Child, maternal and socio-economic influences on infant feeding in Scotland 2001 – 2009
(GCPH Breastfeeding Project)

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Glasgow Centre for Population Health
11th August 2011
Overview

• Background
• Aims/Objectives
• Project stages
• Findings
• Next steps…
Breast feeding by CHP/CHCP

Breast feeding at 6/8 weeks, by CHP/CHCP, 2004-2006

Source: Women and Children Team, ISD Scotland

Scotland = 36.4
Greater Gorbals

**Male Life Expectancy**

- Life expectancy in years
- 1994-1998: 61.4
- 1996-2000: 62.6
- 1999-2003: 63.4
- 2001-2005: 64.2

**Female Life Expectancy**

- Life expectancy in years
- 1994-1998: 72.0
- 1996-2000: 73.6
- 1999-2003: 75.1
- 2001-2005: 76.0

**Breast Feeding**

- % of mothers breastfeeding at 6/8 weeks
- 97-98: 14.9
- 98-99: 37.5
- 99-00: 41.4
- 00-01: 43.7
- 01-03: 48.1
- 02-04: 49.3
- 03-05: 50.2
- 04-06: 52.0

**Hospital Patients with Alcohol Attributable & Related Conditions**

- Age/sex standardised rate per 100,000 pop
- 97-99: 2447
- 98-00: 2495
- 99-01: 2640
- 00-02: 2600
- 01-03: 2640
- 02-04: 2600
- 03-05: 2640
- 04-06: 2600
GCPH Project Objectives

• 2 main aims:
  – Investigate local and national breastfeeding trends using a new linked maternal and child health dataset.
  – To investigate the unexpected increase in breastfeeding in selected deprived neighbourhoods within Greater Glasgow and Clyde.
Research Questions

• What contextual changes may have influenced breastfeeding rates?
• What are the best data sources to understand breastfeeding trends?
• What is the impact of a range of cultural and socio-economic factors on the likelihood to breastfeed and the duration of breastfeeding?
Linked data schemes

- National Records of Scotland Births (formerly General Register Office for Scotland - GROS)
- ISD Scottish Maternity Records (SMR02)
- Child Health Surveillance Programme – Pre-school Scheme (CHSP-PS)
- ISD Scottish Morbidity Records for Neonatal and Infant Health (SMR11) and Scottish Birth Records (SBR)
- Scottish Still Birth and Infant Death Records (SSBID)
Overview of data schemes

**Predictor Variables**

- **Geography** (NHS Board, CHP, Neighbourhood area, hospital)
- **Maternal characteristics** (e.g. maternal age, marital status, ethnicity, socioeconomic characteristics, deprivation, smoking status)
- **Pregnancy/Delivery characteristics** (e.g. gestation, previous pregnancies, parity, length of stay, mode of delivery, outcome, multiple birth, caesarean section)
- **Infant characteristics** (e.g. APGAR score, birth weight, congenital anomaly, neonatal/infant admission, length of stay)

**Outcome Variables**

- **Infant feeding – initiation** (first feed or feed at birth, feed on hospital discharge)
- **Infant feeding – duration** (feed on hospital discharge, feed at community discharge, feed at first visit, 6 to 8 week review, 8-9 month review)

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**GROS – Births; SMR02 – Maternal hospital records; CHSP-PS - Child Health Surveillance (pre-school); SBR/SMR11 - Scottish Birth Record/Neonatal and infant health; SSBID - Scottish Still Birth and Infant Death Records**
Overall infant feeding trends

Scotland *
Infant feeding data collection

- Birth
- Hospital discharge
- First visit
- Community discharge
- 6 to 8 week review
Breastfeeding (exclusive) trends 2001 - 2009

Source: GROS, CHSP-PS/ISD Scotland linked extract

<table>
<thead>
<tr>
<th>Year of birth</th>
<th>Gestation</th>
<th>Hospital discharge</th>
<th>Community discharge</th>
<th>First visit</th>
<th>6 to 8 week review</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>43%</td>
<td>37%</td>
<td>26%</td>
<td>27%</td>
<td>27%</td>
</tr>
<tr>
<td>2002</td>
<td>45%</td>
<td>39%</td>
<td>27%</td>
<td>27%</td>
<td>26%</td>
</tr>
<tr>
<td>2003</td>
<td>45%</td>
<td>38%</td>
<td>26%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>2004</td>
<td>44%</td>
<td>38%</td>
<td>26%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>2005</td>
<td>45%</td>
<td>38%</td>
<td>26%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>2006</td>
<td>44%</td>
<td>37%</td>
<td>26%</td>
<td>28%</td>
<td>26%</td>
</tr>
<tr>
<td>2007</td>
<td>45%</td>
<td>38%</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>2008</td>
<td>45%</td>
<td>38%</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
<tr>
<td>2009</td>
<td>45%</td>
<td>37%</td>
<td>26%</td>
<td>26%</td>
<td>26%</td>
</tr>
</tbody>
</table>
Scotland: Bottle feeding trends

**Bottlefeeding trends 2001 - 2009**

Source: GROS, CHSP-PS/ ISD Scotland linked extract

The graph illustrates the bottle feeding trends from 2001 to 2009. The data shows the percentage of infants born and discharged from hospitals, as well as those seen at their first visit and 6 to 8 week review. The percentages are as follows:

- **2001**: 44% at birth, 51% at hospital discharge, 54% at community discharge, 42% at first visit, 56% at 6 to 8 week review.
- **2002**: 50%, 50%, 50%, 42%, 50%.
- **2003**: 54%, 50%, 50%, 42%, 54%.
- **2004**: 63%, 55%, 55%, 41%, 62%.
- **2005**: 63%, 63%, 63%, 62%, 62%.
- **2006**: 63%, 63%, 63%, 63%, 63%.
- **2007**: 64%, 55%, 55%, 49%, 64%.
- **2008**: 63%, 55%, 55%, 49%, 63%.
- **2009**: 63%, 54%, 54%, 48%, 63%.

The data indicates a general increase in bottle feeding over the 9-year period.
Scotland: Mixed feeding trends

Mixed feeding trends 2001 - 2009
Source: GROS, CHSP-PS/ISD Scotland linked extract

<table>
<thead>
<tr>
<th>Year of birth</th>
<th>Birth</th>
<th>Hospital discharge</th>
<th>Community discharge</th>
<th>First visit</th>
<th>6 to 8 week review</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>3%</td>
<td>3%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>5%</td>
<td>3%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>5%</td>
<td>3%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>6%</td>
<td>4%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>6%</td>
<td>5%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5%</td>
<td>4%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>7%</td>
<td>4%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>7%</td>
<td>5%</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>9%</td>
<td>5%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Influence of demographic, maternal and child-related factors
Breastfeeding (exclusive) trends and maternal age

Breastfeeding (exclusive) trends by age of mother 2001 - 2009
Source: SMR02, CHSP- PS/ISD linked extract

<table>
<thead>
<tr>
<th>Age range of mother</th>
<th>Infant records (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20 years</td>
<td>27% 18% 6%</td>
</tr>
<tr>
<td>20 - 24 years</td>
<td>40% 30% 13%</td>
</tr>
<tr>
<td>25 - 29 years</td>
<td>54% 44% 37%</td>
</tr>
<tr>
<td>30 - 34 years</td>
<td>63% 54% 47%</td>
</tr>
<tr>
<td>35 - 39 years</td>
<td>65% 56% 49%</td>
</tr>
<tr>
<td>40 - 44 years</td>
<td>65% 56% 49%</td>
</tr>
<tr>
<td>45 years+</td>
<td>69% 57% 48%</td>
</tr>
</tbody>
</table>

- Birth
- Hospital discharge
- First Visit
- 6 to 8 week review
Breastfeeding at birth (exclusive) trends by area deprivation

Breastfeeding (exclusive) trends at birth and area deprivation 2001 - 2009
Source: GROS, CHSP-PS, SIMD 2006/ISD Scotland linked extract

Year of birth

Infants (%)

2001 2002 2003 2004 2005 2006 2007 2008 2009

SIMD 5_Least deprived
SIMD 4
SIMD 3
SIMD 2
SIMD 1_Most deprived
Breastfeeding trends and maternal socio-economic status

Breastfeeding (exclusive) trends and maternal socio-economic class
Source: GROS, CHSP-PS/ISD linked extract

[Bar chart showing breastfeeding rates by socio-economic class and stage: birth, hospital discharge, first visit, 6 to 8 week review]
Breastfeeding (exclusive) trends by mother’s country of birth

Breastfeeding (exclusive) trends by mother’s country of birth 2001 - 2009

Source: GROS Births, CHSP-PS/ISD Scotland linked extract

South America 88% 58% 83% 55% 80% 53% 79% 49% 73% 40% 52% 24%

Australasia 83% 58% 83% 55% 80% 53% 79% 49% 73% 40% 52% 24%

North America 83% 58% 83% 55% 80% 53% 79% 49% 73% 40% 52% 24%

Africa 80% 58% 83% 55% 80% 53% 79% 49% 73% 40% 52% 24%

Europe 79% 58% 83% 55% 80% 53% 79% 49% 73% 40% 52% 24%

Asia 73% 58% 83% 55% 80% 53% 79% 49% 73% 40% 52% 24%

British Isles 58% 58% 55% 53% 53% 49% 49% 49% 49% 49% 49% 49%
Breastfeeding (exclusive) trends and mother’s place of birth and ethnicity

Breastfeeding trends (exclusive) and maternal ethnicity and place of birth
2001 - 2009
Source: GROS Births, ONOMAP, CHSP-PS/ISD Scotland linked extract

Maternal background

- Non-British birth and Non-British origin
- Non-British birth and British origin
- British birth and Non-British origin
- British birth and British origin

- Birth
- Hospital discharge
- First visit
- 6 to 8 week visit
Breastfeeding (exclusive) and maternal smoking status

Breastfeeding (exclusive) trends and maternal smoking status
2001 - 2009
Source: CHSP-PS/ISD Scotland linked extract

Maternal smoking status

- Non smoker
  - Birth: 61%
  - Hospital discharge: 51%
  - First visit: 44%
  - 6 to 8 week review: 31%

- Smoker
  - Birth: 31%
  - Hospital discharge: 22%
  - First visit: 16%
  - 6 to 8 week review: 9%
Breastfeeding (exclusive) and maternal body mass index

Breastfeeding (exclusive) trends and maternal body mass index 2003 - 2009

Source: SMR02, CHSP-PS, GROS/ISD Scotland linked extract

![Bar chart showing breastfeeding trends by maternal BMI and time of measurement (birth, hospital discharge, first visit, 6 to 8 week review). The chart illustrates the percentage of infant records (%) for different BMI categories across these time points.]
Breastfeeding (exclusive) and neonatal admission

Breastfeeding (exclusive) trends and neonatal admission 2001 - 2009
Source: SMR02, CHSP- PS/ ISD Scotland linked extract

<table>
<thead>
<tr>
<th>Neonatal admission</th>
<th>Birth</th>
<th>Hospital discharge</th>
<th>First visit</th>
<th>6 to 8 week review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not admitted</td>
<td>55%</td>
<td>46%</td>
<td>38%</td>
<td>27%</td>
</tr>
<tr>
<td>Admitted - up to 48 hours</td>
<td>43%</td>
<td>35%</td>
<td>31%</td>
<td>21%</td>
</tr>
<tr>
<td>Admitted - more than 48 hours</td>
<td>40%</td>
<td>30%</td>
<td>27%</td>
<td>16%</td>
</tr>
</tbody>
</table>
Infant feeding patterns
Weight gain at 6 to 8 week review (median)

Patterns of infant feeding and weight gain (median) 2001 - 2009
Source: CHSP-PS/ISD Scotland linked extract

Median weight gain (g)

Age of infant (days)
Predictors of any breastfeeding in first time mothers (singleton births): 2003 – 2009

<table>
<thead>
<tr>
<th>Demographic</th>
<th>maternal age, paternal age, area deprivation (SIMD), mother and father’s socioeconomic status, marital status, mother’s country of birth (and father’s), maternal religious background, year of birth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal and infant health</td>
<td>maternal body mass index, mode of delivery, maternal health at delivery, maternal smoking status, neonatal admission, infant gestation/birth weight, infant health, infant sex, estimated gestation, mode of feeding at birth*</td>
</tr>
<tr>
<td>Health services</td>
<td>full baby friendly accreditation, timing of review visits*, length of postnatal stay</td>
</tr>
</tbody>
</table>

* indicates significant predictors or confounders.
### Predictors of any breastfeeding continued…

| Variables that predict any breastfeeding: mixed and exclusive (reference) | Odds ratios (95% confidence intervals) |
|---|---|---|---|
|  | Birth | First visit | 6 to 8 weeks |
| **Maternal age (teenage mother)** | | | |
| 20 – 24 years | 1.36 (1.30 – 1.43) | 1.27 (1.19 – 1.36) | 1.33 (1.24 – 1.44) |
| 25 – 30 years | 1.67 (1.58 – 1.76) | 1.57 (1.46 – 1.69) | 1.76 (1.62 – 1.91) |
| 30 – 34 years | 2.00 (1.88 – 2.12) | 1.92 (1.78 – 2.08) | 2.19 (2.01 – 2.39) |
| 35 – 40 years | 2.09 (1.95 – 2.25) | 2.08 (1.90 – 2.27) | 2.41 (2.19 – 2.65) |
| 40 + years | 2.36 (2.09 – 2.67) | 2.28 (2.11 – 2.28) | 2.70 (2.37 – 3.07) |
| **Deprivation (Most deprived)** | | | |
| SIMD 2 | 1.27 (1.22 – 1.31) | 1.11 (1.06 – 1.16) | - |
| SIMD 3 | 1.54 (1.48 – 1.61) | 1.27 (1.21 – 1.34) | 1.14 (1.09 – 1.19) |
| SIMD 4 | 1.85 (1.78 – 1.93) | 1.44 (1.37 – 1.51) | 1.32 (1.26 – 1.37) |
| SIMD 5 _Least deprived | 2.07 (1.97 – 2.17) | 1.54 (1.46 –1.63) | 1.37 (1.32 – 1.43) |
| 2006 - 2009 | 1.04 (1.01 – 1.07) | 0.95 (0.92 – 0.98) | 0.89 (0.87 – 0.92) |
## Predictors of any breastfeeding continued...

| Variables that predict any breastfeeding: mixed and exclusive (reference) | Odds ratios (95% confidence intervals) |  |
|---|---|---|---|
|  | Birth | First visit | 6 to 8 weeks |
| **Country of birth (British)** |  |  |  |
| Mother of Non-British birth | 2.80 (2.60 – 3.20) | 2.63 (2.45 – 2.83) | 2.27 (2.14 – 2.41) |
| **Marital status (married parents)** |  |  |  |
| Cohabiting parents | 0.83 (0.81 – 0.86) | 0.90 (0.87 – 0.93) | 0.87 (0.84 – 0.91) |
| Single/separated parent | 0.55 (0.52 – 0.57) | 0.72 (0.68 – 0.76) | 0.67 (0.63 – 0.72) |
| **Smoking status (non smoker)** |  |  |  |
| Smoker | 0.62 (0.60 – 0.65) | 0.67 (0.64 – 0.70) | 0.58 (0.55 – 0.61) |
| **Maternal BMI (normal BMI)** |  |  |  |
| Underweight | 0.78 (0.70 – 0.86) |  |  |
| Overweight |  | 0.85 (0.80 – 0.89) | 0.82 (0.78 – 0.86) |
| Obese | 0.86 (0.82-0.90) | 0.68 (0.64 – 0.72) | 0.66 (0.62 – 0.70) |
| **Baby friendly facility (Partial or Non BFI)** |  |  |  |
| Full Accreditation | 1.15 (1.11 – 1.18) | 1.16 (1.12 – 1.20) | 1.13 (1.09 – 1.16) |
Predictors of any breastfeeding continued…

| Variables that predict any breastfeeding: mixed and exclusive (reference) | Odds ratios (95% confidence intervals) |
|---|---|---|---|
|  | Birth | First visit | 6 to 8 weeks |
| **Length of stay** (2 days or less) |  |  |  |
| 3 days or more | 1.60 (1.55-1.65) | 1.17 (1.13 – 1.22) | – |
| **Partner’s age** (< than 24 yrs) |  |  |  |
| 25 – 34 years | 1.25 (1.20 – 1.29) | 1.26 (1.19 – 1.32) | 1.16 (1.10 – 1.23) |
| 35 years or older | 1.35 (1.29 – 1.41) | 1.41 (1.32 – 1.50) | 1.32 (1.24 – 1.41) |
| **Parental background** (British) |  |  |  |
| Either parent of Non-British country of origin | 1.44 (1.35 – 1.54) | 1.25 (1.17 – 1.35) | 1.21 (1.13 – 1.29) |
| Both parents of Non-British country of origin | 2.07 (1.79 – 2.39) | 1.85 (1.62 – 2.13) | 1.21 (1.11 – 1.32) |
| Either parent of unknown country of origin | 2.14 (1.54 – 2.98) | 1.56 (1.36 – 1.80) | – |
Summary

A range of infant and maternal characteristics influence type and duration of infant feeding.

• Older mothers, mothers living in less deprived areas, those married or living with a partner, mothers who did not smoke and those born outside the British Isles or with a non-British ethnic origin had higher levels of breast-feeding.

• In contrast, younger mothers, mothers living in more deprived areas, single mothers, smokers and mothers born in Britain or of British origin had higher rates of bottle feeding.

• Mode of delivery, parity, length of maternal stay in hospital, gestation and infant health also clearly influence type and duration of infant feeding.

• Mixed feeding has increased over time and appears more prevalent in mothers who are ‘traditionally’ likely to breastfeed exclusively. It is also the major source of breast milk for infants of mothers of Non-British birth, younger mothers, deprived mothers and infants with prolonged stay in hospital.
Next steps…

• Publish papers for Phase I

• Follow up Phase 2: Additional linkage to other schemes to explore the relationship between infant feeding and maternal ethnic background and infant outcomes within the first few years of life i.e. infant weight gain, illness etc.
Acknowledgements

• The project is being managed by Bruce Whyte (GCPH)
• Advisory group:
  – James Egan (Public Health Programme Manager, GCPH)
  – Pauline Craig (Health Scotland)
  – Jim Chalmers (Public Health Consultant, ISD Scotland)
  – Judith Tait (Child Health Information Team Leader, ISD Scotland)
  – Linda Wolfson (Infant Feeding Advisor, NHS GG&C),
  – Jill Muirie (Public Health Advisor, NHS Health Scotland)
  – Ruth Campbell (Consultant Dietitian, NHS Ayrshire & Arran)
  – Louise Johnstone (Scottish Government)
  – David Tappin (Senior Clinical Lecturer, PEACH unit, Royal Hospital for Sick Children, Glasgow)
• Colleagues at ISD Scotland, GROS and GCPH
Thank you!