly higher infant mortality rates. Thus, while a cultural model anticipates religious effects, such variations are not anticipated to be uniformly protective in character.

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Second, rigorous prior research has linked community-level religiosity to collective mortality patterns (population-based death rates). A recent study by Blanchard and colleagues (2008) documented that adult mortality rates were significantly higher in predominantly conservative Protestant communities than in counties dominated by other faith traditions such as mainline Protestantism and Catholicism. Blanchard et al. explained these differences by arguing that the otherworldly, anti-institutional characteristics of conservative Protestantism led to a diminished investment in community infrastructures that promote this-worldly pursuits such as health care. Interestingly, Blanchard and colleagues also performed decomposition analyses to examine mortality rates across communities characterized by different types of conservative Protestant churches, namely, fundamentalist, Pentecostal, evangelical, and other conservative Protestant congregations, with the last of these a residual category for Bible churches not clearly situated in any of the first three subgroups. Blanchard and colleagues found that communities characterized by a larger number of fundamentalist and Pentecostal churches had higher mortality rates than those dominated by their evangelical and other conservative Protestant cousins. They explained these findings by arguing that although evangelical and Bible churches are careful to distinguish themselves from the secular world, their desire to attract converts entails maintaining a degree of engagement with the surrounding culture. It is this same secular culture that is more thoroughly shunned by their fundamentalist and Pentecostal counterparts. The especially high rates of mortality evident in Pentecostal communities are likely also a product of the centrality of faith healing within this subgroup and a concomitant distrust of conventional medicine.

In light of foregoing research, and particularly scholarship on denominational market share and infant mortality patterns (Bartkowski et al. 2011), we offer the following hypotheses.

H1: In comparisons of broad denominational families (i.e., Catholic, mainline Protestant, conservative Protestant, and other religions), counties with a greater proportion of Catholic congregations will exhibit significantly lower infant mortality rates.

H2: Among conservative Protestant faith traditions, (a) counties with a greater proportion of evangelical, fundamentalist, and other conservative Protestant congregations will exhibit significantly lower infant mortality rates, while (b) those with a greater proportion of Pentecostal congregations will have significantly higher infant mortality rates.

H3: The anticipated relationships from H1 and H2 will be stable over time (1990-2000).

Data and Methods

The data used in the present study are obtained from two different sources. Decennial Census data were used to generate the dependent variable, infant mortality rates, for the years 1990 and 2000. This measure represents the number of deaths of infants under the age of one year per 1,000 live births. These values were taken from the *USA Counties Database* (2007) which compiles information from the National Vital Statistics System on births and deaths in the United States. This database is a comprehensive source and the most recent tests indicated that nearly all births and deaths were registered in most areas (Census 2007). Thus, we have compiled infant mortality rates for all 3,141 counties in the United States, though the data did evidence some no-incident counties (693 in 2000 and 600 in 1990). Thus, the minimum value for infant mortality by county is zero in both years and the maximum reported value for 1990 is 166.7 and 130.4 in 2000 (mean value of 9.07 in 1990, mean value of 7.40 in 2000).

Our primary independent variables reflecting county-level religious ecologies, the Glenmary Census of Churches (1990 and 2000) were retrieved from the Associated Religion

Data Archive (Bradley et al. 1990; Jones et al. 2000). Religious denominations in this dataset were coded according to the framework developed and utilized in Blanchard et al. (2008). As a first step, the major faith traditions were coded into four categories: conservative Protestant, mainline Protestant, Catholic, and other. A series of denominational variables were then created to reflect the number of congregations per 1,000 residents for each denominational family in a county. (Standardizing this measure as the number of denomination-specific congregations per 1,000 county residents creates a comparable baseline of comparison across counties of different sizes.) This coding scheme allows for aggregate analyses of the effects of religious ecology on infant mortality for broad denominational families. A number of statistical tests revealed that OLS regression was the appropriate technique to use in conducting the data analyses.

To conduct the decomposition analyses, we recoded the conservative Protestant category into four subcategories: evangelical, fundamentalist, Pentecostal, and other conservative Protestant, with the last category representing the residual denominations that did not fit into the previous three categories. The analytical strategy used in this phase of investigation, i.e. unit change in the denominational variable compared with unit change in the infant mortality rate variable, is the same that was used for the major faith traditions. Again, denominational variables are defined as the number of congregations per 1,000 residents.

In light of previous literature on the subject, we control for three key ecological factors known to influence infant mortality rates (information on county-level control variables were obtained through the *USA Counties* database). To control for economic disadvantage and account for the relationship between income and infant mortality, we include per capita income. This variable is measured as the mean income computed for every man, woman, and child in a particular group. It is derived by dividing the aggregate income of the group by the total

population of the group (Census 2007). To account for the influence of race-ethnicity, we include

percent of the population under eighteen that is Black and the percent of the population under

eighteen that is Hispanic (included in models as separate variables specific to each racial-ethnic

group). Finally, in an effort to address the role of urbanization, we control for percent of the

population that is rural.

Results

United States counties displayed the following with respect to the distribution of various

faith traditions in 1990 and 2000. Conservative Protestants represented the largest group with an

average of 1.17 congregations per 1,000 residents (1.32 in 1990). This was followed by mainline

Protestants at 0.75 congregations per 1000 residents (0.85 in 1990), Catholics at 0.19

congregations per 1000 residents (.21 in 1990), and other at 0.08 congregations per 1,000

residents (0.08 in 1990). With respect to the conservative Protestant categories in 2000,

fundamentalist was the largest group at 0.67 per 1,000 residents, followed by values of 0.22,

0.18, and 0.07 for evangelical, Pentecostal, and other conservative Protestant congregations,

respectively. In 1990, the same pattern was evidenced with values of 0.69, 0.26, 0.18, and 0.0.7

for fundamentalist, evangelical, Pentecostal, and other conservative congregations, respectively.

The results of our regression analyses are reported in Table 1. Major denominational

groupings are displayed in Model 1, with year 2000 results presented in the uppermost rows and

year 1990 result presented in the lower rows of the table. Model 2 presents the results of

decomposition analyses performed on conservative Protestant subgroups. All results reported

here are net of control variables (i.e., per capita personal income, racial-ethnic covariates, rural

locale, and births per 1,000 residents).

Hypothesis 1 predicted significantly lower infant mortality rates for counties with a greater proportion of Catholic congregations. This hypothesis is supported in the year 2000 data. There is more marginal support for this hypothesis in the 1990 ($p < .10$, which represents borderline significance).

Model 1 also reveals some unanticipated results. While conservative Protestant congregations did not produce significant effects on infant mortality in the preliminary study (Bartkowski et al. 2011), counties with a higher rate of conservative Protestant congregations exhibit a higher incidence of infant mortality.

Next, we consider the results of the decomposition analysis, which examines the outcomes for each of our conservative Protestant subgroups. We hypothesized that counties with a higher rate of evangelical, fundamentalist, and other conservative Protestant congregations would have significantly lower rates of infant death (H2a), while those with a greater rate of Pentecostal congregations would exhibit higher infant mortality rates (H2b). This hypothesis, based on the results of the preliminary study by Bartkowski et al. (2011), was only partially supported. H2a is not supported. No significant effects on infant mortality surface for evangelical, fundamental, and other conservative Protestant subgroups. H2b is supported, such that counties with a greater rate of Pentecostal congregations do exhibit higher infant mortality rates.

Hypothesis 3 predicted that the relationships between religious factors and infant mortality would remain stable over time. For the most part, this hypothesis is supported. The protective effects of Catholic congregations generally hold from 1990 to 2000. The poisonous effects of conservative Protestant congregations are observed in both 1990 and 2000 (albeit more

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weakly in 1990). The effects of Pentecostal congregations change somewhat over the study

period, such that insignificant effects observed in 1990 became significant in 2000.

Table 1. Estimated Net Effects of OLS Regression Predicting Infant Mortality		
2000	**Model 1**	**Model 2**
Congregations per 1,000 residents		
Conservative Protestant	0.3935*	
Evangelical		0.7175
Fundamentalist		0.0461
Pentecostal		1.6211*
Mainline Protestant	-0.4134$^+$	-0.5105$^+$
Catholic	-1.3702**	-1.5721**
Other	-0.3160	-0.5247
1990		
Conservative Protestant	0.3252$^+$	
Evangelical		-0.7779
Fundamentalist		0.5616*
Pentecostal		0.2510
Mainline Protestant	0.1113	-0.4717$^+$
Catholic	-0.9584$^+$	-0.7420
Other	0.7570	1.1213

Key: $^+$ p < .10; * p < .05; ** p < .01; *** p < .001.
Note: The following variables are controlled: per capita personal income; percent of population under age 18 that is black; percent of population under age 18 that is Hispanic; rural; births per 1,000 population. Dependent variable: infant deaths per 1,000 live births.

Discussion

This study examined the effects of religious ecology (that is, community-level denominational market share) on infant mortality. Our study sought to address the gaps found in Bartkowski and colleagues' (2011) initial investigation of the topic by examining the full gamut of U.S. counties, enlisting longitudinal data, and incorporating additional control variables. Our findings lend additional confirmation to the results reported in that initial study. We found that counties with a greater market share of Catholic congregations were characterized by lower infant mortality rates. This pattern can be explained by many of the same arguments enlisted by Bartkowski et al. (2011), namely, that civically engaged denominations can be distinguished from their civically insular counterparts (Blanchard et al. 2008; Tolbert, Lyson, and Irwin 1998; see also Lee and Bartkowski 2003, 2004). Catholic congregations are civically minded, externally oriented institutions that emphasize community-level care. As noted in previous research, Catholics evince a theological commitment to "subsidiarity," that is, caring for persons not just as individuals but as groups situated within communities.

We did not anticipate that a greater county-level market share of conservative Protestant congregations would be associated with higher rates of infant mortality in both 1990 and 2000. Yet, this finding emerged. This unanticipated result was followed by decomposition analyses that estimated the net effects of various conservative Protestant subgroups on infant mortality. These subgroups included fundamentalists, evangelicals, Pentecostals, and other conservative Protestant congregations. Decomposition analyses could reveal subgroup variations that might be masked among conservative Protestants writ large. And, indeed, our decomposition analyses did just that.

The decomposition analyses revealed higher rates of infant mortality in counties with a greater market share of fundamentalist churches in 1990 only, while no significant effects were

observed for evangelical and other conservative Protestant congregations in either study year. Quite notably, counties with a greater market share of Pentecostal congregations in the year 2000 were marked by significantly higher rates of infant mortality. One of the key elements of the Pentecostal faith tradition is a commitment to faith healing. It is quite likely that in such communities, a collective suspicion toward medical interventions leads to a lack of community support for prenatal or postpartum care. Perhaps both preventive care and medical intervention in the face of complications are collectively defined as a demonstrated lack of faith in God. Although more research is clearly needed on this front, the much higher rates of adult mortality (Blanchard et al. 2008) and infant mortality (Bartkowski et al. 2011) in counties with higher proportions of Pentecostal congregations lend credibility to this interpretation.

This study is not without limitations, all of which suggest fruitful lines of future research. First, once the 2010 Glenmary Census of Churches data are available, it would be wise to conduct time series analyses with the goal of establishing causal connections between religious ecology and infant mortality. We are reluctant to offer definitive statements of causation with only two points in time. Second, future research could control for a wider array of factors, such as health care access, to determine if such factors mediate or moderate the relationship between religious ecology and infant mortality.

These limitations notwithstanding, our investigation adds significantly to the literature on infant mortality. To this point, explanations of infant mortality differentials have been dominated by either demographic or public health approaches, with only scant attention to religious factors (Bartkowski et al. 2011). Demographers have enlisted a structural model that emphasizes, among other factors, how poverty and concentrated disadvantaged contribute to higher infant mortality rates. By contrast, public health approaches utilize a medical model to explain infant mortality.

The medical model examines how factors such as health care access (e.g., physicians per capita) may contribute to infant mortality rates. This study represents an important additional step toward examining a cultural model of infant mortality. Central to this cultural model is the moral ethos that religious institutions can create in communities, and the way in which this ethos can produce real-world effects on population health, in this case, infant mortality. While there is much additional work to be conducted on this topic, our study demonstrates that cultural factors should no longer be ignored in exploring the determinants of infant mortality in the U.S.

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