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Racial and Ethnic Disparities in Post-neonatal Mortality in Florida

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ABSTRACT

This policy-related study examines primary care delivery methods in reducing population health disparities. We use post-neonatal mortality as an indicator of population health within counties to study the effects of using contracted service providers compared to direct provision of primary care by county health departments in improving health equity. We analyzed post-neonatal mortality data collected annually between 1997 and 2006 from ten of Florida's most populous counties (>500,000). Using Poisson regression analyses with generalized estimating equations (GEE), we examined differences in post-neonatal mortality among racial and ethnic groups; and among counties and groups over time. The results show significant differences in post-neonatal mortality between Black and White groups in both counties that outsource county health department primary care services and also counties that do not outsource these services. After adjusting for low birth weight and age of the mother (< 20 years), the post-neonatal mortality rate for black infants remains higher in outsourced counties but not in non-outsourced counties. The increase in disparity in post-neonatal mortality rates between black and white infants in outsourced counties compared to non-outsourced counties is also significant. Contracted service providers are being used with greater frequency to expand access to health services with the idea that they can improve health outcomes; however, these data show that all groups may not benefit equally under this mechanism of service delivery.

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Background

According to the most recent Centers for Disease Control and Prevention report on infant mortality, the United States ranks 29th among developed countries and declines in national infant mortality rates have remained relatively stable since 2005 (MacDorman & Mathews, 2008). It has been suggested that the lack of further decline in infant mortality rates can be attributed to the increasing numbers of minorities in the U.S. population and poor outcomes among these groups (MacDorman & Mathews; Keppel, Bilheimer, & Gurley, 2007). In the U.S., the infant mortality rate of black infants is twice that of white infants (MacDorman & Mathews; U.S. Department of Health and Human Services, 2000). These differences also exist among other racial and ethnic groups (Tomashek, et al, 2006). Rates of infant mortality serve as indicators in assessing the overall health of a community. In general, infant mortality measures infant deaths per 1000 live births and is divided into neonatal (0-27 days) and post-neonatal (28-364 days) (MacDorman & Mathews; Keppel, Bilheimer, & Gurley, 2007). Racial disparity in the first year of life has been shown to be largely related to post-neonatal mortality (Tomashek, et al; Collins & Hawkes, 1997). Because of its relationship to population health status, post-neonatal mortality is one of the indicators collected by state and local health departments (Starfield, 1998; Studnicki, Steverson, Myers, Hevner, & Berndt, 1997). Factors cited by previous studies that influence post-neonatal mortality rates include fewer years of maternal education, receiving little or no prenatal care, low or very low weight births, and the race of the mother (Hessol & Fuentes-Afflick, 2005). Lower rates of post-neonatal mortality have been shown to be an indicator of good primary care (Starfield, 1998).

Additional factors that influence post-neonatal mortality include availability and access to health services. Equitable access to health care services is a challenge that remains particularly elusive in minority and low-income populations. Barriers exist on the individual and the systemic level (Warnecki, et al, 2008). Individual barriers are well researched and include income, health insurance coverage, language, and inclination to seek health care (DeRose, et al, 2009; Hall, et al, 2008). Systemic factors include inequities in the distribution of or access to resources that promote good health outcomes, such as the availability of local health care resources (van Ryn & Fu, 2003).

Public health, medical care and human services providers continue to show growing interest in addressing health disparities from a population point of view. Many theoretical frameworks have been proposed regarding the factors that affect access to services, particularly among improving care provided to vulnerable populations (Warnecke, et al, 2008; van Ryn & Fu, 2003). Yet few studies use population-based data to expand knowledge about factors that may influence access to treatments or services (Ross & Mirosky, 2001; Pickett & Pearl, 2001; Shi, 2009) and the loss of benefits and rights (Newdick & Derrett, 2006).

Addressing racial and ethnic health disparities is made even more difficult by shrinking financial resources. Based on studies of managed care, many health officials believe that contracting with private service providers can reduce disparities by improving access to health services and creating better health outcomes. To improve cost-effectiveness and quality, states and local health departments have contracted services to private providers through managed care arrangements (Mays, Halverson, & Stevens, 2001). Whereas cost containment and preventive care methods used by managed care organizations have definite advantages, the private provider networks have not shown that they have the capacity, infrastructure, or quality assurance mechanisms to assure access to needed services for disadvantaged populations (Van Slyke, 2003; Keane, Marx, Ricci, 2002a; Keane, Marx, Ricci, 2002b; Keane, Marx, Ricci, Barron, 2002; Keane, Marx, Ricci, 2001). This is relevant for areas where there are large numbers of individuals lacking health insurance or with populations that contain large numbers of undocumented immigrants. Since financial resources diverted to private providers would no longer support the health department in providing services to these clients, access problems may be created and health disparities in these communities would increase. Over the last ten years, the state of Florida has outsourced many health and human services (Office of Program Policy Analysis and Government Accountability, 2004). This study examines whether disparities in post-neonatal mortality are reduced or increased as a result of outsourcing primary care services in county health departments in Florida.

Methods

Study Design

Secondary data analysis was conducted using data obtained from the FloridaCHARTS system. FloridaCHARTS is a Web-based system developed by the Florida Department of Health that contains hundreds of the most frequently used population and health indicators. Whereas outsourced counties were defined as those counties whose services are provided by organizations other than the county health department, non-outsourced counties provided services within the county health department. The data were stratified into outsourced and non-outsourced counties by race and ethnicity based on delivery of services. Counties included in the non-outsourced group were Brevard, Duval, Hillsborough, Lee and Polk. The five outsourced counties were Broward, Miami-Dade, Orange, Palm Beach and Pinellas. The research protocol was approved by the University of Michigan-Flint Institutional Review Board.

Measures

Post-neonatal mortality rates were gathered from the FloridaCHARTS system for the years 1997 through 2006 (Table 1). For each of the ten years, post-neonatal mortality rates were collected by race and ethnicity. Since post-neonatal mortality occurs less frequently than other types of mortality, many mid-size and smaller counties have zero reported cases when data are stratified by year, race, and ethnicity. Therefore, this study contains information from counties with populations over 500,000. Ten of Florida's 67 counties met the criteria for inclusion in the study (Figure 1). This number may seem small in comparison to the total number of counties in Florida; however, the population is not equally distributed throughout the state. As a result, these ten counties contain 61% of Florida's total population based on 2006 estimates.

Several important maternal and pregnancy characteristics found in the FloridaCHARTS system are linked to infant deaths. These variables were gathered at the county level and included the number of live births, maternal age (< 20 years), marital status, and maternal education level. Other measures such as births with little or no prenatal care and number of low birth weight births were also included as found in other studies of infant mortality. These variables are important in this study because they also are believed to measure access to primary care.

Data Analysis

We wanted to examine whether disparities in post-neonatal mortality are reduced or increased as a result of outsourcing primary care services in county health departments in Florida. We analyzed the data using a Poisson regression model with generalized estimating equations (GEE). We created an unadjusted model (model 1) using post-neonatal mortality as our outcome measure. The unadjusted model included service delivery status (outsourced vs. non-outsourced), race, year and status/race interactions terms. We then created an adjusted model (model 2) by adding maternal age, marital status, maternal education level, low birth weight birth and little or no prenatal care variables individually to the unadjusted model. The variables that were not significant were excluded from the final adjusted model. In a follow-up analysis, we calculated contrast estimates to determine specific differences in our analysis. Data analyses were conducted using SAS 9.1.3.

Results

Table 1 shows the number of live births, the number of low birth weight births, the number of births to women under age 20 years, and the number of post-neonatal deaths stratified by race/ethnicity and divided into outsourced and non-outsourced counties. The selection and importance of these

variables are discussed in the Measures section of this paper. Only low birth weight and age (> 20 years) were significant when these variables were added to model 1 one variable at a time. Therefore, the final model (model 2) contained age and low birth weight in addition to the variables in model 1. Table 2 shows the score statistics for model 1 and model 2. Model 1 includes delivery status, race, year and status x race interaction terms. In model 1, there is a significant difference in post-neonatal mortality between outsourced and non-outsourced counties (p=.006) and among race/ethnicity groups (p=.043). There is no significant difference in mortality rates over the time period studied (p=.33). In the final model, the difference in post-neonatal mortality between outsourced counties and non-outsourced counties remains almost significant (p=.051). Overall, race approaches significance (p=.057).

Table 3 gives the contrast estimates for the increase in post-neonatal mortality rate for black infants compared to the white infants for both outsourced and non-outsourced counties and the increase in disparity in post-neonatal mortality rates in outsourced counties compared to non-outsourced counties from the Poisson regression. In model 1, the post-neonatal mortality rate for black infants is significantly higher in both outsourced counties (p< .001) and non-outsourced counties (p<.001). The post-neonatal mortality rates for black infants are 2.71 times the post-neonatal mortality rate for the white infants in outsourced counties and 2.21 times the post-neonatal mortality rate for the white infants in non-outsourced counties. The increase in disparity in post-neonatal mortality rates between black and white infants in outsourced counties compared to non-outsourced counties is not significant (p=.08). However, after adjusting for low birth weight and age (> 20 years) (model 2), the increase in post-neonatal mortality rate for black infants remains significantly higher (p=.004) in outsourced counties but the increase in post-neonatal mortality is not significant (p=.24) in non-outsourced counties compared to white infants. The increase in disparity in post-neonatal mortality rates between black and white infants in outsourced counties compared to non-outsourced counties is also significant (p=.04).

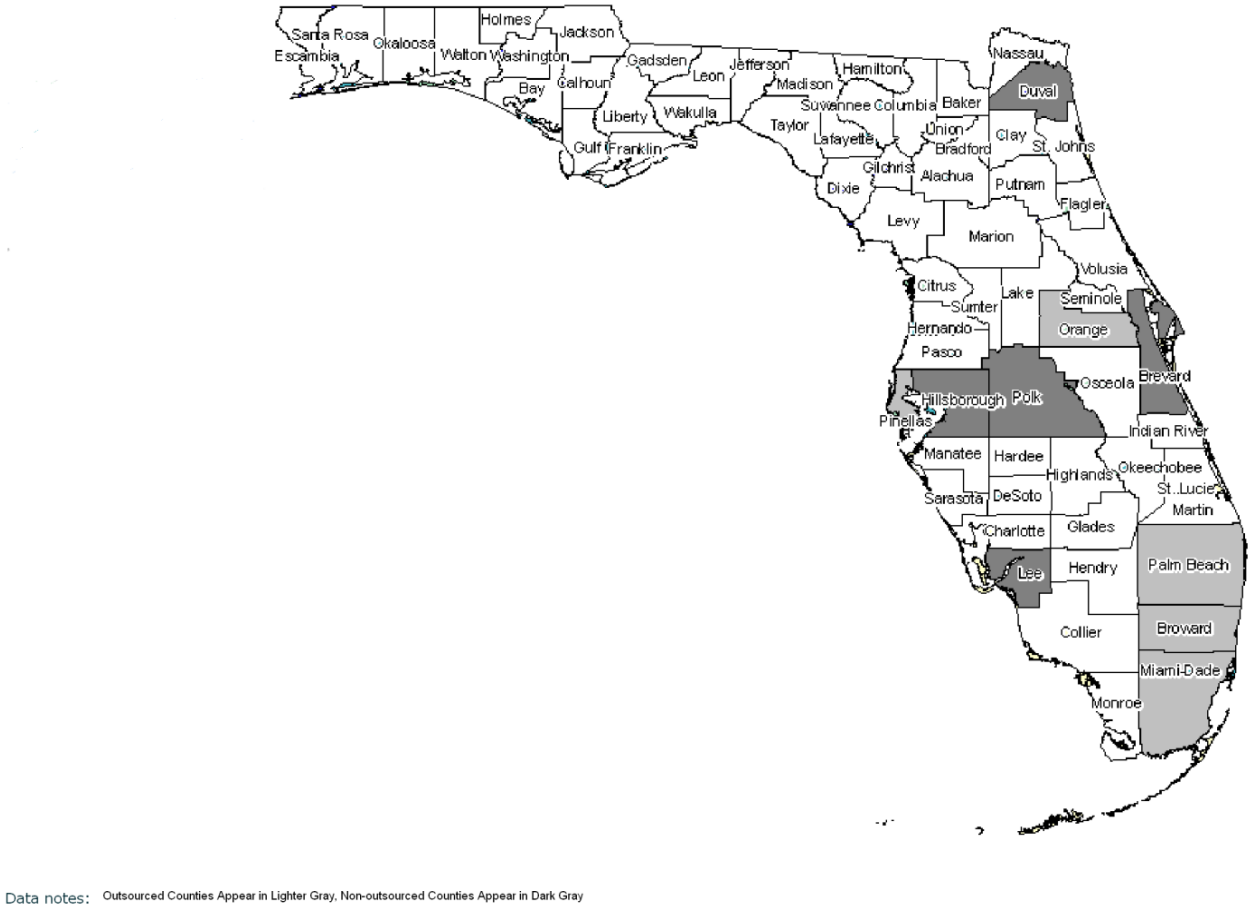
Discussion

The goals of public health include improving the quality and length of life and also eliminating health disparities among population groups based on characteristics such as race/ethnicity, gender, income or education. Although both goals focus on improving health status in the population, reducing the rates of morbidity and mortality in the overall population does not ensure that all groups receive the same benefit and may in fact create greater disparities among subgroups. Therefore it becomes more important when creating strategies to maximize the use of scarce resources to balance these two goals.

The *Healthy People* target for post-neonatal mortality is 1.2 deaths per 1000 live births (DHHS, 2010). Both the outsourced counties and the non-outsourced counties showed differences in the proportions of deaths between white and black groups. However, there was an even greater difference between groups in the outsourced counties. Racial and ethnic disparities are measured by the percentage difference from the best group rate. So, for the counties with private providers, there was greater disparity between groups. This difference still existed even after controlling for age of the mother and low weight births. We also examined other factors such as education level of the mother, and marital status of the mother. Our analysis determined that these factors were not significant. A possible explanation for greater disparities lies with access to primary care for the uninsured. There is no virtually competition among private providers to serve uninsured clients. Health departments particularly those in Florida serve as safety-net providers. Safety net providers are obligated to provide care for those who cannot pay for it. As a result, they are more likely to provide primary care to the uninsured.

Over the last ten years, Florida has aggressively pursued outsourcing, mostly in the form of contracting, mirroring similar occurrences in other states such as New York, Michigan, and Arizona (OPPAGA, 2004). Reasons commonly cited by policy makers and advocates include cost savings, efficiency, better service quality, flexibility, innovativeness, and limiting government growth (Savas, 2000). Many of the reasons cited are based on governmental studies of services at city, county, or state level. In instances of human services and public health contracting, these beliefs are based on studies of managed care. Previous research has identified no prior studies examining the effect of outsourcing on the reduction or elimination of health disparities. The strength of this study is that it uses a primary care sensitive indicator (post-neonatal mortality) to study disparities related to outsourcing services within a public health context. This is also its contribution to the literature. Outsourcing is likely to continue as public health departments try to provide services with fewer resources. However, it is important to examine the effects of various strategies on the overall health of the population.

Figure 1 – Map of Florida's Large Population (>500,000) Counties showing Outsourcing and Non-outsourcing of Services



Data notes: Outsourced Counties Appear in Lighter Gray, Non-outsourced Counties Appear in Dark Gray

Table 1. Maternal and Infant Characteristics by County, Race, and Service Delivery Status (1997-2006)

Outsourced Counties	Characteristic	White (%)	Black (%)	Hispanic (%)	Total No. (100%)
Broward	Live Births	135,628 (51.25)	74,751 (28.25)	54,243 (20.50)	264,622
	Low Birth Weight	9,393 (43.36)	8,708 (40.20)	3,562 (16.44)	21,663
	Mother's Age Less Than 20	7,402 (33.53)	10,632 (48.16)	4,401 (18.31)	22,435
	Post-neonatal Deaths	178 (34.83)	272 (53.23)	61 (11.94)	511
Miami-Dade	Live Births	226,269 (44.85)	87,592 (17.36)	190,605 (37.78)	504,466
	Low Birth Weight	15,180 (39.55)	10,518 (27.40)	12,688 (33.05)	38,386
	Mother's Age Less Than 20	17,597 (36.89)	14,928 (31.30)	15,172 (31.81)	47,697
	Post-neonatal Deaths	297 (35.19)	340 (340.28)	207 (24.53)	844
Orange	Live Births	100,239 (57.53)	36,373 (21.59)	37,625 (20.88)	174,237
	Low Birth Weight	7,680 (49.00)	4,979 (31.77)	3,013 (19.23)	15,672
	Mother's Age Less Than 20	9,511(45.13)	6,506 (30.87)	5,059 (24.00)	21,076
	Post-neonatal Deaths	172 (37.89)	198 (43.61)	84 (18.50)	454
Palm Beach	Live Births	98,094 (58.01)	36.035 (21.31)	34,982 (20.69)	133,112
	Low Birth Weight	6,749 (49.31)	4,540 (33.17)	2,397 (17.51)	13,686
	Mother's Age Less Than 20	7,025 (39.84)	6,118 (34.70)	4,490 (25.46)	17,633
	Post-neonatal Deaths	172 (43.65)	146 (37.06)	76 (19.29)	394
Pinellas	Live Births	72,717 (74.67)	15,175 (15.58)	9,493 (9.75)	97,385
	Low Birth Weight	5,033 (65.36)	2,130 (27.66)	537 (6.97)	7,700
	Mother's Age Less Than 20	6,543 (56.32)	3,764 (32.40)	1,310 (11.28)	11,617
	Post-neonatal Deaths	135 (61.09)	70 (31.67)	16 (7.24)	221

Table 1 is continued next page……

Table 1 continued……

Non-Outsourced Counties	Characteristic	White (%)	Black (%)	Hispanic (%)	Total No.
Brevard	Live Births	41,307 (79.40)	6,937 (13.33)	3,777 (7.26)	52,021
	Low Birth Weight	2,929 (71.51)	879 (21.46)	288 (7.03)	4,096
	Mother's Age Less Than 20	4033 (68.00)	1431 (24.13)	467 (7.87)	5,931
	Post-neonatal Deaths	85 (67.46)	25 (19.84)	16 (12.70)	126
Duval	Live Births	75,109 (59.85)	42,903 (34.19)	7,486 (5.97)	125,498
	Low Birth Weight	5443 (46.10)	5828 (49.36)	537 (4.55)	11,808
	Mother's Age Less Than 20	7248 (42.99)	8694 (51.57)	917 (5.44)	16,859
	Post-neonatal Deaths	200 (45.66)	226 (51.60)	12 (2.74)	438
Hillsborough	Live Births	115,874 (62.23)	30,180 (16.21)	40,152 (21.56)	186,206
	Low Birth Weight	8,365 (54.30)	4,040 (26.23)	3,000 (19.47)	15,405
	Mother's Age Less Than 20	12,913 (50.24)	6,275 (24.41)	6,515 (25.35)	25,703
	Post-neonatal Deaths	242 (48.99)	164 (33.20)	88 (17.81)	494
Lee	Live Births	47,109 (69.09)	7,541 (11.06)	13,532 (19.85)	68,182
	Low Birth Weight	3,400 (65.06)	980 (18.75)	846 (16.19)	5,226
	Mother's Age Less Than 20	5,689 (58.62)	1,649 (16.99)	2,367 (24.39)	9,705
	Post-neonatal Deaths	88 (58.28)	33 (21.85)	30 (19.87)	151
Polk	Live Births	55,411(66.87)	13,555 (16.36)	13,897 (16.77)	82,863
	Low Birth Weight	3,881 (60.19)	1,655 (25.67)	912 (14.14)	6,448
	Mother's Age Less Than 20	8,715 (60.04)	3,177 (21.89)	2,624 (18.08)	14,516
	Post-neonatal Deaths	141 (60.00)	63 (26.81)	31 (13.19)	235

Table 2. Score Statistics for Poisson Regression Analysis of Post-neonatal Mortality in Outsourced versus Non-outsourced Counties.

	Model 1			Model 2		
	df	χ^2	*p*	*df*	χ^2	*p*
Status	1	7.51	0.006	1	3.82	0.051
Race	2	6.31	0.043	2	5.71	0.057
Year	9	10.26	0.330	9	10.56	0.307
Age <20 years	--	--	---	1	6.94	0.008
Birth Characteristic Low Birth Weight	--	--	---	1	1.33	0.249
Status x Race Interactions	2	4.3	0.116	2	3.84	0.146

Table 3. Contrast Estimates from the Poisson Regression Analysis

	Estimate (CI)	χ^2	*p*	Estimate (CI)	χ^2	*p*
	Model 1			Model 2		
Outsourced Black/ White	2.71(2.26, 3.25)	116.68	<0.01	1.61 (1.17, 2.22)	8.35	.004
Non-outsourced Black/ White	2.21(1.94, 2.53)	134.89	<0.01	1.27 (0.85, 1.91)	1.38	0.24
Disparity in mortality Black/ White for Outsourced vs. Non-outsourced	1.22 (0.98, 1.54)	3.13	0.08	1.26 (1.01, 1.57)	4.45	.04

Whereas this study contributes to the literature, it does have limitations. First, the data are at the population level, and therefore, not directly linked to specific individuals. Although it would have made a stronger study, it was not possible to link actual outcomes to specific individuals within these ten counties. Another limitation is that post-neonatal mortality has a low level of incidence within the population. Thus, rates can only be accurately measured within larger population groups. This restricted the number of counties that could be used in the study which reduced the number of variables we could include in our study.

Addressing this complex issue involves a careful examination of the incentives for private and public providers. A large body of research exists on health care access for the uninsured (Grensenz, Gogowski, & Escarse, 2007; Haberer, Garrett, & Baker, 2005; Cunningham, 1999) as well as on contracting of government services (Fernandez, Ryu, & Brudney, 2008). To improve population health status without sacrificing the health status of any one group, it is important to develop strategies that will counter negative changes in sub-populations. Future research on this topic may include examining the effects of outsourcing on other primary care specific population indicators. Those of particular interest to public health departments include rates of sexually transmitted disease or immunization. By closely monitoring the effectiveness of government contracts and health status, we may begin to address the health improvement versus health disparity dilemma.

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