



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

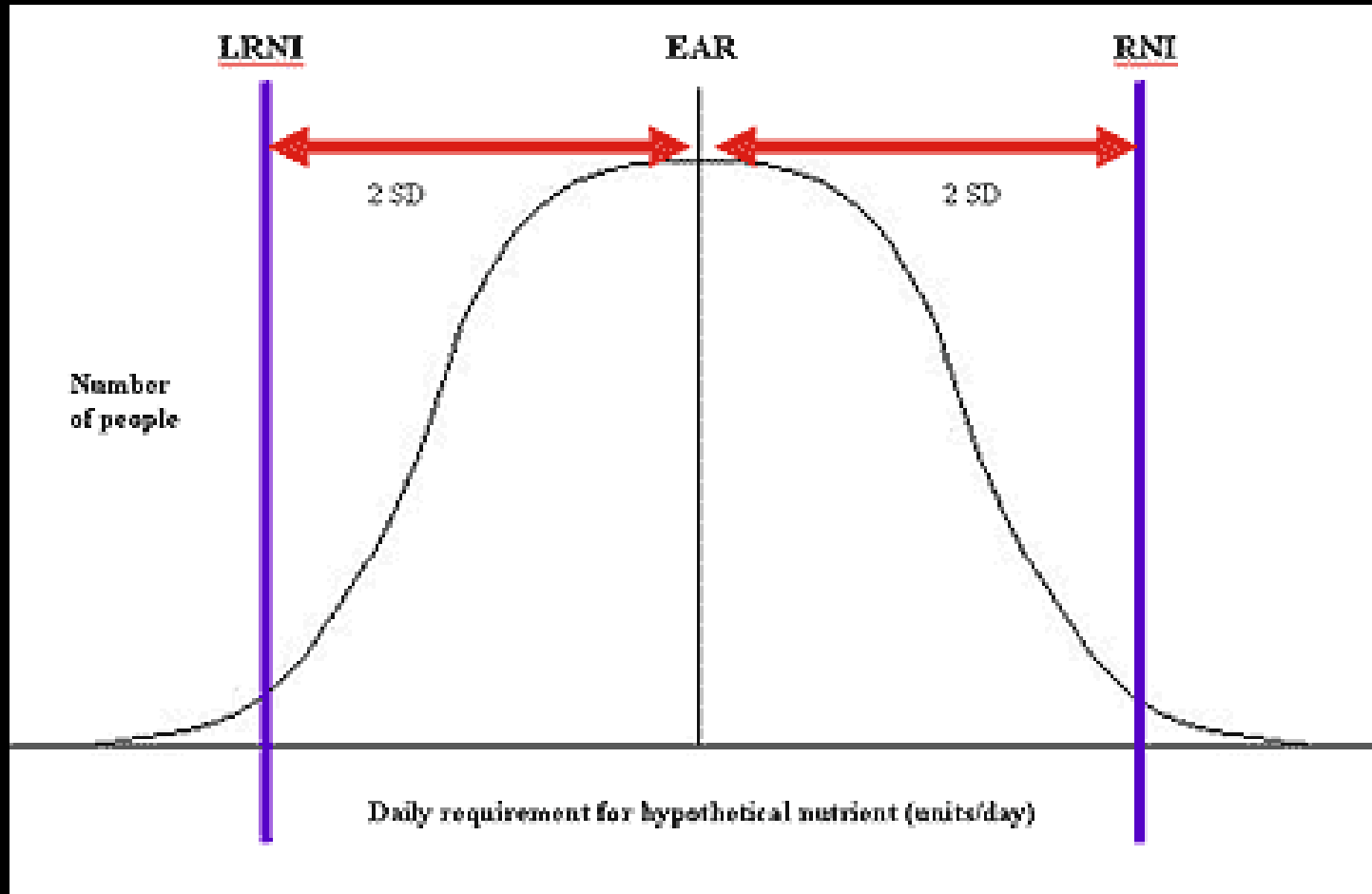
- What do we expect toddlers to eat?
 - Dietary guidelines
 - Evidence behind them

Guidelines

Are they consistent?

- UK **D**ietary **R**eference **V**alues
- US **D**ietary **R**eference **I**ntakes
- 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 $\mu\text{g}/\text{day}$
- (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 1/3rd 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

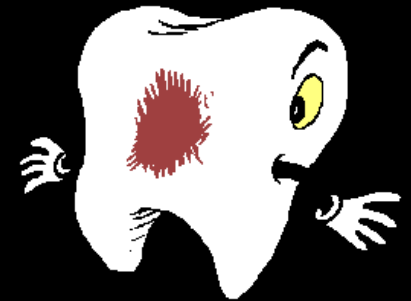


Energy from Sugar

- 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 (25th – 75th 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

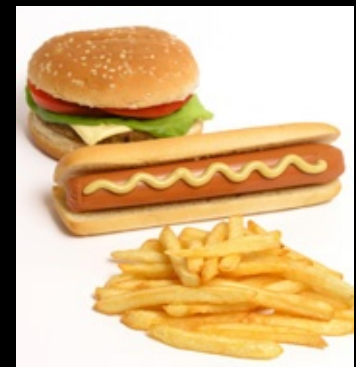
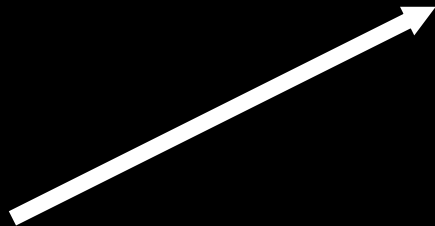
Development



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

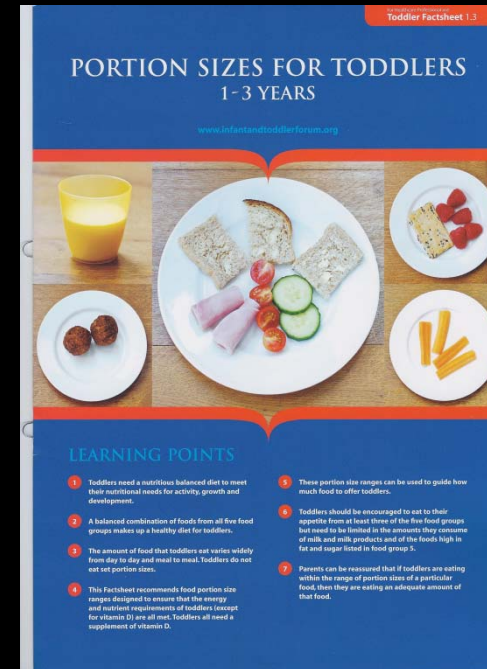
Well off &
Older sibs

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

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

- 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?

- 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

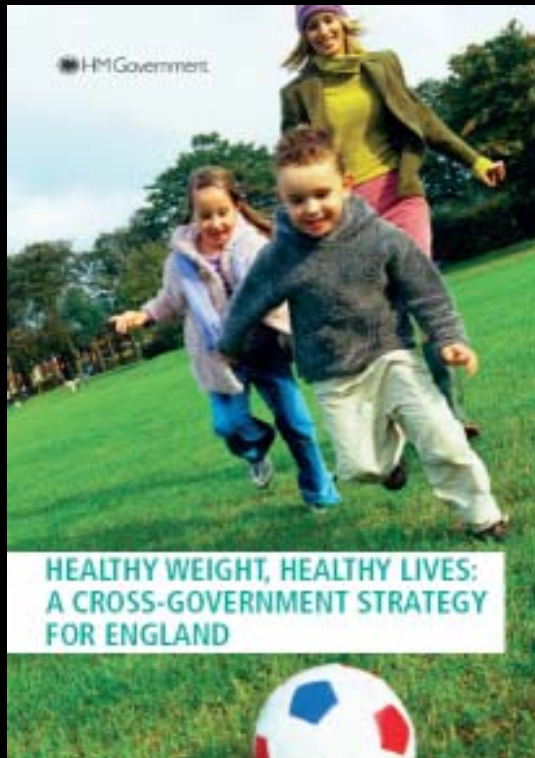
- 3 Systematic Reviews
- 7 RCTs
- All Ineffective

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

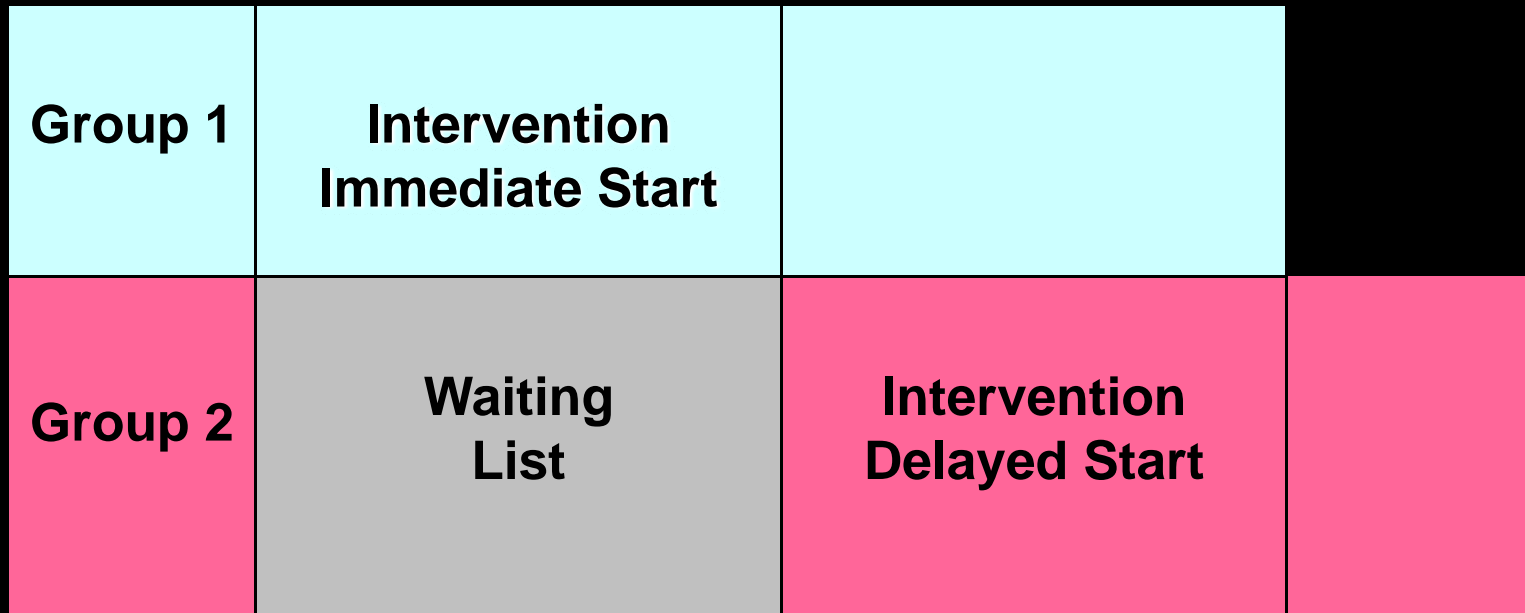
- **Randomised Controlled Trial**
- **Primary Outcome**
 - **Body Mass Index z score**

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-initi>

What can HCPs do?

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