Underlying causes of perinatal deaths among cases undergoing minimally invasive tissue sampling in Bangladesh

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Perinatal death refers to the number of stillbirths and deaths in the first week of life (early neonatal mortality).

The estimated global stillbirth rate~ 13.9 per 1,000 total births in 2019, declined from 16.7 in 2010 (unicef).

Stillbirth reduction rate is significantly slow compared to the reduction of under 5 mortality due to:

- less exploration of underlying factors of perinatal deaths
- lack of standardized vital registration system

Estimated perinatal mortality rate (PNMR) in Bangladesh (2014)~ 41 per 1,000 pregnancies (Hossain et. al)
CHAMPS

- **Child Health and Mortality Prevention Surveillance- multi-country programme** -
  - Understand and track the preventable causes of childhood deaths in seven countries
  - Postmortem minimally invasive tissue sampling (MITS) and other information
What is MITS?

- A technique comprising very fine needles to collect tissue samples from deceased body
- Done within 24 hours of death
- Use needle to collect tissues from brain, lung, liver, heart, bone
- Collect other fluid (Blood, CSF) and swabs (throat, rectal)
Baliakandi sub-district of Rajbari, since Sept 2017

Faridpur, since Oct 2018

Mostly rural area

Total population of Baliakandi ~225,912 (2019)

Minimally invasive tissue sampling (MITS) started since October 2017
Major components of CHAMPS Bangladesh

1. Demographic Surveillance System (DSS)
2. Mortality Surveillance
3. Social and Behavioral Science
4. Laboratory
5. Determination of Cause of Death (DeCoDe)
CHAMPS: MITS to Determination of Cause of Death (DeCoDe)

Deceased child → Minimally Invasive Tissue Sampling → Tissue specimens

Brain → Lung → Heart → Liver

Blood → CSF

Stool → NP/OP swab

Non-Tissue specimens

Histopathology-BSMMU → Systemic response

Immunohistochemistry-CDC → Specific detection of microorganism

Microbial culture

Real Time PCR (Taqman Array Card)

Bacteria → Fungi

Virus → Fungi → Nematodes → Toxins

Bacteria

Fungi

Specific detection of microorganism

Microbial culture

Real Time PCR (Taqman Array Card)

Inform Family & Policy makers

Cause of Death

Clinical report

DeCoDe

Verbal autopsy

Demographic data

Deceased child

CHAMPS: Child Health and Mortality Prevention Surveillance
What is DeCoDe?

- An expert panel determined cause of death for MITS cases and reviewed following data:
  - Child clinical data
  - Maternal clinical data
  - Histopathology and laboratory investigation reports
  - Verbal autopsy findings
- Using all the available information panel assigned:
  - Underlying cause of death
  - Immediate cause of death
  - Morbid Condition
  - Main maternal disease/condition
- The panel also recommends action that could have potentially prevented these deaths
Objective

To explore underlying causes of perinatal deaths among cases undergoing MITS in Bangladesh
What is Underlying and Immediate cause?

**Underlying cause or factor**

is the one, which started the chain of linked events leading to the immediate cause of death

**Immediate cause**

is the final event in the causal pathway leading to death
As of 31 October 2020, we analyzed underlying cause for 151 deaths, determined from DeCoDe panel.

We also analyzed maternal condition related to 72 stillbirths and 68 early neonates.
Underlying Cause of death among stillbirths (N=72)
Underlying Cause of death among early neonatal deaths (N=68)
### Maternal conditions

<table>
<thead>
<tr>
<th>Stillbirths (N=72)</th>
<th>Early Neonatal Deaths (N=68)</th>
</tr>
</thead>
</table>

#### Maternal Condition
- Pregnancy complication
- Delivery complication
- Placenta complication
- Medical & surgical condition
- Unknown
# Maternal conditions

<table>
<thead>
<tr>
<th>Medical &amp; Surgical Condition</th>
<th>Hypertension, Diabetes, Infection, Anemia, Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pregnancy Complication</td>
<td>Premature rupture of membrane, Oligohydramnios, Polyhydramnios, Twin pregnancy, cervical incompetence, Spontaneous labour</td>
</tr>
<tr>
<td>Placenta Complication</td>
<td>Abruptio placenta, Placenta previa, placental insufficiency, Chorioamnionitis, Cord prolapse, Cord around the neck</td>
</tr>
<tr>
<td>Delivery complication</td>
<td>Breech delivery, Transverse lie, Precipitate labour, Induction of labour, Rupture uterus, Prolong pregnancy</td>
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</table>
Recommendation from expert panel

- Expert panel considered 78 (65%) of 120 preventable deaths as preventable through regular quality antenatal care (ANC) from skilled health care provider.
- Recommendations for other 42 (35%) preventable cases include the following common themes:
  - Improved clinical management and quality of care at the facility level
  - Improved health-seeking behavior
  - Improved infection prevention and control
ANC visits are common but at facilities with poor readiness

- In 2019, we started pregnancy surveillance to better understand the ANC and Postnatal Care (PNC) in Baliakandi.
- From there we found, most women are seeking ANC but not from quality health facility.
- A cross-sectional survey of health facilities serving the Baliakandi population in 2019 concluded that majority of health facilities from where they were taking ANC were not prepared to provide quality ANC or with poor readiness.
- A composite index was developed to assess overall service readiness.
<table>
<thead>
<tr>
<th>Place of ANC visit (Major places)</th>
<th>Number of ANC visit</th>
<th>Percentage (%) of ANC visit (N=13,705)</th>
<th>Readiness score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private clinic</td>
<td>4,249</td>
<td>31%</td>
<td>57%</td>
</tr>
<tr>
<td>Chamber of qualified doctor</td>
<td>3,426</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Union Health &amp; Family Welfare Centre (UH&amp;FWC)</td>
<td>1,645</td>
<td>12%</td>
<td>51%</td>
</tr>
<tr>
<td>Community clinic at village level</td>
<td>1,233</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>District hospital/Medical college hospital</td>
<td>548</td>
<td>4%</td>
<td>86%</td>
</tr>
<tr>
<td>Baliakandi Upazila Health Complex (BUHC)</td>
<td>548</td>
<td>4%</td>
<td>90%</td>
</tr>
</tbody>
</table>
Conclusion

- **Stillbirth**-
  - Main Underlying cause: IUH
  - Main maternal condition: placenta and hypertension related complications

- **Early neonatal deaths**-
  - Main Underlying cause: preterm LBW, Birth Asphyxia
  - Main maternal condition: Hypertension, Diabetes, infection, Anemia

- Quality ANC from skilled health care provider can prevent such perinatal deaths

- Lack of robust information from the mother about infection during pregnancy
Scope for future work

- Identify the gaps in providing quality ANC
- Adequate on-site laboratory facilities for evidence based quality ANC
- Exploration of the barriers behind inappropriate clinical management
Thank you

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