

# Prevalence of breastfeeding at four months in general practices in south London

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## SUMMARY

**Background:** Successive quinquennial National Infant Feeding Surveys have provided a valuable picture of national and regional variations in infant feeding practices within the United Kingdom. Social variation in breastfeeding has been recognised to be an important source of health inequalities in childhood by the *Independent Inquiry into Inequalities in Health Report*.

**Aim:** To determine the prevalence of breastfeeding at birth and at four months in a sample of women from urban general practices, its variation between practices, and relation to practice population deprivation scores. To report the timing of introduction of solid feeds.

**Design of study:** Cross-sectional questionnaire survey based on a random cluster sample.

**Setting:** Women with infants aged four months in general practices in South London.

**Method:** Mode of infant feeding at birth and four months, and time of introduction of solids. Jarman score as a measure of practice population deprivation. Housing tenure, maternal ethnic group, and maternal age at leaving full-time education.

**Results:** Twenty-five general practices were sampled. Median practice Jarman score was 15.0 (interquartile range [IQR] = 12.6–21.9). Responses were received from 1053 out of 1532 mothers approached (69%). Of these, 87% (897) had breastfed at birth, while 59% (609) were still breastfeeding their babies at four months. Mothers in rented accommodation were less likely to breastfeed than owner-occupiers (odds ratio [95% CI] = 0.52 [0.37–0.74]), as were women of white, compared with those of black, ethnic origin (odds ratio [95% CI] = 0.55 [0.36–0.82]). Those who completed up to two years and more than two years education after the age of 16 were 2.94 (95% CI = 1.85–4.66) and 9.25 (95% CI = 6.02–14.21) more likely to breastfeed at four months, respectively, than mothers whose formal education was completed at or before 16 years. Practice-specific rates of breastfeeding ranged from 71% to 100% at birth (median 87%; IQR = 79–93%) and 22% to 83% at four months (median 61%; interquartile range = 47–66%). The intra-practice correlation coefficient for breastfeeding at four months was 0.052 (within-cluster variance = 0.23, between-cluster variance = 0.013). There was no association between breastfeeding at four months and practice-specific Jarman score. Median age of starting solids was 16 weeks (IQR = 15–17 weeks).

**Conclusions:** Housing tenure, maternal education, and ethnic group are significantly associated with breastfeeding prevalence at four months. Between-practice variation in breastfeeding prevalence is not associated with measures of practice population deprivation, as assessed by Jarman scores. Consideration should be given to including information on maternal ethnic group and housing tenure in future National Infant Feeding Surveys. Current weaning practices fall short of the recommendation of the World Health Assembly.

**Keywords:** breastfeeding; infant feeding practices; deprivation.

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Submitted: 11 January 2000; Editor's response: 17 April 2000; final acceptance: 26 April 2001.

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© *British Journal of General Practice*, 2001, 51, 445–450.

## Introduction

SUCCESSIVE quinquennial National Infant Feeding Surveys have provided a valuable picture of national and regional variations in infant feeding practices within the UK.<sup>1</sup> Social variation in breastfeeding has been recognised to be an important source of health inequalities in childhood by the *Independent Inquiry into Inequalities in Health Report*.<sup>2</sup> However, surveys specific to urban populations with high levels of deprivation are lacking. As data on the mode of infant feeding are not routinely collected after the six-week maternal postnatal examination, little is known about local variation in breastfeeding rates at later time-points. These data are important since the benefits of breastfeeding appear to increase with increasing duration, at least until four months of age, and to continue throughout early childhood.<sup>3</sup>

While much is known about the factors influencing breastfeeding at an individual level, there are few data examining factors influencing variation in breastfeeding between different communities. This information is needed to inform the design of trials of interventions aimed at increasing breastfeeding rates that operate at a community rather than an individual level.

This study was undertaken to inform the design of a proposed randomised controlled trial, testing a practice-based intervention aimed at increasing breastfeeding duration. As such a trial would involve randomising general practices rather than individual women, a prior estimate of the extent to which breastfeeding duration varies between practices was required. This variation is measured by calculating an intra-practice correlation coefficient (ICC)<sup>4</sup> that may then be used to adjust the sample size estimates for the main trial. This study aimed to assess between-practice variation in breastfeeding prevalence in an urban population with high levels of deprivation. A subsidiary aim was to assess the association, at a practice level, of breastfeeding prevalence with measures of deprivation in the practice population, to determine whether randomisation should be balanced with respect to this factor. We also assessed socioeconomic factors operating at the individual level in this population that might determine breastfeeding practices, including housing tenure, maternal education, and maternal ethnic group.

## Method

### Sampling

Twenty-five general practices were selected using cluster random sampling from the 105 practices with a list size of over 3000 in the Lambeth, Southwark, and Lewisham Health Authority area. Practices of this size were selected from the total of 160 practices to ensure an adequate number of births per cluster during the time-frame of the survey. These

## HOW THIS FITS IN

### What do we know?

- Lower socioeconomic status (partner-defined) and shorter duration of education are associated with lower rates of breastfeeding.
- In the UK, there is evidence that young white mothers are the group least likely to breastfeed.

### What does this paper add?

- There is considerable variation between practices in the prevalence of breastfeeding at four months, suggesting local practice-specific effects.
- This study reports the first estimate of an ICC (intra-practice correlation co-efficient) for breastfeeding at four months derived from an inner-London borough.
- Ethnic group was confirmed as a predictor of breastfeeding prevalence while at general practice level rates of breastfeeding were not related to the Jarman deprivation score.



London boroughs were selected as they contain areas of high deprivation, with a higher proportion of children under four years old, young adults (aged 25 to 44 years), and women of childbearing age than England and Wales as a whole. Compared with England and Wales, the population has a higher fertility rate and double the teenage conception rate. Mean perinatal mortality rates for 1994–1996 were 11.8 per 1000 total births, compared with 8.7 for England and Wales.<sup>5</sup>

All women registered with the 25 practices giving birth between January and August 1998 constituted the sample and were sent a questionnaire by post 17 weeks postnatally. Women in the study had given birth in one of three maternity units in the area. Antenatal breastfeeding programmes differed between these units, one of which had formally applied for recognition of 'Baby Friendly' status at the time the study was carried out.<sup>6</sup>

Women were asked to complete a postal questionnaire requesting demographic data and details of infant feeding practices. Information regarding sources of support for breastfeeding, maternal mood, self-esteem, and satisfaction with breastfeeding was also obtained but is not reported here. Non-responders were sent, at fortnightly intervals, two further abbreviated reminder questionnaires, limited to information on feeding at four months and basic demographic data. The percentage of women who breastfed their baby at birth was determined by response to the question: 'Have you ever put your baby to the breast?', and the percentage who breastfed their baby at four months from replies to the question: 'How are you feeding your baby now?' This allowed direct comparison with data reported from the National Infant Feeding Survey.<sup>1</sup>

Mothers were asked to report their age at leaving full-time education, housing tenure (council-rented, private-rented or owner-occupied), and ethnic group (based on 1991 Census categories).<sup>7</sup> Similarly, practice-specific Jarman scores, originally developed as a measure of social deprivation in general practice populations (with higher scores indicating greater need), were taken from data derived from the 1991 Census.<sup>8</sup> The Health Authority calculates a Jarman score for

each general practice by weighting census enumeration district scores by the number of patients on the practice list who live within each enumeration district. The Jarman score is the only practice population-based indicator of deprivation available in Lambeth, Southwark, and Lewisham.

### Ethical issues

General practitioners gave consent for the research team to contact women in their practices who had given birth during the selected time period. Details of the births were obtained from the child health computer systems administered by the two Community Trusts within the Health Authority. Mothers were then sent a study questionnaire together with a written consent form. The three Local Ethics Committees approved the study.

### Sample size

It was estimated that 25 clusters, each containing a minimum of 25 women, would be sufficient to calculate the ICC. This total of 625 women would also be sufficient to estimate the overall rate of breastfeeding at four months to within 4%, with 95% confidence. Practice-specific breastfeeding rates could also be estimated to within 20% from this number of women per cluster.

### Statistical analysis

Continuous outcomes were compared between groups using *t*-tests and categorical outcomes investigated using  $\chi^2$ . Results are presented with 95% confidence intervals. The significance of trends was estimated using the Cochran–Armitage trend test. Multi-level modelling was used to investigate differences at the individual level in the prevalence of breastfeeding at four months by ethnic group, years of education, and differences at the practice level by practice and by practice Jarman score. Intra-practice correlation coefficients were calculated by analysis of variance.<sup>9</sup> As the focus of this study was on duration rather than initiation of breastfeeding, data on breastfeeding at birth were not analysed in this way. The Kaplan–Meier estimate of median time to introduction of solids was calculated.

## Results

### Response

A total of 1532 women from 25 general practices were sent questionnaires at 17 weeks postpartum. The recruitment of greater numbers than anticipated allowed for more precise estimates of overall and practice-specific breastfeeding rates. Data on feeding practices were obtained from 1035 women, giving an overall response rate of 68%. The latest response was received by 28 weeks. Abbreviated questionnaires were completed by 173 of the women and hence complete individual level information was available for 862 women (83% of those responding).

### Demographic data

**Practice level.** The practice Jarman scores ranged from 3.8 to 27.1, with a median of 15.0 (IQR = 12.6–21.9). These scores were representative of the range found within the health authority.

*Individual level.* The mean age of responders was 31 years (range = 16–45 years) and median age at leaving full-time education was 20 years (range = 12–32 years). Thirty-four per cent lived in rented council accommodation, 62% described themselves as white, and 26% as black (black African, black Caribbean or black other), while the remaining 12% came from a range of ethnic groups (Table 1). This was the first child for 51% of women in this study. Women living in rented accommodation had on average 1.83 years less education (95% CI = 1.45–2.22;  $P < 0.00005$ ) than owner-occupiers. Women from a white ethnic group were less likely to rent (39%) than those from black (77%) or other ethnic groups (65%) ( $P < 0.00005$ ), but there was no significant ethnic variation in age at leaving full-time education (data not shown).

Table 1 compares some characteristics of this cohort with the population of the Lambeth, Southwark, and Lewisham Health Authority and the 1995 National Infant Feeding Survey sample. While the study sample reflects the ethnic diversity of the area, older mothers and owner-occupiers are over-represented. Those who left full-time education after 16 years of age may also be over-represented since a trial of antenatal care in the same Health Authority<sup>10</sup> found that 35% of participants had finished full-time education at 16 years of age.

### Feeding practices

Practice-specific rates of breastfeeding varied from 71% to 100% (median = 87%; IQR = 79–93%) at birth, and from 22% to 83% (median = 61%; IQR = 47–66%) at four months. Of the total sample 87% (897 out of 1035) had breastfed at birth, while 59% (609 out of 1035) were still breastfeeding their babies at four months.

Tables 2 and 3 compare data on feeding intention and subsequent feeding practices from this study and the 1995

National Infant Feeding Survey. All measures of breastfeeding were higher in the current study.

Housing tenure, maternal education, and maternal ethnic group were all significantly associated with breastfeeding. Mothers in rented accommodation were less likely to breastfeed than owner-occupiers (odds ratio [95% CI] = 0.52 [0.37–0.74],  $P = 0.00024$ ), as were women of white compared to those of black ethnic origin (odds ratio [95% CI] = 0.55 [0.36–0.82],  $P = 0.00358$ ). Those who completed up to two years and more than two years education after the age of 16 were 2.94 (95% CI = 1.85–4.66),  $P = 0.00014$  and 9.25 (95% CI = 6.02–14.21),  $P < 0.0005$  more likely to breastfeed at four months, respectively, than mothers whose formal education was completed at or before the age of 16 years. There was a significant interaction between ethnic group and education, with the odds ratio falling by a further 64% (95% CI = 10%–85%) for women who were white and left school at or before 16 years.

The association of renting or years of education with breastfeeding was almost constant across practices. The association with ethnicity was not significantly different between practices but the range of practice-specific breastfeeding rates for ethnic groups was wide. After accounting for individual differences in education, ethnicity, and renting the practice Jarman score was not associated with practice breastfeeding rates at four months (odds ratio [95% CI] = 1.00 [0.96–1.04],  $P = 0.88$ ). Figure 1 shows the relationship between breastfeeding incidence and prevalence at four months across the range of practice-specific Jarman scores. The ICC for breastfeeding at four months was 0.052 (within-cluster variance = 0.23, between-cluster variance = 0.013). Figure 2 summarises the distribution of age of starting solids (median time = 16 weeks, IQR = 15–17 weeks). The survival curve was curtailed at 22 weeks when only six mothers

Table 1. Demographic variables from current study, Lambeth, Southwark, and Lewisham Health Authority and the National Infant Feeding Survey (1995).

	Current study (%) <sup>a</sup>	LSL (%) <sup>b</sup>	NIFS (%) <sup>c</sup>
Age (years)			
<20	4	6	6
20–24	11	16	19
25–34	60	61	62
35	26	17	12
Age on leaving full-time education (years)			
<16	18	NA	45
17–18	24	NA	35
19	59	NA	20
Housing tenure			
Owner occupier	46	37 <sup>d</sup>	NA
Council rented	34	42 <sup>d</sup>	NA
Other rented	19	21 <sup>d</sup>	NA
Ethnicity			
White	62	74 <sup>d</sup>	
Black Caribbean/Black African/Black other	26	19 <sup>d</sup>	

<sup>a</sup>Based on 1035 responses from a sample of 1532 women. <sup>b</sup>Lambeth, Southwark, and Lewisham Health Authority. <sup>c</sup>National Infant Feeding Survey 1995 — based on 5240 responses from a national random sample of births to 6972 women between August and October 1995. <sup>d</sup>1991 census data for the whole population of these boroughs. NA = not available.

Table 2. Reported feeding intention and infant feeding practices in current study and National Infant Feeding Survey (1995).

	Feeding intention		Feeding at birth		Feeding at four months	
	Current study % (N)	NIFS (E&W) %	Current study % (N)	NIFS (L&SE) %	Current study % (N)	NIFS (L&SE) %
Breast feeding	82 (852)	65	88 (897)	76	59 (609)	33
Bottle feeding	13 (128)	29	12 (121)	24 <sup>a</sup>	41 (425)	67 <sup>a</sup>

<sup>a</sup>number obtained by subtracting from 100%. NIFS<sup>‡</sup> = national infant feeding survey 1995 (E&W = England and Wales; L&SE = London and South East).

Table 3. Reported feeding intention and infant feeding practices in current study and National Infant Feeding Survey (1995) by educational status.

Age at which mother completed full-time education (years)	Percentage who planned to breastfeed		Percentage who breastfed at birth		Percentage breastfeeding at four months	
	Current study (N)	NIFS <sup>b</sup>	Current study (N)	NIFS <sup>b</sup>	Current study (N)	NIFS <sup>b</sup>
<16	64 (99/154)	50	68(105/155)	52	25(39/155)	16
17–18	79(162/205)	68	83(173/208)	72	50(105/208)	27
19	92(478/519)	86	97(504/519)	89	78(401/518)	56
P value for trend <sup>a</sup>	P<0.00005		P<0.00005		P<0.00005	

<sup>a</sup>Cochran-Armitage trend test. <sup>b</sup>NIFS = National Infant Feeding Survey 1995. Figures for UK as a whole.

remained in the data set. Median age of starting solids was 16 weeks in 21 out of the 25 practices (range = 14–17 weeks).

## Discussion

### Response

The overall response rate for this survey was greater than that expected for an inner-city postnatal questionnaire,<sup>11</sup> and that achieved six weeks postnatally in a randomised controlled trial carried out in the same Health Authority.<sup>10</sup> It was also higher than the 64% response rate achieved in the second stage of the 1995 National Infant Feeding Survey. Although the sample used in the National Infant Feeding Survey is weighted to allow for expected low response from mothers of lower social class, we were not able to make a similar correction owing to the practice-based nature of this study. The finding of a higher prevalence of breastfeeding at birth and at four months, than that reported in the 1995 National Infant Feeding Survey, partly reflects the difference in age structure of the population residing in the Health Authority in which the current study took place. It may also reflect the higher rates of breastfeeding among the black community in south London but direct comparison with the national survey is impossible, as the latter does not collect information about maternal ethnic group. The finding may also reflect a degree of response bias since non-responders in infant feeding surveys have been previously found to be more similar to bottle-feeding responders than to breast-feeding responders.<sup>12</sup>

### Association with deprivation scores

While our findings confirm the recognised association between individual measures of socioeconomic status and breastfeeding behaviour, we did not find an association between practice-specific Jarman scores and breastfeeding prevalence. The association between deprivation indices and maternal and child health indicators is unclear. While in one study, high electoral ward Jarman scores were associated with higher rates of post-perinatal mortality,<sup>13</sup> this was only seen when Jarman scores were over 30. The highest practice Jarman score in the current study was 27. We were not able to test the association of breastfeeding with alternative, area-based deprivation indicators in this study. However, Joyce *et al* compared the predictive value of the Jarman score for stillbirth, neonatal, and infant mortality with that of the Townsend score, or with percentage unemployment, and found no significant difference between these different measures of population deprivation.<sup>14</sup> While the lack of association in our study may reflect the characteristics of our sample, an alternative explanation is that the Jarman index is not predictive of some of the health behaviours or outcomes associated with socioeconomic deprivation. Recently, Marsh *et al*<sup>15</sup> have cautioned against assuming that the Jarman score of a population has a clear relationship to its health status. Previous studies have suggested that individual social class is a more accurate predictor of morbidity and mortality than Jarman scores for electoral wards<sup>16</sup> or postcode sectors.<sup>17</sup> In the current study, housing tenure was similarly more helpful in predicting infant feeding

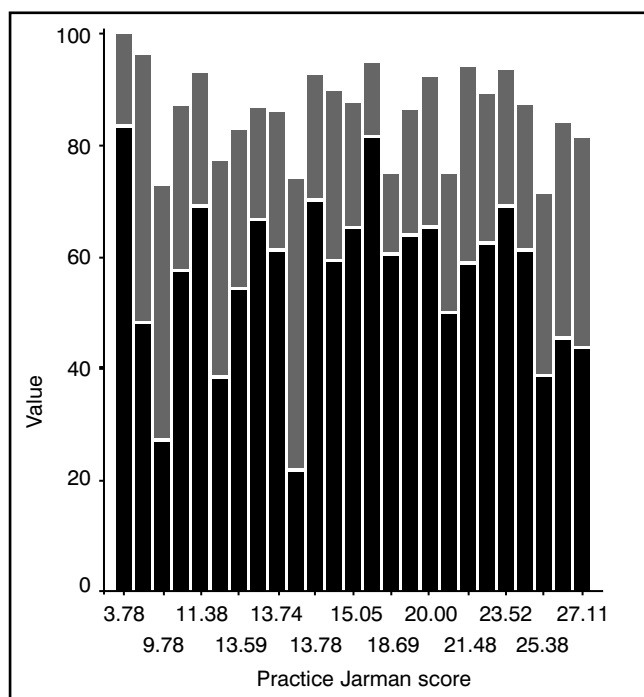


Figure 1. Relationship between breastfeeding incidence and prevalence at four months with practice Jarman score.

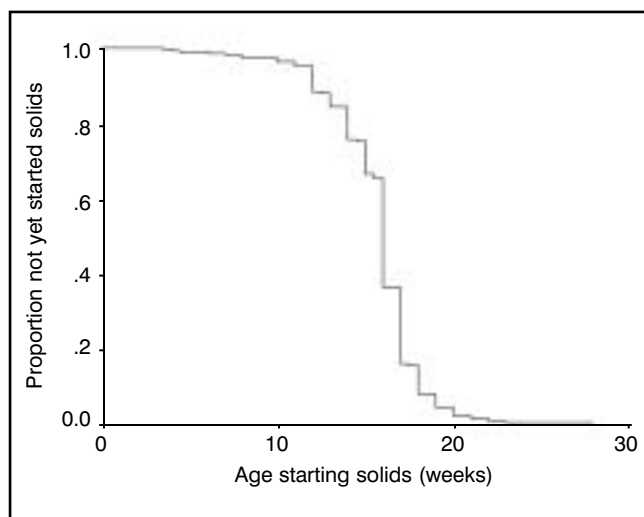


Figure 2. Survival curve showing proportion of babies not yet started solids.

practices. These findings would seem to confirm the necessity of collecting individual as well as ecological data when undertaking health needs assessment or measuring health-related behaviours.<sup>18</sup>

#### Between-practice variation

We found considerable variation between general practices in the prevalence of breastfeeding at four months suggesting the presence of local, practice-specific effects. The ICC is a measure of the contribution of general practice membership to the total observed variation in the endpoint of interest. The figure reported in this study for breastfeeding at four months is greater than that calculated for a selection of health-related behaviours from the Health Survey for

England 1994, at the postal code sector level.<sup>19</sup> Postal code sectors have populations of approximately 6500 and are therefore not dissimilar in size to many of the practices in this survey. The finding of a larger ICC than expected suggests the possibility of a practice influence on breastfeeding. The presence of a practice-related contextual effect on breastfeeding rates might be mediated through professional attitudes, organisation of care or characteristics of the local community (for example, the absence of appropriate role models for mothers).

#### Ethnic differences

Breastfeeding prevalence was highest among black women. Like Hoddinott *et al*,<sup>20</sup> we found ethnic differences in the association between maternal educational level and infant feeding choice. The complex relationship between ethnic group, educational level, and feeding choice requires further study.

#### Weaning practices

In the current study, solids were introduced at, or before, 15 weeks in one-quarter of all infants and the figure rose to 75% by four months. Both the 1995 National Infant Feeding Survey<sup>1</sup> and the Glasgow longitudinal infant growth study<sup>21</sup> found that even larger proportions of women reported weaning at these stages. Although the *Innocenti Declaration*<sup>22</sup> recommends exclusive breastfeeding for four months, the World Health Assembly (WHA)<sup>23</sup> regards six months as the optimal duration and its recommendation has been adopted by over 60 countries. It is clear that reported weaning practices in this study population fall short of the WHA recommendation.

This study has allowed estimation of the variation in breastfeeding related to general practice membership. It has also provided evidence that other population characteristics, such as ethnic group, contribute importantly to variations in breastfeeding rates. Consideration should be given to including information on maternal ethnic group in future National Infant Feeding Surveys. Finally, we have shown that, in deprived urban populations, there remains considerable scope for increasing breastfeeding rates and improving weaning practices.

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## Acknowledgements

We would like to thank all the women who took part in the survey and their GPs for their co-operation. Thanks are also due to Carol Stamper and Keith Jackson, child health system managers at Optimum Health Services NHS Trust and Lambeth Health Care Trust. Early statistical advice was received from Obi Ukoumunne. This study was funded by the Special Trustees of Guy's Hospital and through a Health Action Zone grant from Lambeth, Southwark, and Lewisham Health Authority.