MECIDS Annual Meeting
Amman January 16-18, 2007

Jordan Salmonella Report

Disease Control Directorate
Ministry of Health, Jordan

Outline

• Background: Jordan Burden of Illness Study
• MECIDS objectives
• Methods
• Results
• Conclusions & Recommendations
Jordan Burden of Illness Study

- Jordan first site in Eastern Mediterranean
- Burden of *Salmonella, Shigella, Brucella*
- Burden of illness study
  - Population survey
  - Laboratory survey
- Validation study

Measuring the burden of foodborne illnesses

1. Persons become ill
2. Persons seek medical care
3. Specimens obtained
4. Laboratory tests for pathogens
5. Lab-confirmed Case
6. MOH

Multiplier 1
Multiplier 2
Cases of *Salmonella* and *Shigella* in stool cultures*

<table>
<thead>
<tr>
<th></th>
<th>Sep. 03</th>
<th>May 04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
</tr>
<tr>
<td><strong>Shigella</strong></td>
<td>7 1.0</td>
<td>3 0.6</td>
</tr>
<tr>
<td><strong>Salmonella</strong></td>
<td>1 0.1</td>
<td>3 0.6</td>
</tr>
<tr>
<td><strong>Stools</strong></td>
<td>696</td>
<td>495</td>
</tr>
</tbody>
</table>

*In 24 MOH lab

Comparison of laboratory survey results & MOH Reports

<table>
<thead>
<tr>
<th></th>
<th>Lab survey</th>
<th>MOH Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq</td>
<td>%</td>
<td>Freq</td>
</tr>
<tr>
<td><strong>Shigella</strong></td>
<td>10 0.8</td>
<td>3 0.01</td>
</tr>
<tr>
<td><strong>Salmonella</strong></td>
<td>4 0.3</td>
<td>13 0.03</td>
</tr>
<tr>
<td><strong>Stools</strong></td>
<td>1191*</td>
<td>41273†</td>
</tr>
</tbody>
</table>

* cultured
† tested: food handlers probably included, unknown procedures
## Jordan Diarrhea Burden

<table>
<thead>
<tr>
<th>Metric</th>
<th>Sep 03</th>
<th>May 04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population &gt;1 year</td>
<td>5316696</td>
<td>5316696</td>
</tr>
<tr>
<td>% diarrhea</td>
<td>7.8%</td>
<td>6.1%</td>
</tr>
<tr>
<td># population diarrhea</td>
<td>414702</td>
<td>324318</td>
</tr>
<tr>
<td>% diarrhea sought care</td>
<td>19.5%</td>
<td>40.8%</td>
</tr>
<tr>
<td># population diarrhea sought care</td>
<td>80867</td>
<td>132322</td>
</tr>
<tr>
<td>% diarrhea sought care MOH</td>
<td>8.9%</td>
<td>16.2%</td>
</tr>
<tr>
<td># population diarrhea sought care MOH</td>
<td>36909</td>
<td>52540</td>
</tr>
<tr>
<td>Stools received MOH</td>
<td>696</td>
<td>495</td>
</tr>
<tr>
<td><em>Shigella</em></td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td><em>Salmonella</em></td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

### Measuring the burden of foodborne illnesses

- **Persons become ill**
- **Persons seek medical care**
- **Specimens submitted**
- **Laboratory tests for pathogens**
- **Lab-confirmed Case**
- **Reported Case**

For each *Salm./Shig.*

273 infected persons in the community
Estimated Burden of Foodborne Pathogens Jordan 03-04*

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Yearly burden</th>
<th>IR/100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmonella</td>
<td>6606</td>
<td>124</td>
</tr>
<tr>
<td>Shigella</td>
<td>16266</td>
<td>306</td>
</tr>
<tr>
<td>Brucella</td>
<td>6912</td>
<td>130</td>
</tr>
</tbody>
</table>

*Only 50% of Jordan’s population seeks care in MOH facilities.

Comparison of Isolation Rates of Foodborne Pathogens between Lab. Survey & Validation Study*

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Lab. Survey</th>
<th>Validation Study</th>
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</thead>
<tbody>
<tr>
<td>Salmonella</td>
<td>Freq</td>
<td>Total</td>
</tr>
<tr>
<td>1</td>
<td>696</td>
<td>0.1</td>
</tr>
<tr>
<td>Shigella</td>
<td>7</td>
<td>696</td>
</tr>
<tr>
<td>S.Typhi</td>
<td>0</td>
<td>1085</td>
</tr>
<tr>
<td>Brucella</td>
<td>31</td>
<td>1510</td>
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</tbody>
</table>

* Jordan Aug—Sep 2003
MECIDS objectives

- Establish sentinel laboratory-based surveillance in Israel, Jordan, and PA
- Enhance laboratory capabilities to identify *Salmonella*
- Strengthen existing capabilities and develop new ones for characterization of *Salmonella* using phenotypic and genotypic markers

Methods

- Meetings at national and regional levels
- Sentinel sites
- Study population
- SOPs
- Training (local & regional)
- Data collection forms (lab. logbooks, reporting forms)
Data flow chart

Regional center
Israel  Jordan (DCD*)  Palestinian Authority
Laboratory Directorate

- Al-Basheer
- Al-Eman-Ajloon
- Al-Nadeem-Madaba
- South Shuneh
- Amman Central Lab
- JFDA

Training

MoH Lab. Training Center, Amman, Sept 2006
Data collection forms

Methods

- Data collection started in July 2005
- Information on specimens tested recorded routinely
- Aggregated numbers sent monthly by fax to Lab. Directorate & DDC*
- Data entered and analyzed at DDC using Microsoft Excel
- Monthly reports sent to CMC Amman

*Disease Control Directorate
Specimens Tested
Jordan Jul 05-Nov 06

Food Items Tested
Jordan Jul 05-Nov 06
Isolation Rate of *Salmonella* by Type of Specimen
Jordan July 05-Nov 06

<table>
<thead>
<tr>
<th>Type of Specimen</th>
<th>Freq</th>
<th>%</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood cultures_Patients</td>
<td>9</td>
<td>0.13</td>
<td>6853</td>
</tr>
<tr>
<td>Stool cultures_Patients</td>
<td>64</td>
<td>1.54</td>
<td>4165</td>
</tr>
<tr>
<td>Stool cultures_FH</td>
<td>74</td>
<td>1.53</td>
<td>4848</td>
</tr>
<tr>
<td>Food items</td>
<td>7</td>
<td>0.02</td>
<td>29900</td>
</tr>
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</table>
Isolation Rate of *Salmonella* by Type of Specimen
Jordan July 2005-June 2006

<table>
<thead>
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<td>6853</td>
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<td>.02</td>
<td>7</td>
</tr>
</tbody>
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Isolation Rate of *Salmonella* by Month
Jordan July 2005-June 2006

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Isolation Rate

- Blood cultures_Patients
- Stool cultures_Patients
- Food handlers
- Food Items

Month
- Jul 05
- Aug 05
- Sep 05
- Oct 05
- Nov 05
- Dec 05
- Jan 06
- Feb 06
- Mar 06
- April 06
- May 06
- Jun 06
- Jul 06
- Aug 06
- Sep 06
- Oct 06
- Nov 06

Isolation Rate (%)
Isolation Rate of *Salmonella* by Sentinel Laboratory
Jordan July 2005-June 2006

Percentage of *Salmonella* Isolates by Seroguppe

- **Salmonella B**
- **Salmonella C2**
- **Salmonella E**
- **Salmonella spp.**
- **Salmonella D**
- **Salmonella C1**
- **Salmonella G**
- **Salmonella I**
- **Salmonella H**
- **Salmonella F**
- **Salmonella C**
- **Salmonella A**
- **Other**

*S. enteritidis* 15%
*S. typhimurium* 5%
Conclusions

- System is useful and operates efficiently
- Similar *Salmonella* rates in stools from patients (1.54%) & food handlers (1.53%)
- Overall *Salmonella* rate in stool: 1.5%
- Rates comparable to those of developing countries (1.8%) and tenfold lower than rates in developed countries (0.15%)*


Conclusions

- Higher than rates laboratory survey (0.3%), lower than rates in validation study (2.5%)*
- High *Salmonella* burden ([64+74]*273~38,000 cases in 18 months)
- High % of *S. enteritidis*

*Jordan Burden of Illness Study
Recommendations

- **At sentinel lab level**
  - Continue *Salmonella* surveillance system
  - Add *Shigella* using same diagnostic procedures and mechanisms of reporting
  - Test for other entero-pathogens (*Campylobacter, E. coli*, etc.)
  - Establish electronic reporting from sentinel labs

- **At reference lab level**
  - Use PFGE
  - Establish electronic reporting from reference lab

- **At regional level**
  - Training?
  - Compare & publish data
### Acknowledgements

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<thead>
<tr>
<th>Ministry of Health</th>
<th>CMC</th>
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<tbody>
<tr>
<td></td>
<td>Palestinian &amp; Israeli partners</td>
</tr>
<tr>
<td></td>
<td>NTI</td>
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<tr>
<td></td>
<td>World Bank</td>
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