
Maternal Mortality and Severe Maternal Morbidity
ACOG-CDC Study Group
Washington DC, May 15, 2016

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Michigan Maternal Mortality Medical Survey
Pregnancy-related deaths. The death of a woman while pregnant or within one year of termination of pregnancy, irrespective of duration and site of pregnancy, from any cause related to or aggravated by her pregnancy or its management, but not from accidental or incidental causes.


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Lessons Learned from Maternal Mortality Surveillance in Michigan, 1999-2004

45th Annual Conference on Maternal and Perinatal Health

- James Gell, MD: Chair Medical Committee
- Joseph Moore, MD: Chair Injury Committee
- Federico Mariona, MD, FACOG: Medical and Interdisciplinary Committees
- Norma Killilea, RN, MA: MMMS coordinator
- Helen Sanders, BBA, AAS, Office of Vital Statistics and Health Data Development: data linkage
The possible role of maternal obesity has not been previously evaluated in Michigan.
DEFINITIONS

World Health Organization/National Institutes of Health

Body Mass Index (BMI) Kg/m²

BMI

• Normal Weight 18.5 to 24.9
• Overweight 25.0 to 29.9
• Obesity ≥ 30
  Class I 30 to 34.9
  Class II 35 to 39.9
  Class III (extreme obesity) ≥ 40
  with comorbidities ≥ 35

• Super obesity (8.0%) ≥ 50
Goal evaluate the potential role of maternal obesity as a risk factor for pregnancy related deaths

Objective develop a statewide preconception educational program to address maternal obesity and its short and long term adverse effects on mothers and newborns

Purpose utilize evidence-based, value added interventions to decrease or reverse the growing epidemic of obesity in Michigan
Voluntary reporting from different sources

Sort cases and prepare materials for review

Non-Injury

MMMS Medical Review Committee Recommendations for prevention strategies

Injury

MMMS Injury Committee Recommendations for prevention strategies

Case review findings:
- entered in MMMS database
- summarized by Medical & Injury Committee Chairs

MMMS Interdisciplinary Committee Translates Recommendations to actions

Analysis of MMMS data / Annual Report
Method

- Secondary review of voluntary reported maternal deaths to the State 2004-2006
- Records were identified by the MMMRS
- Approved by MDCH (now MDHHS) IRB 201204-06-XA 07/11/2012 Exempt 46.101b4
- Retrospective manual record review of the three year cohort
- SPSS version 18-19 for analysis
- Debra Kimball, RN  MDCH liaison
BACKGROUND

Live births  384,765
Pregnancy associated deaths  N= 205
                      MMR  53.2/100,000
Pregnancy related deaths  N= 67 (32.7 %)
Maternal obesity BMI ≥ 30 K/m² (≥ 30 to 73 K/m²)  53.7 %
                      MMR  34.1/100,000
# Maternal Demographics

- Black American: 54% (2004, N=33)
- White: 42% (2005, N=23)
- Hispanic: 3% (2006, N=11)

<table>
<thead>
<tr>
<th>Maternal Age (years)</th>
<th>Body Mass Index (K/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>30-34</td>
</tr>
<tr>
<td>20-24</td>
<td>35-39.9</td>
</tr>
<tr>
<td>25-29</td>
<td>40-44.9</td>
</tr>
<tr>
<td>30-34</td>
<td>45-49.9</td>
</tr>
<tr>
<td>35-39</td>
<td>≥ 50</td>
</tr>
<tr>
<td>40-44</td>
<td>NR</td>
</tr>
<tr>
<td>≥ 45</td>
<td>NR</td>
</tr>
</tbody>
</table>

*30% of BMI data not recorded (NR)*
Maternal Demographics

- Health Care Insurance: 43.2%
- Cesarean delivery: 37.0%
- Cardiovascular/Diabetes (1st): 41.0%
- P.P.H (2nd): 28.0%
- Sepsis (3rd): 11.0%
- Eclampsia: 8.3%
- Thrombosis: 5.5%
- PRD ≥ 42 days PP: 4.87%
- NN survival: 55.0%
- No autopsy: 6.00%
## RESULTS

<table>
<thead>
<tr>
<th></th>
<th>Died</th>
<th>Alive</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obese</td>
<td>36</td>
<td>105,425</td>
<td>105,461</td>
</tr>
<tr>
<td>Non-obese</td>
<td>25</td>
<td>279,340</td>
<td>279,365</td>
</tr>
<tr>
<td>Missing BMI</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>384,765</td>
<td>384,826</td>
</tr>
</tbody>
</table>

Expected 17 deaths in the obese group
Observed 36 deaths
Expected 44 deaths in the non obese group
Observed 25 deaths

Chi square 3.098  $p<0.001$
CONCLUSION

2004 to 2006  384,765 live births reported

• Pregnancy associated deaths  N=205  MMR 53.2/100,000
• Pregnancy related deaths        N=67  (32.7%)
• Maternal obesity        53.7 %  MMR 34.1/100,000
• Maternal non-obese  36.3 %  MMR 9.0/100,000

This preliminary study shows that maternal obesity increases the risk of maternal death in obese pregnant women by a factor of 3.7 X
LIMITATIONS

• Retrospective study, limited size sample
• Report of maternal deaths is voluntary in Michigan
• Information may be missing or misclassified
• Number of deaths may be underestimated

• Better understanding of the geopolitical environs
• Develop targeted prevention strategies
• Assess/evaluate collaborative processes; clinical outcomes are key for improvement
• 3 Post-Hoc studies are in progress.