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A Method for Identifying Positive Deviant Local Health Departments in Maternal and Child Health

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Abstract

Local health departments (LHDs) are under increasing pressure to improve performance with limited resources. While research has found that financial resources may be associated with better health outcomes, there are some LHDs that maintain exceptional performance, even with limited budgets. Our interest was identifying LHDs that positively deviate in MCH outcomes compared to their peers while taking into account local context including geography and finances. We found that our method for identifying positive deviants was effective, and that LHD expenditures may not be linked to MCH outcomes. The next step in our work is to conduct in-depth analysis with positive deviants to understand the practices they use to achieve exceptional health outcomes.

Keywords

positive deviance, maternal and child health, methodology

Cover Page Footnote

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Maternal and child health (MCH) outcomes in the U.S. lag behind most other industrialized nations. Local health departments (LHDs) administer many of the services intended to improve MCH health outcomes including the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), referring women to health care providers for prenatal care, and educating women about healthy pregnancies and postpartum care. LHDs deliver these services in varied ways, with certain LHD structures and services being linked to improvements in MCH outcomes and mortality disparities(1). Best practices are often self-identified by LHD leaders and shared via websites such as through the National Association of County and City Health Official's (NACCHO) Model Practices Database(2). There is no known research, however, that has systematically identified LHDs for which MCH outcomes have favorably deviated from their counterparts, and little empirical evidence exists regarding the nature of the specific activities that LHDs implement that actually lead to better than expected MCH outcomes. This project used a positive deviance framework to address the gap in systematic identification of LHDs that have consistently better MCH outcomes than their peers. Identification of these LHDs can ultimately support examination of effective practices.

Positive deviance (PD) is used to identify and learn from units that perform beyond expectations. The PD framework has been used to improve the performance of community health programs and in health intervention planning (3,4). Identifying LHDs that maintain a high level of performance despite various external challenges can lead to filling gaps in understanding how to optimize LHD efforts and improve population health. Here, we describe the method used for identifying PD LHDs in relation to selected MCH outcome indicators.

METHODS

We used data from the Public Health Activities and Services Tracking (PHAST) database as a resource for identifying PD LHDs. The Robert Wood Johnson Foundation (RWJF)-funded PHAST database relies on externally validated measures of public health service production in key public health priority areas, including MCH.(5) The PHAST database includes linked, spatial data from the 2005, 2008, and 2010 NACCHO profiles as well as data from other state and national data sets. The PHAST research team has been specifically conducting in-depth MCH-related studies with cleaned, comparable, linked datasets for WA and FL so far. We used uniquely detailed and matched annual MCH-related county-level expenditure data for all LHDs in FL (n=67) and WA (n=35) for 2009 and 2010. These data were linked with variables depicting local context and LHD structure. The MCH expenditures and other variables included in our model are described in a previous paper (5). The PHAST database also included MCH outcome data.

Various factors influence population health outcomes; however, LHD leaders have control over only some of these. Ultimately, our interest lies in learning about the relationship between contextual factors and modifiable activities or approaches that contribute to better than expected health outcomes. To this end, we categorized variables into two types of factors. The first type of factors (Z) were those over which LHDs have no control, including population size, geography, and (arguably) the size of their budgets. The second type included variables over which LHD leaders and boards have some internal control (X), such as assuring service through alternative providers in the community, having a clinician as an LHDs "top executive," and the types of services the LHD

provides. We examined these factors in relation to MCH health outcomes (Y) in terms of county-level rates of teen births, late or no prenatal care, infant mortality, and the percent of low weight births.

Identifying PDs required classifying all LHD cases as exceeding or not exceeding a threshold for each outcome (4). We identified PDs using three steps:

Step 1: We regressed $Y=a+b1(Z)+e$ to assess how much variance in each outcome was explained by factors outside of LHD control.

Step 2: We added in X variables $Y=a+b1(Z)+b2(X)+e$ to assess how LHD-controlled variables accounted for variations in each outcome.

Step 3: We used a likelihood ratio test to determine whether the internal control variables improved the explanatory power of the model. In every case they did. Looking at outcomes where lower is better; we identified potential PDs as those with standardized residuals less than -1, as they performed better on the outcome than the model predicted. Particularly influential observations were identified and the full model, including X and Z variables, was run omitting influential observations that pulled the regression line and may have masked the predominant relationship. Removing influential observations did not change the PDs identified in WA and resulted in removal of a few PDs in FL. We defined PDs as LHDs that consistently had better than expected outcomes compared to their peers within the same state: those that were exceptional for 2 or more years and/or 2 or more outcomes.

RESULTS

We identified 10 PD LHDs in Washington (29%) and 24 PD LHDs in Florida (36%). Thirty of the 34 LHDs (10 in WA, 20 in FL) had better than expected MCH outcomes over the two-year study period, and 22 LHDs (5 in WA, 17 in FL) had 2 or more exceptional outcomes in a study year. (See Table 1 for descriptive statistics of the outcomes). The PD LHDs varied by context with 19 serving metropolitan counties, five micropolitan and 10 rural (as defined by the federal government). This urban-to-rural distribution of PD LHDs was in similar proportion to the distribution of all LHDs in both states. The range of combined MCH and of specific WIC, Family Planning, Maternal/Infant/Child/Adolescent Health expenditures was similarly varied in all LHDs and PD LHDs (Table 2). In fact, the range of expenditures between non-PDs and PDs was similar for each of the expenditure categories as well as the type of LHD.

Table 1: Descriptive Statistics for MCH Outcomes

	FL		WA	
Outcomes	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Percent of all births with low birth weight	9.967	1.65	5.85	1.08
Infant Mortality Rate per 1,000	7.1	2.67	5.03	2.93
Percent of births that received no or late pre-natal care	4.46	1.86	4.49	1.97

Teen Birth Rate	46.57	15.75	36.5	20.83

IMPLICATIONS

While resources such as the NACCHO Model Practices Database(2) offer an important mechanism for LHDs to share their approaches, many LHDs with limited resources may not be identified in self-selection resources such as these. The empirical method used here controlled for contextual factors and found PD LHDs in similar rural/urban proportions as the total of LHDs are distributed in both states, potentially identifying LHDs in small or under-resourced jurisdictions that may be less likely to self-report model practices or even be aware of their better-than-expected MCH outcomes. Similarities across expenditure categories among non-PD and PD LHDs and the variation between states in MCH expenditures suggest that LHD factors other than financial resources have influenced these MCH outcomes. A limitation of this study is that additional contextual variables such as historical experience, financial shocks, or resources being shifted from one program to another are not included in this analysis, and they may have had some influence on which LHDs performed well. These findings call for additional exploration into the modifiable factors that underlie how and why LHDs perform better than expected and achieve exceptional MCH outcomes. Additional research through in-depth qualitative analysis and directed toward understanding what practices led to better health outcomes will identify practices these varied LHDs may be utilizing to establish and maintain such positive health outcomes.

Table 2: Range and Mean of per capita expenditures for maternal child health expenditure areas

State		LHDs	PDs (%)	Total Maternal Child Health Expenditures*		WIC Expenditures		Family Planning Expenditures		Maternal, Infant, Child and Adolescent Health Expenditures	
				non-PDs	*PDs*	*non-PDs*	*PDs*	*non-PDs*	*PDs*	*non-PDs*	*PDs*
Florida	*Rural*	18	7 (39%)	$ 5.78-35.67 (19.68)	$ 7.64-33.26 (22.71)	$ 0-21.20 (1.91)	$ 0-0.89 (0.22)	$ 4.49-15.42 (9.35)	$ 2.38-16.03 (8.49)	$ 0.01-23.60 (8.42)	$ 4.48-22.41 (14.00)
	Micro	10	2 (2%)	$ 8.56-46.36 (20.80)	$ 28.05-36.26 (32.98)	$ 0.02-11.45 (4.80)	$ 0.02-11.05 (5.52)	$ 4.01-15.84 (6.27)	$ 9.12-20.72 (14.13)	$ 0.06-30.82 (9.73)	$ 10.57-16.09 (13.33)
	Metro	39	15 (38%)	$ 7.26-27.69 (15.49)	$ 7.49-56.38 (16.93)	$ 0-11.89 (5.40)	$ 0.02-15.01 (5.15)	$ 1.22-9.59 (4.06)	$ 1.97-10.87 (4.33)	$ 0.26-16.85 (6.02)	$ 0.32-32.04 (7.44)
Washington	*Rural*	11	3 (27%)	$ 3.44-32.20 (15.16)	$ 17.17-25.95 (21.22)	$ 0-8.68 (3.96)	$ 4.98-8.97 (7.31)	$ 0-17.86 (3.84)	$ 0-10.27 (5.55)	$ 2.36-18.83 (7.37)	$ 3.14-11.81 (8.36)
	Micro	11	3 (27%)	$ 1.21-9.40 (5.77)	$ 2.36-6.21 (4.48)	$ 0-5.33 (2.90)	$ 0-3.43 (1.55)	$ 0 - 0.64 (0.08)	$ 0-0.01 (0)	$ 1.02-4.67 (2.79)	$ 1.09-5.11 (2.92)
	Metro	13	4 (31%)	$ 0.82-27.52 (9.30)	$ 0.73-11.71 (7.32)	$ 0-4.71 (1.78)	$ 0-4.98 (2.76)	$ 0-10.09 (2.15)	$ 0-2.87 (1.14)	$ 0.82-18.78 (5.36)	$ 0.73-5.36 (3.42)
Combined	*Rural*	29	10 (34%)	$ 3.45-35.67 (17.81)	$ 7.64-33.21 (22.27)	$ 0-21.20 (2.76)	$ 0-8.97 (2.30)	$ 0-17.86 (7.06)	$ 0-16.02 (7.63)	$ 0.01-23.60 (7.99)	$ 3.14-22.41 (12.34)
	Micro	21	5 (24%)	$ 1.21-46.36 (13.78)	$ 2.36-36.26 (15.88)	$ 0-11.45 (3.91)	$ 0-11.05 (3.14)	$ 0-15.83 (3.38)	$ 0-20.72 (5.65)	$ 0.06-30.82 (6.49)	$ 1.09-16.09 (7.08)
	Metro	52	19 (37%)	$ 0.82-27.67 (13.82)	$ 0.73-56.38 (14.85)	$ 0-11.87 (4.43)	$ 0-15.01 (4.63)	$ 0-10.09 (3.55)	$ 0-10.87 (3.64)	$ 0.26-18.78 (5.84)	$ 0.32-32.04 (6.57)

Table 2: Range (and mean) of Local Health Department Maternal and Child Health Expenditures over 2009-2010 by Metropolitan, Micropolitan and Rural Location and by whether or not indicated as a Positive Deviant Performer in Infant Mortaliy Rate, Teen Birth Rate, the Percentage of Births with Late or No Prenatal Care,

and/or Percent of Low Birth Rate Births in Florida, Washington and in Both States. *Total Maternal Child Health in this case represents a compilation of expenditures in the three program areas examined above.

SUMMARY BOX:

What is Already Known about This Topic? Some local health departments maintain high performance, even during challenging times. Many local health departments self-identify best practices, but, to date, no empirical method has been used to identify high performing local health departments.

What is Added by this Report? Rather than rely on self-report, the empirical method used here controlled for contextual factors and identified positive deviant local health departments in maternal and child health in two states. We found positive deviant local health departments in similar rural/urban proportions as the distribution of total local health departments in both states, and the range of expenditures was similarly varied across positive deviant and all local health departments.

What are the Implications for Public Health Practice, Policy, and Research? Similarities across expenditure categories among non positive deviant and positive deviant local health departments and the variation between states in maternal and child health expenditures suggest that local health department factors other than financial resources may have influenced these maternal and child health outcomes.

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