

Nutrition in Utero: Giving Children the best start in life

Dr Julie Abayomi

Reader in Dietetics

Liverpool John Moores University

Good nutrition in the 1st 1000 days

- Between conception & a child's 2nd birthday
 - has more influence on a child's future than any other time in their life.
- This includes:
 - Pre-conception
 - Pregnancy
 - Breast feeding
 - Weaning



Consequences of poor maternal nutrition

- Low birth weight
 - Short term health, risks such as
 - hearing/visual impairment
 - Delays in neural development
- Preterm birth
 - Micronutrient deficiencies
- Long term risks
 - Non communicable disease as adults
 - Barker 2008

Prevention of NCD

- The work of DJP Barker, in Southampton
 - Low birth weight infants
 - reflecting poor nutrition in utero
 - Low weight at 12 months
 - reflecting poor nutrition in early life
 - Found to have increased risk of obesity, type 2 diabetes, hypertension, & CVD as adults.
 - Gene expression may be permanently altered by nutrient environment in early life.

Risk of childhood obesity

- Pregnant women with:
 - a high BMI ($> 30 \text{ kg/m}^2$)
 - poorly nourished
 - or gain excessive weight during pregnancy
- → Increased risk of obesity in offspring
 - WHO 2017

Healthy eating guidelines for pregnancy

- Pregnant women require slightly higher amounts of some nutrients:
 - Energy (+200 kcal in 3rd trimester only)
 - Protein
 - Vitamins A, B group & C
 - Folic acid
 - Vitamin D

Healthy eating guidelines for pregnancy

- Pregnant women require slightly higher amounts of some nutrients:

- Energy (+200 kcal in 3rd trimester only)

- Protein

- Vitamins A, B group & C

- Folic acid

- Vitamin D



Unlikely to be
lacking in a normal
balanced diet

Healthy eating guidelines for pregnancy

- Pregnant women require slightly higher amounts of some nutrients:

- Energy (+200 kcal in 3rd trimester only)

- Protein

- Vitamins A, B group & C

- Folic acid

- Vitamin D

Unlikely to be
lacking in a normal
balanced diet

Supplements of these are
recommended:
400µg & 10µg

Iron & Calcium

- No *additional* requirements for pregnancy
 - COMA 1991
- However, some women may have poor intake of these key nutrients regardless of pregnancy.
 - Strict vegetarians
 - Teenagers
 - Poor diet (low SES)
 - Refugees/asylum seekers
- Supplements may be required

Iodine in pregnancy

- WHO considers iodine deficiency to be “*the single most important preventable cause of brain damage*” worldwide
- Severe deficiency in pregnancy is known to result in cretinism and mental retardation
- Mild deficiency can affect IQ in offspring
 - Bath *et al.*, (2013)
- NDNS (2016) 40% of UK women (age 19-50) were deficient in iodine

Gestational weight gain (GWG)

- Currently there are no UK guidelines for healthy weight gain pregnancy
 - Often USA Institute of Medicine guidelines are referred to:
 - BMI 18.5 -25 kg/m² = 25-35 lb (11-16 kg)
 - BMI 25-30 kg/m² = 15-25 lb (6-11 kg)
 - BMI > 30 kg/m² = 11-20 lb (5-9 kg)
 - IOM 2009

Overweight & excessive GWG

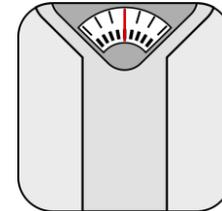
- Associated with health risks for both mother & baby
 - Pre-eclampsia
 - Gestational/type 2 diabetes
 - Thromboembolism
 - C-section & post op complications
 - Macrosomia/Shoulder dystocia
 - Childhood obesity
- CEMACH 2007
 - 50% of all maternal deaths associated with obesity.

Prevalence of Overweight in Pregnancy

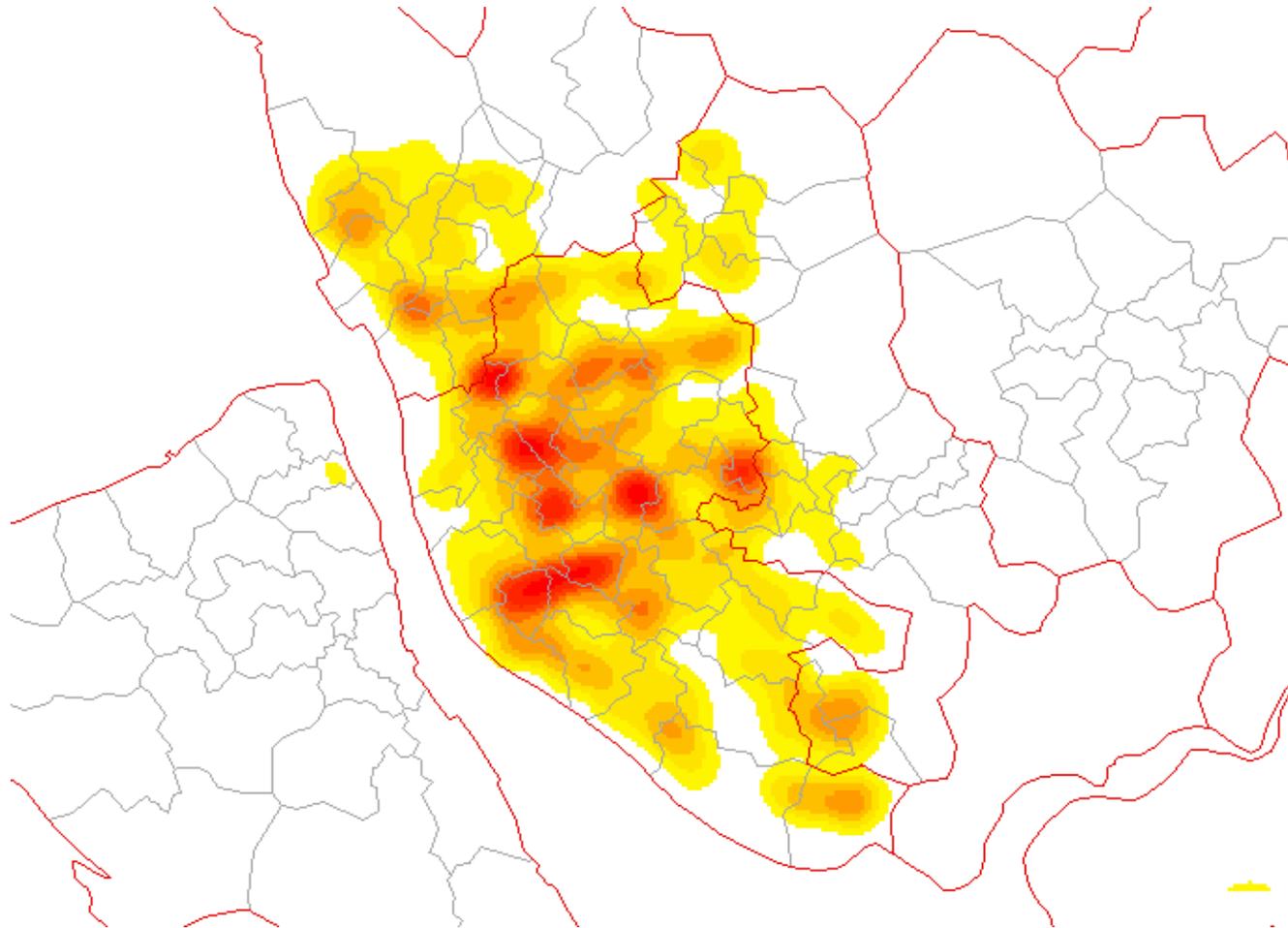
- Liverpool (~ 8,000 deliveries per year)
 - 26.7% = overweight (BMI \geq 25 kg/m²)
 - 17.2% = obese (BMI \geq 30 kg/m²)
 - Highest BMI = **65.7kg/m²**
 - Abayomi *et al.*, 2009
- England
 - 26% = overweight & 21% = obese
 - Health and Social Care Information Centre, 2017.
- Every 1 in 1000 UK pregnancies BMI \geq 50 kg/m²
 - NICE 2010

Under Weight women in Liverpool

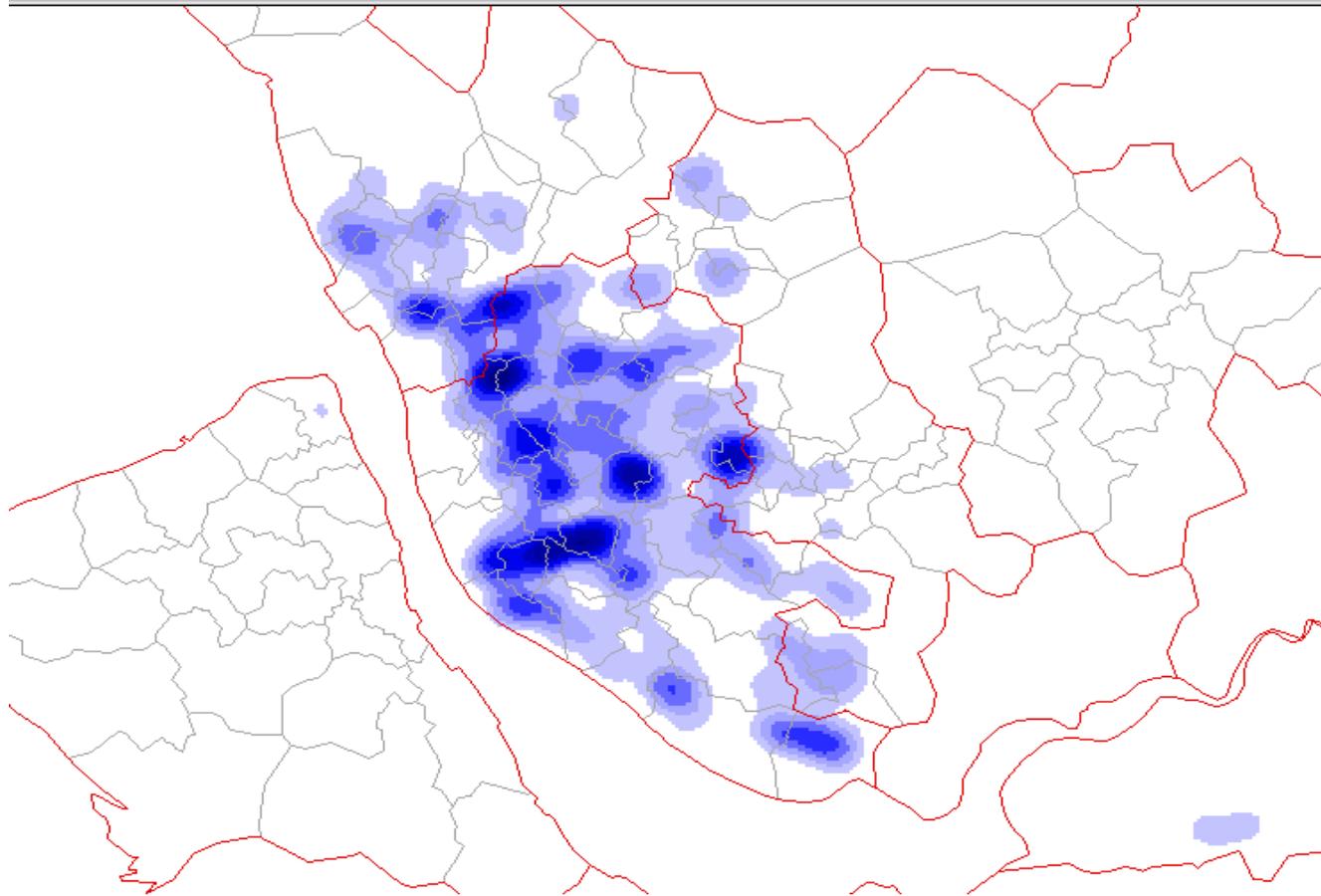
- In Liverpool
- 10% underweight (BMI < 20 kg/m²)
 - 4% (n=267) BMI < 18.5 kg/m²
 - Lowest BMI = 14.3 kg/m²
 - Abayomi *et al.*, 2009
- Increased risk:
 - LBW/IUGR
 - Pre-term delivery
 - anaemia



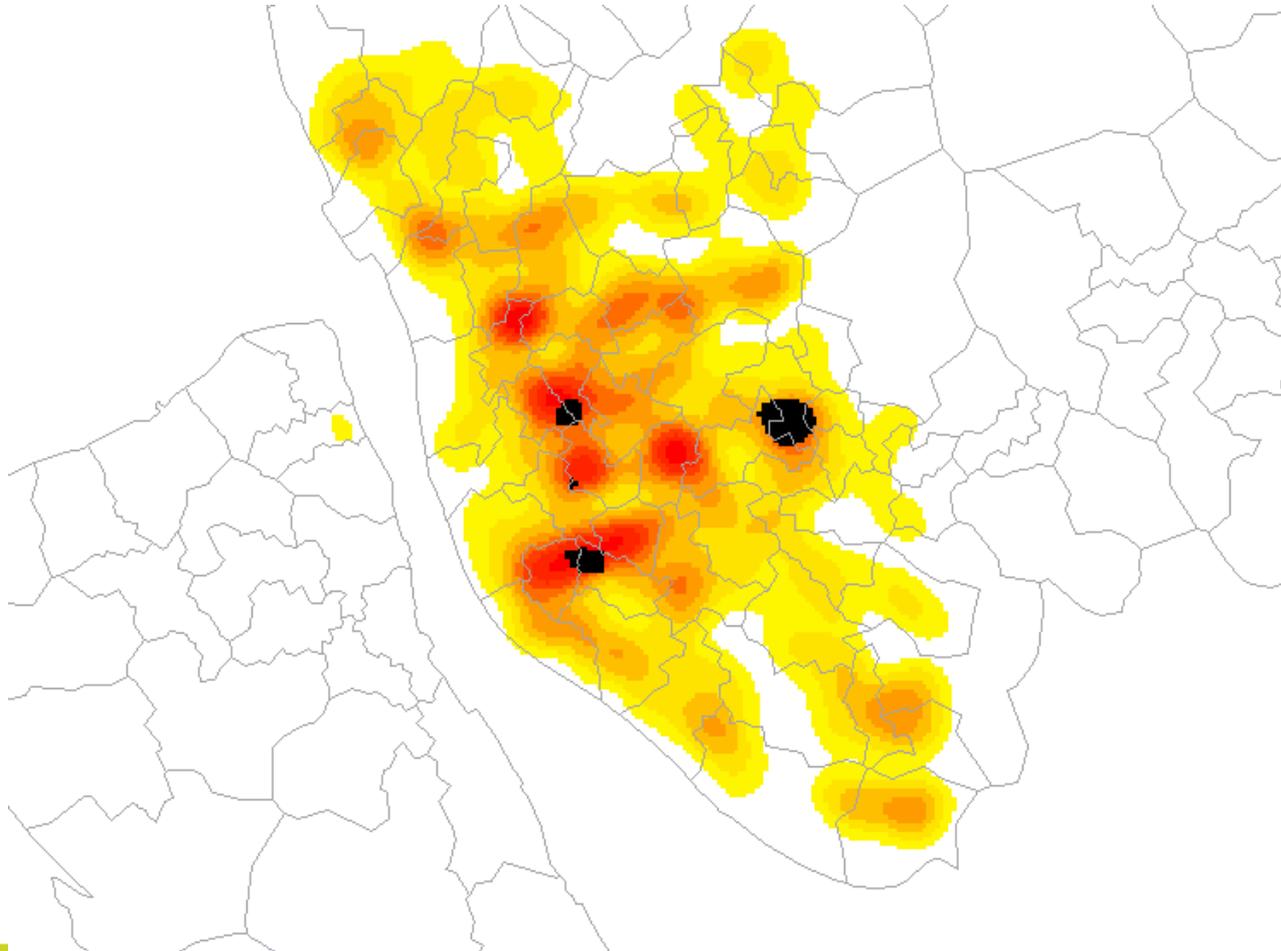
Dual burden of malnutrition in pregnancy



All cases BMI > 30 kg/m² in pregnancy



'Hotspots' of obesity (shown in black)



Health Inequalities

- The same areas were also ‘hotspots’ for underweight in pregnancy
 - Dual burden of malnutrition
- Deprivation = important
 - But not the only factor
 - Speke (most deprived, not a hotspot)
- Environment may be significant

Environment for Dual burden



Limited access to physical activity, economically deprived, high prevalence of fast food outlets (Abayomi et al 2009)

Current UK guidelines

- NICE (2010)
 - Achieve a healthy weight before conception
 - Avoid ‘dieting’ whilst pregnant.
- CMACE/RCOG (2010)
 - Encourage weight loss before & after pregnancy
 - Encourage ‘healthy eating and appropriate exercise to prevent excessive weight gain during pregnancy’.

Fit For Birth (Liverpool)

- A longitudinal cohort study of obese pregnancies (BMI \geq 35 kg/m²)
- Monitored weight and nutritional intake at each trimester.
- Findings suggest
 - Weight loss or weight maintenance offers some protection against adverse pregnancy outcomes
 - 30% of women who avoided weight gain
 - 79% of women who gained further weight
 - Experienced adverse pregnancy outcomes

Table 1: Gestational weight gain compared to IOM BMI categories

Initial BMI (women with 1st & 3rd weights)	Gestational weight gain (GWG)	N (% of BMI group)
30-34.9 (226)	>9 kg	102 (45.1)
	5.1-9 kg	51 (22.5)
	0-5 kg	62 (27.4)
	Weight loss	11 (4.9)
35-39.9 (132)	>9 kg	53 (40.1)
	5.1-9 kg	33 (25.0)
	0-5 kg	37(28.0)
	Weight loss	9 (6.8)
≥ 40 (69)	>9 kg	18 (26.0)
	5.1-9 kg	14 (20.3)
	0-5 kg	21 (30.4)
	Weight loss	16 (23.2)
All (427)	>9 kg	173 (40.5)
	5.1-9 kg	98 (22.9)
	0-5 kg	120 (28.1)
	Weight loss	36 (8.4)

Narayanan *et al.*, 2016

Risks of excessive GWG (Cassidy *et al.*, 2018)

- 'Normal' weight women (BMI 20.0-24.9)
 - higher GWG = 11.4 (9.0-13.4) kg
- Overweight women (BMI 25.0-29.9)
 - Less GWG = 8.1 (6.6-12.2) kg
- Women with obesity (BMI > 30)
 - Less GWG = 8.8 (3.6-11.7) kg
 - normal vs overweight $p=0.004$
 - normal vs obese $p= 0.029$
- Normal weight women with high GWG required significantly more assisted deliveries than normal weight women with low GWG.

Quality V Quantity

- Our findings also suggest that **quality** of diet may be more important than overall kcal intake:
- Women achieved adequate energy intake and kcal consumption increased in 3rd trimester.
- But very few achieved EAR for important micronutrients
 - Iron (22% < LRNI)
 - Calcium
- This did not increase with kcal consumption
 - “empty Kcals”

NICE recommendations

- NICE recommend that all women presenting for maternity services should receive healthy eating advice from midwives at their initial appointment
 - (NICE 2017)
- Those with a BMI ≥ 30 kg/m² should be offered a structured weight loss programme following childbirth
 - (NICE 2010).
- Midwives often feel uncomfortable discussing such issues with overweight women as they worry about causing offence or they lack relevant knowledge
 - (Russell et al 2010; McCann et al 2017).

Midwives' experiences of giving healthy eating advice

- All midwives agreed that they should provide healthy eating advice, although none had any training:
- *"We don't have any training or updates or anything about diet in pregnancy"*
- Many recognised that dealing with more complex issues, such as obesity were beyond their remit:

"I don't think that's within the midwives remit... I think that is more specialised...we should be able to hand that on to someone else...we are not experienced enough to really tailor diets"

Midwives' experiences of giving healthy eating advice

- Fear of causing offence was a barrier to initiating the difficult conversation surrounding weight management in pregnancy.

“Sometimes women will get offended even when you mention the word obese”

- A major challenge faced by midwives was the socio-cultural acceptance and normalisation of obesity in pregnancy.

“BMI of 32 wouldn't bother me that much because most women are in this category”

Implications

- High quality nutrition and optimal weight gain in pregnancy are vital for good pregnancy outcomes.
- Poor nutrition has short term and long term health implications.
- Certain groups of women have more complex needs:
 - Low SES, overweight, underweight, restrictive diets

Implications

- Midwives lack the confidence and skills to discuss pregnancy-specific healthy eating, and weight management advice
- There is a lack of organisational support regarding midwifery training, access to specialised care and specific care pathways for pregnancy women with obesity
- Healthcare commissioners and policy makers need to prioritise the topic of maternal nutrition and weight management, ensuring clear clinical guidelines are in place.

Thank you

- Any questions?

Liverpool Women's 

