

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

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# Background

- LHDs are responsible for many MCH services, but have limited resources.
- Some LHDs have managed to achieve better than expected MCH outcomes compared to peers.



# Research Objective

To identify LHDs that positively deviate in MCH outcomes compared to their peers while taking into account local context including geography, demographics, and finances.

# Positive Deviance

- Used to identify and learn from units that perform beyond expectations
- Defined by context
- Performance Improvement

# Methods

- 2009-2010 Public Health Activities and Services Tracking (PHAST) data for FL (n=67) and WA (n=35)
  - uniquely detailed and matched annual MCH-related county-level expenditure data



# Methods

- $X$  = variables within LHD control
- $Z$  = variables not under LHD control
- $Y$  = outcomes

# X Variables

## *Inputs (LHD can control)*

Alternative Provider	Categorical variables for each MCH service area (linked to expenditure included); captures whether other entity is providing the service in the county area
Executive Clinician	0-1; captures whether the executive at the LHD has a clinical degree or not



# Z variables

Variables	Notes
<i>External factors LHDs cannot control (Context)</i>	
Total LHD expenditure	Raw number or per capita
Population	Total population of the county/area the LHD serves (number)
Number of Medicaid births in the county	Controls for need of services
CBSA	3 levels: metropolitan, micropolitan, rural
% of children under 18 living in poverty	
Social Disadvantage Index	Index of median HH income; % of households receiving public assistance; % unemployed
% of persons 25+ with HS or more education in county	
% of county population that is African American	
% of county population that is Hispanic	
Per Capita number of nurses	
Per Capita number of midwives	
Per Capita number of doctors	

# Y Variables

<i>MCH Outcomes</i>	
Teen pregnancy rate	Number of births to girls age 15-19 over total number of girls age 15-19 (x 1000), smoothed (3 year average)
Infant Mortality rate	Number of infant deaths over total number of births, smoothed (3 year average)
Late or no prenatal care rate	Number of infants born that received no or late prenatal care over total births, smoothed (3 year average)
Low birth weight rate	Number of infants born at low birth weight over total births, smoothed (3 year average)

# Analysis

- MRA to identify LHDs that performed better than expected over time and across outcomes.
  - **Step 1:** Regressed  $Y=a+b1(Z)+e$
  - **Step 2:** Added in X variables  $Y=a+b1(Z)+b2(X)+e$
  - **Step 3:** Likelihood ratio test to determine whether the internal control variables improved the explanatory power of the model.

**PDs = standardized residuals <-1**

# Add tables for each outcome/each state

- Add tables for each MCH outcome using per capita MCH expenditures as predictor (as opposed to each expenditure category) – see PD summary table file
- Note that PDs remain after influential points removed

# Results – Descriptive Statistics for MCH Outcomes

Outcomes	FL		WA	
	Mean	Standard Deviation	Mean	Standard Deviation
Percent of all births with low birth weight	9.97	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

# Results – Range and Mean of Expenditures

		<b>LHD</b>	<b>PDs (%)</b>	<b>Total MCH Expenditures*</b>	
<b>State</b>				<i>non-PDs</i>	<i>PDs</i>
<b>FL</b>	<i>Rural</i>	18	7 (39%)	\$ 5.78-35.67 (19.68)	\$ 7.64-33.26 (22.71)
	<i>Micro</i>	10	2 (2%)	\$ 8.56-46.36 (20.80)	\$ 28.05-36.26 (32.98)
	<i>Metro</i>	39	15 (38%)	\$ 7.26-27.69 (15.49)	\$ 7.49-56.38 (16.93)
<b>WA</b>	<i>Rural</i>	11	3 (27%)	\$ 3.44-32.20 (15.16)	\$ 17.17-25.95 (21.22)
	<i>Micro</i>	11	3 (27%)	\$ 1.21-9.40 (5.77)	\$ 2.36-6.21 (4.48)
	<i>Metro</i>	13	4 (31%)	\$ 0.82-27.52 (9.30)	\$ 0.73-11.71 (7.32)
<b>FL &amp; WA</b>	<i>Rural</i>	29	10 (34%)	\$ 3.45-35.67 (17.81)	\$ 7.64-33.21 (22.27)
	<i>Micro</i>	21	5 (24%)	\$ 1.21-46.36 (13.78)	\$ 2.36-36.26 (15.88)
	<i>Metro</i>	52	19 (37%)	\$ 0.82-27.67 (13.82)	\$ 0.73-56.38 (14.85)

# Results

- 34 PD LHDs [WA=10(29%); FL=24(29%)]
- 30 of 34 LHDs (WA=10; FL=20) had better than expected MCH outcomes over 2 years
- 22 LHDs (WA=5; FL=17) had 2 or more exceptional outcomes in a study year (Table 1)
- PD LHDs varied by context in proportion to all LHDs
  - (metropolitan=19; micropolitan=5; rural=10)
- Range of expenditures varied similarly in all LHDs and PD LHDs (Table 2)

# Implications

- LHD factors other than financial resources have influenced these MCH outcomes
- Additional research is needed to understand what makes these LHDs PDs

