



# Toddler Diets and Long Term Health

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# Aims of Discussion

- What do we expect toddlers to eat?
- What are toddlers eating?
- What are the consequences?
- What can be done?

# What is a toddler?

- Not a clearly defined age-group
  - 1 - 2's
  - 1 - 3's
  - 1 - 5's
  - Preschoolers

# Measuring toddler diets



- Age surveyed varies
  - 1½ - 4 ½ (NDNS 95)
  - 1½ - 3 (NDNS 2011)

# Trouble with toddlers...

- Difficult age group to work with!
- Not good communicators  
of dietary information
- Reliant on parents
- Throw food around

# Aims of Discussion

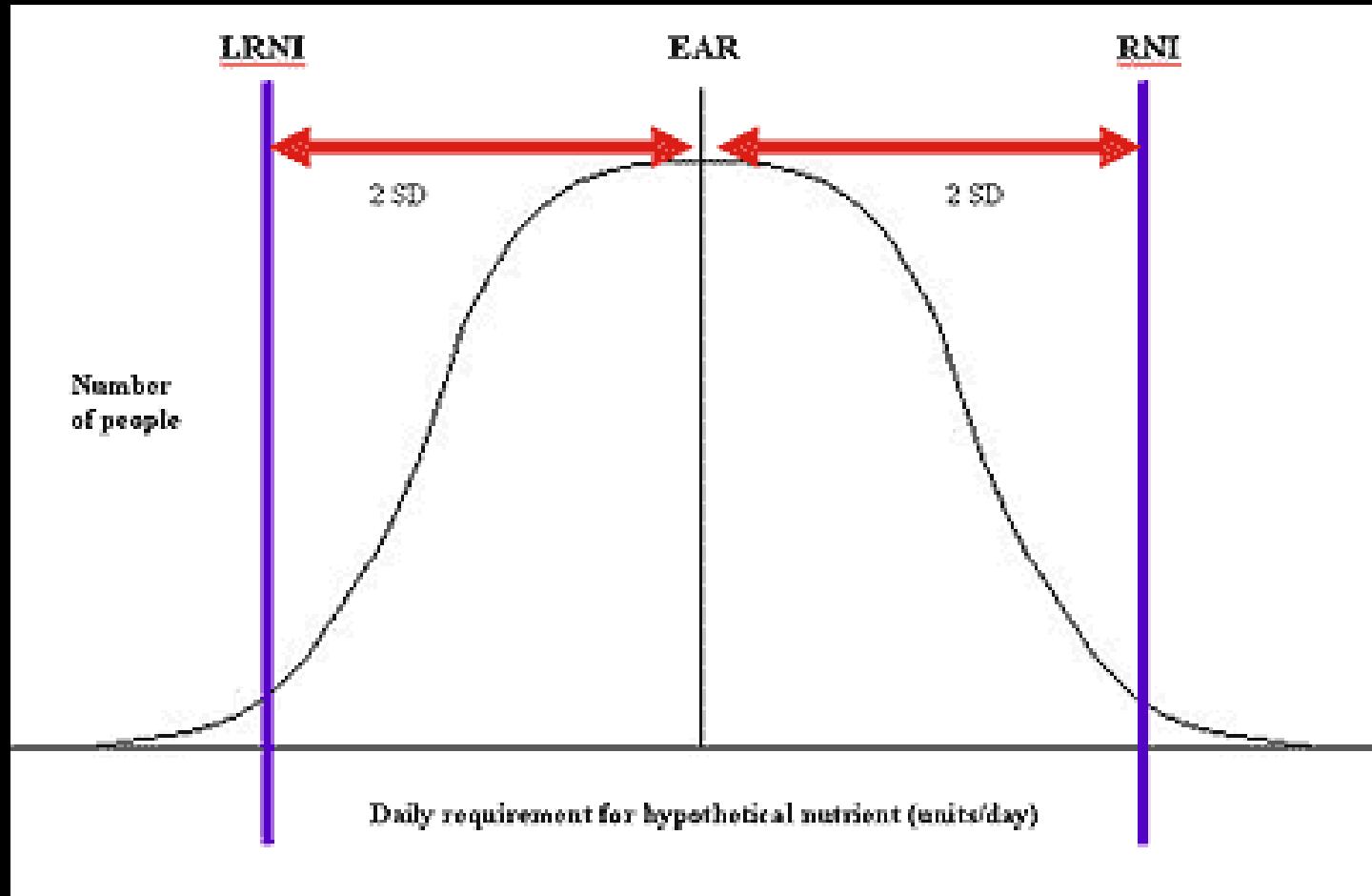
- What do we expect toddlers to eat?
  - Dietary guidelines
  - Evidence behind them

# Guidelines

Are they consistent?

- UK Dietary Reference Values
- US Dietary Reference Intakes
- WHO expert consultations

# Dietary Guidelines



# Guidelines for toddlers

- Vary widely
- Energy & Protein
- Higher in UK and US compared with WHO
- Vitamin D lower

# Guidelines

Are they evidence based?

- Research based
- Extrapolation
  - Adult studies

# Guidelines

- Few studies of nutritional intake in toddlers
- Based on adult studies e.g. Fibre
- Dietary surveys

# Aims of Discussion

- What are toddlers eating?
  - What informs us?
  - Which foods and nutrients are problems?

# **UK Dietary Surveys**

**Survey of the food  
consumption, nutrient  
intakes and nutritional  
status of people aged 1.5  
years and older living in  
private households in the  
four countries of the UK**

# NDNS 2008-2012

- New Rolling Survey
- Intakes of all vitamins (except D) met RNI
- Mean D intake = 1.9 µg/day
- (27% of RNI, 33% inc. supps)

# NDNS 2008-2012

- Iron and Zinc improved
  - 8% below LRNI for Iron
  - 6% below LNRI for Zinc

# Trends in Iron

- Iron intake
  - 1995 84% below RNI (6.9 mg/d)
  - 2008-12 Median 6.1 mg/day
    - 88% of RNI
  - 1995 13% anaemic
  - ALSPAC 17% anaemic
  - 2008-12 Blood data awaited

# At Risk - Iron

- Ethnicity – high prevalence in UK Asian families
- Vegetarians or exclusions
- Due to diet itself or displacement of iron-rich foods?
  - Phytate, tannins
  - Cows milk

# At Risk - Iron

- Observational studies
  - Anaemia
    - Impairs development?
  - Studies conflicting
  - Comparisons difficult

# At Risk - Iron

- Randomised Controlled Trials
  - No immediate benefits on psychomotor development
  - Possible long-term effects?

# Trends in Zinc

- Zinc intake
  - 1995 72% < RNI (5 mg/d)
  - 2008-12 median 5.1 mg/d
    - >100% RNI

# NDNS 2008-2012

- Overweight & Obesity
- 2-15 years
- Highest in 2-3 year olds

# NDNS 2008-2012

- Overweight & Obesity
- 2-3 years
  - 1 in 2 overweight or obese
    - Boys 20% OWT & 34% Obese
    - Girls 29% OWT & 21% obese

# Vitamin D Deficiency

- **Resurgence**
  - Excessive sun protection
  - Lack of supplementation
  - Belief milk is high in vitamin D
- **Risk factors**
  - Darker skin
  - Higher vitamin D requirement
  - 20-40% prevalence in UK Asian toddlers

(Lawson & Thomas, 1998)

# Vitamin D in the UK

- NDNS survey
  - Many toddlers' intake inadequate
- Supplements
  - Increase intake by 24-33%
  - But only 17-19% uptake (IFS 2005)



# Vitamin D Sources

- Dietary
  - Few sources: oily fish, egg yolk, infant formula, fortified foods
- Sunlight
  - 90% from sun exposure
  - Converts to active form

# Vitamin D Sources

- Exposure to sunlight
  - 20 – 30 minutes 2-3 times per week in summer
- Sunscreens
  - Overly used
  - Avoid redness/burning

# Vitamin Supplements

- Healthy Start Scheme (2006)
- Families receiving benefits
  - Pregnancy/lactation
    - Vitamins C, D and Folic Acid
  - Children up to 4 years A, D and C
    - Food vouchers:
      - Formula
      - Cow's Milk
      - Fruit & Veg

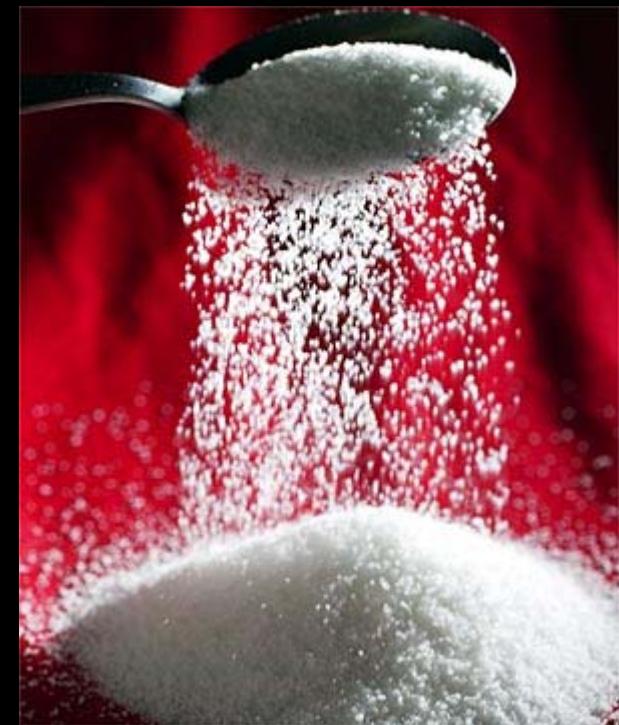
# Excess Energy



In UK toddlers up to 1/3<sup>rd</sup> of total daily calories comes from sugar  
- much of this is added sugar

# Sugar Calories

- NDNS 1 ½ - 2 ½ year olds (1995)
  - Sugar 29% energy
    - **Non-milk sugar 19%**
    - Most children consumed above recommendations

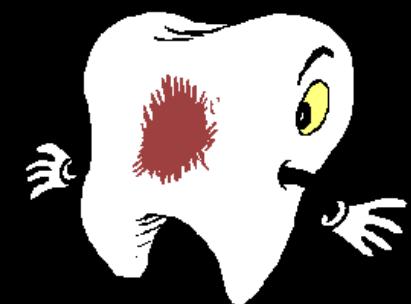


# Energy from Sugar

- About 100 kcals/day
- Energy intake
  - Age 1.5-3 years - 1127kcal/day
  - About 10% energy from non-milk sugar
- Hidden sugar – not yet in NDNS

# Problems with Sugar

- Dental decay in toddlers
  - Sweets age 1 – 3 years leads to caries before age 3.5y
  - Soft drinks and Fruit juices
- Source of energy
  - Energy dense foods
  - Fat's best buddy!



# Energy from Food Groups

- Carbohydrate
  - 51% energy
- Protein (Major source - milk)
  - 15% energy
- Fat
  - 34% energy

# Foods Consumed

Cereals and cereal products

- Pizza – equivalent of 1 portion per day



- Milk
- Whole milk most common



# Foods Consumed

- Meat and Meat Dishes
  - Mainly white meat
  - 55% chicken/turkey



- Fish
  - Total fish 8g/day
  - Oily fish 1g/day



# Foods Consumed

- Vegetables
  - 73g/day
  - Portions not defined
  - Increased 18g (33%)
- Fruit
  - Total 108g/day
  - Higher than other child age groups



# Summary

- Diet has improved
  - Fewer deficiencies
    - Vitamin D main concern
  - Fruit & Vegetables increased
  - Energy
    - Macronutrient proportions OK
    - Why is obesity increasing?

# Estimating Needs

- Energy requirements
  - COMA 1991
    - Based on WHO 1985
  - Based on average needs
    - 910 – 1380 kcal/day for boys & girls aged 1 – 3 years

# A Revised Estimate

- WHO growth chart centiles
  - Females
  - Revised down (95-83 kcal/kg)
- Based on range (25<sup>th</sup> – 75<sup>th</sup> pc)
  - 747 – 1195 kcal/day for boys & girls aged 1 – 3 years

# Preschool Obesity

Does the energy  
source in toddlers  
affect later obesity?

# Systematic Review

In 7/14 studies protein  
intake associated with  
greater obesity risk later in  
childhood (up to double)

Lanigan et al. (unpublished)

# Childhood Obesity

- How ‘big’ is the problem ?
- What are the early causes ?
- What are the consequences?
- What can be done?

# A Global Problem

up to 200 million school aged children are either overweight or obese, of those 40-50 million are classified as obese.

(International Obesity Taskforce (IOTF), 2010)

# A Global Problem

Nearly 43 million children under the age of five were overweight in 2010.

(WHO, 2010)

# Childhood Obesity

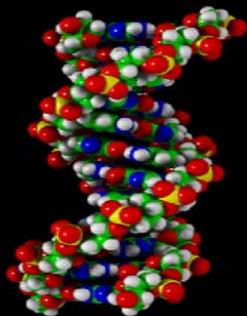
- How ‘big’ is the problem ?
- What are the early causes ?
- What are the consequences?
- What can be done?

# Why does it happen?

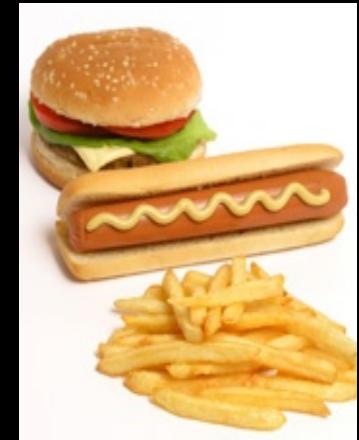
- Complex problem
  - Genetics
  - Environment
    - Diet
    - Physical Activity
    - Sleep Patterns

# Childhood Obesity

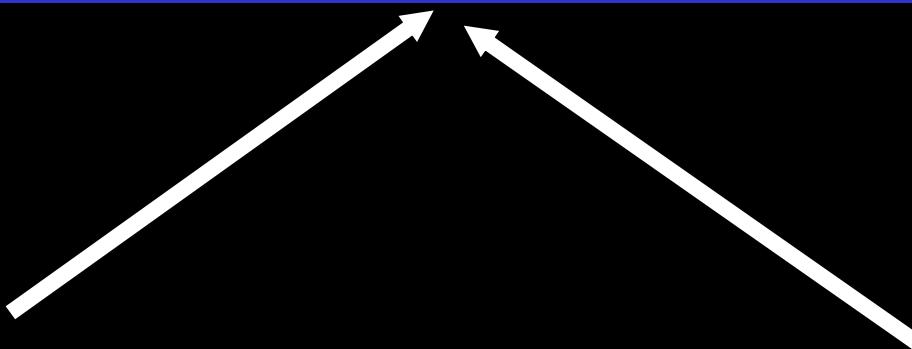
Energy intake > expenditure



Genes



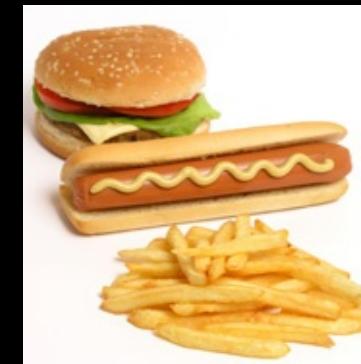
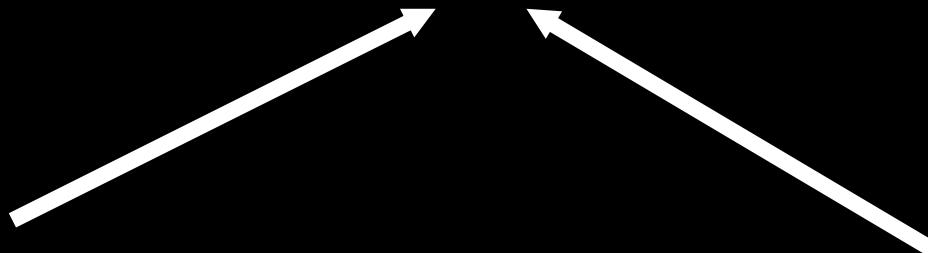
Environment



# Development



**Obesity = Energy intake > expenditure**



**Genes**

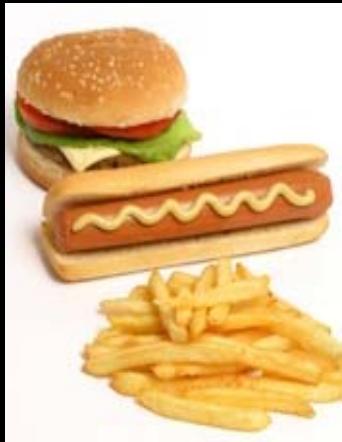
**Environment**

# Why does it happen?

- Early nutrition
  - Infant feeding
    - Breastfeeding
    - Formula feeding
  - Weaning

# Why does it happen?

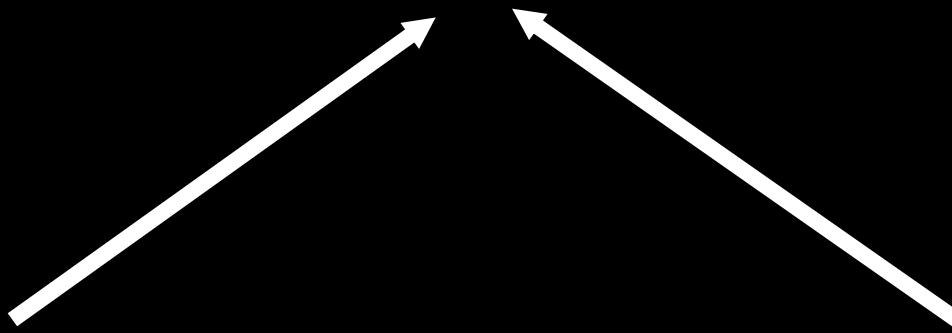
Energy intake > expenditure



Diet



Exercise



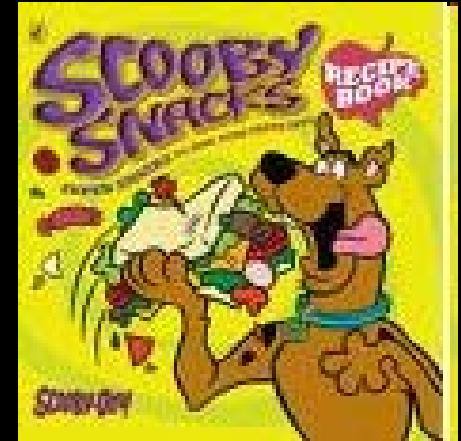
# Why does it happen?

- Reduced physical activity
- Increased sedentary behaviours
  - TV viewing and computer games
  - Car use



# Why does it happen?

- Dietary Behaviours
  - High energy density diets
  - Eating away from home
  - Increased portion size
  - Frequent snacking
  - Parental practice



# Who does it affect?

## National Child Measurement Programme

Measures the height and weight  
of children aged 4–5 years  
(Reception) and 10–11  
years (Year 6).

# Who does it affect?

- Highest Prevalence
  - Multicultural City Life
  - Disadvantaged Urban Communities
  - Certain ethnic groups
    - Bangladeshi, Black African, and Black Caribbean

# Toddler Diet

Critical period for development of dietary and behavioural habits



# Dietary patterns: emerge during early childhood - by age 3 years – ALSPAC study



Young mums  
↓ education

Veg'n mums  
↑ education

Females &  
Singletons

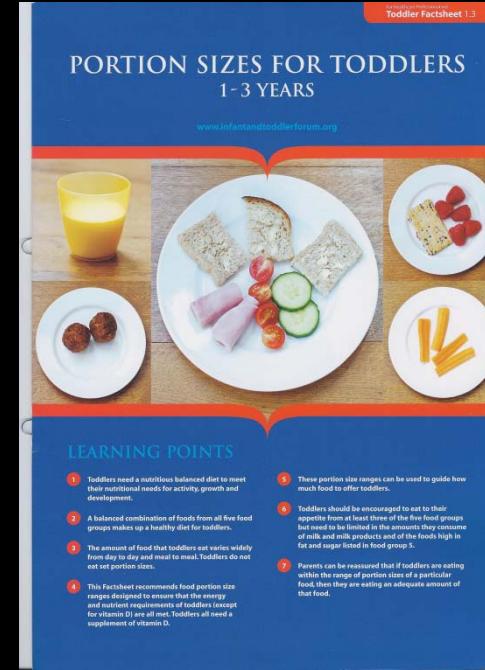
Well off &  
Older sibs

# Dietary Patterns

- Established early
- Track through childhood
- Transition to adult diet
  - Fear of new foods
  - Picky eaters
- Adequate intakes

# Importance of Portions

- Long awaited portion size data
- Based on what toddlers do eat
- Not related to health or growth outcomes



Judy More &  
Pauline Emmett  
Support from ITF

# Importance of Portions

- Has portion size changed?
- US Surveys
  - CSFII 1994 -1998
  - Little change for most foods
  - Increases for milk, bread, cereal, juice and peanut butter

McConably et al, (2002)

# Importance of Portions

- US Surveys
  - NFCS, CSFII & NHANES  
1977 -2006
  - Energy dense foods
  - 28% energy intake at 2-6 y
  - Pizza highly implicated!

Piernas & Popkin, (2011)

# Trends in Energy

- Has energy intake increased?
  - Up 179kcal/day 1977-2006
- Energy eating outside home
  - Up from 23.4 to 33.9%
  - Take aways and “store bought” foods increased
  - Impact of convenience foods

# Does Portion Size Matter

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- Increasing portion size
- Increases energy intake from portion and total meal
- Body weight positively related to energy intake and portion size
- Children regulate energy intake through portion size

# What should we advise?

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- Range of portion sizes
- Based on actual intake
- Relation to outcome?
  - Unknown
- Meet UK EAR for energy
- RNI for nutrients

# Childhood Obesity

- How ‘big’ is the problem ?
- What are the early causes ?
- **What are the consequences?**
- What can be done?

# Why is it important?

- Obesity Associated With
  - Increased Morbidity
    - Short Term
    - Long Term

# Why is it important?

- Short Term Risk
  - Sleep Apnoea
  - Low self-esteem
  - Low Physical Activity

# Obesity Tracking And CVD Risk

Childhood obesity tracks throughout childhood and is likely to persist into adulthood

# Why is it important?

- Long Term Risk
  - Increased Morbidity
  - Cardiovascular Disease
    - Diabetes
  - Cancer
  - Joints/mobility

# **Childhood Obesity And CVD Risk**

**Studies have found an increase in CVD risk factors including hypertension, atherosclerosis and insulin resistance**

# Childhood Obesity

- How ‘big’ is the problem ?
- What are the early causes ?
- What are the consequences?
- **What can be done?**

# Preschool Obesity

Is diet important in the development of obesity during the preschool years?

# Lifestyle Interventions

- Programmes
  - Diet
  - Physical Activity
  - Behavioural Therapy
  - Family Involvement

# Interventions in Preschool Children

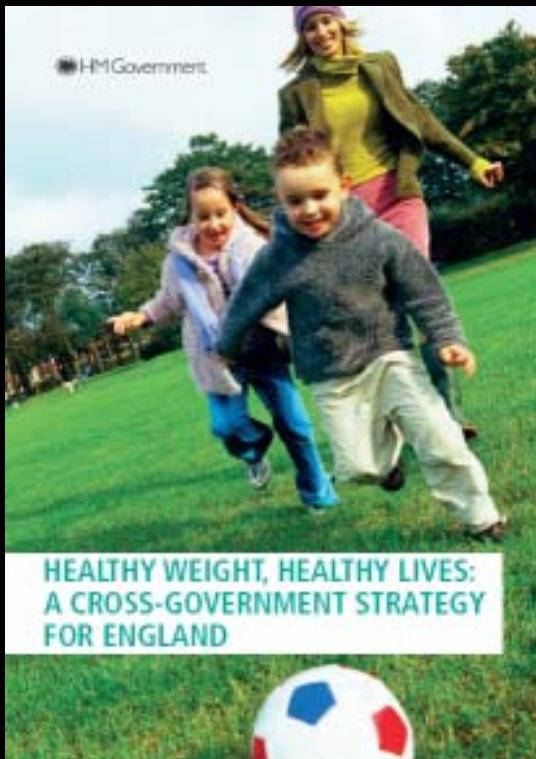
- 3 Systematic Reviews
- 7 RCTs
- All Ineffective

# NICE Guidelines

- Priority for UK Department of Health
  - Halt the rise in obesity by 2020
- Strategy
  - Multicomponent Interventions
    - Include advice on healthy eating
    - Address lifestyle within family and social settings
    - Incorporate strategies for behavioural change
    - Involve family member/s

# What is being done?

- **Healthy Weight, Healthy Lives: A Cross Government Strategy for England (Jan 2008)**



# What is being done?

- **Healthy Lives, Healthy People: A Call to Action on Obesity in England (Jan 2011)**

**“Not enough” says Jamie Oliver**



# What is being done?

- "Simply telling people what they already know - that they need to eat less and move more - is a complete cop out. The country's bill of health is shocking, and it's not going to get any better over the next 30 years if a clearly defined plan isn't put into place soon.

# **Institute of Child Health Pre-school Obesity Intervention**

- Addresses all elements of NICE guidelines
- Community and home based
- Promotes
  - Healthy Eating
  - Physical Activity
  - Positive diet and lifestyle
- Engages
  - Family & wider community

# Trim Tots

A fun, interactive  
healthy lifestyle  
programme for  
mothers, carers and  
children aged 1-5

# Trim Tots

**Encourages physical activity through movement and music, raises awareness of healthy eating and facilitates mother and child interaction in art and craft workshops**

# Trim Tots Pilot

- **Venue**
  - **Sure Start Children's Centre**
    - South Oxhey, Watford
- **Partners**
  - **Sensory Planet**
    - Local arts organisation
  - **Herts PCT**
  - **Watford Recycled Arts**

# Trim Tots Pilot

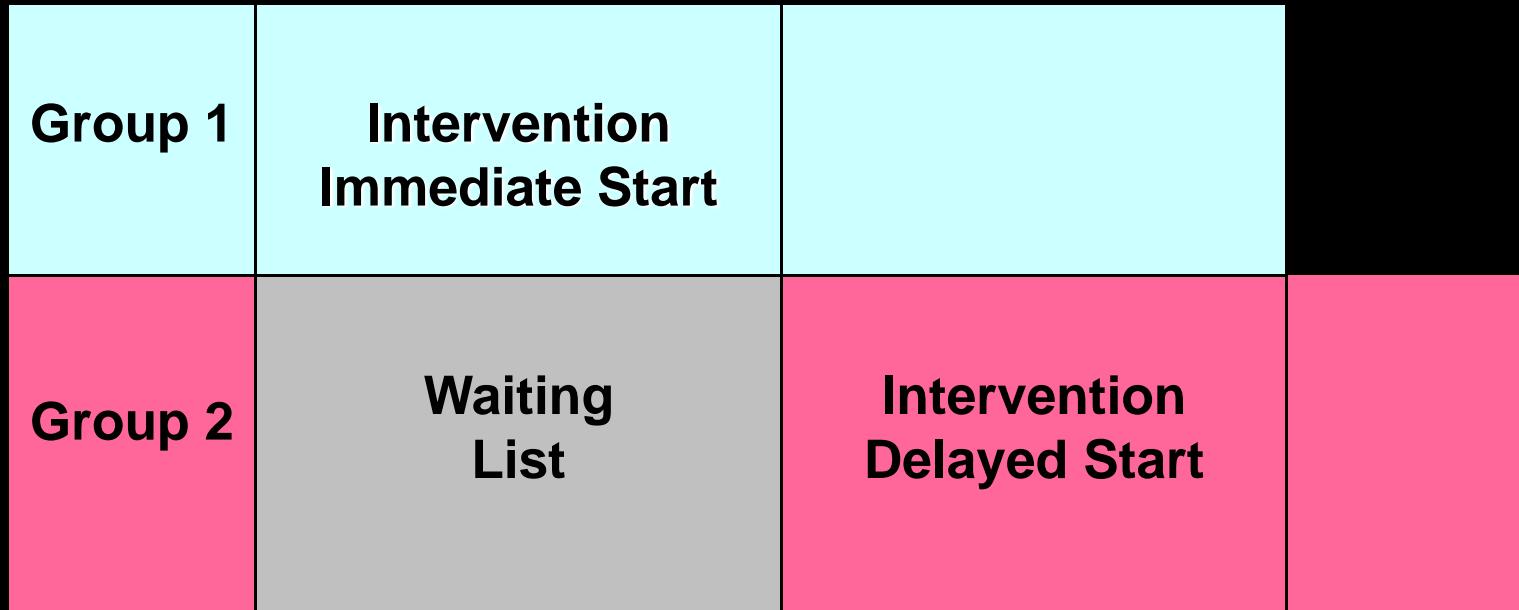
- Randomised Controlled Trial
- Primary Outcome
  - Body Mass Index z score

# Trim Tots Pilot

- 90 children recruited
- 88 children randomised
  - 52 boys
  - 36 girls
- Mean age 2.5 yrs
- BMI 18.5

# Study Design

Time (months) 0 3 6 9 12 18



# Trim Tots Pilot Results

- 73% Completed Trial
- Results
  - BMI z-score lower in intervention group
  - 0.9 SD - More than one major centile space on the growth chart  
(Body Mass Index for age/sex)

(Lanigan et al., **Obesity**, 2010)

# What can HCPs do?

- Practice the 3 R's
- Recognition
- Referral
- Research

# What can HCPs do?

- Recognition
  - Early growth
  - Infancy
    - Promote breastfeeding
    - Advice re overfeeding

# What can HCPs do?

- Recognition
  - Use of growth charts

[\*\*http://www.rcpch.ac.uk/child-health/research-projects/uk-who-growth-charts-early-years/uk-who-0-4-years-growth-charts-initiative\*\*](http://www.rcpch.ac.uk/child-health/research-projects/uk-who-growth-charts-early-years/uk-who-0-4-years-growth-charts-initiative)

# What can HCPs do?

- Referral
  - MEND
  - Trim Tots
    - March 2012
  - Others