

# Nutrition Surveillance and Policy: State of the Art and Future Needs

Patrick Wall, Celine Murrin, Patricia  
Heavey & Cecily C Kelleher

National Nutrition Surveillance Centre,  
University College Dublin



# Nutritional Surveillance System :

analyse the occurrence of malnutrition of  
dietary mediated conditions,  
with the

**Information for Policy**

Identifying trends in current status,  
highlighting areas of concern,  
**Enable Evaluation of Policies**  
and targeting  
preventive measures.

FAO/UNICEF/WHO Expert Committee 1976)

# Need for Nutritional Surveillance

It is recognised that the major causes of death and illness are linked to unhealthy behaviour and lifestyle

## *Governmental Reports*

1. Nutrition Framework for Action 1991
2. Shaping a Healthier Future 1994
3. Recommendations for a Food & Nutrition Policy 1995
4. Building Healthier Hearts: report of the Cardiovascular Health Strategy Group 1999
5. National Health Promotion Strategy 2000-2005
6. Quality & Fairness: A Health System for You 2001

# **Some Policy Challenges**

- 1. “Evidence” or anecdote?**
- 2. Effective Survey Instruments**
- 3. Recall bias, Anchoring vignettes?**
- 4. Comparability of data**
- 5. Anthropometric measurements**
- 6. Dealing with Inequalities**
- 7. Food Freq Questionnaires or food diaries**
- 8. Behavioural change initiatives ??**

# **More Policy Challenges**

- 7. Cost constraints**
- 8. Clinical Assessment & Biomarkers**
- 9. Nutrogenomic revolution & Systems Biology?**
- 10. New Channels of Communication-  
“Blogsphere”, Social Networks, 2-Way**
- 11. No single cause so no single intervention**
- 12. More Regulations V “Nanny State”**
- 13. Influence of Food & Beverage Industry**

# Range of Studies



**Examining Nutrition Surveillance  
on the island of Ireland**

*Due out shortly*

Name of study		Lead research institution	Years of data collection
1	Child Health System	DHSSPS NI	Continuous since 1997
2	Health and Social Wellbeing Survey ]	DHSSPS NI	1997, 2001, 2006
3	North South Ireland Food Consumption Survey of Adults [	IUNA	1997-1999
4	Survey of Lifestyle, Attitudes and Nutrition (SLAN) in Ireland	UCG/UCC	1998, 2002, 2007
5	Diet obesity and health in adults- Cork and Kerry heart disease and diabetes study (phase 1 and 2).	UCC	1998, 2007-2008
6	HRB centre for diet and health, cluster 4: weight management service clinical database.	Loughlinstown/UCD	Continuous since 2001
7	Lifeways cross generation cohort study.	UCD and NNSC	2001, 2007



<b>7</b>	<b>Lifeways cross generation cohort study.</b>	<b>UCD and NNSC</b>	<b>2001, 2007</b>
<b>8</b>	<b>North South Survey of Children's Dental Health</b>	<b>UCC</b>	<b>2001/2002</b>
<b>9</b>	<b>National Children's Food Survey</b>	<b>IUNA</b>	<b>2003/2004</b>
<b>10</b>	<b>Childhood Obesity: the extent of the problem among 6 year old Irish national school children.</b>	<b>HSE</b>	<b>2004-2007</b>
<b>11</b>	<b>National Teen's Food Survey</b>	<b>IUNA</b>	<b>2005/2006</b>
<b>12</b>	<b>Public Perception of Food Risk</b>	<b>UCD</b>	<b>2006</b>
<b>13</b>	<b>Health Behaviour in School Aged Children (HBSC) Ireland.</b>	<b>NUI Galway</b>	<b>2006</b>
<b>14</b>	<b>The Survey of Health, Ageing and Retirement in Europe</b>	<b>UCD</b>	<b>2006, 2010</b>
<b>15</b>	<b>Growing up in Ireland</b>	<b>ESRI/ TCD</b>	<b>2007/2008</b>



<b>14</b>	<b>The Survey of Health, Ageing and Retirement in Europe</b>	<b>UCD</b>	<b>2006, 2010</b>
<b>15</b>	<b>Growing up in Ireland</b>	<b>ESRI/ TCD</b>	<b>2007/2008</b>
<b>16</b>	<b>Millennium Cohort Study</b>	<b>ESRC</b>	<b>2008</b>
<b>17</b>	<b>National Adult Nutrition Survey</b>	<b>IUNA</b>	<b>2008/2009</b>
<b>18</b>	<b>National Diet and Nutrition Survey [</b>	<b>FSA, Dept. of Health</b>	<b>2008-2012</b>
<b>19</b>	<b>The Trinity, Ulster and Department of Agriculture (TUDA) Cohort Study</b>	<b>JINGO Consortium</b>	<b>2008-2013</b>
<b>20</b>	<b>WHO childhood obesity surveillance initiative (phase 1+2)</b>	<b>NNSC</b>	<b>2008, 2010</b>
<b>21</b>	<b>Sport and Physical Activity Participation Survey [</b>	<b>Dept Culture Arts and Leisure/ Sport NI</b>	<b>2009/2010</b>

<b>22</b>	<b>A cross sectional analysis of an Irish population estimating dietary salt intake and its association with other lifestyle risk factors</b>	<b>UCC</b>	<b>2008/2009</b>
<b>23</b>	<b>Health Survey Northern Ireland</b>	<b>DHSSPS NI</b>	<b>2010/2011</b>
<b>24</b>	<b>Infant Feeding Survey</b>	<b>DHSSPS NI</b>	<b>2010</b>
<b>25</b>	<b>National Preschool Nutrition Survey</b>	<b>IUNA</b>	<b>2010/2011</b>
<b>26</b>	<b>Young Person's Behaviour and Attitude survey</b>	<b>NISRA</b>	<b>2010</b>
<b>27</b>	<b>TILDA</b>	<b>TCD</b>	<b>2011</b>

# Loyalty cards



**Ultimate data collection device**



# National Nutritional Surveillance Centre 1992-2012



**School of Public Health, Physiotherapy and Population Science,  
University College Dublin**

# Main Functions of NNSC:

- To provide nutrition-related information to relevant organizations in an accessible form.
- To monitor trends in health status in relation to food supply, availability and consumption
- To act as a source of information and research expertise, particularly in the areas of epidemiology and surveillance methodology related to nutrition.

# Data Types

Primary data: eg SLÁN surveys, Lifeways, Other Surveys

Secondary data:

- Technical reports, organisation literature
  - Production
  - Marketing
  - Retail
- Peer review publications
- Internet / Mass Media
- Central Statistics Office publications
- Vital Statistics, Trade Balances, Household Data



# Data Sources Include:

- Government Departments and Agencies
- Health Boards
- International Food and Health Agencies
- UK Institutions
- Major Food Companies
- Academic Institutions
- Pharmaceutical Companies
- Media
- Health / Medical Organisations
- Consumer & Voluntary Organisations
- Food / Agricultural Organisations



# Information collated:

## ➤ *Dietary Information*

- Consumption from different food groups
- Nutrients
- Other dietary habits: Meal patterns, Attitudinal studies

## ➤ *Diseases*

- Obesity, Diabetes, Liver Cirrhosis, Food Allergies, Eating Disorders, Osteoporosis, Dental Disease, Cardiovascular Disease, Cancers : Colon, Rectum, Stomach, Breast, Women's Health

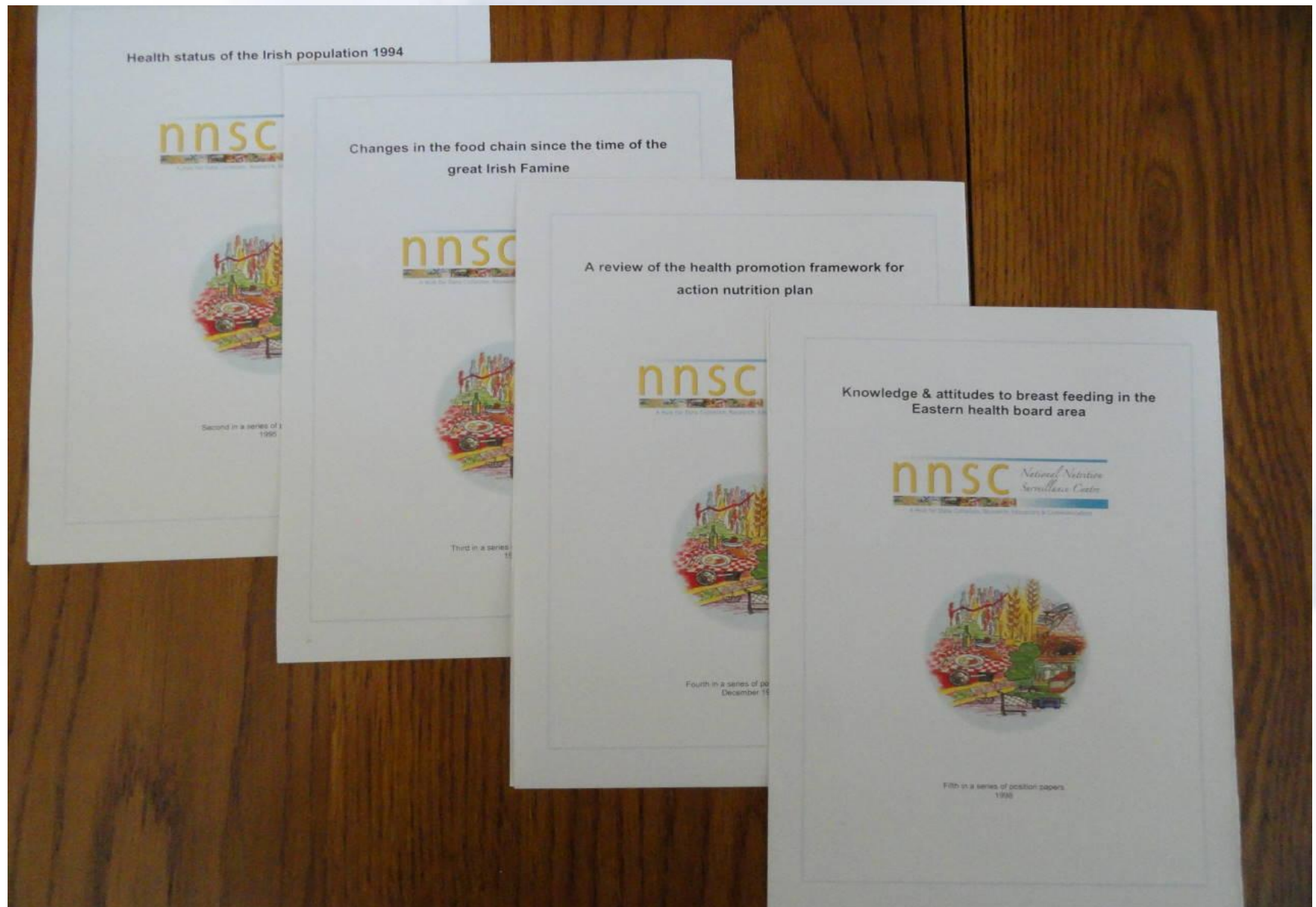
## ➤ *Population Subgroups*

- Infants, Children, Adolescence, Adults, Pregnant Women, Elderly, Low Income Groups, Vegetarians, Travellers

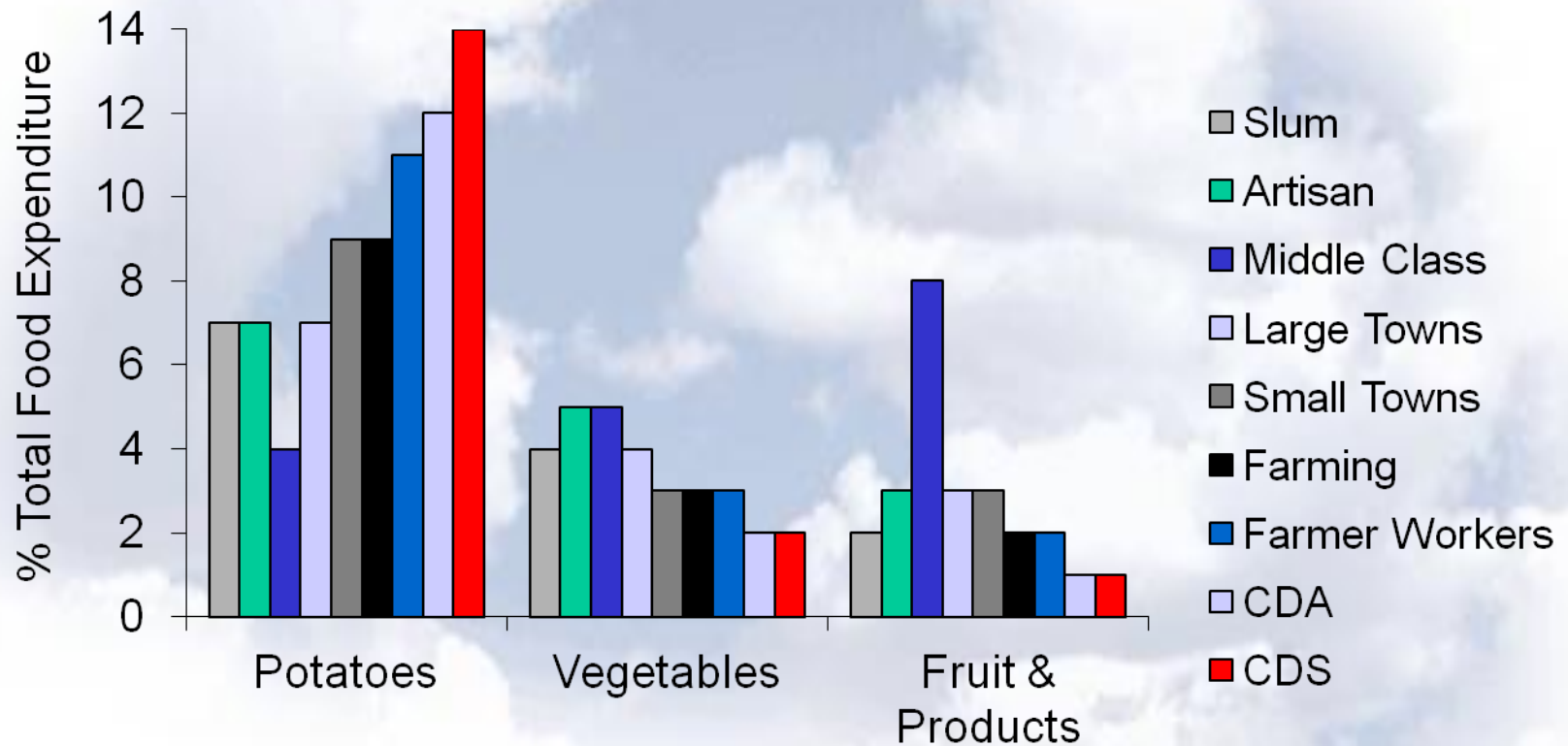
## ➤ *Other Food related info:*

- Policy documents and reports from Depts of Agriculture, Social and Family Affairs, Industry and Trade.
- Market/ consumer research

# NNSC: Historical Context of Irish Diet

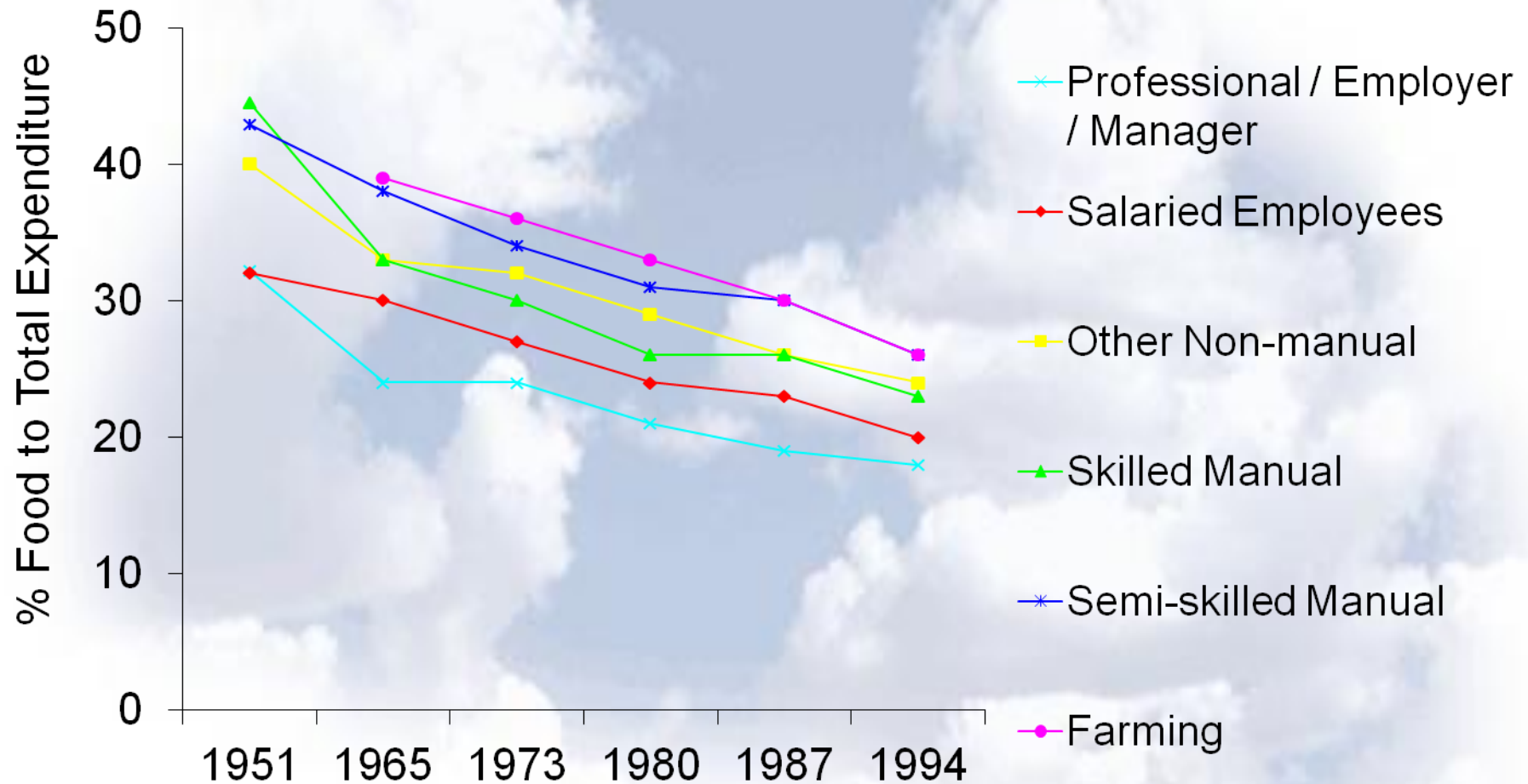


# Potatoes, Fruit and Vegetables in 1948



Source: 1948 Nutrition Survey, Stationery Office, Dublin

# Household Food Purchasing Patterns



Household Budget Surveys 1951-1994, Central Statistics Office, Ireland

**Macro-nutrient intake estimates as % total energy from  
North/South Food consumption survey (1997-9) & Survey  
of Lifestyles, Attitudes & Nutrition (1998)**

	<b>SLAN</b> <b>(N=6539)</b> <b><u>45.4% M</u></b>	<b>NSFCS</b> <b>(N=1379)</b> <b><u>48% M</u></b>
<b>Protein</b>	<b>17.0</b>	<b>15.5</b>
<b>Fat</b>	<b>34.5</b>	<b>34.8</b>
<b>Carbohydrate</b>	<b>46.5</b>	<b>43.5</b>
<b>Alcohol</b>	<b>2.7</b>	<b>5.9</b>



# Diet, Nutrition and Health Status in Republic of Ireland

European Journal of Clinical Nutrition (2003) 57, 865–875  
© 2003 Nature Publishing Group All rights reserved 0954-3007/03 \$25.00  
www.nature.com/ejcn



## ORIGINAL COMMUNICATION

### Social diversity of Irish adults nutritional intake

S Friel<sup>1\*</sup>, CC Kelleher<sup>1</sup>, G Nolan<sup>1</sup> and J Harrington<sup>1</sup>

<sup>1</sup>National Nutrition Surveillance Centre, Department of Health Promotion, National University of Ireland, Galway, Republic of Ireland

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1: Public Health Nutr. 2005 Apr;8(2):159-69.

Related Articles, Links

**Who eats four or more servings of fruit and vegetables per day? Multivariate classification tree analysis of data from the 1998 Survey of Lifestyle, Attitudes and Nutrition in the Republic of Ireland.**

Friel S, Newell J, Kelleher C.

RESEARCH ARTICLE

Open Access

# Temporal trends in misclassification patterns of measured and self-report based body mass index categories - findings from three population surveys in Ireland

Frances Shiely<sup>1,2\*</sup>, Ivan J. Perry<sup>1</sup>, Jennifer Lutonski<sup>1</sup>, Janas Harrington<sup>1</sup>, C. Cecily Kelleher<sup>3</sup>, Hannah McGee<sup>4</sup>, Kevin Hayes<sup>1</sup>

## Abstract

**Background:** As the use of self-reported data to classify obesity continues, the temporal change in the accuracy of self-report measurement when compared to clinical measurement remains unclear. The objective of this study was to examine temporal trends in misclassification patterns, as well as sensitivity and specificity, of clinically measured versus self-report based body mass index (BMI) from three national lifestyle surveys over a 10-year period.

**Methods:** The Surveys of Lifestyle Attitudes and Nutrition (SLAN) were interview based cross-sectional survey/measurements involving nationally representative samples in 1998, 2002 and 2007. Data from a subsample of both self-reported and measured height and weight were available from 66 men and 142 women in 1998, 147 men and 124 women in 2002 and 909 men and 1128 women in 2007. Respondents were classified into the BMI categories normal ( $< 25 \text{ kg m}^{-2}$ ), overweight ( $25 \leq 30 \text{ kg m}^{-2}$ ) and obese ( $\geq 30 \text{ kg m}^{-2}$ ).

**Results:** Underreporting of BMI increased across the three surveys (14%→21%→24%;  $p = 0.002$ ). Sensitivity scores for the normal category exceeded 94% in all three surveys but decreased for the overweight (75%→68%→66%) and obese categories (80%→64%→53%). Simultaneously, specificity levels remained high.

**Conclusions:** BMI values based on self-reported determinations of height and weight in population samples are underestimating the true prevalence of the obesity epidemic and this underestimation is increasing with time. The decreased sensitivity and consistently high specificity scores in the obese category across time, highlights the limitation of self-report based BMI classifications and the need for simple, readily comprehensible indicators of obesity.



# WHO Obesity Surveillance Initiative

## 2008-2012



Feidhmeannacht na Seirbhíse Sláinte  
Health Service Executive

	7 year-olds	9 year-olds	11 year-olds
2008	yes		
2010	yes	yes	
2012	yes	yes	yes

# Background WHO survey

- **2005** National Taskforce on Obesity calls for ‘A national database of growth measurements for children and adults to be developed by the Population Health Directorate in order to monitor prevalence trends of growth, overweight and obesity.’
- **Jan 2008** World Health Organisation (WHO) issued recommendations and guidelines for regular collection of data on weight, height, waist and hip circumference in children worldwide
- **March – June 2008** The Department of Health and Children and the Health Service Executive commissioned the National Nutrition Surveillance Centre (NNSC, UCD) to conduct the first round in Ireland
- **July 2010** The Health Service Executive and the Department of Health and Children commissioned the NNSC to conduct the second round of the WHO Childhood Obesity Surveillance Initiative

# Findings from 2008 WHO (Ire) survey



- 2420 children (aged 7.0-7.9 years old) had their height, weight and waist circumference recorded (1152, boys and 1268 girls)
- There was no significant difference between all boys and girls for weight or waist measurements. However, there was a significant difference between girls and boys for height ( $p=0.000$ ) and BMI ( $p=0.005$ )

# AIMS- 2010

- The core objective was to measure in primary school children in 1<sup>st</sup> and 3<sup>rd</sup> class:
  - Weight, height and waist circumference
  - Prevalence of normal weight, overweight, obesity and mean BMI
- To measure trends in overweight and obesity in children:
  - To have a correct understanding of the progress of the epidemic
  - To compare within the WHO European Region

# Aims and Objectives 2010

- In 2008, only 7 year old children were measured
- In 2010, this was extended to include measuring both 7 and 9 year old children
- In addition, further data collection on the children's diet and lifestyle was collected (Family Survey)
- School principals were also interviewed to gather information about the school environment and any school policies regarding physical activity and healthy eating



# Methods

- Ethical approval for round two of the study was obtained from the Research Ethics Committee, Human Research Sub Committee, University College, Dublin in September 2010
- Calibration of all equipment (weighing scales, height measures) took place on the 2<sup>nd</sup> September 2010 and was carried out by an independent company

# Methods- Recruitment of schools

- 163 schools took part in the first round of the WHO Surveillance Initiative
- These same schools were invited to participate in the second round
- All schools were sent an initial letter, information pack and school consent form
- Reminder letter followed by a phone call
- In total 131 schools consented to taking part, a response rate of 80%



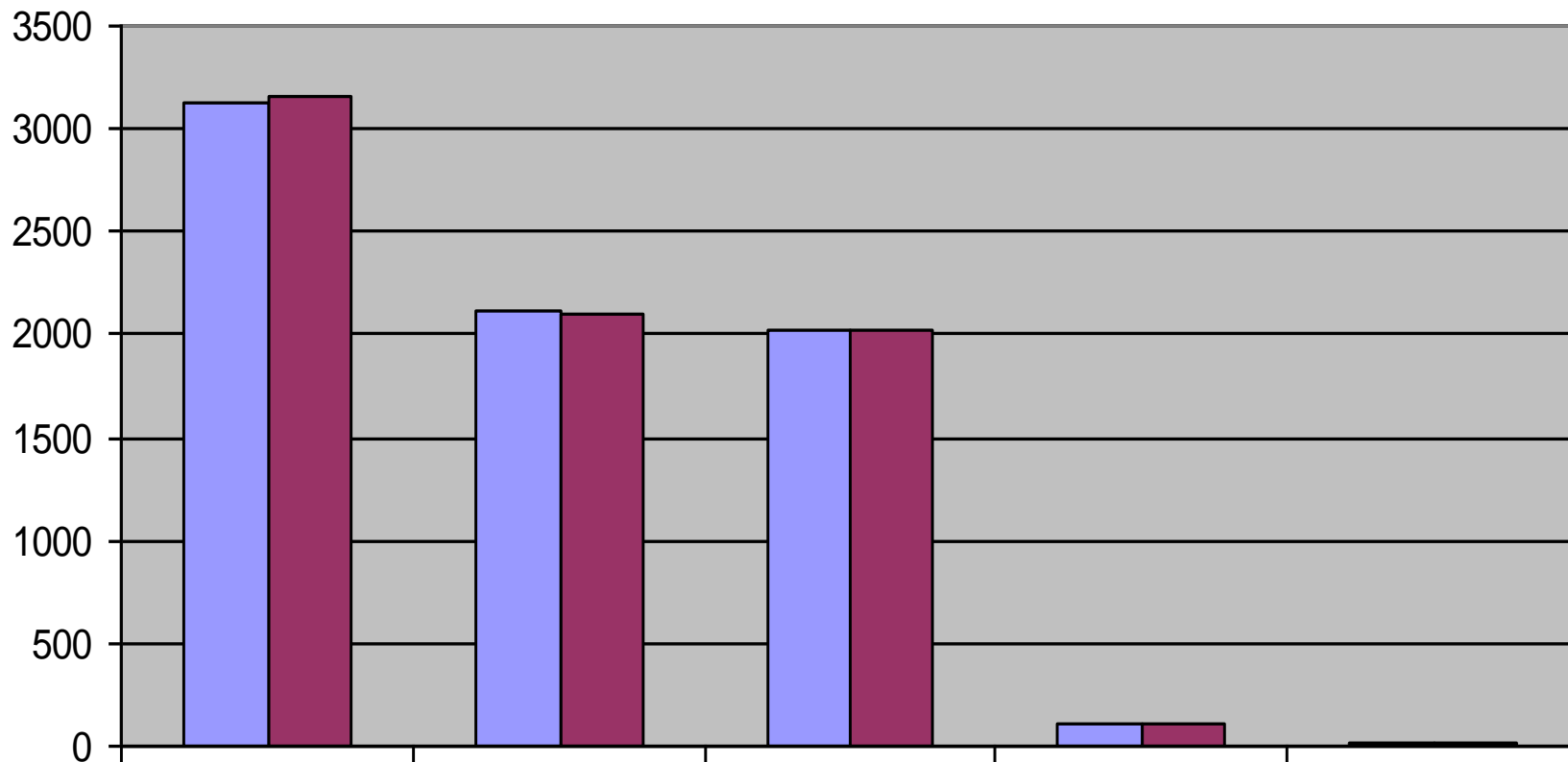
# Methods- Measurements

- All measurements were done in a private room or behind screens to ensure confidentiality and privacy
- Height was recorded to the last 0.1cm, weight recorded to the last 0.1kg and waist circumference to the last mm
- BMI scores were compared with the International Obesity Taskforce (IOTF) cut off points

# Response Rate (parents/children)

- A total of six thousand, three hundred and sixty three children were on the school register for both 1<sup>st</sup> and 3<sup>rd</sup> class
- 4038 children were measured (63.46%)
- 2075 parents did not consent (32.6%)
- 24 children refused to be measured on the day (0.37%)
- 226 children were absent (3.55%)

## Comparison of the participation rates 1st class vs 3rd class



■ 1st class

3134

2111

2020

113

14

■ 3rd class

3159

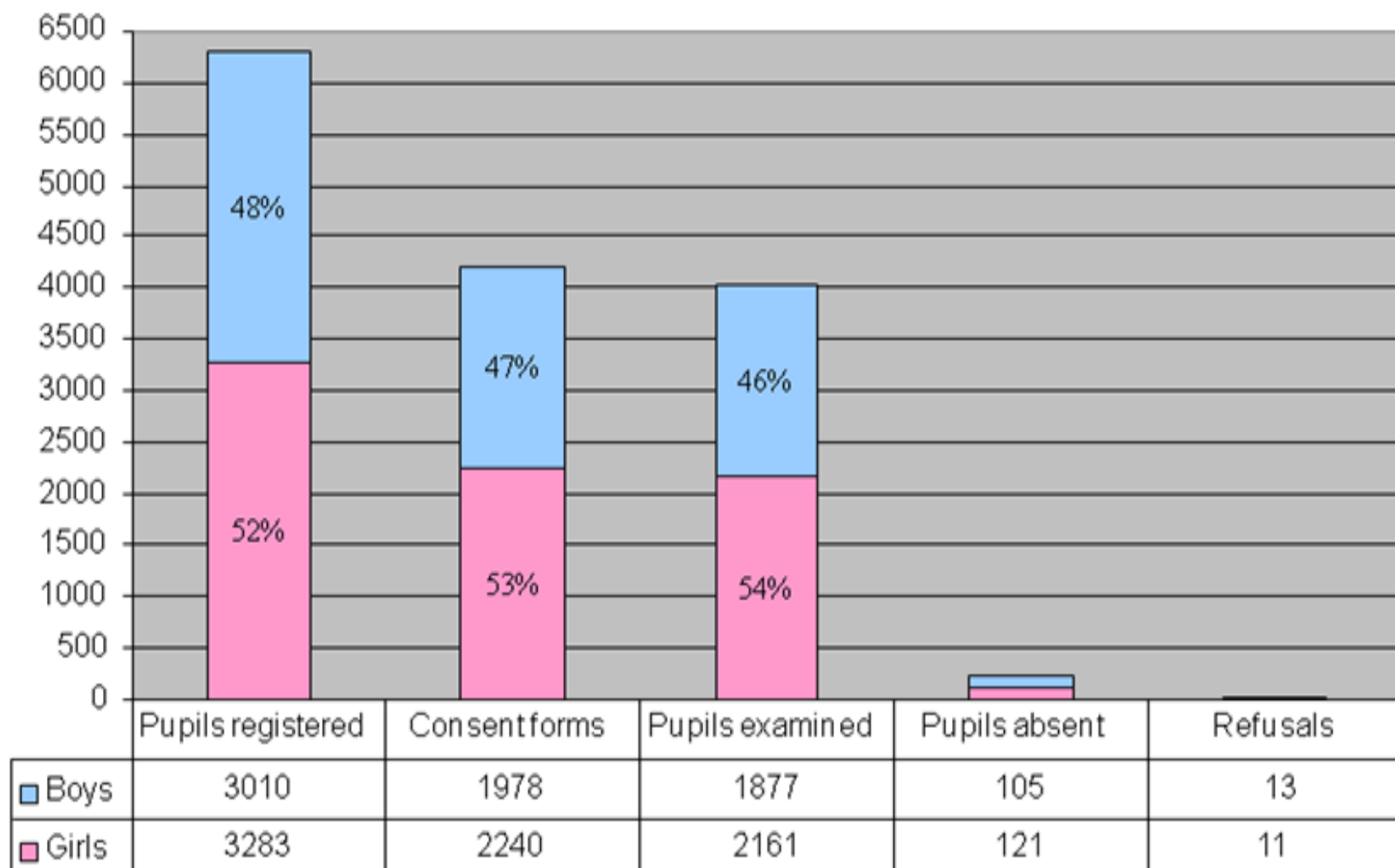
2107

2017

113

10

Comparison of the participation rates boys/girls

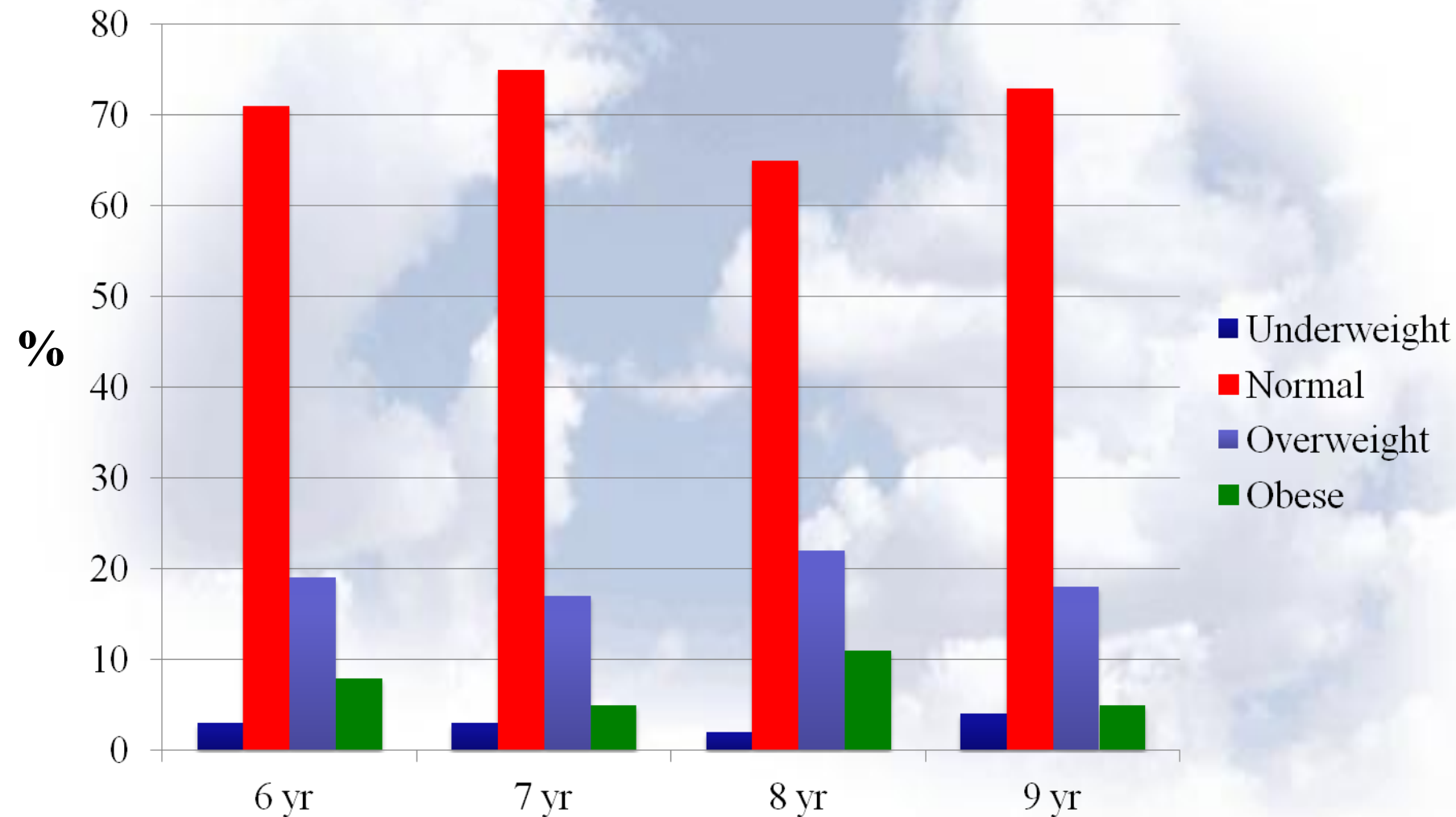


# Age and Gender of children

Age (years)	Boys <i>n</i> (%)	Girls <i>n</i> (%)	Total <i>n</i> (%)
5	1 (12.5%)	7 (8.75%)	8 (0.2%)
6	412 (44.8%)	507 (55.2%)	919 (23%)
7	569 (52.6%)	513 (47.4%)	1082 (27%)
8	394 (43%)	523 (57%)	917 (23%)
9	539 (50.2%)	534 (49.8%)	1073 (27%)
10	6 (28.5%)	15 (71.5%)	21 (0.5%)
Total	1921 (48%)	2099 (52%)	4020 (100%)

Overall, 48% of participants were boys and 52% were girls  
In 2008, 47.6% of participants were boys and 52.4% were girls

# BMI of Irish children categorised by the IOTF standards





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Social Science & Medicine

journal homepage: [www.elsevier.com/locate/socscimed](http://www.elsevier.com/locate/socscimed)



## Breastfeeding and risk of overweight and obesity at nine-years of age

Cathal McCrory<sup>a</sup>, Richard Layte<sup>1</sup>

<sup>a</sup> The Economic and Social Research Institute, Whitaker Square, Sir John Rogerson's Quay, Dublin 2, Ireland

### ARTICLE INFO

#### Article history:

Available online 17 April 2012

#### Keywords:

Ireland  
Breastfeeding  
Children  
Overweight  
Obesity  
Body mass index (BMI)  
Cohort study

### ABSTRACT

Whether breastfeeding is protective against the development of childhood overweight and obesity remains the subject of considerable debate. Although a number of meta-analyses and syntheses of the literature have concluded that the greater preponderance of evidence indicates that breastfeeding reduces the risk of obesity, these findings are by no means conclusive. The present study used data from the Growing Up in Ireland study to examine the relationship between retrospectively recalled breastfeeding data and contemporaneously measured weight status for 7798 children at nine-years of age controlling for a wide range of variables including: socio-demographic factors, the child's own lifestyle-related behaviours, and parental BMI. The results of the multivariable analysis indicated that being breastfed for between 13 and 25 weeks was associated with a 38 percent ( $p < 0.05$ ) reduction in the risk of obesity at nine-years of age, while being breastfed for 26 weeks or more was associated with a 51 percent ( $p < 0.01$ ) reduction in the risk of obesity at nine-years of age. Moreover, results pointed towards a dose–response patterning in the data for those breastfed in excess of 4 weeks. Possible mechanisms conveying this health benefit include slower patterns of growth among breastfed children, which it is believed, are largely attributable to differences in the composition of human breast milk compared with synthesised formula. The suggestion that the choice of infant feeding method has important implications for health and development is tantalising as it identifies a modifiable health behaviour that is amenable to intervention in primary health care settings and has the potential to improve the health of the population.



# WHO Obesity Surveillance Surveys 2008-2010: Predictors of Overweight or Obesity

Proceedings Eur Soc Cardiol; Munich Sep 2012

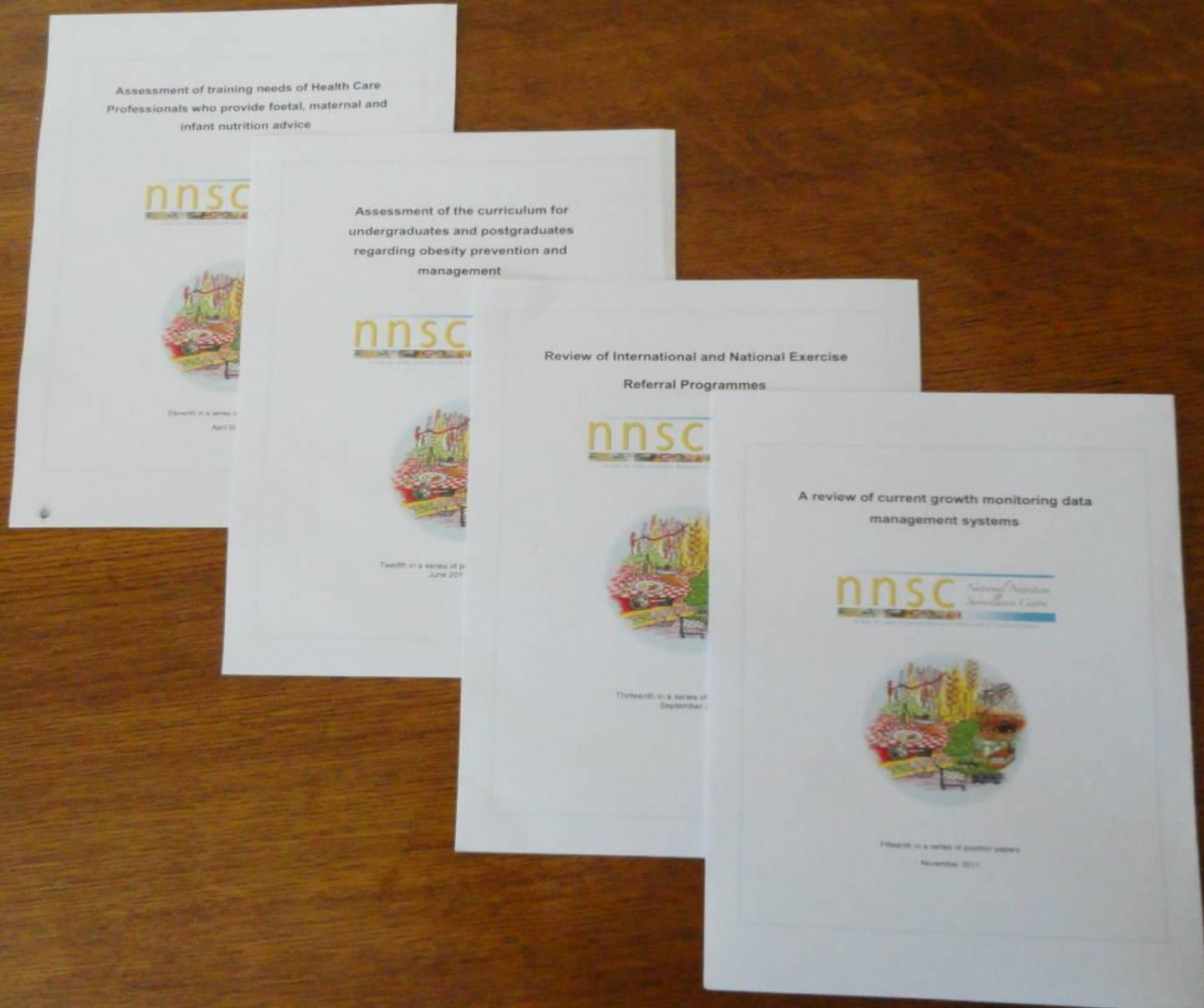
Variable		OR	Lower	Upper	P value
Gender	Male	1.00			
	Female	1.27	1.13	1.44	<0.001
School size	Large school	1.00			
	Small school (<20 pupils per class)	1.20	1.06	1.36	<0.005
Age	9	1.00			
	6	1.16	0.93	1.43	0.183
	7	0.95	0.77	1.17	0.621
	8	1.26	1.03	1.55	0.027

# WHO Obesity Surveillance Surveys 2008-2010: Predictors of Overweight or Obesity

Proceedings Eur Soc Cardiol; Munich Sep 2012

Variable		OR	Lower	Upper	P value
Gender	Male	1.00			
	Female	1.31	1.12	1.53	0.001
School size	Large school	1.00			
	Small school (<20 pupils per class)	1.38	1.17	1.63	<0.001
Age	9	1.00			
	6	6.92	5.12	9.36	<0.001
	7	3.48	2.63	4.61	<0.001
	8	1.65	1.28	2.12	<0.001
Waist circumference	Q1	1.00			
	Q2	3.63	1.99	6.62	<0.001
	Q3	26.37	15.28	45.51	<0.001
	Q4	373.46	215.5	647.18	<0.001

# NNSC: Position Papers on Assessment and Good Practice



# NNSC: Management of Overweight and Obesity



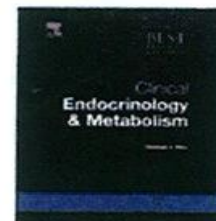




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journal homepage: [www.elsevier.com/locate/beem](http://www.elsevier.com/locate/beem)



6

# Maternal obesity, gestational weight gain and diet as determinants of offspring long term health

Lucilla Poston, Professor\*

*Division of Women's Health, Women's Health Academic Centre, King's College London, 10th Floor North Wing, St. Thomas' Hospital, London SE1 7EH, United Kingdom*

### Keywords.

pregnancy  
nutrition  
developmental programming  
obesity  
diet  
offspring

This review addresses the increasingly prolific literature from studies in man and animals suggesting that maternal obesity, a diet rich in calories or excess gestational weight gain may, through perturbation of the intrauterine environment, lead to lifelong risk of obesity and related disorders in the child. In addressing maternal–child obesity relationships it remains a challenge to distinguish the influence of the intrauterine environment from the contribution of shared genetic traits, and to adequately adjust for postnatal determinants of childhood obesity. Studies in genetically identical rodents convincingly show that maternal obesity, as well as elements of a hypercaloric diet can permanently influence offspring risk of obesity, and are these are supported by studies in larger mammals. Importantly, dissection of the mechanism in animals has led to description of novel interactive pathways between maternal environment and fetus which are amenable to investigation in humans.

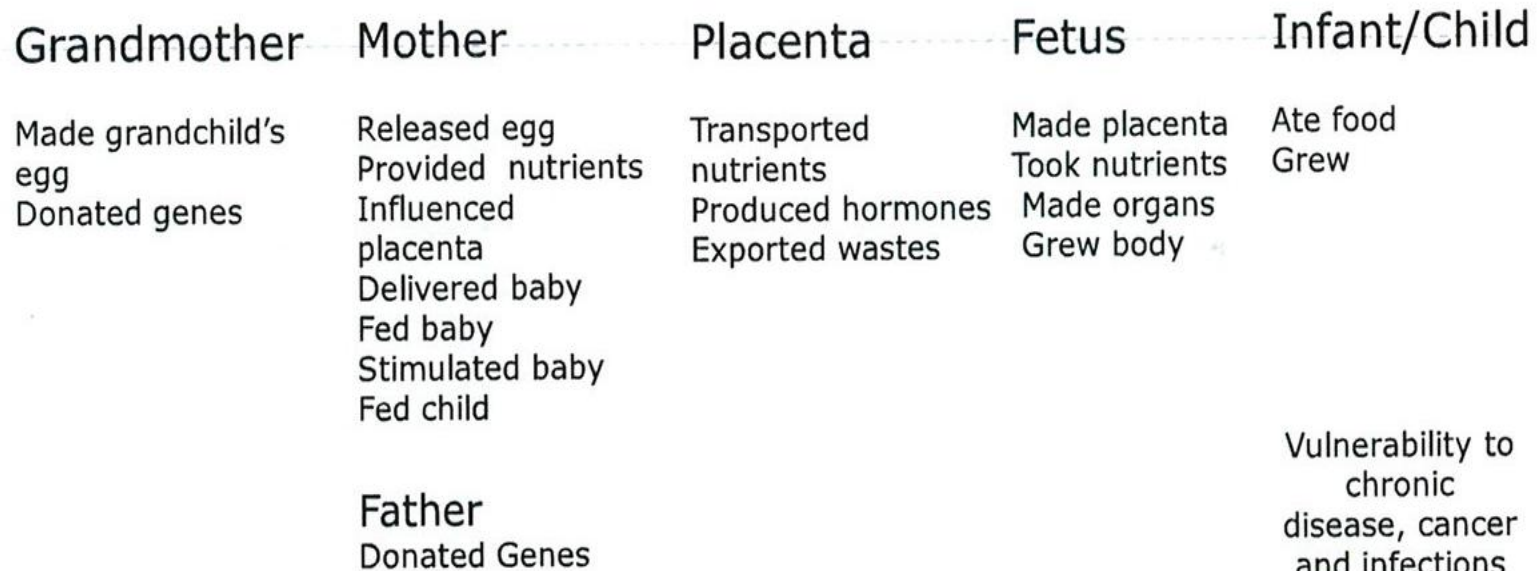
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# The Developmental Origins of Chronic Disease: The Richard Doll Prize Lecture

DJP Barker 2012; Public Health

## 100 Years of Nutritional Flow



## 1000 Days of Development

# Aims and Objectives of Life-ways Cross-Generation Cohort Study of One Thousand Families

- Determine health status, diet and lifestyle
- Establish patterns and links across generations
- Document primary care utilisation patterns across the social spectrum and across generations
- Examine how indicators of social position, particularly means-tested GMS eligibility, influences health status during first 5 years of life



RESEARCH ARTICLE

Open Access

# Body mass index and height over three generations: evidence from the Lifeways cross-generational cohort study

Celine M Murrin<sup>1\*</sup>, Gabrielle E Kelly<sup>2</sup>, Richard E Tremblay<sup>1</sup> and Cecily C Kelleher<sup>1</sup>

## Abstract

**Background:** Obesity and its measure of body mass index are strongly determined by parental body size. Debate continues as to whether both parents contribute equally to offspring body mass which is key to understanding the aetiology of the disease. The aim of this study was to use cohort data from three generations of one family to examine the relative maternal and paternal associations with offspring body mass index and how these associations compare with family height to demonstrate evidence of genetic or environmental cross-generational transmission.

# Cross-Generation and Familial predictors of BMI at 5-year olds follow-up

Murrin et al, BMC Public Health 2012



- Each family comprised 7 possible members, child, mother, father, maternal grandmother/grandfather and paternal grandmother/grandfather
- BMI for 5 year olds was measured, that for adults was self-reported
- Models were constructed to assess predictors of BMI in cohort members
- Fixed effects covariates were gender, group, fruit, vegetable and fish consumption, self rated health (SRH), physical activity level and education
- Random effect was family identity, which enables correlation between family members to be modelled



# Cross-Generation and Familial predictors of BMI at 5-year olds follow-up



Murrin et al, BMC Public Health 2011

- In model one, which included all participants, significant covariates were **SRH** ( $p < 0.0001$ ), **education** ( $p = 0.0596$ ) and of borderline significance, interaction term for group and **fruit and vegetable** consumption
- In model 2, of **maternal line** family members only, the **family effect was even stronger** ( $p < 0.0001$ ), average BMI difference of 1.33
- In model 3, for **paternal line** members only, the effect was **no longer statistically significant**.



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