From Infant mortality to women’s health

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One Day Conference
October 25, 2007
Basic Health Indicators

**Infant Mortality Rate (IMR):** number of infant deaths per 1,000 live births

**Maternal Mortality Ratio (MMR):** number of maternal deaths per 100,000 live births
Infant Mortality

**Infant mortality rate (IMR):** indicator of general health, economic and social well-being status in a population.

Healthy People 2010 goal: IMR = 4.5
Infant Mortality in Michigan

- Persistently higher than U.S. average
- Larger racial disparities compared to U.S.
Infant Mortality Rate (IMR): Michigan compared to United States

<table>
<thead>
<tr>
<th>Year</th>
<th>MI</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>20.3</td>
<td>20</td>
</tr>
<tr>
<td>1980</td>
<td>12.8</td>
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</tr>
<tr>
<td>1985</td>
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<td>2004</td>
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<tr>
<td>2005</td>
<td>7.9</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>7.4</td>
<td></td>
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Infant Mortality Rate by Race: Michigan compared to United States

<table>
<thead>
<tr>
<th>Year</th>
<th>Black MI</th>
<th>Black US</th>
<th>White MI</th>
<th>White US</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>21.6</td>
<td>18.0</td>
<td>7.9</td>
<td>7.6</td>
</tr>
<tr>
<td>1995</td>
<td>17.3</td>
<td>15.1</td>
<td>6.2</td>
<td>6.3</td>
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<td>1996</td>
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<td>1997</td>
<td>17.6</td>
<td>14.2</td>
<td>6.1</td>
<td>6.0</td>
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<tr>
<td>1998</td>
<td>16.8</td>
<td>14.3</td>
<td>6.3</td>
<td>6.0</td>
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<td>1999</td>
<td>17.9</td>
<td>14.6</td>
<td>5.9</td>
<td>5.8</td>
</tr>
<tr>
<td>2000</td>
<td>18.2</td>
<td>14.0</td>
<td>6.0</td>
<td>5.7</td>
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<tr>
<td>2001</td>
<td>16.9</td>
<td>14.0</td>
<td>6.1</td>
<td>5.7</td>
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<tr>
<td>2002</td>
<td>18.4</td>
<td>14.4</td>
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<td>5.8</td>
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<tr>
<td>2003</td>
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<td>5.8</td>
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<tr>
<td>2004</td>
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<td>2005</td>
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<td>5.4</td>
</tr>
<tr>
<td>2006</td>
<td>14.8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Infant Mortality in Michigan

- Persistently higher than U.S. average
- Larger racial disparities compared to U.S.
- **Geographic analysis identifies communities with highest infant mortality**
Eleven communities with high Black IMR

Berrien  Genesee  Ingham  Kalamazoo  Kent  Macomb  Oakland  Saginaw  Washtenaw  Wayne  Detroit City

2005  2006
Infant Mortality in Michigan

- Persistently higher than U.S. average
- Larger racial disparities compared to U.S.
- Geographic analysis identifies 16 communities with highest infant mortality
- PPOR analysis points to Maternal Health/Prematurity as main target for intervention

Leading causes: Low Birth Weight (LBW)/Prematurity and Congenital anomalies

Literature points to comprehensive intervention for both, mother and baby
What is PPOR?
Perinatal Periods Of Risk: New Approach to Infant Mortality

6 KEY STEPS FOR PPOR
1. Engage community partners
2. Map feto-infant mortality
3. Focus on overall rate
4. Examine potential opportunity gaps
5. Target further efforts
6. Mobilize for sustainable systems change
**PPOR : Excess Feto-Infant Mortality to Blacks in Michigan**

<table>
<thead>
<tr>
<th></th>
<th>Maternal Health/Prematurity</th>
<th>Maternal Care</th>
<th>Newborn Care</th>
<th>Infant Health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2005</strong></td>
<td>7.5</td>
<td>2.2</td>
<td>1.7</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>2006</strong></td>
<td>5.4</td>
<td>1.3</td>
<td>0.8</td>
<td>2.5</td>
</tr>
</tbody>
</table>

392 Total Feto-Infant Deaths  
Total feto-infant mortality rate: 17.6

348 Total Feto-Infant Deaths  
Total feto-infant mortality rate: 15.2

Reminder: PPOR counts only 500 grams and over
Map Connections to Action

Maternal Health/Prematurity
- Preconceptional Health
- Health Behaviors
- Perinatal Care

Maternal Care
- Prenatal Care
- High Risk Referral
- Obstetric Care

Newborn Care
- Perinatal Management
- Neonatal Care
- Pediatric Surgery

Infant Health
- Sleep Position
- Breast Feeding
- Injury Prevention
- Prevention
Maternal Health/Prematurity

- Smoking
- Prenatal care
- Race
- Maternal age
- Parity
- Multiple Pregnancy
- STD/Bacterial Vag.
- Previous preterm births
- Unintended pregnancy
- Alcohol/drug use
- Maternal health conditions

Birthweight Distribution (VLBW Births)

Birthweight- Specific Mortality Rates

- Gestational age
- Referral system
- Mother transfer
- Infant transfer
- Perinatal care
- Neonatal conditions
- Pay source
- Maternal complications

CDC / CityMatCH: PPOR - PC
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- **Leading causes: Low Birth Weight (LBW)/Prematurity and Congenital anomalies**
## Infant Deaths by Age at Death and Underlying Cause of Death

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>&lt;1 Year</th>
<th>&lt;1 Day</th>
<th>1-6 Days</th>
<th>7-27 Days</th>
<th>1-5 Months</th>
<th>6-11 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disorders relating to short gestation and unspecified low birth weight</td>
<td>201</td>
<td>178</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Congenital anomalies</td>
<td>185</td>
<td>86</td>
<td>27</td>
<td>30</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>Unintentional injuries</td>
<td>71</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>51</td>
<td>12</td>
</tr>
<tr>
<td>Respiratory distress newborn</td>
<td>36</td>
<td>11</td>
<td>15</td>
<td>8</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Sudden infant death syndrome</td>
<td>51</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>42</td>
<td>5</td>
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<tr>
<td>Other respiratory conditions of newborn</td>
<td>28</td>
<td>6</td>
<td>3</td>
<td>10</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Homicide</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>All other causes</td>
<td>359</td>
<td>136</td>
<td>55</td>
<td>65</td>
<td>81</td>
<td>22</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>940</strong></td>
<td><strong>417</strong></td>
<td><strong>111</strong></td>
<td><strong>132</strong></td>
<td><strong>219</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>

Source: 2006 Michigan Resident Death File, Vital Records and Health Data Development Section, MDCH
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- Leading causes: Low Birth Weight (LBW) and Congenital anomalies
- Literature points to comprehensive intervention for both, mother and baby
PPOR-Driven Interventions: from Knowing to Doing

- Identify critical information and evidence-based approaches in key areas
- Assure participating communities understand the data/information
- Assess current intervention strategies and compare to evidence-based strategies
- Revise or develop new plan based on community assessment, intervention strategy assessment or other information
Comprehensive interventions

- Community initiatives (i.e., Fetal and Infant Mortality Review, Infant Mortality Coalitions, etc.)

- Understanding the Perinatal system of care: Perinatal Survey

- Maternal Mortality Surveillance
Michigan Maternal Mortality Background

*Michigan Maternal Mortality Study (MMMS) Initiated in 1950* as a collaborative effort among:

- Michigan Department of Community Health,
- Committee on Maternal and Perinatal Health of the Michigan State Medical Society and
- Chairs of the Departments of Obstetrics and Gynecology of the Medical Schools in Michigan

*Currently: Michigan Maternal Mortality Surveillance (MMMS) is:*

- Michigan Department of Community Health (MDCH)’s program
- Bureau of Epidemiology and Bureau of Family, Maternal and Child Health share the responsibilities
- Committee on Maternal and Perinatal Health of the Michigan State Medical Society - committed and strong partner
## Maternal Deaths by Race

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>White</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of cases</td>
<td>50</td>
<td>34</td>
<td>41</td>
<td>35</td>
<td>37</td>
<td>41</td>
<td>52</td>
</tr>
<tr>
<td>MMR</td>
<td>47.7</td>
<td>32.3</td>
<td>38.9</td>
<td>34.0</td>
<td>36.3</td>
<td>40.7</td>
<td>52.5</td>
</tr>
<tr>
<td><strong>Black</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Cases</td>
<td>21</td>
<td>25</td>
<td>28</td>
<td>28</td>
<td>23</td>
<td>41</td>
<td>37</td>
</tr>
<tr>
<td>MMR</td>
<td>88.1</td>
<td>103.9</td>
<td>119.2</td>
<td>125.9</td>
<td>102.8</td>
<td>182.5</td>
<td>165.4</td>
</tr>
<tr>
<td><strong>Black/White Ratio</strong></td>
<td>1.8</td>
<td>3.2</td>
<td>3.1</td>
<td>3.7</td>
<td>2.8</td>
<td>4.5</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Maternal deaths to other races: 3 in 1999, 2 in 2000, 3 in 2002; 4 in 2003; 11 in 2005

Maternal death with unknown race: 1 in 2001 and 5 in 2003
Maternal morbidity

- Maternal mortality represents the definitive consequence of severe maternal morbidity
- For every woman who dies, many suffer serious life-threatening complications of pregnancy

Maternal morbidity:
- a public health problem that affects nearly 1.7 million women annually (AJPH, 2003)
- related to a pre-existing medical condition that affects or is exacerbated by pregnancy, or a pregnancy-related medical condition
- not very well understood, less frequently measured and more difficult to track at the population level than maternal mortality
Health beyond pregnancy

- Health conditions that women may experience before or during pregnancy have a great impact on pregnancy outcomes.
- Pregnancy outcome is shaped by social, psychological, behavioral, environmental, and biological forces: “multiple determinants” model.
- Preconception and interconception health as important as prenatal health.
- Further prevention strategies should be focused on improving women’s health not just during but beyond pregnancy.
- Develop partnership and collaboration among organizations, programs, public health professionals and providers, etc.
Epidemiological analyses/studies

Presented at the state and national meetings
- Racial disparities in maternal mortality
- Trends in maternal mortality
- Maternal morbidity: an emerging issue
- Pregnancy outcomes in Medicaid population
- WIC studies:
  1/ VLBW and birth outcomes among WIC and non-WIC Medicaid participants for residents of Detroit
  2/ Postneonatal infant mortality among WIC and non-WIC Medicaid participants for residents of Detroit
The Special Supplemental Nutrition Program for Women, Infants, and Children (better known as the WIC Program) seeks to safeguard the health of low-income nutritionally at-risk women, infants, & children under the age of five years old.

- WIC is administered by the Department of Agriculture, unlike other MCH programs.
- WIC is a federal grant program not an entitlement program.
  - Congress authorizes a specific amount of funds each year for the program.
- WIC Legislative Requirements are contained in Section 17 of the Child Nutrition Act of 1966.
There are 48 WIC agencies with approximately 248 clinics that work with clients, in Michigan.

Approximately half babies born in Michigan receive WIC benefits.

For every dollar spent by this program, more than three dollars in subsequent health care costs are saved.

Local communities are supported with more than $120 million yearly when WIC foods are purchased at grocery stores and pharmacies.
The mission of the Michigan WIC program is to improve the health outcome and quality of life for eligible women, infants, and children by providing nutritious food, nutrition education, breastfeeding promotion, and support and referrals to health and other services.
To this end, Michigan WIC seeks to:

- deliver services and supports in a caring, respectful, efficient, cost effective confidential, and culturally competent manner
- Assure the broadest possible access to services, supports, and food
WIC Eligibility

There are four eligibility criteria that must be met to participate in Michigan WIC:

- be a pregnant or postpartum woman, infant, or child (under the age of five years old);
- be a resident of Michigan;
- be at or below 185% of the Poverty Income Guideline or participate in another state administered program that utilizes the same income criteria; and
- be classified by a health professional as “nutritionally at risk.”
WIC data

- Data from Michigan’s WIC program can be obtained via two methods:
  - Accessing Michigan’s data warehouse
  - Obtaining Michigan PedNSS/PNSS data from the CDC

- Both sets of information are derived from the same source: information from the local agency.
- The type of information provided is slightly different depending on the method used to access the data
The Pregnancy Nutrition Surveillance System (PNSS) is a program-based public health nutritional surveillance system that monitors the health outcome of low-income women who participate in federally funded maternal and child health programs.

- Nationally PNSS data represent approximately 750,000 pregnant and postpartum women.

Pediatric Nutrition Surveillance System (PedNSS) is the national child-based surveillance system used by public health professionals to monitor the nutritional status of children participating in the federally-funded maternal and child health programs.

- Nationally PedNSS data represent more than 7 million children from birth to 5 years old.
So how are our participants doing?
1st Trimester WIC Entry
Normal Pre-pregnancy BMI
Ideal Weight Gain During Pregnancy
Smoking
Infant Low Birthweight
Breastfeeding Initiation

Worse
Better

-15% -10% -5% 0% 5% 10% 15% 20%

-12% -3% 2% 5% 12% 20%
PedNSS Health Progress: Michigan

- Low Birthweight: -10%
- High Birthweight: 10%
- Ever Breastfed: 18%
- Breastfed 6 months: 28%
- Short Stature: 10%
- Underweight: 13%
- Risk of Overweight: 9%
- Overweight: -5%
PNSS Health Progress: Detroit DHWP

- **1st Trimester WIC Entry**: Worse (43%) Better (36%)
- **Normal Pre-pregnancy BMI**: Worse (-5%) Better (3%)
- **Ideal Weight Gain During Pregnancy**: Worse (-16%) Better (8%)
- **Smoking**: Better (36%)
- **Infant Low Birthweight**: Better (43%)
- **Breastfeeding Initiation**: Better (36%)
PedNSS Health Progress: Detroit DHWP

- Low Birthweight: worse by 12%, better by 0%
- High Birthweight: worse by 2%
- Ever Breastfed: better by 22%
- Breastfed 6 months: better by 30%
- Short Stature: worse by 14%, better by 0%
- Underweight: worse by 3%, better by 0%
- Risk of Overweight: worse by 1%, better by 0%
- Overweight: worse by 8%, better by 0%
PNSS Health Progress: Kent CHD

1st Trimester WIC Entry
-35%

Normal Pre-pregnancy BMI
-3%

Ideal Weight Gain During Pregnancy
12%

Smoking
17%

Infant Low Birthweight
8%

Breastfeeding Initiation
13%
Thank you for your attention

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