PRETERM BIRTHS AND INFANT MORTALITY IN MISSOURI

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Missouri Department of Health and Senior Services
November 22, 2013
2013 Premature Birth Report Card

US Rate = 11.6%
MO Rate = 11.7%
**TERMINOLOGY**

First day of LMP

Week # 0 20 0/7 34 0/7 37 0/7 39 0/7 41 6/7

Preterm (any birth < 37 weeks)  Early Term  Term  Post term

**Early term:** Births at 37–38 completed weeks of gestation  
**Full term:** Births at 39–40 completed weeks of gestation  
**Late term:** Births at 41 completed weeks of gestation

Why discuss preterm births?

- Every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising.
- An estimated 1 million babies die annually from preterm birth complications.
- Preterm birth is the leading cause of newborn deaths (babies in the first four weeks of life) and the second leading cause of death after pneumonia in children under five years.
- Three-quarters of them could be saved with current, cost-effective interventions, even without intensive care facilities.
- Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born.

Source: http://www.who.int/mediacentre/factsheets/fs363/en/
Preterm Births Around the Globe, 2010

Figure 2.5: Estimated numbers of preterm births in 2010

10 countries account for 60% of the world’s preterm births by rank:

1. India
2. China
3. Nigeria
4. Pakistan
5. Indonesia
6. United States of America
7. Bangladesh
8. Philippines
10. Brazil

Number of preterm births, year 2010
- <5,000
- 5,000 - <10,000
- 10,000 - <50,000
- 50,000 - <100,000
- 100,000 - <250,000
- 250,000 or more
- Data not available
- Not applicable

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

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Note: preterm birth numbers by country are available on the accompanying wall chart.
Not applicable = non WHO Members State.
## International Comparisons: Infant Mortality Rates (IMR), 2012

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country Name</th>
<th>Rate per 1,000</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Global</td>
<td>39.48</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Monaco</td>
<td>1.80 (36,371)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Japan</td>
<td>2.21</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bermuda</td>
<td>2.47</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Singapore</td>
<td>2.65</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sweden</td>
<td>2.74</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Iceland</td>
<td>3.18</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Italy</td>
<td>3.36</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>France</td>
<td>3.37</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Spain</td>
<td>3.37</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Anguilla</td>
<td>3.44</td>
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</tr>
<tr>
<td>11</td>
<td>Norway</td>
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</tr>
<tr>
<td>12</td>
<td>Germany</td>
<td>3.51</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Malta</td>
<td>3.65</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Czech Republic</td>
<td>3.70</td>
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<tr>
<td>15</td>
<td>Netherlands</td>
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<td>16</td>
<td>Andorra</td>
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<td>Ireland</td>
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<td>18</td>
<td>Switzerland</td>
<td>4.03</td>
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<td>19</td>
<td>Israel</td>
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</tr>
<tr>
<td>20</td>
<td>Korea (Republic of)</td>
<td>4.08</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Slovenia</td>
<td>4.12</td>
<td></td>
</tr>
</tbody>
</table>

Recent Declines in Infant Mortality in the United States, 2005–2011

Infant Mortality Rate (IMR), MO and US, 2000-2012

Racial disparities in IMR, MO 1990-2012

Source: Missouri Vital Statistics
Preterm Births (PTB’s): US and MO

- Affects nearly 500,000 babies—that's 1 of every 9 infants born in the US.

- Affects 1 of every 9 infants born in MO (2012 PTB Rate = 11.8%)

- ~ 66% of preterm babies are low birthweight
Consequences of preterm Births

- Leading cause of infant mortality in US and MO
- Leading cause of long-term neurological disabilities / other morbidities in children
- Societal economic burden: $26.2 billion in 2005, or $51,600 per infant born preterm
- ~ two-thirds of societal cost – medical services

*Source: Institute of Medicine. 2006. Preterm Birth: Causes, Consequences, and Prevention*
PTB Rates in Missouri, 2007-11

State Rate (2007-2011) = 12.5%

Source: MO DHSS, Birth MICA, www.health.mo.gov/MICA
IMR for five leading causes of death in US: 2005 and 2011

- **Congenital malformations**: 134.2 (2005) vs. 126.1 (2011)
- **Short gestation/low birthweight**: 113.9 (2005) vs. 104.1 (2011)
- **SIDS**: 53.9 (2005) vs. 43.3 (2011)
- **Maternal complications**: 42.9 (2005) vs. 39.9 (2011)
- **Unintentional injuries**: 26.2 (2005) vs. 27.5 (2011)

**NOTE**: Data for 2011 are preliminary. SIDS is Sudden infant death syndrome.

# 1 cause of Infant Deaths in MO, 2007-11

Source: Missouri Vital Statistics (Modified Dolfus Classification)
## Preterm Births, MO, 2006-2010

<table>
<thead>
<tr>
<th>Gestational Age</th>
<th>% of Births</th>
<th>% of Deaths</th>
<th>IMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-31 weeks</td>
<td>10.9%</td>
<td>51.2%</td>
<td>177.1</td>
</tr>
<tr>
<td>32,33 weeks</td>
<td>8.9%</td>
<td>4.4%</td>
<td>18.3</td>
</tr>
<tr>
<td>34-36 weeks</td>
<td>50.1%</td>
<td>9.8%</td>
<td>7.3</td>
</tr>
<tr>
<td>All preterm,&lt;37 weeks</td>
<td>69.8%</td>
<td>65.3%</td>
<td>35.1</td>
</tr>
<tr>
<td>All term, 37+ weeks</td>
<td>30.2%</td>
<td>34.7%</td>
<td>2.7</td>
</tr>
</tbody>
</table>

- About 2/3 of all deaths occur among preterm births
- Over half occur among those born <31 weeks

Source: MO DHSS Vital statistics Birth/Death match file
Live births by gestational age, US and MO, 1990 vs 2010

Source: MO DHSS. Vital Statistics ;US data :CDC, NCHS. National Vital Statistics Reports
PTB rates in US and MO, 1990-2012

Source: MO DHSS, Birth MICA, www.health.mo.gov/MICA
PTB’s by race, MO, 1990-2012

Source: MO DHSS, Birth MICA, [www.health.mo.gov/MICA](http://www.health.mo.gov/MICA)
Singleton PTB’s by race, MO, 1990-2010

Source: MO DHSS, Birth MICA, www.health.mo.gov/MICA
Causes of preterm birth

- Complex etiology - still under active investigation
- Potential candidate genes for preterm births from multiple biological pathways (124 listed):
  - Inflammatory pathway
  - Utero-placental pathway
  - Endocrine pathway
  - Uterine contraction
  - Metabolic pathway
- Partial listing only, some familiar names include: TNF-alpha, Cox-2
- Gene Microarray technology – 500,000 SNP chip

Source: Institute of Medicine. 2006. Preterm Birth: Causes, Consequences, and Prevention
Causes of preterm birth

PATHWAYS

FACTORS

External Environment

Immune Status

Nutrition

Behaviors

Medical Conditions

Medical Interventions

Psychosocial

PRETERM BIRTH

OUTCOMES

Preterm Labor / pPROM

Racial / Ethnic Disparities

Genetics / Family History

Behavioral / Infection

Maternal / Fetal Stress

Abnormal Uterine Distention

Bleeding / Thrombophilias

Others: Hormones? Toxins?

Factors associated with preterm birth

- Social, personal and economic characteristics
  - Low or high maternal age
    - Black race
    - Low maternal income and socio-economic status
  - Medical and Pregnancy conditions
    - Infection
    - Prior preterm birth
    - Carrying multiples
    - High blood pressure during pregnancy
- Behavioral
  - Tobacco and alcohol use
  - Substance abuse
  - Late prenatal care
  - Stress
Prematurity Report Card - Factors

- Uninsured women
- Late Preterm Births (34-36 weeks)
- Smoking among women of childbearing age
Uninsured Women, US, 2009-2011

Percent of women ages 15-44

- Over 23.0 (15)
- 17.6-23.0 (19)
- Under 17.6 (17)

<table>
<thead>
<tr>
<th>Year</th>
<th>MO</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-05</td>
<td>15.8</td>
<td>205</td>
</tr>
<tr>
<td>2004-06</td>
<td>17.5</td>
<td>20</td>
</tr>
<tr>
<td>2005-07</td>
<td>18.2</td>
<td>20.1</td>
</tr>
<tr>
<td>2006-08</td>
<td>17.6</td>
<td>20.1</td>
</tr>
<tr>
<td>2007-09</td>
<td>18.4</td>
<td>20.7</td>
</tr>
<tr>
<td>2008-10</td>
<td>18.8</td>
<td>20.8</td>
</tr>
<tr>
<td>2009-11</td>
<td>21.1</td>
<td>21.9</td>
</tr>
<tr>
<td>2010-12</td>
<td>20.5</td>
<td>21.3</td>
</tr>
</tbody>
</table>

Figure 1

Women’s Health Insurance Coverage, 2012

- Job-Based, Own Name: 35%
- Job-Based, Dependent: 23%
- Medicaid: 12%
- Individual/Private: 7%
- Other: 4%
- Uninsured: 19%

Total = 98.4 Million Women Ages 18 to 64

Note: Other includes Medicare, TRICARE, and other courses of coverage. Data may not total 100% due to rounding.
Women’s Access to Care, by Insurance Coverage, 2010

Use of Preventive Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Insured</th>
<th>Uninsured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of mammography within past two years</td>
<td>74%</td>
<td>36%</td>
</tr>
<tr>
<td>(Age 40 - 64)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of pap test within past three years</td>
<td>83%</td>
<td>62%</td>
</tr>
<tr>
<td>(Age 18 - 64)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cost Barriers to Care

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Insured</th>
<th>Uninsured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not fill prescription (Age 19 - 64)</td>
<td>25%</td>
<td>54%</td>
</tr>
<tr>
<td>Did not get care despite medical problem (Age 19 - 64)</td>
<td>20%</td>
<td>61%</td>
</tr>
</tbody>
</table>

Sources:
National Center for Health Statistics, National Health Interview Survey in Health, United States 2012.
The Commonwealth Fund Biennial Health Insurance Survey, 2010
Figure 3

Women at Greatest Risk for Being Uninsured, 2012

Percentage of Women ages 18 to 64 years among various groups who are uninsured

- Poor: 39%
- Near Poor: 32%
- Single Parent: 27%
- 19 to 25 years: 25%
- < High School: 38%
- Latina: 36%
- Am Ind/Alaska Native Only: 29%
- Foreign Born: 34%

U.S. Women’s Average = 20%

Note: Poor indicates family income <100% of the federal poverty level, which was $19,090 for a family of three in 2012. Near poor indicates family income between 100% and 200% of the federal poverty level.

PTB’s by Payer Source, MO, 1990-2011

Source: MO DHSS, Birth MICA, www.health.mo.gov/MICA
Barriers to Prenatal Care, 2009-2011

- No Available Appointment: 44.8%
- Didn't know: 38.6%
- No Medicaid Card: 35.2%
- No Money: 28.8%
- Plan would not start: 22.4%
- Too Much Going On: 20.9%
- No Transportation: 14.3%
- Kept Pregnancy Secret: 11.3%
- No Leave Time: 9.9%
- No Child Care: 6.6%
- Didn't know: 0.5%

Percent reporting barriers to care

Source: Missouri Pregnancy Risk Assessment Monitoring System (PRAMS)
Unintended Pregnancy, MO, 2007-2011

Source: Missouri Pregnancy Risk Assessment Monitoring System (PRAMS)
PTB’s by select maternal characteristics, MO PRAMS, 2009-11

Source: Missouri Pregnancy Risk Assessment Monitoring System (PRAMS)
Late preterm is between 34 and 36 weeks gestation.

Source: National Center for Health Statistics, final natality data. [www.marchofdimes.com/peristats](http://www.marchofdimes.com/peristats)
Late PTB’s, MO and US, 2000-2012

Source: National Center for Health Statistics, Missouri Vital Statistics
Distribution of singleton PTBs in MO, 2012

Late PTB’s (34-36 weeks): 72.2 % in 2012 vs 74% in 2008

Source: Missouri Vital Statistics
IMR by Gestational Age, Singleton births, MO, 2006-2010

Source: Missouri Vital Statistics
Smoking among women of childbearing age, US, 2011

Smoking among women of childbearing age (18-44 years), MO and US

Source: CDC Behavioral Risk Factor Surveillance System (BRFSS)
Smoking during pregnancy, US and MO, 1990-2012

Smoking During Pregnancy, MO, 2007-11

State Rate (2007-2011) = 17.8%

Source: MO DHSS, Birth MICA, www.health.mo.gov/MICA
Smoking during pregnancy, Medicaid clients, MO, 2007-11

State Rate (2007-2011) = 29.8%

Source: MO DHSS, Birth MICA, www.health.mo.gov/MICA
**Pregnancy: A teachable moment for smoking cessation, MO PRAMS, 2007-09**

<table>
<thead>
<tr>
<th>Smoking</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Months Before Pregnancy</td>
<td>31.7 (28.7-34.8)</td>
<td>34.7 (31.4-38.1)</td>
<td>35.2 (32.0-38.3)</td>
</tr>
<tr>
<td>Last 3 Months of Pregnancy</td>
<td>18.4 (15.9-20.9)</td>
<td>21.8 (18.8-24.7)</td>
<td>18.9 (16.4-21.5)</td>
</tr>
<tr>
<td>At the Time of the Survey</td>
<td>25.9 (23.0-28.7)</td>
<td>27.5 (24.3-30.7)</td>
<td>26.1 (23.2-28.9)</td>
</tr>
<tr>
<td>% Who Relapsed*</td>
<td>7.3 (5.6-9.1)</td>
<td>6.2 (4.5-7.8)</td>
<td>7.2 (5.5-9.0)</td>
</tr>
</tbody>
</table>

*This includes women who smoked before pregnancy, quit during pregnancy, and then smoked again after pregnancy.

**Source:** Missouri Pregnancy Risk Assessment Monitoring System (PRAMS)
Map of state cigarette taxes

http://www.thecommunityguide.org/Tobacco/increasingunitprice.html

Social Determinants of Health: Why equality is better for everyone?

Figure 2.2. Health and social problems are closely related to inequality among rich countries.

At-Risk Counties Based on Composite Ranking of 13 Indicators

<table>
<thead>
<tr>
<th>County</th>
<th>Composite ranking based on 13 indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pemiscot</td>
<td>1</td>
</tr>
<tr>
<td>Dunklin</td>
<td>2</td>
</tr>
<tr>
<td>Butler</td>
<td>3</td>
</tr>
<tr>
<td>Ripley</td>
<td>4</td>
</tr>
<tr>
<td>St. Louis City</td>
<td>5</td>
</tr>
<tr>
<td>Mississippi</td>
<td>6</td>
</tr>
<tr>
<td>New Madrid</td>
<td>7</td>
</tr>
<tr>
<td>Washington</td>
<td>8</td>
</tr>
<tr>
<td>Crawford</td>
<td>9</td>
</tr>
<tr>
<td>Scott</td>
<td>10</td>
</tr>
</tbody>
</table>

- Although the county rankings may vary across individual indicators, county maps of most indicators show similar geographic distribution patterns of areas at higher risk – southeast area and St. Louis City
- 9 of 10 least healthy counties are in Southeast Missouri

March 31, 2011

Source: 2010 Home Visiting Needs Assessment
Health Outcomes / Factors Map – County Health Rankings, 2013

Different years, same counties..

<table>
<thead>
<tr>
<th>Rank</th>
<th>Health Outcomes</th>
<th>Rank</th>
<th>Health Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>St Louis City</td>
<td>106</td>
<td>Reynolds</td>
</tr>
<tr>
<td>107</td>
<td>Wayne</td>
<td>107</td>
<td>Butler</td>
</tr>
<tr>
<td>108</td>
<td>Mississippi</td>
<td>108</td>
<td>Carter</td>
</tr>
<tr>
<td>109</td>
<td>Butler</td>
<td>109</td>
<td>Ripley</td>
</tr>
<tr>
<td>110</td>
<td>Washington</td>
<td>110</td>
<td>New Madrid</td>
</tr>
<tr>
<td>111</td>
<td>New Madrid</td>
<td>111</td>
<td>Mississippi</td>
</tr>
<tr>
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<td>Reynolds</td>
<td>112</td>
<td>Dunklin</td>
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<tr>
<td>113</td>
<td>Ripley</td>
<td>113</td>
<td>Washington</td>
</tr>
<tr>
<td>114</td>
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<td>Pemiscot</td>
</tr>
<tr>
<td>115</td>
<td>Pemiscot</td>
<td>115</td>
<td>St Louis City</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>105</td>
<td>St Louis City</td>
<td>105</td>
<td>Miller</td>
</tr>
<tr>
<td>106</td>
<td>Wayne</td>
<td>106</td>
<td>New Madrid</td>
</tr>
<tr>
<td>107</td>
<td>Iron</td>
<td>107</td>
<td>Reynolds</td>
</tr>
<tr>
<td>108</td>
<td>Washington</td>
<td>108</td>
<td>Ripley</td>
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<td>Butler</td>
<td>109</td>
<td>Mississippi</td>
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<tr>
<td>110</td>
<td>Reynolds</td>
<td>110</td>
<td>Shannon</td>
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<tr>
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<td>New Madrid</td>
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<td>Washington</td>
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<td>Dunklin</td>
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<td>114</td>
<td>Ripley</td>
<td>114</td>
<td>Pemiscot</td>
</tr>
<tr>
<td>115</td>
<td>Pemiscot</td>
<td>115</td>
<td>St Louis City</td>
</tr>
</tbody>
</table>

Source: County Health Rankings, [http://www.countyhealthrankings.org](http://www.countyhealthrankings.org)
Life Course Perspective

Life Course Perspective: Theme of Missouri

MCH Priorities

- Improve Health Care Access for MCH populations
- Improve preconception health among women of childbearing age
- Reduce the rate of teen pregnancies and births
- Prevent and Reduce Smoking Among Women and Adolescents
- Reduce Obesity Among Women, Children and Adolescents

Source: 2010 Missouri Title V MCH Needs Assessment
MISSOURI MCH PRIORITIES (contd…)

- Reduce Disparities in Adverse Birth and Pregnancy Outcomes
- Support Adequate Early Childhood Development and Education
- Improve the Mental Health Status of MCH Populations
- Enhance access to oral health care services for MCH populations
- Reduce Intentional and Unintentional Injuries Among Women, Children, and Adolescents

Source: 2010 Missouri Title V MCH Needs Assessment
Pregnancy Risk Assessment Monitoring System (PRAMS)

http://www.cdc.gov/prams/

http://health.mo.gov/data/prams/
PRAMS

- Population based surveillance system that collects state-specific data on maternal attitudes, behaviors and experiences before, during and shortly after pregnancy.
- Collects information not available through any other data sources.
- Standardized methodology across all PRAMS states makes data comparison possible.
- Stratified random sample of women with a recent live birth (2-4 months).
PRAMS Participation, 2012

PRAMS represents approximately 78% of all U.S. live births
PRAMS Surveys

- Data collection primarily by mailed paper survey
- Survey booklets are 14 pages and around
  - 85 questions in length
- Telephone follow-up
  - Takes 20 - 30 minutes to complete
- Phase V (2007-2008),
- Phase VI (2009-2011)
- Phase VII (2012- Present)
Selected PRAMS Survey Topics

- Breastfeeding
- Cigarette smoking during pregnancy
- Contraceptive use
- HIV counseling and testing
- Infant Sleep Position
- Influenza vaccination
- Medicaid and WIC participation
- Multivitamin use
- Physical abuse
- Preconception health
- Prenatal care
- Unintended pregnancy
MO PRAMS and CPONDER

http://www.cdc.gov/prams/cponder.htm

CPONDER – CDC’s PRAMS On-line data For Epidemiologic Research

Public Access web data portal

Users have the ability to design their own analysis by choosing from an indexed list of available categorical variables.

2007, 2009 & 2010 MO PRAMS data is on CPONDER
Summary

- Significant declines in IMR – US and MO, racial disparities persist
- Downward trend in PTB’s between 2008 and 2013 (US and MO from grade D to C)
- PTB’s continue to be the leading cause of infant deaths, particularly among African-American babies
- Access to care (Insurance and otherwise) continues to be a major public health challenge
- 72% of PTB’s are Late PTB’s (34-36 weeks)
- Smoking during pregnancy and among women of childbearing age – High time to alter course
Summary

- Bootheel region and STL City continue to be areas of concern in the state
- Intra-/Inter-agency coordination – Data & Programs
- Pre-/Inter-conception (WIC?) care
- In the absence of a comprehensive approach to address social determinants of health (poverty, education, housing) gains in public health sector will be offset by losses in other sectors of society
US spends two-and-a-half times the OECD average

Total health expenditure per capita, public and private, 2010 (or nearest year)

USD PPP

1. In the Netherlands, it is not possible to clearly distinguish the public and private share related to investments.
2. Total expenditure excluding investments.

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

Source: OECD Health Data 2012.
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THANK YOU!

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“We ourselves feel that what we are doing is just a drop in the ocean. But if that drop was not in the ocean, I think the ocean would be less because of that missing drop.”

- Mother Teresa