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Characteristics of Local Health Departments Associated with their Implementation of Electronic Health Records and Other Informatics Systems

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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%
- Have investigated: 4%
- Planning to implement: 3%
- No activity: 7%
Electronic Disease Reporting System-LHD Activity

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

- No activity: 33%
- Have implemented: 50%
- Have investigated: 8%
- Planning to implement: 9%

Georgia's large-scale, small-feel research university
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></td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.00</td>
<td></td>
<td>0.01</td>
<td></td>
<td>0.02</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>
<td>1.21</td>
<td>0.00</td>
<td>0.92</td>
<td>0.14</td>
<td>1.01</td>
</tr>
<tr>
<td>Geographic location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North East</td>
<td>1.56</td>
<td>0.02</td>
<td>0.95</td>
<td>0.83</td>
<td>2.56</td>
</tr>
<tr>
<td>South</td>
<td>1.38</td>
<td>0.16</td>
<td>1.99</td>
<td>0.01</td>
<td>0.23</td>
</tr>
<tr>
<td>West</td>
<td>0.83</td>
<td>0.43</td>
<td>1.85</td>
<td>0.02</td>
<td>0.76</td>
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<tr>
<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: Multinomial Logistic Regression

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<thead>
<tr>
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<tr>
<td></td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>Local Board of Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No LBOH</td>
<td>1.26 0.13</td>
<td>0.46 0.00</td>
<td>0.69 0.06</td>
<td>0.70 0.01</td>
<td>0.73 0.01</td>
</tr>
<tr>
<td>One or more LBOH</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>Decentralized Governance</td>
<td>9.55 0.00</td>
<td>1.34 0.21</td>
<td>0.95 0.86</td>
<td>10.35 0.00</td>
<td>0.81 0.24</td>
</tr>
<tr>
<td>Decentralized</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>Centralized/Shared</td>
<td>1.09 0.68</td>
<td>0.52 0.01</td>
<td>0.99 0.96</td>
<td>0.59 0.02</td>
<td>0.55 0.00</td>
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<tr>
<td>Not reported</td>
<td>X X</td>
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<td>X X</td>
<td>X X</td>
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<tr>
<td>2nd Quintile</td>
<td>1.11 0.63</td>
<td>0.81 0.39</td>
<td>1.27 0.44</td>
<td>0.41 0.00</td>
<td>0.47 0.00</td>
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<tr>
<td>3rd Quintile</td>
<td>1.31 0.25</td>
<td>1.11 0.68</td>
<td>4.47 0.00</td>
<td>0.61 0.06</td>
<td>0.94 0.73</td>
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<tr>
<td>4th Quintile</td>
<td>2.12 0.00</td>
<td>0.60 0.05</td>
<td>0.70 0.26</td>
<td>0.22 0.00</td>
<td>0.71 0.06</td>
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<tr>
<td>5th Quintile</td>
<td>3.47 0.00</td>
<td>1.84 0.02</td>
<td>0.68 0.22</td>
<td>0.66 0.14</td>
<td>0.71 0.09</td>
</tr>
<tr>
<td>1st Quintile</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
</tr>
</tbody>
</table>
## Results: Multinomial Logistic Regression

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<th>LHD Characteristics</th>
<th>EHRs</th>
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<th>Electronic Lab Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Implemented vs. No Activity</td>
<td>Implemented vs. No Activity</td>
<td>Implemented vs. No Activity</td>
<td>Implemented vs. No Activity</td>
<td>Implemented vs. No Activity</td>
</tr>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
<td>P-value</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>Whether LHD had reserve funds</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>No/Don't Know</td>
<td>1.60 0.00</td>
<td>1.77 0.00</td>
<td>0.81 0.27</td>
<td>1.25 0.13</td>
<td>0.99 0.95</td>
</tr>
<tr>
<td>Yes</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>LHD has information system specialist on staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1.54 0.02</td>
<td>2.01 0.00</td>
<td>1.22 0.47</td>
<td>1.70 0.01</td>
<td>2.69 0.00</td>
</tr>
<tr>
<td>No</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
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<tr>
<td>Gender of the top executive</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>1.45 0.02</td>
<td>1.06 0.68</td>
<td>0.36 0.00</td>
<td>0.84 0.19</td>
<td>0.83 0.08</td>
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<tr>
<td>Female</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>Number of Clinical Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Quartile</td>
<td>1.53 0.02</td>
<td>1.67 0.01</td>
<td>6.25 0.00</td>
<td>1.78 0.00</td>
<td>1.54 0.00</td>
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<tr>
<td>3rd Quartile</td>
<td>3.23 0.00</td>
<td>1.66 0.02</td>
<td>8.92 0.00</td>
<td>1.89 0.00</td>
<td>1.45 0.01</td>
</tr>
<tr>
<td>4th Quartile</td>
<td>3.75 0.00</td>
<td>2.37 0.00</td>
<td>3.31 0.00</td>
<td>1.07 0.77</td>
<td>2.26 0.00</td>
</tr>
<tr>
<td>1st Quartile</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X X</td>
<td>X 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
References

- Shah GH, Holley V, Rogers V. Local health departments' (LHDs) Meaningful Use readiness, general informatics capacity, needs, and barriers. CDC Public Health Informatics Annual Conference; Atlanta, GA2011, August 21-August 24.
References 2

• Handler AS, Turnock BJ. Local Health Department Effectiveness in Addressing the Core Functions of Public Health: Essential Ingredients. 1996:460.
• Singh S, Bernet PM. Economies of scale and scope in public health: An analysis of food hygiene services provided by local health departments in Florida. Frontiers in Public Health Services and Systems Research. 2014;3(3).
• NACCHO’s Informatics Needs Assessment of Local Health Departments. National Association of City and County Health Officials, 2009.
THANK YOU!

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