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Characteristics of Local Health Departments Associated with Their Implementation of Electronic Health Records and Other Informatics System

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Gulzar H. Shah, Jonathon P. Leider, Brian Castrucci, Karmen S. Williams, Huabin Luo
OVERVIEW

• Background & Introduction
• Objectives
• Design & Methods
• Statistical Analysis
• Results
• Discussion
• Limitations
• References
Background & Introduction

Centrality of **informatics** capacity of LHDs is supported by three pillars:

1. Several developments (changing environment)
2. LHD’s needs in **changing environment**
3. **Functionality** offered by **informatics** to support day-to-day work of LHDs
Several developments:

• **HITECH Act:**

• **IOM:** Call for integrating PH and healthcare
  – Interoperable surveillance systems
  – Improved evidence base
    • Public health interventions
    • Administrative practices

• **PHAB Accreditation**
LHD’s needs in changing environment

- Various functional needs for electronic information sharing
- Infrastructural changes as an aftermath of 2007-2009 recession…
Functionality offered by informatics to support day-to-day work of LHDs:

• Uses of EHRs
• Better surveillance
• Efficient health promotion
• Syndromic surveillance
• Real-time info exchange
Objectives

To assess LHDs’ informatics capacity, and the factors associated with adoption/implementation:

1. Electronic health records (EHRs)
2. Health information exchange (HIE)
3. Immunization registry (IZ-R)
4. Electronic disease reporting system (EDRS)
5. Electronic lab reporting (ELR)
Data

2013 Profile of Local Health Departments Survey conducted by NACCHO

- Administered to all 2,532 LHDs across the country
- Nationally-representative sample consisted of 625 LHDs (Module 2)
- 505 LHDs completed the survey (81% response rate)
**Methods**

**Dependent variables:** Five outcome variables; the question included five IT areas:

- Electronic health records (EHRs)
- Health information exchange (HIE)
- Immunization registry (IR)
- Electronic disease reporting system (EDRS)
- Electronic lab reporting (ELR)

- The response categories for each IT area were:
  - (a) no activity,
  - (b) have investigated, (c) planning to implement, (combined by us)
  - (d) have implemented.
Methods 2

• **Independent variables:**
  – Infrastructural/Financial characteristics
    • Population of LHD jurisdiction
    • Per capita expenditures
      – Not Reported; 1st <$19; 2nd $19-30; 3rd $31-46; 4th $46-75; 5th≥76
    • LHD had rollover reserve funds
      – (no/don’t know, yes)
    • LHD has information system specialist on staff
      – (yes, no)
  – Number of clinical services provided by LHDs
    – (Q1: <8; Q2: 8-11; Q3: 12-15; Q4: ≥16 services)
Methods 3

• Independent Variables
  – Other characteristics
    • Length of top executive tenure (years)
    • Gender of the top executive (male, female)
    • Geographic location of LHD by census regions (Northeast, Midwest, South, West)
Statistical Analysis

• Descriptive analysis
• Multivariable analysis had several options, first dichotomizing at “have implemented” vs. all other response items.
• Five separate multinomial logistic regression models were computed
  – Nagelkerke Pseudo R-Squares for the five models were 0.28 (EHRs), 0.22 (HIEs) 0.36 (IR), 0.22 (EDRSs), and 0.23 (ELRs)
Bottom line Results

Large variation in implementation of five information systems

- 14% had interacted with HIEs
- 23% had implemented EHRs in a clinical context
- 50% had implemented electronic lab reporting.
- 75% had implemented an electronic disease reporting system
- 86% had implemented an immunization registry
Bottom line Results (2)

• Five multinomial logistic regression models; factors most strongly associated are:
  – Provision of greater number of clinical services,
  – Greater per capita expenditures,
  – Having health information system specialist on staff,
  – Having larger population size,
  – Having decentralized governance system,
  – Having one or more local boards of health,
  – Experienced top Executive: greater number of years in the job
  – Regional variation: Being located in the Northeast or West regions (vs. Mid-West).
Electronic Health Records-LHD Activity

- Have implemented: 23%
- Planning to implement: 22%
- Have investigated: 24%
- No activity: 31%
Health Information Exchange - LHD Activity

- No activity: 41%
- Have investigated: 26%
- Planning to implement: 19%
- Have implemented: 14%
Immunization Registry-LHD activity

- have implemented: 86%
- no activity: 7%
- have investigated: 4%
- planning to implement: 3%
Electronic Disease Reporting System-LHD Activity

- have implemented: 75%
- no activity: 15%
- have investigated: 5%
- planning to implement: 5%
Electronic lab reporting-LHD activity

- no activity: 33%
- have implemented: 50%
- have investigated: 8%
- planning to implement: 9%
Electronic Syndromic Surveillance

- yes: 62%
- no: 38%
## Results: Multinomial Logistic Regression

<table>
<thead>
<tr>
<th>LHD Characteristics</th>
<th>EHRs Implemented vs. No Activity</th>
<th>HIE Implemented vs. No Activity</th>
<th>Immunization Registry Implemented vs. No Activity</th>
<th>Electronic Disease Reporting System Implemented vs. No Activity</th>
<th>Electronic Lab Reporting Implemented vs. No Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>Odds Ratio: 0.00</td>
<td>P-value: 0.01</td>
<td>Odds Ratio: 0.02</td>
<td>0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Length of tenure (Years)</td>
<td>1.03</td>
<td>0.00</td>
<td>1.05</td>
<td>0.00</td>
<td>1.03</td>
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<tr>
<td>Population of LHD jurisdiction (log)</td>
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<td>1.01</td>
<td>1.00</td>
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<td>Geographic location</td>
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<td>North East</td>
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<td>0.02</td>
<td>0.95</td>
<td>2.56</td>
<td>1.63</td>
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<tr>
<td>South</td>
<td>1.38</td>
<td>0.16</td>
<td>1.99</td>
<td>0.23</td>
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<td>West</td>
<td>0.83</td>
<td>0.43</td>
<td>1.85</td>
<td>0.76</td>
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<td>Mid West</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

[Note: For the ease of reporting, “Investigated or plan to implement vs. No Activity” not included in this table]
## Results: Multinominal Logistic Regression

<table>
<thead>
<tr>
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<th>Electronic Lab Reporting Implemented vs. No Activity</th>
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<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
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<tr>
<td>Local Board of Health</td>
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<tr>
<td>No LBOH</td>
<td>1.26</td>
<td>0.13</td>
<td><strong>0.46</strong></td>
<td><strong>0.00</strong></td>
<td>0.69</td>
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<tr>
<td>One or more LBOH</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>Decentralized Governance</td>
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<tr>
<td>Decentralized</td>
<td><strong>9.55</strong></td>
<td><strong>0.00</strong></td>
<td>1.34</td>
<td>0.21</td>
<td>0.95</td>
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<td>Centralized/Shared</td>
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<td>X</td>
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<tr>
<td>2nd Quintile</td>
<td>1.11</td>
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<td>0.81</td>
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<td>3rd Quintile</td>
<td>1.31</td>
<td>0.25</td>
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<td>4th Quintile</td>
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<td><strong>0.60</strong></td>
<td><strong>0.05</strong></td>
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<tr>
<td>5th Quintile</td>
<td><strong>3.47</strong></td>
<td><strong>0.00</strong></td>
<td><strong>1.84</strong></td>
<td><strong>0.02</strong></td>
<td>0.68</td>
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<tr>
<td>1st Quintile</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
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<td>Whether LHD had reserve funds</td>
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<td>No/Don't Know</td>
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<td>0.00</td>
<td>1.77</td>
<td>0.00</td>
<td>0.81</td>
</tr>
<tr>
<td>Yes</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>LHD has information system specialist on staff</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.54</td>
<td>0.02</td>
<td>2.01</td>
<td>0.00</td>
<td>1.22</td>
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<tr>
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<td>X</td>
<td>X</td>
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<td>Gender of the top executive</td>
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<tr>
<td>Male</td>
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<td>1.06</td>
<td>0.68</td>
<td>0.36</td>
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<td>Female</td>
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<td>X</td>
<td>X</td>
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<tr>
<td>Number of Clinical Services</td>
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<tr>
<td>2nd Quartile</td>
<td>1.53</td>
<td>0.02</td>
<td>1.67</td>
<td>0.01</td>
<td>6.25</td>
</tr>
<tr>
<td>3rd Quartile</td>
<td>3.23</td>
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<td>1.66</td>
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<td>8.92</td>
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<tr>
<td>4th Quartile</td>
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<td>2.37</td>
<td>0.00</td>
<td>3.31</td>
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<tr>
<td>1st Quartile</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Discussion & Conclusions

• Implementation of EHRs is also still fairly low (23%)
• The results indicate that having information specialists on staff was important
  – However, only about 1 in every 5 LHDs had information specialists on staff.
• Special needs of LHDs in centralized governance must be assessed and addressed.
The capacity of LHDs to use real-time, local data and information is critical. Many LHDs do not have this capacity. This may be due to lack of specialized staff, availability of data systems, or a host of other political or organizational constraints. This is especially the case for smaller jurisdictions.
Discussion & Conclusion 2

Implications/recommendations:

• **Cross-jurisdictional sharing** might be helpful

• **Investment** in public health informatics infrastructure

• Additional training of new informatics staff and existing epidemiologists

• Better integration with healthcare

• Policies to support training and infrastructural needs of LHDs
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THANK YOU!

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