LIFE-COURSE APPROACH

MALNUTRITION OF THE MOTHER DIRECTLY INFLUENCES HERSELF AND HER CHILD

-9–6 months

Women of reproductive age

-6–24 months

Adolescence

Childhood

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### Short-term consequences of maternal malnutrition

<table>
<thead>
<tr>
<th>Maternal nutritional problem</th>
<th>Associated health consequences</th>
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</thead>
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<td>Short maternal status (stunting)</td>
<td>Maternal and neonatal death, SGA</td>
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<tr>
<td>Underweight</td>
<td>SGA</td>
</tr>
<tr>
<td>Obesity</td>
<td>gestational diabetes, pre-eclampsia, haemorrhage, neonatal and infant death</td>
</tr>
<tr>
<td>Anemia and iron</td>
<td>LBW, perinatal mortality, maternal mortality</td>
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<tr>
<td>Vitamin A</td>
<td>LBW, infant mortality</td>
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<tr>
<td>Zinc</td>
<td>pre-term delivery, delivery complications</td>
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<tr>
<td>Iodine</td>
<td>lowered IQ, mental retardation, sub-optimal cognitive development and growth</td>
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<tr>
<td>Folate</td>
<td>neural tube defects</td>
</tr>
<tr>
<td>Calcium &amp; Vitamin D</td>
<td>hypertension during pregnancy, pre-eclampsia, preterm birth and SGA</td>
</tr>
</tbody>
</table>

### Long-term consequences of maternal malnutrition

- Early puberty
- Metabolic syndrome
- High BMI obesity
- Early adipsity rebound
- Rapid growth
- Fetal macrosomia
- Fetal growth restriction
- Hormonal response
- Placental metal shooow
- Maternal glucose insulin
- + Energy balance
- Early pregnancy BMI

**Sources:** Bhutta et al. Lancet 2013, Black et al. Lancet 2013

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Both short & long term consequences for mother and child
UNDERLYING NUTRITION-RELATED CAUSES OF MATERNAL DEATHS

- Iron-deficient anemia is a risk factor for death due to hemorrhage.
- Calcium & vit D deficiency contribute to hypertension, pre-eclampsia and eclampsia.
- Micronutrient deficiencies reduce immune response.
- Chronic Energy Deficiency contributes to prolonged labor.
- Stunting contributes to obstructed labor.

Haemorrhage: 35%
Hypertension: 18%
Other direct: 11%
Unsafe abortion*: 9%
Sepsis: 8%
Embolism: 1%
Indirect: 18%

*Note: *Indicates an indirect cause.

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NUTRITIONAL RISK FACTORS FOR HYPERTENSIVE DISORDERS/PREECLAMPSIA

Maternal weight:
- Pre-pregnancy overweight ↑ risk ~x2 (1.99 for HTD, 2.28 for preeclampsia)
- ↑ risk with ↑ BMI (~2x risk by ~5-7kg/m² ↑)

Maternal micronutrient status
- Micronutrients in general:
  • Supplementation → ↓27% preeclampsia
- Calcium:
  • Supplementation → ↓52% preeclampsia, mainly in deficient populations
- Vitamin D deficiency:
  • ↑ risk ~x2 (OR 2.09) especially in early pregnancy

Source: Bhutta, et al. (2011a), Black et al. 2013
EVIDENCE OF KEY PREVENTATIVE INTERVENTIONS

- Calcium suppl. → ↓ risk 52%
  - In deplete populations & high risk of hypertensive disorders
  - To fill a dietary gap, not as therapy

- Other
  - Multivitamin suppl. → ↓ risk 27%
  - Physical activity: → ↓ risk 35%
  - Reduction of salt intake in general

- Insufficient evidence:
  - Vitamin D supplementation – limited evidence (incl. safety)

- No effect: Antioxidants (Vit E & C)

Source: WHO 2011, Bhutta, et al. (2011a)
**Pre-term**
- Pre-pregnancy weight status:
  - Underweight
  - Overweight/obesity
  - Indirectly: hypertension, pre-eclampsia
- Micronutrient deficiencies?
  - Zinc suppl
  - Calcium suppl
  - Vit D def – pre-term and pre-eclampsia
- Fatty acids?
- Nutrition related disorders

**Small for Gestational Age (SGA)**
- Pre-pregnancy weight status:
  - **Underweight**
  - Overweight/obesity
- Short stature (stunting)
- Micronutrient deficiencies
  - Iron def
  - Vit A?
  - **Vit D def**
- Nutrition related diseases
  - Hypertension (Vit D, Calcium)
  - Anemia (Mod/Sev)

Black et al, 2013
Optimize pre-pregnancy weight
– Including the promotion of physical activity

Promote healthy nutrition
– Improved micronutrient intakes
  • Supplementation
  • Other: fortification, dietary diversification, biofortification
– Reduction of salt (generally)
NUTRITION AND PRECONCEPTION HEALTH

HEALTHY WOMEN, MOTHERS & BABIES

IMMEDIATE
- Reproductive health & family planning
- Healthy diet, physical activity, micronutrient supplementation
- Screening & management of chronic diseases/infectious diseases (immunization)

INTERMEDIATE
Essential health services
Care for adolescent girls & women
Adequate nutrition

UNDERLYING
Healthy environment & women’s empowerment:
- Financial independence & education
- Preventing violence against women & girls

Adapted from WHO, 2012
BEYOND THE HEALTH SYSTEM AND BEFORE PREGNANCY

- Start pre-conception → adolescent girls
- Intervene beyond the health system
  - Workplace
  - Community e.g. girl centers
  - Schools
  - Sports
  - Social media
- Social change – not only individual behavior change
REFERENCES


Thank you