

# Diet and nutrition in the first year: What makes the real difference for current and future health?



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# Plan for presentation

- How do we weigh up the evidence?
- What does it tell us about
  - Optimal age of starting solids?
  - Baby led weaning?
  - Micronutrients?
  - Vegetables?

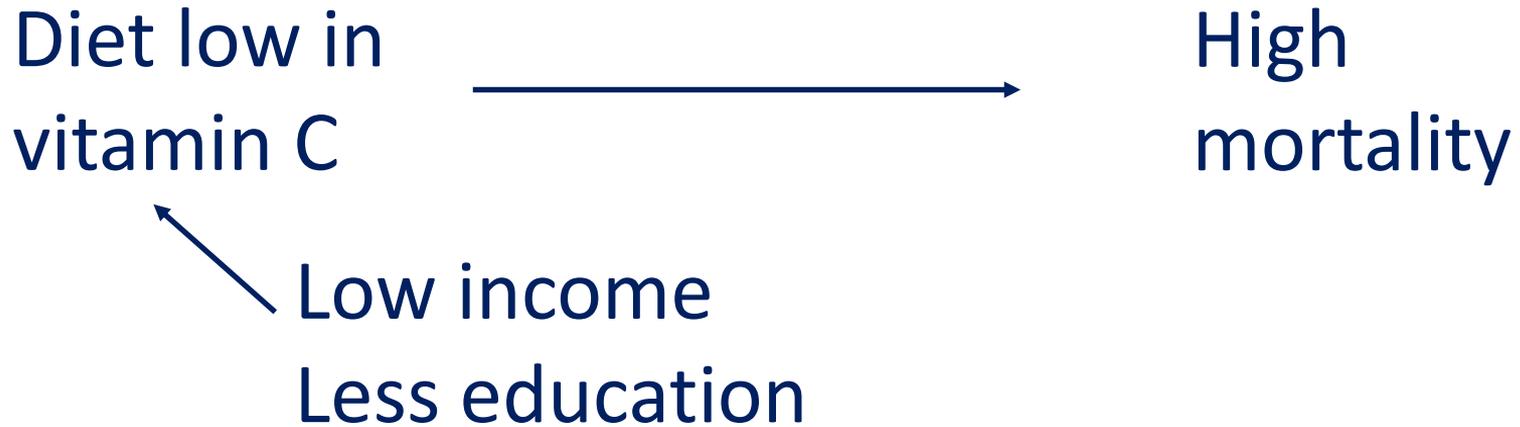
# What sort of evidence is there?

- Trials
- Experiments
  - Flavour /texture learning
- Cohort studies
- National surveys
  - Infant Feeding survey
  - National diet and nutrition survey in young children

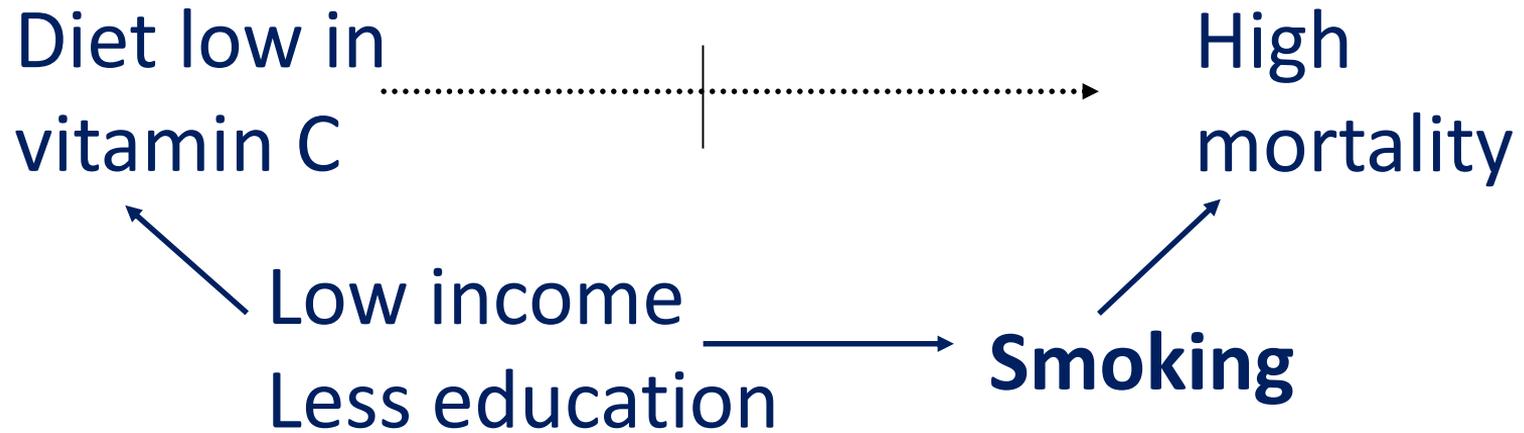


**Observational studies**

# Observational studies can only describe associations, not establish causation



# Behaviour choices are usually determined by other key characteristics



# Randomised control trials

- Exposure / treatment only difference between groups
- Establish causation, as long as properly conducted
  - True randomisation
  - Intention to treat analysis
- Expensive and challenging, so usually few
- Highly informative and never lightly ignored

# Proposed risks of starting solids

## Before 6 months

- Displacement of breast milk
- Increased risk of infection

## After 6 months

- Inadequate weight gain
- Micronutrient deficiency
- Missed opportunity to develop tastes and feeding skills?
- Increased risk of allergy?

# Does delaying till 6 months compromise weight gain / micro nutrients?

- Good evidence from 3 RCTs 1994-2012:
  - No difference in growth or weight gain when starting solids at 4 or 6 months
  - Solids simply displace breastmilk
  - Lower iron stores, but not higher rates of deficiency
- Stable isotope study:
  - Increase in milk production as infant grows

# Does delaying till 6 months compromise weight gain or micro nutrients?

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  - No difference in growth or weight gain when starting solids at 6 months
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- Stable isotope study:
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6 months = fine

# Does delaying till 6 months compromise development of tastes and feeding skills?

- Hypothesised 'critical' period
- Association observed between 'delayed' (>4m) solid feeding and poor acceptance of variety and textures
- Honduran age of weaning RCT (1995) found no difference in appetite or food acceptance
- In BLW trial, intervention infants started solids 4 weeks later, but were less fussy and ate wider range of foods at follow up

# Does not starting till 6 months compromise development of tastes and feeding skills?

- Hypothetical evidence for critical period
- Association between 'delayed' (>4m) solid feeding and poor variety and textures
- Honduran age of weaning found no difference in appetite or intake
- In BLW trial, intervention infants solids 4 weeks later, but were less fussy and wider range of foods at follow up

# Does delaying till 6 months cause allergy?

- LEAP study: high risk infants started peanuts with first solids (most >5m) or avoided till age 5 years
  - Allergy 7 times higher in avoidance group
- EAT study: unselected BF infants started multiple allergens aged 3-4m
  - Poor compliance, most at least partially adhered
  - No difference between randomised groups
  - ‘Per protocol’ **observational** analysis found reduced peanut allergy

# Does delaying till 6 months cause allergy?

- LEAP study: high risk infants started peanuts with first meal (4-6m) or avoided till age 5 years
  - Allergy 5% in avoidance group
- EAT study: unselected infants started multiple allergens aged 3-6 months
  - Poor compliance, many partially adhered
  - No difference between groups
  - ‘Per protocol’ **observational** study showed reduced peanut allergy

**No benefit <6 months**  
**<6 months beneficial**

# Baby led weaning

- Parent / web based movement
- Infant self feeds bite size solids
  - No spoon feeding at all
  - Less coercive
- Until recently only observational research, mainly web based
- Improves energy regulation?
- Many differences between BLW mothers and PLW mothers



# Is baby led weaning safe?

- One in seven children in GMS cohort not reaching out for food by 7 months
- Little or no useful solid intake in first 2 months
- One small observational study found BLW babies more likely to be underweight (5% vs 0)



# Effect of a Baby-Led Approach to Complementary Feeding on Infant Growth and Overweight

## A Randomized Clinical Trial

Rachael W. Taylor, PhD; Sheila M. Williams, DSc; Louise J. Fangupo, MSc; Benjamin J. Wheeler, FRACP; Barry J. Taylor, FRACP; Lisa Daniels, MDiet; Elizabeth A. Fleming, MCapSc; Jenny McArthur, BEd(Hons) Primary; Brittany Morison, MSc; Liz Williams Erickson, MSc; Rhondda S. Davies, IBCLC; Sabina Bacchus, PGDipSci; Sonya L. Cameron, PhD; Anne-Louise M. Heath, PhD

- Slightly higher BMI at follow up (not sig diff)
- No difference in choking risk
  - Lower satiety responsiveness
  - Less fussy
  - Greater enjoyment of food
  - Exclusively breastfed for 4 weeks longer

# Effect of a Behavior-Based Approach to Complementary Feeding on Infant Growth and Overweight

## A Randomized Clinical Trial

Rachael W. Taylor, PhD; Elizabeth A. Fleming, MCapSc; Sabina Bacchus, PGDipSc; Sonya L.

L. Wheeler, FRACP; Barry J. Taylor, FRACP; Lisa Daniels, MDiet; MSc; Liz Williams Erickson, MSc; Rhondda S. Davies, IBCLC;

- Slightly higher weight gain at 12 months (not sig diff)
- No difference in overweight at 12 months (not sig diff)
  - Lower satiety
  - Less fussy
  - Greater enjoyment of feeding
  - Exclusively breastfed for 4 weeks longer

**A good thing for different reasons!**

# Which micronutrients matter in the infant diet?

- Vitamins and minerals essential for successful growth and development
- Most vulnerable micronutrients worldwide at this age are
  - Vitamin A, Zinc
  - Iron, Vitamin D

# Zinc

- **Department of Health advice:**
  - *“You should be able to get all the zinc you need by eating a varied and balanced diet. If you take zinc supplements, don't take too much as this could be harmful”*

# Zinc

- Dependent on

Health advice:

- “You should be able to get all the zinc you need by eating a varied and balanced diet. If you take zinc supplements, don't take too much as this could be harmful.”

**Not a problem**

# Vitamin A

- Deficiency states hardly ever seen in UK
- High levels can be toxic
  - Included in healthy start vitamins (after withdrawal of cod liver oil)
  - Also added to formula milk
  - Taking both could exceed tolerable upper limit

# Vitamin A

- Denmark states hardly ever seen in UK
- High levels can be toxic
  - Included in some start vitamins (after withdrawal of cod liver oil)
  - Also added to formula
  - Taking both could exceed upper limit

**Only a problem in excess**

# Iron: potential dietary sources

- Haem iron (most bioavailable)
  - Red meat, liver, eggs
- Unbound natural iron
  - Beans, pulses, nuts, dried fruit, whole grains
- Fortified foods
  - Commercial baby foods
  - Formula milk
  - Breakfast cereals

# Actual sources of iron in infants

- Haem iron – most bioavailable
  - Red meat, liver, eggs
- Unbound natural iron
  - Beans, pulses, nuts, dried fruit, whole grains
- Fortified foods
  - Formula milk
  - Breakfast cereals
  - Commercial baby foods

# Iron deficiency (and excess)

- Anaemia much less common than previously
  - 3% in children under 2
- Risk factors (mainly in children >18m)
  - Large volumes of unmodified milk + restricted diet
- Supplementation trials in healthy children found no benefit and some harms to growth and immunity
  - Highly fortified milks could be a risk?

# Sources of Vitamin D

- Natural source is by synthesis in the skin in response to UVB sunlight
  - Low levels in northern Europe in Winter
  - Skin pigmentation, clothes and being indoors reduces exposure
- Few natural food sources: oily fish, cod liver oil
- Vitamin D added to many foods (fortification)
  - Margarine, formula milk, breakfast cereals

# Vitamin D deficiency

- Vitamin D levels < 25 nmol/L
  - 2-8% of children under three
  - 36-42% British Asian 2 year olds
- Symptomatic deficiency (Rickets)
  - Prevalence unclear:  $\approx 0.1\%$  births in Glasgow
  - Almost all in dark skinned ethnic minorities
  - Little or no solid food, no supplementation
  - Mothers deficient in pregnancy



# Prevention of Vitamin D Deficiency

- Target high risk groups for supplementation
  - Multivitamins in pregnancy
  - Vitamin D (alone) from birth for high risk?
- Stamp on suggestions that breastfeeding is a 'risk factor' for deficiency

# Fruit and vegetables

- Early exposure assumed to be important
  - Associated with higher later intake
  - Multiple exposures improve acceptance
  - Limited evidence that acceptance can be modified
- **But** toddlers eat more F&V than children
  - Mean intake at 18m = 2 adult portions
  - Eating more fruit than children aged 11-18
- Is early exposure actually the key issue?

# How much do (extra) micronutrients and vegetables matter in the infant diet?

- Western diet diverse and nutrient rich, even 'unhealthy' foods
- Deficiency states only seen in toddlers with very restricted diets
- Concerns about diet quality may lead to
  - Reliance on processed foods and formula milk
  - Food aversion
- Need to be more chilled about this?