

# Summary of research: 1999 to 2003

Now that the children are not babies, the study has been renamed the Gateshead Millennium Study. This leaflet gives details of the results to far. There is also a study website: www.ncl.ac.uk/gms

# Background

The population for the study was Gateshead babies – the aim was to recruit 1000 mother-baby pairs within the year running from 1<sup>st</sup> June 1999 to 31<sup>st</sup> May 2000 inclusive. Within the year we had 'recruiting' weeks. There were two criteria for eligibility for the Millennium Baby Study. The first was that the baby's mother was a Gateshead resident at the time of delivery, and the second was that the baby was born within a pre-specified recruiting week. A total of 1029 babies were recruited. The table below shows some of the details.

	Number
Recruited at	
Queen Elizabeth	654
RVI	334
Other hospital	29
Home	12
Gender	
Boys	523
Girls	506

Babies were born at 27 to 43 weeks gestation with an average gestation of 39 weeks. The average weight at birth was 7lb 6oz, with a range of 1lb 14oz to 12lb 4oz.

During the first stages of the study we collected information in three ways:

- i) A series of questionnaires
- ii) A special edition of the Parent-Held Child Record
- iii) A clinic run to measure the weight of the child at 13 months

Later when the children started school:

Children are routinely measured at school entry for height and weight. For those families who did not express a wish not to be included, we recently obtained their child's measurements.

Type of data	Number received
Weights	
Routinely measured:	
Birth	1029
13 month health check	847
School entry	724
Well-baby clinic measured (recorded in Grey	book):
12 days	839
6 weeks	832
4 months	763
8 months	676
12 months	638
Parent-Held Child Record	
Maternity hospital discharge form	633
Six day visit form	801
Primary visit form	944
Three month visit form	792
Questionnaires	
Birth	1027
6 weeks	832
4 months	762
8 months	675
12 months	636
30 months	492

The table below shows a breakdown of the information we have received.

# Results

The study had a number of themes. The following is a summary of each theme, all of which have results in at least one published article.

# Postnatal weight loss in infants: what is "normal"?

It is well known that most babies lose weight in the first few days after birth. However, there is very little information about how *much* weight babies lose and the amount of weight gain that follows. This makes it difficult to assess children who have long-term weight loss. Half the Gateshead Millennium babies were weighed at 5 days of age and as many as possible were weighed at 12 days and 6 weeks. The Gateshead babies lost less weight than had been shown in previous studies. One in five infants had not regained their birth weight by 12 days old. Only 26 babies lost more than 10% of their weight, but none showed any signs of serious illness. The babies who were lightest at birth lost the least weight.

*In a nutshell:* Weight loss after birth is lower than previously shown and lasts only a short period of time.

#### Do early infant feeding patterns relate to continued breast-feeding?

Mothers completed feeding diaries about their baby in the first week after birth. At later routine health checks, weight and feeding information were collected. Breast-fed babies were fed more frequently than bottle-fed or mixed-fed babies in the first week of life, but feeds lasted the same length of time regardless of how the babies were fed. More frequent feeding in the first week was related to higher weight gain at 6 weeks of age for breast-feeders but not for bottle-feeders. Babies who were fed by both breast and bottles were less likely to still be fed by breast at 6 weeks of age than those who received only breast milk.

*In a nutshell:* Giving supplementary formula feeds was clearly associated with stopping breast feeding by 6 weeks of age.

#### When are babies weaned?

Since the Millennium babies' first year of life, the recommended age for introducing solid foods into the diets of infants (weaning) has been increased to 6 months of age. At the time the Millennium babies were recruited, the advice was that solids should not be introduced before 4 months of age. In the Millennium babies, the majority of babies were weaned between 3 and 4 months. Nearly one quarter started eating solids before 3 months of age, while only 10% started after 4 months of age. Infants progressed quickly to regular solids, with few problems reported by parents, even when they were weaned early. Some of the characteristics that led to early weaning were fast weight gain to age 6 weeks, parents' perception that their baby was hungry, and being bottle fed. Babies weaned before 3 months, compared with those weaned after 4 months of age, had increased risk of diarrhoea.

*In a nutshell:* The majority of infants were established on solids before the previously recommended age of 4 months and babies weaned earlier had increased rates of diarrhoea.

#### Appetite and weight gain

Parents completed questionnaires when their child was aged 6 weeks, and 4, 8 and 12 months. These questionnaires asked about children's appetite and feeding behaviour, and mothers' behaviour associated with feeding their baby. Weights were collected at routine clinic appointments over the first year. Weight gain at age 6 weeks was related separately to both appetite and any problems with controlling the muscles of the mouth, tongue and lips. Appetite at age 6 weeks and 12 months was related to weight gain at age 12 months – with good appetite leading to good weight gain, while poor appetite was associated with the child avoiding being fed and the mother worrying! It also appeared that persuading a child to eat when not hungry led to worse not better weight gain.

*In a nutshell:* Children have appetite patterns that determine how well or poorly they eat and grow.

#### The mother's influence on infant weight gain

Mothers answered questions about their own lives in the first year after the birth of their babies – such as their eating behaviour, mood, and social characteristics. Children's weight gain was assessed from birth to 13 months and related to the information about the mother. Mothers' eating behaviour was not related to their children's rates of weight gain. Children of mothers who suffered from postnatal depression had significantly slower weight gain up to age 4 months. However, by the time they were 12 months old, they were no different to other children in the group. There was no relationship between mothers' education levels and children's weight gain. *In a nutshell:* This study found that mothers' characteristics did not have much effect on children's weight gain over the first year. The only strong effect on children's weight gain was from postnatal depression, but this effect was short lasting.

# Mealtime energy intake and feeding behaviour

Few studies have watched feeding behaviour in children who do not gain weight as quickly as expected. In this study, 87 children were video taped throughout two meals - 30 who were not gaining weight as expected and 57 who had normal weight gain patterns. The children's ages at the time the videos were taken ranged from 13 to 21 months. The video tapes were used to identify types of children's feeding behaviour. Other things were also considered, including energy intake, weight of food eaten and length of time of the meal. The children who were gaining less weight seemed to be offered and eat the same amount of food as children with normal weight gain but in fact ate fewer calories. They were also less likely to sit in a high chair throughout the meal.

*In a nutshell:* Children with slow weight gain eat fewer calories during meals than similar aged children without slow weight gain but there were no clear differences in the mealtime feeding behaviour of the two groups. However, children with slow weight gain were less likely to eat their meal from start to finish sitting in a highchair.

#### The diagnosis of borderline iron deficiency

Insufficient iron is common in early childhood, and can lead to developmental problems. This study tried to discover how good various blood markers were at identifying true iron deficiency. The parents of about half the children in the study agreed to have blood samples taken when their child was 13 months old and these were tested for several possible markers of iron deficiency. Children with any low marker were offered treatment by oral iron medicine and given suggestions for changes in diet, then tested again three months later. This allowed us to find out which markers actually related most closely to a response to treatment. Anaemia (low haemoglobin) was usually associated with a response to treatment, but about half the children who responded were not anaemic. Other markers were effective at identifying iron shortage only when two or more were both abnormal. Of the children tested, 13% (about 1 in 8) could be defined as truly iron deficient. The children with low iron levels did not generally show differences in diet, social factors or growth compared to those with normal iron levels. In a nutshell: Iron deficiency can occur without anaemia but should only be treated if more than one marker of possible iron deficiency is abnormal.

# A new phase of the Gateshead Millennium Study began in 2005, so further results will be available in the future.