A Comparison of Stillbirth and Early Neonatal Mortality Rates in Central Africa

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INTRODUCTION
- Perinatal deaths account for 7% of the global burden of disease.
- Each year, over 8 million stillbirths and neonatal deaths occur.
- 98% of these deaths and stillbirths occur in developing countries.
- Vital registration systems that include cause of death and differentiate between stillbirth and neonatal death are available for less than 3% of all perinatal deaths.
- Over 68% of perinatal deaths occur in community settings.
- There is a paucity of community-derived perinatal data from emerging countries and especially from rural Central Africa.

OBJECTIVES
- To estimate the proportion of fresh and macerated stillbirths.
- To compare stillbirth and early neonatal mortality rates.
- To obtain an accurate population-based registry of all deliveries that differentiates between stillbirths and early neonatal deaths in a remote, rural area of Central Africa.
- To collect stillbirth and neonatal data from emerging countries and especially from rural Central Africa.

METHODS
- A prospective observational study.
- Cohort of all stillbirths and live infants born to consented mothers in 21 geographically scattered study villages within 4 health districts of the Equateur Province, Democratic Republic of Congo.
- Enrollment period: June 20, 2005 to August 31, 2006.
- Follow-up of subjects through the first 7 days postpartum.
- Stillbirths determined by birth attendant (nurses and traditional birth attendants) and defined as no breathing, heart rate and movement after delivery.
- Early neonatal death defined as death of a live born infant before 7 days of life.

RESULTS

Figure 1. Study Population

Of 6021 pregnant women screened, 5,997 consented to participate in this study. There were 186 stillbirths and 3811 live births. Of these, there were 194 early neonatal deaths.

Table 1. Characteristics of Enrolled Infants and Deliveries*

<table>
<thead>
<tr>
<th>Site</th>
<th>Number enrolled</th>
<th>Birth Weight (grams)±SD</th>
<th>Vaginal</th>
<th>Breech</th>
<th>C-section</th>
<th>Doctor or TBA</th>
<th>TBA or other</th>
<th>Mother/TBA Clinic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bodumbili, Bomogoro</td>
<td>558</td>
<td>3.053± 574</td>
<td>98%</td>
<td>2%</td>
<td>0%</td>
<td>17%</td>
<td>83%</td>
<td>8%</td>
</tr>
<tr>
<td>Bodangani, Bombogra</td>
<td>584</td>
<td>3.07± 530</td>
<td>98%</td>
<td>1%</td>
<td>0%</td>
<td>48%</td>
<td>52%</td>
<td>49%</td>
</tr>
<tr>
<td>Bodubola, Bousedoko</td>
<td>392</td>
<td>3.156± 676</td>
<td>98%</td>
<td>2%</td>
<td>0%</td>
<td>14%</td>
<td>86%</td>
<td>55%</td>
</tr>
<tr>
<td>Bodubole, Bokivwa</td>
<td>360</td>
<td>3.029± 557</td>
<td>97%</td>
<td>3%</td>
<td>0%</td>
<td>24%</td>
<td>76%</td>
<td>76%</td>
</tr>
<tr>
<td>Bodoula, Bokivwa</td>
<td>632</td>
<td>3.069± 570</td>
<td>98%</td>
<td>2%</td>
<td>0%</td>
<td>9%</td>
<td>92%</td>
<td>98%</td>
</tr>
<tr>
<td>Bokivwa</td>
<td>624</td>
<td>3.03± 563</td>
<td>98%</td>
<td>2%</td>
<td>0%</td>
<td>6%</td>
<td>58%</td>
<td>40%</td>
</tr>
<tr>
<td>Bogadoula, Bousedoko</td>
<td>486</td>
<td>3.005± 549</td>
<td>98%</td>
<td>2%</td>
<td>1%</td>
<td>13%</td>
<td>87%</td>
<td>84%</td>
</tr>
<tr>
<td>Bodangani, Bodugbwa</td>
<td>666</td>
<td>3.085± 565</td>
<td>98%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>8%</td>
<td>76%</td>
</tr>
<tr>
<td>Bogadoula, Bousedoko</td>
<td>80</td>
<td>2.959± 573</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>36%</td>
<td>42%</td>
<td>12%</td>
</tr>
<tr>
<td>Bodubola / Bombubalo</td>
<td>789</td>
<td>3.03± 563</td>
<td>98%</td>
<td>2%</td>
<td>1%</td>
<td>22%</td>
<td>78%</td>
<td>78%</td>
</tr>
</tbody>
</table>

Characteristics of Deliveries
- 99% of deliveries occurred in communities.
- 74% at home.
- 25% in local health centers.
- <1% in hospitals.
- 98% of deliveries were vaginal.
- 78% of deliveries were attended by skilled personnel.

Characteristics of Infants
- Mean birth weight was 3.03Kg.
- 16% were low birth weight (LBW <2.5Kg).
- 15% were very low birth weight (VLBW <1.5Kg).

Characteristics of Deaths
- Stillbirths (SB) rate was 31/1000 births.
- 75% of SB were fresh.
- 24% of SB were macerated.
- 1% of SB were unclassified.
- 64% of SB were LBW.
- 31% of SB were VLBW.
- Early neonatal death (END) rate was 34/1000 live births.
- 65% of END were LBW.
- 22% of END were VLBW.

DISCUSSION

- The stillbirth (SB) rate of 31/1000 births was less than WHO estimates (42/1000 births). Rigorous training was provided to accurately classify SB and END, thus avoiding the problem of misclassifying an END as a SB and overestimating stillbirths.
- The early neonatal death (END) rate of 34/1000 live births is similar to WHO estimates (35/1000 live births).
- The Neonatal Mortality Rate (deaths before 28 days/1000 live births) calculated from our data, was 45/1000 live births (using the assumption that 75% of all neonatal deaths occur in the first 7 days). This approximates the WHO regional estimates of 47/1000 live births.
- The fresh: macerated SB ratio was 3:1. Fresh SB implies death during labor or delivery, while macerated SB implies an in-utero insult days or weeks before delivery. The fresh: macerated SB ratio may reflect the quality of antenatal and obstetric care - the lower the ratio, the higher the quality of care.

Of SB were fresh.
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- 31% of SB were VLBW.
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- 65% of END were LBW.
- 22% of END were VLBW.

- The stillbirth and Early Neonatal Deaths remain a significant problem in Central Africa.
- The high percentage of unskilled personnel attending births and high fresh SB rates suggest there may be an important role for improved intrapartum training in neonatal resuscitation and post-resuscitation care.
- Nearly 80% of early neonatal deaths were in infants greater than 1500gms, suggesting that in remote geographic areas with weak health systems, targeted interventions such as kangaroo care and improved feeding practices may significantly improve neonatal survival.

Figure 4. Global Network and WHO Estimates of Stillbirths and Neonatal Deaths

Table 2. Characteristics of Birth Attendants

| Site          | Number attended | Delivery Type | Birth Attendant | Location
<table>
<thead>
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<td>392</td>
<td>C-section</td>
<td>Mother</td>
<td>Clinic</td>
</tr>
</tbody>
</table>

Characteristics of Birth Attendants
- Physician
- Nurse or Midwife
- Traditional Birth Attendants (nonpaid)