Public Health Implications

Conclusions and Recommendations of the Task Force

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21 May 2013
Outline

• Background – the current situation

• Conclusions – the way forward

• Recommendations for policy makers and health professionals
Pregnant Women in the UK

- Average age of mothers is increasing
  - 1st pregnancy 27.8y; England & Wales
- As many as 1 in 10 babies born to a teenage mother
- In 2010, 25.1% of births in England and Wales were to mothers born outside UK.
- Increase in birth rate – latest census

Average age of mothers giving birth in England and Wales
More than 5 in 10 women are overweight or obese (57.6%)
Physical Activity Levels

- Only a third of women of childbearing age meet the recommendations of >30 minutes of physical activity on at least 5 days of the week.

Self-reported percentage of women of childbearing age meeting the physical activity recommendations, by age in England 1997 to 2008
Objective summary activity levels (base: boys and girls aged 4-15 with 7 days’ valid accelerometry)

96% 11-15 year old girls have a LOW activity level

Source: BHF 2012
Implications of Maternal Obesity

Maternal Outcomes by BMI Category

- 29% of obese women reported taking folic acid supplements pre-conception; **but** only 1.4% took the recommended 5mg  (CMACE & RCOG 2010 - national study March-Apr 2009)
Implications of Maternal Obesity

- Increased risk of NTDs compared to healthy weight women
  - Less likely to take folic acid and have increased risk of folate deficiency compared to women of a healthy weight (Centre for Maternal & Child Enquiries, 2010)

- Increased risk of vitamin D deficiency compared to healthy weight women (CMACE, 2010)

- Increased risk of fetal/infant death (Tennant et al 2011)

Tennant PW, Rankin K & Bell R, 2011
# Nutrient intakes in women

% with average daily intake of vitamins and minerals from food sources below the LRNI, by age

In 2002, among **11-18 year olds** – similar data to 2012

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>14</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Thiamin</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>21</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Niacin equivalent</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin B₉</td>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Folate</td>
<td>7</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Iron</td>
<td>46</td>
<td>23</td>
<td>41</td>
</tr>
<tr>
<td>Calcium</td>
<td>18</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Magnesium</td>
<td>51</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>Potassium</td>
<td>31</td>
<td>23</td>
<td>30</td>
</tr>
<tr>
<td>Zinc</td>
<td>19</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Selenium</td>
<td>45</td>
<td>52</td>
<td>Not measured</td>
</tr>
<tr>
<td>Iodine</td>
<td>21</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

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Teenage Girls

- A study of pregnant teenagers (n=500) in inner city London and Manchester reported anaemia in 63% in late pregnancy and low 25-OH vitamin D levels in 18% of white and 49% black pregnant adolescents (Baker et al 2009)
- Only 7% of teenagers took folic acid supplements preconception; rose to 44% in early pregnancy <20 weeks (Baker et al 2009)
- Increased incidence of smoking in this age group (Infant Feeding Survey 2010)
- Babies more likely to have low birth weight and less likely to be breast-fed (Infant Feeding Survey 2010)
- Increased risk of postnatal depression (NICE 2012).

Vitamin & mineral intakes (food and supplements): % below LRNI

<table>
<thead>
<tr>
<th>Vitamin/Mineral</th>
<th>Female 11-18</th>
<th>Female 19-64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>Folate</td>
<td>6</td>
<td>3</td>
</tr>
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<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Magnesium</td>
<td>50</td>
<td>11</td>
</tr>
<tr>
<td>Zinc</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Iodine</td>
<td>20</td>
<td>9</td>
</tr>
</tbody>
</table>

Bates et al, 2012
Lower socioeconomic groups

- Lower use of folic acid supplements
- Women are often shorter, are more likely to have low or high pre-pregnancy BMI and low weight gain in pregnancy
- Babies more likely to be low birth weight and pre-term
- Babies less likely to be breast-fed (Infant Feeding Survey 2010).
Ethnic minority groups

- Young women from ethnic minorities are least likely to take folic acid supplements pre-conception (Stockley and Lund 2008)
- At risk of vitamin D deficiency. Healthy diet plus sun exposure unlikely to be sufficient for some groups
- Latest Infant Feeding survey shows better breast feeding rates in non-white ethnic groups (exclusive and mixed feeding combined)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Birth</th>
<th>1 week</th>
<th>6 weeks</th>
<th>4 months</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>79</td>
<td>67</td>
<td>52</td>
<td>39</td>
<td>32</td>
</tr>
<tr>
<td>Asian or Asian British</td>
<td>96</td>
<td>83</td>
<td>73</td>
<td>58</td>
<td>49</td>
</tr>
<tr>
<td>Black or Black British</td>
<td>95</td>
<td>90</td>
<td>85</td>
<td>73</td>
<td>61</td>
</tr>
<tr>
<td>Chinese or other ethnic groups</td>
<td>96</td>
<td>92</td>
<td>82</td>
<td>76</td>
<td>66</td>
</tr>
</tbody>
</table>

Infant Feeding Survey, 2010

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Conclusions – the way forward
Maternal body weight

- Maternal obesity increases risk of pre-eclampsia and a small, growth retarded baby
- Gestational diabetes more common in obese women (5% of pregnancies), increasing fuel to the baby and birth weight (and T2DM risk)
- Gestational weight gain not routinely monitored in UK
- Currently no UK guidelines on appropriate weight gain
- Need far more emphasis on and support with attaining healthy weight postpartum.

USA recommendations for total and rate of weight gain during pregnancy by pre-pregnancy BMI

<table>
<thead>
<tr>
<th>Pre-pregnancy weight</th>
<th>Recommended mean rates of weight gain in 2nd and 3rd trimester (average range/week)</th>
<th>Recommended range of total weight gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BMI kg/m²</td>
<td>Kg/week</td>
</tr>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>0.5-0.6</td>
</tr>
<tr>
<td>Normal weight</td>
<td>18.5-24.9</td>
<td>0.4-0.5</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
<td>0.2-0.3</td>
</tr>
<tr>
<td>Obese</td>
<td>≥30</td>
<td>0.2-0.3</td>
</tr>
</tbody>
</table>

Institute of Medicine, 2009

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Accelerated ‘catch up’ growth

- Poor fetal growth may also affect kidney development, increasing sensitivity to the blood pressure raising effect of salt and hence CVD risk.
- Postnatal growth: linear growth vs. fat mass.
- In low and middle income countries ‘catch-up’ growth important in achieving growth potential (Adair et al. 2013).
- Fast linear growth (and weight gain) in the first 2 years is associated with increased adult height and amount of schooling (supporting the focus on the first 1000 days) (Adair et al. 2013).
- Adair study also reinforces the importance of preventing rapid relative weight gain after age 2y, associated with increased adult obesity and blood pressure.
- Breastfeeding may protect against later obesity (estimated 7-22% reduction in obesity in later life with breastfeeding of varying degree).
Physical activity

- Physical activity has many benefits during pregnancy: enhanced fitness, reduced muscle cramps and reduced swelling of legs and feet.
- Adverse pregnancy or neonatal outcomes are not increased in women who exercise.
- Exercise during lactation does not affect the quantity or composition of breast milk or impact on fetal growth.
- *Start Active, Stay Active* (2011) highlights importance of physical activity in infants and young children (active play - 3h/day once they can walk)

  • Aerobic and strength-conditioning exercise, without trying to reach peak fitness level or train for athletic competition
  • Activities that minimize the risk of loss of balance and fetal trauma
  • Initiation of pelvic floor exercises in the immediate postpartum period may reduce the risk of future urinary incontinence.

http://www.rcog.org.uk/womens-health/clinical-guidance/exercise-pregnancy
Vitamin D

• Average intake among women (19-64y) from dietary sources is 2.6µg/day (Bates et al. 2011).
• Low status common in pregnant women (especially in winter) and neonatal and infant vitamin D status is considered dependent on maternal status.
• Current UK advice: pregnant and lactating women, infants, young children (and those 65+ years) to supplement diet.
• At risk groups
• Relationship between maternal vitamin D supplementation and bone mineral content at age 9-10y questioned (Lawlor et al. 2013)
• Additional roles proposed for vitamin D in protecting against diabetes, CVD and some cancers and in optimising immune function.

Prevalence of vitamin D deficiency in individuals in the UK (25OHD < 25nmol/L)

Lanham-New et al 2011

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Folate/Folic acid

- Women of childbearing age - 400μg/day supplement folic acid and consume foods that provide folate and folic acid
- Relatively poor uptake preconception (e.g. NI study - 19% vs. 84% in 1st trimester, McNulty et al. 2011)
- Women who have had a previous NTD advised to take 5mg/day
- Raised BMI also increases risk of NTD (5mg/day suggested for obese)
- Over 70 countries globally (none in EU) have introduced mandatory folic acid fortification of flour to prevent NTD
- Recent study on folic acid and cancer published (Vollset et al. 2013) – Government decision on fortification soon?

Examples of the impact of global folic acid fortification on NTDs

<table>
<thead>
<tr>
<th>Country</th>
<th>Year of introduction</th>
<th>Fortification</th>
<th>Decrease in NTDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>1998</td>
<td>150μg/100 wheat flour</td>
<td>46% by 2002</td>
</tr>
<tr>
<td>Chile</td>
<td>2000</td>
<td>220μg/100 wheat flour</td>
<td>40% by 2002</td>
</tr>
<tr>
<td>South Africa</td>
<td>2003</td>
<td>150μg/100 wheat flour 221μg/100g maize flour</td>
<td>31% by 2005</td>
</tr>
<tr>
<td>USA</td>
<td>1998</td>
<td>140μg/100 wheat flour</td>
<td>27% by 2000</td>
</tr>
</tbody>
</table>
Iodine

- 21% of adolescent girls have intakes below LRNI (NDNS).
- Sea fish, shellfish, seaweed are rich sources. Milk is also a major source in the UK diet.
- Unclear whether mild-moderate deficiency (present in many parts of Europe) has detrimental impact on cognitive function.
- Severe deficiency causes cretinism and affects cognitive development (WHO recommends 20-40mg iodine per kg table salt).

Urinary iodine concentration in 737 UK schoolgirls, showing mild (50–99 µg/L), moderate (20–49 µg/L), and severe (<20 µg/L) iodine deficiency

Vanderpump et al, 2011
Other nutrients of interest

• Iron
  – Iron intake (46% teenage girls below the LRNI)
  – Policy in UK – no routine fortification of pregnant women
  – But iron supplements should be offered if Hb<110g/L in 1st trimester or <105g/L at 28 weeks (SACN 2010)
  – Iron in the weaning diet – once weaning starts, choice of food and use of formula/follow-on milk plays a key role

• Essential fatty acids
  – Cognitive and neural development
  – n-3 PUFAs of particular concern as conversion limited and oily fish intake well below recommendations
  – 450mg/day of DHA and EPA (combined) is recommended for adults (SACN, 2004)
  – EFSA - extra 100-200mg DHA in pregnancy and lactation
  – Birth spacing.
Prevalence of exclusive breastfeeding up to 6 months in the UK in 2010 (infant Feeding Survey 2010)

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Protein in infant formula

- Evidence to support the benefit of lower protein formats for infant and follow-on formula to achieve growth trajectories in line with breastfeeding

**Mean z-scores (with 95% CIs) for weight in lower-protein and higher-protein groups and in the breastfed children at 0–8 wk of age and at 3, 6, 12, and 24 mo of age.**

Koletzco et al 2009
Proportion of mothers introducing solids at different ages in the UK (2005 vs 2010)
Public health recommendations from the Task Force Report for policy makers and health professionals
Recommendations to policy makers

Maternal obesity

• Pregnancy is a good time to target health behaviour changes.
• Need for clear policy on body weight control and **avoidance of obesity** in pregnancy.
• Better services for women **prior to pregnancy** and support for women in achieving and maintaining a healthy body weight **after** pregnancy.
• Many pregnancies unplanned so a **broad preventative** and public health **strategy** for young women is needed.
• Effective **partnerships** needed between maternity and public health services to manage diet, physical activity and weight throughout the ‘reproductive cycle’.
• Need for **leadership** from government in up-skilling HCPs in obesity prevention and weight loss support.
Recommendations to policy makers

Teenage pregnancy

- Main policy focus is (appropriately) on prevention.
- Support is needed where pregnancies do occur – Family based programmes (e.g. Family Nurse Partnership in England).

Vitamin D

- Healthy Start vitamins available for low income families, but wider need across the population.
- Department of Health leaflet on vitamin D deficiency welcomed (2012)
- But need for on-going promotion of the vitamin D message to relevant audiences.
Recommendations to policy makers

Folic acid supplements

- Awareness of importance of supplementation seems high but uptake remains low.
- Need to target vulnerable groups (less well educated, young women, ? obese women)
- Reaching women whose pregnancies are unplanned is challenging. Fortification of foods may be an option.
Recommendations to policy makers

Breastfeeding and formula feeding

- Evidence-based strategies for promoting initiation and extending duration of breastfeeding should remain high on the agenda.
- Continued support for events to raise awareness of benefits of breastfeeding, increase social acceptance and promote support for breastfeeding mothers (e.g. National Breastfeeding Week).
- **BUT** also need to provide advice and support for mothers who cannot breastfeed or choose to formula feed (on all aspects of infant feeding).
- Ensure midwives, health visitors, pharmacists etc. are able to support parents regardless of the choices they make and have access to up to date information on relevant aspects of formula feeding.
Recommendations to policy makers

**Introduction of solids**

- Need for *more clarity* for health professionals and mothers about:
  - current recommendations of when and how to wean
  - behavioural aspects of infant feeding (portion sizes, pace of progression, introduction of textures)
- SACN review on complementary and young child feeding is underway.
  - Communication of findings should include *targeted training* to a wide range of health professionals (health visitors, community-based nurses, GPs, pharmacists and nursery and childcare professionals)
Recommendations to health professionals

• Promote and support breastfeeding.
• Provide advice and support to parents using infant formulas/ follow-on milks (up-to-date knowledge of formulas available and how to prepare and store formula safely).
• Opportunistic strategy to improve uptake of vitamin D supplements, particularly in vulnerable groups.
• Opportunistic strategy to raise awareness and uptake of folic acid supplements.
• Training to ensure widespread understanding and effective communication of:
  • risks/complications of maternal obesity and effect on the child’s future health
  • effect of rate of excess weight gain in infancy.
• BNF/RCM training modules.
New resources from BNF

http://www.nutrition.org.uk/healthyliving/healthylifeplanner

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Nutrition and Development: 
Short- and Long-Term 
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Edited by British Nutrition Foundation

The report of the 
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