Overview of current maternal, infant and young child nutritional health in the UK

Siân Robinson
20 April 2016
Nutritional health: a lifecourse perspective
Nutritional health: an overview

• A lifecourse approach – pre-conception, pregnancy, infancy, childhood

• What are the key issues? – diet quality, infant feeding practice, obesity

• Inequalities in nutritional health

• Implications for policy and preventive strategies?
The Southampton Women’s Survey
The Southampton Women’s Survey

12,583 non-pregnant women (20-34 y) interviewed 1998-2002, information collected about diet, body composition, physical activity and lifestyle.

- 3,159 pregnant women
- diet assessed at 11 & 34 weeks, ultrasound scans at 11, 19 and 34 weeks
- neonatal measurements, cord blood
- children followed-up at 6 & 12 months, 2, 3, 4, 6, 8 & 10 years
Diet quality
Diet quality: headline messages from the National Diet & Nutrition Survey (Y1-Y4)

• a third of adults meeting ‘5-a-day ‘recommendation

• average consumption of oily fish well below the recommended 1 portion per week in all age groups

• average saturated fat intakes exceeded the DRV (no more than 11% food energy) in all age groups

• average non-milk extrinsic sugar intakes > DRV (no more than 11% food energy) for all age groups - children aged 11 to 18 years (15.6%)

• average intakes of non-starch polysaccharides for adults 13-14g (< DRV set at least 18g per day)

• significant proportion boys and girls aged 11 to 18 years and adults with low vitamin D status, low riboflavin status
NDNS: food consumption according to income quintile (women)
NDNS: food consumption according to income quintile (women)
Defining ‘quality’ of diet

• Uses principal component analysis to identify dietary patterns

• Most important pattern in mothers and children describes ‘healthiness’ or ‘quality’ of diet

• Every SWS mother (before and during pregnancy) and child (infancy and childhood) has a diet quality score
Differences in diet quality across the population

High diet quality scores

High consumption of fruit, vegetables, fish

Low consumption of refined cereals, chips added sugar

High antioxidant status (blood biomarkers)

Low consumption of refined cereals, chips added sugar

High antioxidant status (blood biomarkers)
Diet quality and nutritional status

High diet quality scores

- High consumption of fruit, vegetables, fish
- Higher status: vitamin D, folate, omega 3 (blood biomarkers)

- Low consumption of refined cereals, chips, added sugar
- Higher antioxidant status (blood biomarkers)
% of SWS women with diets of lowest ‘quality’ according to level of educational attainment

% of none, CSE, O-level, A-level, HND, degree.
Influences on children’s diet quality at age 3 years

- Mother’s diet quality
- Birth order
- Poverty/food insecurity
- Mother’s education
- Mother is obese
1 in 20 SWS children aged 3 years living in food insecure homes

- Higher energy intake/kg
- More sugar
- More white bread
- More crisps
- Fewer wholemeal bread
- Fewer vegetables

% SWS 3-year-olds with poor quality diets according to quality of mother’s diet & birth order

Quality of mother’s diet (diet score)

Fisk et al Br J Nutr (2011)
The importance of a mother’s own dietary choices

- Birth order
- Poverty/food insecurity
- Mother’s education
- Mother is obese

Mother’s diet quality
When do differences in diet quality start?
Feeding choices at 6 months: Jack

<table>
<thead>
<tr>
<th>Time</th>
<th>Meal Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0945</td>
<td>Cow &amp; gate plus baby milk</td>
<td>196g</td>
</tr>
<tr>
<td>1000</td>
<td>Farleys sunfruit orange rusk</td>
<td>14g</td>
</tr>
<tr>
<td>1530</td>
<td>Cow &amp; gate plus baby milk</td>
<td>196g</td>
</tr>
<tr>
<td>1800</td>
<td>Heinz vegetable &amp; chicken casserole</td>
<td>128g</td>
</tr>
<tr>
<td></td>
<td>Oven chips</td>
<td>40g</td>
</tr>
<tr>
<td></td>
<td>Cow &amp; gate plus baby milk</td>
<td>196g</td>
</tr>
</tbody>
</table>

### Feeding choices at 6 months: Sara

<table>
<thead>
<tr>
<th>Time</th>
<th>Meal/Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>0930</td>
<td>Farleys reduced sugar gluten free rusk</td>
<td>28g</td>
</tr>
<tr>
<td>1200</td>
<td>Farleys bear biscuits (6 months)</td>
<td>8g</td>
</tr>
<tr>
<td>1250</td>
<td>Squash fruit drink</td>
<td>252g</td>
</tr>
<tr>
<td></td>
<td>Hipp jar, vegetable &amp; beef risotto (4 mo)</td>
<td>63g</td>
</tr>
<tr>
<td></td>
<td>Hipp jar, banana &amp; peach dessert (4mo)</td>
<td>63g</td>
</tr>
<tr>
<td>1500</td>
<td>White chocolate</td>
<td>50g</td>
</tr>
<tr>
<td>1800</td>
<td>Milk, whole pasteurised</td>
<td>224g</td>
</tr>
</tbody>
</table>

## Feeding choices at 6 months: Aaron

<table>
<thead>
<tr>
<th>Time</th>
<th>Meal/Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>0930</td>
<td>Breastfeed</td>
<td>10min</td>
</tr>
<tr>
<td>13.30</td>
<td>Tomato, cooked</td>
<td>16g</td>
</tr>
<tr>
<td></td>
<td>White rice boiled</td>
<td>16g</td>
</tr>
<tr>
<td></td>
<td>Lentils, boiled</td>
<td>5g</td>
</tr>
<tr>
<td></td>
<td>Split peas, boiled</td>
<td>15g</td>
</tr>
<tr>
<td></td>
<td>Carrots</td>
<td>15g</td>
</tr>
<tr>
<td></td>
<td>Pepper</td>
<td>15g</td>
</tr>
<tr>
<td></td>
<td>Squash, butternut</td>
<td>15g</td>
</tr>
<tr>
<td>1430</td>
<td>Milupa aptamil extra</td>
<td>80g</td>
</tr>
<tr>
<td>1600</td>
<td>Banana</td>
<td>68g</td>
</tr>
<tr>
<td>1600</td>
<td>Pear</td>
<td>128g</td>
</tr>
<tr>
<td>1900</td>
<td>Breastfeed</td>
<td>10min</td>
</tr>
<tr>
<td>2200</td>
<td>Breastfeed</td>
<td>10min</td>
</tr>
</tbody>
</table>

Diet quality in SWS children

<table>
<thead>
<tr>
<th>Age</th>
<th>High consumption</th>
<th>Low consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>vegetables, fruit, meat and fish, other home-prepared foods, breast milk</td>
<td>commercial baby foods, formula milk</td>
</tr>
<tr>
<td>12 months</td>
<td>vegetables, fruit, rice and pasta, fish, cheese and meat</td>
<td>commercial baby foods</td>
</tr>
<tr>
<td>3 years</td>
<td>fruit, vegetables, water, wholemeal bread, fish, fruit juices</td>
<td>white bread, crisps, chips, processed meat, confectionery, cakes and biscuits</td>
</tr>
<tr>
<td>6 years</td>
<td>fruit, vegetables, water, wholemeal bread, fish, nuts &amp; seeds</td>
<td>white bread, crisps, chips, confectionery, soft drinks</td>
</tr>
</tbody>
</table>
Tracking of diet quality in early childhood: correlation matrix of diet quality scores 6 months to 6 years

<table>
<thead>
<tr>
<th>Diet quality score</th>
<th>6 months</th>
<th>12 months</th>
<th>3 years</th>
<th>6 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 months</td>
<td>0.53</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 years</td>
<td>0.38</td>
<td>0.63</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6 years</td>
<td>0.32</td>
<td>0.51</td>
<td>0.69</td>
<td>-</td>
</tr>
</tbody>
</table>

Mean (95% CI) diet score at each age according to childhood ‘diet quality index’

Diet quality across infancy and early childhood predicts adiposity at age 6 years

*adjusted for child’s sex, age at DXA, height, duration of breast-feeding, physical activity level; mother’s BMI, smoking status in pregnancy, gestational weight gain, vitamin D status

Infant feeding practice
Rates of any breastfeeding at 6 months by country

Australia 60%
New Zealand 60%
USA 50%
UK 30%
Sweden 50%
Norway 70%

Victora et al 2016. Lancet series on breastfeeding
Patterns of breastfeeding in Norway and the UK

Williams T, Foyle G. in Growing up in the UK – Ensuring a healthy future for our children. BMA 2013
Prevalence of breastfeeding according to mothers occupation: Infant Feeding Survey 2010

http://www.ic.nhs.uk/pubs/infantfeeding10final
Shorter duration of breastfeeding

Odds of having five+ GCSE grades at grade C or above

Fat mass at 9-10 years in the ALSPAC cohort

% with infections 0-6mo (SWS)

Fisk et al MCN 2011

Toschke et al (2007) AJCN 85: 1578

Straub et al 2016 Br J Nutr
Obesity
Health Survey for England: rising prevalence of obesity* in women aged 16-44 years in period 1993-2010

*BMI ≥30kg/m²

Associated with:

• excess gestational weight gain
• pregnancy complications (GDM, pre-eclampsia)
• lower duration of breastfeeding
• obesity in children
BMI distribution: Reception children
National Child Measurement Programme 2010/11

Boys
Girls

1990 baseline

2nd centile
85th centile
91st centile
95th centile
98th centile

BMI z score
Trends in hospital admission rates (2000–2009) for obesity and where obesity was a comorbidity, among children aged 5 to 19 years

Obesity prevalence by deprivation decile
National Child Measurement Programme 2014/15

Children obesity: BMI ≥ 95th centile of the UK90 growth reference

Patterns and trends in child obesity
Weight status of English children aged 4-5 years (2014/15)*

*Data from the National Child Measurement Programme
Early life risk factors for childhood obesity

- Obese mother
- Excess gestational weight gain
- Low vitamin D status
- Smokes in pregnancy
- No/short breastfeeding
Early life risk factors and fat mass at 6 years

Adjusted for age at DXA, height, sex, gestational age, maternal height, parity, age at child’s birth and education (Am J Clin Nutr 2015;101:368-375).
Clustering of early life risk factors: maternal education

Number of early life risk factors

%
Height of children according to deprivation index: NCMP

Hancock et al. Arch Dis Child 2016;101:422-426
Nutritional health: an overview

• Poor diet quality is common – high consumption of energy-dense, micronutrient-poor foods

• Breastfeeding rates are low – out of step with comparable countries

• Poor nutrition spread unevenly across the population – associated with lower maternal education

• Most evident as overweight and obesity
Inequalities in nutritional health

- Poor diet quality in mother → Child has poor diet
- Mother is overweight/obese → ↑Gains in adiposity/obesity risk in childhood → Short breastfeeding duration → Poorer cognitive development, school performance
Perpetuation of inequalities in nutritional health

- Poor diet quality in mother
  - Child has poor diet
    - Gains in adiposity / obesity risk in childhood
      - Poorer cognitive development, school performance
- Mother is overweight/obese
  - Short breastfeeding duration
  - Poor diet quality in mother
- Child has poor diet
  - Gains in adiposity / obesity risk in childhood
- Mother is overweight/obese
  - Short breastfeeding duration
Breaking the cycle: starting before conception?

- Modifiable health behaviours – that are linked

- They point to the value of interventions *before conception* as part of effective preventive strategies for childhood obesity and promotion of child health

- Benefits for future generations
But also...

• consider our acceptance of differences in nutritional health across the population

• successful interventions and policies to encourage behaviour change need to recognise the influence of the wider social and economic environment and provide effective support, particularly for more vulnerable families.