Original article

Ethnic Differences in dietary intake at age 12 and 18 months: The Born in Bradford 1000 Study.

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Abstract

Objective: To compare the intake of key indicator foods at age 12 months and 18 months between infants of Pakistani and White British origin.

Design: Logistic regression was used to model associations between ethnicity and consumption of key indicator foods defined by high or low energy density using a Food Frequency questionnaire at age 12 and 18 months.

Setting: Born in Bradford 1000 study, Bradford, UK

Subjects: 1,259 infants (38% White British; 49% Pakistani) mean age (sd) 12.7 (1.0) months; 1,257 toddlers (37% White British; 49% Pakistani) mean age (sd) 18.7 (1.0) months

Results: At 12 months, Pakistani infants consumed more commercial sweet baby meals than White British infants, with greater odds for being above average consumers, adjusted Odds Ratio (OR) = 1.90 (95% CI 1.40, 2.56); more chips/roast potatoes (2.75 (2.09, 3.62); less processed meat products 0.11 (0.08, 0.15); more fruit 2.20 (1.70, 2.85) and more sugar-sweetened drinks 1.68 (1.29, 2.18). By 18 months these differences persisted with Pakistani infants consuming more commercial sweet baby meals 4.57 (2.49, 8.39); more chips/roast potato shapes 2.26 (1.50, 3.43); more fruit 1.40 (1.08, 1.81); more sugar-sweetened drinks 2.03 (1.53, 2.70); more pure fruit juice 1.82 (1.40, 2.35); more water 3.24(2.46, 4.25) and less processed meat 0.10 (0.06, 0.15) than White British infants.

Conclusion: Dietary intake during infancy and the early toddlerhood period is associated with ethnicity suggesting the importance of early and culturally-adapted interventions aimed at establishing healthy eating behaviours.

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Introduction

Childhood obesity is a growing problem internationally [1, 2]. Within the UK, over a fifth of children starting school are overweight or obese and it is estimated that by 2020, 20% of all boys and 33% of all girls will be obese [3]. Although recent indications are that prevalence is levelling off in 4-5 year olds in the UK, it still remains high and of concern across other ages and certain ethnic groups [4]. The prevalence of obesity is significantly higher in children of South Asian origin in the UK compared to White British children [4, 5,] and people of South Asian origin are also at greater risk of obesity-related conditions such as type 2 diabetes and hypertension [6].

Early childhood provides a unique opportunity to promote health and prevent obesity [7]. It has been suggested that dietary patterns emerge early [8] and track through infancy [9] into later childhood [10] and from childhood to adulthood [11]. The diet of infants and toddlers has short and long-term implications for health and development [12]. It is therefore important to be able to characterize early life dietary intake including understanding the influence of ethnicity on early diet in order to examine how early diet influences later health outcomes including weight comes in childhood across diverse ethnic groups.

Inappropriate early dietary patterns that are established during the complementary feeding period (weaning) may persist into the second year of life and beyond [13, 14] and therefore optimising a child's diet before the age of 2 years may be critical in preventing obesity-related disease [15]. However there is increasing consensus that many children consume inappropriate foods; consume food in excess of their energy requirements and that inappropriate foods are increasingly being introduced during infancy. A US survey of a national sample of the diets of infants and toddlers [16] showed that high-salt fast foods and high-sugar snacks and drinks were commonly consumed by infants. Energy intake in infants aged 7-11 months exceeded requirements by 23% and in one to two year olds by 30%. In

addition, fruit and vegetable consumption was low reflecting a similar pattern to that observed in adults.. Data from the ALSPAC study confirmed that such eating patterns are also a problem in the UK and that infants of mothers of lower education were more likely to have fizzy drinks and more likely to drink from a bottle than from a cup, both of which have been associated with later obesity [17].

Latest UK data from the Diet and Nutrition Survey Infants and Young children aged 4 to 18 months [18] reported that infants consumed a varied diet and dietary recommendations were generally met by the majority of the population. The mean total fruit and vegetable consumption, including contribution from mixed dishes, was relatively high. However consumption of fruit and vegetables was significantly lower in South Asian and children of 'other' ethnicity compared to white children aged 4 to 18 months [18]. Although this survey provides a useful snapshot of the dietary intake of a representative sample of infants within the UK, there is generally limited information from ethnically diverse populations. This information is required to understand the ethnically-specific early dietary risk factors associated with the development of obesity in order to inform interventions aimed at establishing healthy eating behaviours.

In light of the influence of early feeding patterns on health outcomes it is important to explore current infant dietary intakes within populations who are at increased risk of the development of obesity and other co-morbid conditions. This study aims to explore the dietary intake of key indicator foods at age 12 and 18 months and to identify any differences between White British and Pakistani populations. In this study the key indicator foods have been defined as types of food and drink associated with high energy density (high fat, high sugar) and low energy density (high fibre, low fat, low sugar), consumed by this age-group as identified through dietary surveys, and therefore assumed to have a plausible role in obesity development - listed in Table 1.

Methods

Participants and study design

The Born in Bradford (BiB) study is a longitudinal multi-ethnic birth cohort study designed to examine the impact of environmental, psychological and genetic factors on maternal and child health and wellbeing [19]. Bradford is a city in the north of England with high levels of socio-economic deprivation and ethnic diversity. Approximately half the births in Bradford are to mothers of South Asian origin. Women were recruited while waiting for their glucose tolerance test, a routine procedure offered to all pregnant women registered at the Bradford Royal Infirmary, at 26-28 weeks gestation. The BiB cohort recruited 12,453 women comprising 13,776 pregnancies between 2007 and 2010 and the cohort is broadly characteristic of the city's maternal population. Ethical approval was granted by Bradford Research Ethics Committee (Ref 07/H1302/112) and all participants provided written informed consent (including allowing access to routine data collection) prior to inclusion in the research.

A subsample of the BiB cohort; 'The BiB 1000 Cohort' (BiB1000) recruited between August 2008 and March 2009 were invited to participate in more detailed follow-up [20]. This study involved further assessments at around 6, 12, 18, 24 and 36 months of age, including detailed measurement of anthropometry, social, behavioural, and environmental factors that were hypothesised to relate to obesity development [21]. Dietary data were collected when infants were aged 12 and 18 months.

Of 1916 mothers eligible for BiB1000, 1,735 agreed to take part (91%). For the current study, participants were excluded if they had multiple births (n=28) or missing obstetric (n=42), covariate (n=95) or infant feeding (n=269) data. The sample therefore consists of 1259 singleton infants whose mothers had completed the food frequency questionnaire at 12 months post birth. Of the 1259 singleton infants in the 12 month data, 1081 (86%) also provided data at 18 months. There were 176 infants who provided 18 month data who had not done so at 12 months, so the final sample of 18 month olds comprised 1257 singleton infants.

Measurements

Dietary intake

Dietary data was collected when infants were aged 12 and 18 months using a validated Food Frequency Questionnaire (FFQ) designed to assess infant diet from The Southampton Women's cohort study [22] which was adapted for the BiB 1000 cohort. Eight additional items

(chapattis (white flour), chapattis (wholemeal flour), boiled rice, fried rice, semolina pudding, milk-based puddings, sponge puddings, other vegetables e.g. okra, aubergine) were included to reflect dietary intake within the multi-ethnic population of Bradford, based on findings from focus groups and 24-hour dietary recalls in the area. The resulting FFQ included a list of 98 food items which allowed the frequency of consumption and amounts consumed over the preceding month to be recorded. The response categories included 'Never' – (record as 0); 'less than once a week' (record 0.5); 'food was eaten weekly' (record number of times per week); 'food is eaten more than once/day ' (record how many times per day) At the end of each FFQ, an open section in the same format was included, to record frequencies of consumption and amounts of any foods that were not listed on the FFQ, if they were consumed once per week or more. Flash cards were used to show the foods included in each food group, to ensure standardised responses to the FFQ. Household utensils (tablespoons, teaspoons, bowls, feeding beakers were used in estimating portion sizes and quantities of food and drink consumed. A team of multi-lingual community research administrators were trained by dietitians to administer the FFQ. Key indicator food group variables were derived from the FFQ data by a dietitian (PS) by grouping similar types of foods from the FFQ within categories associated with high energy density (high fat, high sugar) and low energy density (high fibre, low sugar, low fat). The key indicator foods were selected on the basis of their contribution to dietary patterns associated with the development of obesity. Key indicator food groups used in analysis are listed in Table 1.

Ethnicity

Ethnicity was self-assigned by the mother and the infant was assigned the same ethnicity at the baseline questionnaire (26-28 weeks gestation) using the same ethnic group classification as the 2001 UK census [23] and categorised into White British, Pakistani, Other South Asian (Indian, Bangladeshi and other South Asian) and Other ethnicities (White other, Black, mixed race, other unspecified) using the same ethnic group classification of the 2001 UK census listed in Table 2. Due to the smaller numbers within the other ethnic groups within the sample, data is presented for the two larger groups at 12 months White British (38%) and Pakistani (49%); at 18 months White British (37%) and Pakistani (49%).

Data Analysis

The frequency of consumption of key indicator foods in infants at 12 months (White British and Pakistani n= 1092) and 18 months (White British and Pakistani n=1087) was tabulated across the full cohort and by ethnic group. Quantitative dietary guidelines do not currently exist for the key indicator foods for this age group in the UK, so it was not possible to categorise intake into those meeting or not meeting recommended intake levels. A pragmatic approach to defining cut offs has been used to define high and low intake due to the lack of guidelines for this age group. Therefore, intake data were dichotomised into either consumer/non-consumer (i.e. zero intake / any intake) or into below/equal and above the median intake for that key indicator food group (i.e. lower intake / higher intake) – See Table 1.

Logistic regression was used to model associations between ethnicity and infant consumption of key indicator food groups at age 12 and 18 months. Odds ratios for the key indicator foods and differences for intakes with 95% confidence intervals are presented for Pakistani cohort members compared to White British adjusted for mother and father's highest educational qualification, mother's age at the 12 month or 18 month follow-up questionnaire. Stata 12.0 [(24)] and SAS 9.2 [(25)] was used for all analyses.

Results

Characteristics of the sample

Table 2 provides information on the characteristics of the sample. Data is presented for Pakistani and White British participants only because they form the largest ethnic groups in BiB 1000 (and are relatively homogeneous), and other ethnic groups were too small for separate analysis to be reliable. No significant differences were observed between the ethnic groups with respect to BMI at booking in (approximately 12 weeks pregnancy), age of mothers and infants at 12 month and 18 month data collection stage.

Infant intake of key indicator foods at age 12 months

Table 3 presents the median (IQR) frequency of consumption of key indicator foods at 12 and 18 months. As expected at 12 months, consumption of commercial sweet baby and savoury baby foods and formula milk was minimal. Although intakes were low, the following foods

featured in the diet at 12 months: chips, roast and potato shapes (1.0 portions per week (0.0, 2.0)); Cakes, biscuits, chocolates and sweets (0.6 portion per day (0.3, 1.1)) and Crisps and savoury snacks (2.0 portions per week (0.0, 3.0)). Processed meat products were also eaten weekly at 12 months (0.5 portions (0.0, 2.5) and fruit was consumed daily (1.9 portions (1.1, 2.7)) as were vegetables (1.7 (0.9, 2.6)).

Comparison of intake of key indicator foods between age 12 and 18 months

At 18 months median (IQR) frequency of intake of most key indicator foods had increased compared to intake at 12 months: Chips, roast and potato shapes (7.0 per week (7.0, 7.0)) Cakes, biscuits, chocolates and sweets (3.0 per day (2.0, 4.0)) Crisps and savoury snacks (7.0 per week (7.0, 7.00)); and Processed meat products (7.0 (0.0, 21.0). Additionally, weekly intake of Sugar-sweetened drinks intake (7.0 portions (7.0. 14.0)) and pure fruit juice (7.0 portions (0.0, 7.0)) had increased at 18 months compared to 12 months.

Ethnic Differences and infant intake of key indicator foods at 12 months

Table 4 presents the associations between consumption of the key indicator foods and ethnicity when infants were age 12 months. Odds ratios are presented for Pakistani compared to White British infants. There were a number of differences between the White British and Pakistani members of the cohort, with Pakistani infants less likely to consume any commercial savoury baby meals , more likely to consume any commercial sweet baby meals , much more likely to consume more chips or potatoes , slightly more likely to consume more vegetables , much more likely to consume more fruit than White British , more likely to consume sugar-sweetened drinks and pure fruit juice but much less likely to consume processed meat products .

Ethnic Differences and infant intake of key indicator foods at 18 months

The associations between consumption of the key indicator food groups at 18 months and ethnicity are shown in Table 5. Odds ratios are presented for Pakistani compared to White British infants. There were a number of differences between the White British and Pakistani infants in the cohort with Pakistani infants less likely to consume any formula milk , processed meat products , vegetables , and low sugar drinks but more likely to consume

commercial sweet baby meals , chips, roast potatoes or potato shapes , fruit , crisps and savoury snacks , sugar-sweetened drinks , pure fruit juice and water .

Changes to intake between 12 and 18 months

There are a number of differences between the White British and Pakistani members of the cohort, and these altered between the 12 month and 18 month follow-up. Pakistani members were much less likely to consume any formula milk at 18 months, whereas there were no ethnic differences at 12 months. Whereas at 12 months the Pakistani infants were much less likely to be having commercial savoury baby meals, by 18 months there was no ethnic difference. At 12 months, Pakistani infants had twice the odds of consuming an above average frequency of commercial sweet baby meals, and by 18 months the difference was fourfold. Pakistani infants continued to have twice the odds of consuming above average amounts of chips, roast potatoes of potato shapes. The tendency for Pakistani infants to consume substantially less processed meat continued at 18 months.

Whereas at 12 months Pakistani infants had slightly higher odds of consuming more than the average amount of vegetables per day, by 18 months this had decreased substantially compared to White British infants, with children of Pakistani mothers having only half the odds of above average vegetable intakes. Pakistani children continued to consume more fruit than their White British counterparts, but the gap was narrower at 18 months. There continued to be little evidence of ethnic differences in the consumption of cakes, biscuits, chocolates and sweets.

Regarding drinks, Pakistani infants continued to drink more sugar-sweetened drinks and more pure fruit juice than their White British counterparts, with the gap widening. And whereas at 12 months there was no difference in consumption of low-sugar drinks, White British infants at 18 months now had twice the odds of consuming above average amounts of this compared to Pakistani infants. Whilst there was no difference in consumption of water at 12 months, by 18 months the Pakistani infants were reported to have at least three times the odds of consuming water alone compared to White British infants.

Discussion

This study indicated that, at 12 months, there was already evidence of the early introduction of foods high in sugar and fat. Foods such as chips, roast and potato shapes; cakes, biscuits, chocolates and sweets; crisps and savoury snacks and processed meat products featured regularly in the diets of infants. Analysis of the diet at 18 months revealed a substantial increase in the frequency of consumption of these same foods. Of particular concern was the increase observed at 18 months in the intake of sugar-sweetened drinks which are associated with development of obesity [26].

Of particular interest are the ethnic differences in intake of key indicator foods observed in our sample of White British and Pakistani infants at 12 and 18 months. Our study has shown ethnic differences in dietary intake as early as 12 months and that these differences persist at 18 months. At 12 months Pakistani infants were less likely to consume commercial savoury baby foods and processed meat products and more likely to consume commercial sweet baby foods, chips or roast potatoes, vegetables, fruit, sugar-sweetened drinks and pure fruit juice than White British infants. By 18 months these differences were shown to persist and increase in magnitude. At 18 months there was a four-fold difference in consuming an above average frequency of commercial sweet baby foods compared to a two-fold difference at 12 months. Pakistani toddlers continued to consume more chips, roast potatoes or potato shapes, more fruit and substantially less processed meat products at 18 months. Regarding drinks, Pakistani children continued to drink increasingly more sugar-sweetened drinks, more pure fruit juice and more water than White British toddlers. However, White British toddlers consumed more low sugar drinks.

This study considered the associations between dietary intake of key indicator foods and ethnicity within a cohort of White British and Pakistani infants at age 12 and 18 months. Other studies have explored ethnic differences in dietary intake and feeding patterns; however these were in older children and not in South Asian infants [27 -29]. Furthermore to our knowledge, this is the first study that examines ethnic differences in the types of foods consumed during infancy with follow-up assessment in early toddlerhood. Findings suggest that ethnicity is associated with early dietary intake and some important trends were found in dietary intake of infants between 12 and 18 months.

Infant feeding practices have been shown to be associated with ethnicity. Higher breastfeeding initiation rates amongst other ethnic groups compared to White British mothers

are well documented [30] and Pakistani mothers are more likely to initiate breastfeeding and breastfeed for longer compared to White British mothers [31]. Although there is also some evidence of ethnic differences in age of weaning suggesting that White mothers introduce solids earlier than mothers of Asian origin [30, 32, 33] limited evidence exists on the types of foods consumed during infancy within these groups.

Epidemiological evidence suggests that early life factors influence later life [34] and that diet of infants and toddlers has short and long-term implications for health and development [12]. Furthermore it has been suggested that dietary patterns emerge early [8] and track through infancy [9] into later childhood [10] and then into adulthood [11]. There are therefore several implications from this study. During infancy and early childhood, infant feeding practices and the child's diet are amongst the risk factors associated with the development of obesity. As infancy represents the most rapid change in diet over the life course and is the period when dietary preferences and habits are first established [9] it is important to understand what infants are eating and whether this conforms to healthy eating patterns. This study has contributed to the limited evidence base by presenting data on early food intake, highlighted the presence of high energy density foods in the diets of infants as early as 12 months and demonstrated evidence of tracking of these early intake patterns.

Understanding and characterizing these differences can help inform the design of clinical and public health interventions and policies to reduce the prevalence of childhood obesity and eliminate disparities among ethnic minority children. Current evidence supports that consumption of sugar-sweetened beverages contributes significantly to obesity [35-37]. Data from interventions targeting a reduction in sugar-sweetened beverages indicate significant reductions in BMI compared to control groups [38, 39]. Data from this study has highlighted the early consumption of sugar-sweetened drinks which increases with age for all infants with particularly higher intake amongst Pakistani infants. The restriction of sugar sweetened drinks should therefore constitute a key message for early interventions aimed at promoting and establishing healthy infant dietary behaviours. For Pakistani infants reduced dependence on sweet commercial baby foods and moderation in consumption of high fat foods such as chips and roast potatoes should be recommended whereas a reduction of processed meat products should a recommendation for White British infants. Parents play an important role in food provision and feeding practices, and act as role models for eating behaviour and food

intakes [40-42]. Furthermore due to the evidence of early tracking of dietary intake patterns, interventions should therefore begin during the ante-natal period so that parents are encouraged to reflect on the family diet and eating patterns in preparation for birth of their baby.

By the preschool years, ethnic disparities in obesity prevalence are already present, suggesting that disparities in childhood obesity prevalence may have their origins in the earliest stages of life [43]. It is considered that ethnic differences in early life risk factors for obesity might contribute to the high prevalence of obesity among minority preschool-age children and beyond. By comparing the dietary intake between Pakistani and White British infants this study has been able to characterize early life dietary intake and understand the influence of ethnicity on intake patterns.

The findings from this study not only help to characterise early dietary intake but will also help to understand intake patterns of Pakistani and White British infants in order to examine how early diet influences later health outcomes including weight outcomes. Further research is required to establish the influence of these dietary patterns during infancy on later health outcomes including weight outcomes and also in other ethnic groups.

Strengths of the study include a large bi-ethnic sample; the data were collected longitudinally at 12 and 18 by trained multi-lingual community researchers. Similar to other cohort studies [44 - 46] dietary data in BiB 1000 was collected by parent-reported FFQ. This method is prone to over-estimate intake but is a standard, feasible approach in large samples [47]. Further, a validated questionnaire was used [22] and to our knowledge, there is no systematic error in reporting within FFQs by ethnicity [27]. The sample within the current study was limited to White British and Pakistani infants and toddlers. It is recognised that this constitutes only one South Asian group and therefore, due to the heterogeneous nature of this ethnic group, the data cannot be generalised to other South Asian infants. Further exploration of dietary intake in this age group is warranted for other ethnic groups including other South Asian groups.

Conclusion

The food intake patterns of White British and Pakistani infants are not well documented. Our study has shown that intake of foods groups high in fat and sugar is evident in the diets of all

infants as early as aged 12 months and that frequency of consumption of these foods increases in toddlers aged 18 months. Furthermore, ethnic differences in consumption patterns are evident in White British and Pakistani infants at 12 months and these differences persist and increase by 18 months of age.

These data help to characterise early diet during infancy, suggesting that unhealthy diets linked with obesity development are established very early in life. New evidence is also presented about early ethnic differences in dietary intake. This information should be used to inform the development of community-tailored and culturally adapted obesity prevention interventions in South Asian populations. The data also helps to characterise early life dietary intake and help understand the composition of such patterns in order to examine how early diet influences later health outcomes. Further research is required to establish the influence of these dietary patterns in infancy and early toddlerhood on later health outcomes including childhood obesity across other ethnic groups.

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Table 1: List of key indicator food groups and categorisations of consumption

Key indicator Food Groups	Categorisation
Baby formula milk (including all formula milk drinks)	consumer / non-consumer
Baby savoury commercial foods (including dried, jars, tinned varieties)	consumer / non-consumer
Baby sweet commercial foods (including dried, jars, tinned varieties)	consumer / non-consumer
Chips, roast and potato shapes	≤ median / > median
Processed meat products	≤ median / > median
Vegetables (incl. tinned and salad)	≤ median / > median
Fruit (including fresh, tinned and cooked fruit)	≤ median / > median
Sweet snacks (including cakes, biscuits, chocolate, sweets)	≤ median / > median
Savoury crisp-type snacks	≤ median / > median
Sugar-sweetened drinks	consumer / non-consumer
Pure fruit juices and Baby fruit Juices	≤ median / > median
Low-sugar drinks (artificially sweetened)	consumer / non-consumer
Water	≤ median / > median

		Sample characteristics at 12 months			Sample characteristics at 18 months		
Ethnicity	Variable	BMI at booking in	Age of Mother	Age of baby	BMI at booking in	Age of Mother	Age of baby
White British	N	416	473	473	448	470	470
	Mean (sd)	26.9 (6.1)	28.7 (6.1)	12.7 (1.0)	26.8 (6.0)	27.1 (6.1)	18.8 (1.0)
	Median (IQR)	25.7 (22.3, 30.3)	27.9 (24.3, 32.7)	12.6 (11.9, 13.5)	25.7 (22.4, 30.0)	26.0 (22.0, 31.0)	18.6 (18.1, 19.5)
Pakistani	N	549	613	613	594	617	617
	Mean (sd)	25.1 (5.4)	29.3 (5.1)	12.8 (1.0)	25.1 (5.5)	27.7 (5.1)	18.6 (0.9)
	Median (IQR)	24.2 (21.4, 28.3)	28.7 (25.3, 32.5)	12.7 (12.1, 13.3)	24.1 (21.2, 28.2)	27.0 (24.0, 31.0)	18.3 (17.9, 19.2)
Other SA[1]	N	79	89	89	75	80	8
	Mean (sd)	26.3 (6.4)	31.1 (5.1)	12.7 (1.0)	25.7 (6.1)	29.4 (5.3)	18.6 (1.0)
	Median (IQR)	25.0 (21.4, 29.6)	30.8 (27.2, 34.3)	12.7 (12.1, 13.3)	24.8 (21.1, 27.8)	18.6 (26.0, 33.0)	18.3 (18.0, 19.0)
Other[2]	N	72	84	84	86	90	90
	Mean (sd)	25.2 (4.9)	29.1 (6.3)	12.7 (1.1)	24.6 (4.2)	27.7 (6.4)	18.7 (1.1)
	Median (IQR)	24.3 (21.5, 28.3)	28.5 (25.0, 32.1)	12.7 (11.9, 13.4)	23.9 (21.5, 26.9)	28.0 (23.0, 31.0)	18.3 (17.9, 19.5)
Total	N	1116	1259	1259	1203	1257	1257
	Mean (sd)	25.9 (5.8)	29.2 (5.6)	12.7 (1.0)	25.8 (5.7)	27.6 (5.6)	18.7 (1.0)
	Median (IQR)	24.8 (21.6, 29.1)	28.5 (25.1, 32.7)	12.7 (12.0, 13.4)	24.7 (21.5, 28.9)	27.0 (23.0, 31.0)	18.4 (18.0, 19.3)

[1]Indian, Bangladeshi, other South Asian; [2]White other, mixed White and Black, mixed White and South Asian, Black.

Table 2. Characteristics of Sample at 12 and 18 months

Table 3. Descriptive statistics for dietary intake of key indicator food groups: Whole Cohort

	Intake at 12 months		Intake at 18 months	
Key Indicator Food group	Median	IQR	Median	IQR
Key 1: Formula Milk (frequency/day)	0.0	0.0, 2.0	0.0	0.0, 0.0
Key 2: Commercial savoury baby foods (frequency/week)	0.0	0.0, 3.0	0.0	0.0, 0.0
Key 3: Commercial sweet baby foods (frequency/week)	0.0	0.0, 0.5	0.0	0.0, 0.0
Key 4: Chips, roast and potato shapes (frequency/week)	1.0	0.0, 2.0	7.0	7.0, 7.0
Key 5: Processed meat products (frequency/week)	0.5	0.0, 2.5	7.0	0.0, 21.0
Key 6: Vegetables (incl. tinned and salad)(frequency/day)	1.7	0.9, 2.6	5.0	4.0. 7.0
Key 7: Fruit incl fresh, tinned, cooked (frequency/day)	1.9	1.1, 2.7	5.0	4.0. 6.0
Key 8: Cakes, biscuits, chocolates and sweets (frequency/day)	0.6	0.3, 1.1	3.0	2.0, 4.0
Key 9: Crisps and savoury snacks (frequency/week)	2.0	0.0, 3.0	7.0	7.0, 7.0
Key 10: Sugar-sweetened drinks (frequency/week)	0.0	0.0, 5.0	7.0	7.0. 14.0
Key 11: Pure fruit juice (frequency/week)	0.5	0.0, 7.0	7.0	0.0, 7.0
Key 12: Low-sugar drinks (frequency/week)	0.0	0.0, 1.0	0.0	0.0, 7.0
Key 13: Water (frequency/day)	2.0	1.0, 3.0	2.0	1.0, 4.0

Table 4: Key indicator food consumption at 12 months by ethnic group, median (IQR) and odds ratio of Pakistani relative to White British from unadjusted and adjusted logistic regression models

	Frequency of consumption (per day or per week)		Odds ratio of consumption (Pakistani relative to White British) of any or >median					
	White British	Pakistani	Unadjusted			Adjusted		
Key indicator food group	**Median (IQR)**	**Median (IQR)**	**OR**	**95% CI**	**P**	**OR†**	**95% CI**	**P**
Formula Milk (per day)*	0.0 (0.2, 2.0)	0.0 (0.2, 2.0)	1.13	(0.88, 1.45)	0.3	1.23	(0.95, 1.59)	0.1
Commercial savoury baby meals (per week)*	0.0 (0.0, 4.0)	0.0 (0.2, 2.0)	0.57	(0.44, 0.73)	<0.001	0.59	(0.45, 0.76)	<0.001
Commercial sweet baby meals (per week)*	0.0 (0.0, 0.0)	0.0 (0.0, 2.0)	1.85	(1.39, 2.46)	<0.001	1.90	(1.40, 2.56)	<0.001
Chips, roast and potato shapes (per week)**	1.0 (0.0, 2.0)	1.0 (0.5, 2.0)	2.65	(2.06, 3.42)	<0.001	2.75	(2.09, 3.62)	<0.001
Processed meat products (per week)**	2.0 (0.5, 4.0)	0.0 (0.0, 1.0)	0.12	(0.09, 0.16)	<0.001	0.11	(0.08, 0.15)	<0.001
Vegetables (incl. tinned and salad) (per day)**	1.6 (1.0, 2.3)	1.8 (0.9, 2.7)	1.27	(1.00, 1.62)	0.05	1.34	(1.03, 1.73)	0.03
Fruit (incl. fresh, tinned, cooked) (per day)**	1.5 (0.9, 2.3)	2.1 (1.3, 3.0)	2.35	(1.83, 3.00)	<0.001	2.20	(1.70, 2.85)	<0.001
Cakes, biscuits, chocolates and sweets (per day)**	0.7 (0.4, 1.2)	0.6 (0.2, 1.1)	0.78	(0.61, 0.99)	0.04	0.75	(0.58, 0.97)	0.03

Crisps and savoury snacks (per week)**	2.0 (0.0, 3.0)	2.0 (0.0, 4.0)	1.12	(0.88, 1.43)	0.3	1.15	(0.89, 1.49)	0.3
Sugar-sweetened drinks (per week)*	0.0 (0.0, 3.0)	0.5 (0.0, 7.0)	1.55	(1.22, 1.98)	<0.001	1.68	(1.29, 2.18)	<0.001
Pure fruit juice (per week)**	0.0 (0.0, 3.8)	1.0 (0.0, 7.0)	1.79	(1.41, 2.29)	<0.001	1.87	(1.44, 2.41)	<0.001
Low-sugar drinks (per week)*	0.0 (0.0, 2.0)	0.0 (0.0, 1.0)	0.94	(0.72, 1.23)	0.6	0.86	(0.65, 1.14)	0.3
Water (per day)**	2.0 (1.0, 3.0)	2.0 (1.0, 3.0)	1.10	(0.86, 1.41)	0.4	1.09	(0.84, 1.42)	0.5

*consumption of any vs none; **consumption of >median vs <median;

† Model adjusted mother and father's highest educational qualification, mother's age at the 12 month follow-up questionnaire and mother's ethnic group

Table 5. Key indicator food consumption at 18 months by ethnic group, median (IQR) and odds ratio (OR) of Pakistani relative to White British from adjusted and unadjusted logistic regression models

	Frequency of consumption (per day or per week)		**Odds ratio of consumption (Pakistani relative to White British) of any or >median**					
	White British	**Pakistani**						
Key indicator food group	**Median (IQR)**	**Median (IQR)**	**Unadjusted OR**	**95% CI**	**P**	**Adjusted OR†**	**95% CI**	**P**
Formula Milk (per day)*	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.55	(0.39, 0.76)	<0.001	0.55	(0.39, 0.79)	0.001
Commercial savoury baby meals (per week)*	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	0.83	(0.55, 1.26)	0.4	0.89	(0.57, 1.40)	0.6
Commercial sweet baby meals (per week)*	0.0 (0.0, 0.0)	0.0 (0.0, 0.0)	3.81	(2.19, 6.63)	<0.001	4.57	(2.49, 8.39)	<0.001
Chips, roast and potato shapes (per week)**	7.0 (7.0, 7.0)	7.0 (7.0, 7.0)	2.23	(1.51, 3.29)	<0.001	2.26	(1.50, 3.43)	<0.001
Processed meat products (per week)**	21.0 (14.0, 8.0)	7.0 (0.0, 7.0)	0.1	(0.06, 0.14)	<0.001	0.10	(0.06, 0.15)	<0.001
Vegetables (per day)**	6.0 (4.0, 7.0)	5.0 (4.0, 7.0)	0.6	(0.46, 0.77)	<0.001	0.56	(0.42, 0.74)	<0.001
Fruit (per day)**	5.0 (3.0, 6.0)	5.0 (4.0, 6.0)	1.54	(1.21, 1.97)	<0.001	1.40	(1.08, 1.81)	0.01
Cakes, biscuits, chocolates and sweets (per day)**	3.0 (2.0, 4.0)	3.0 (2.0, 4.0)	0.77	(0.60, 0.99)	0.04	0.82	(0.63, 1.07)	0.1
Crisps and savoury snacks (per week)**	7.0 (7,0 7.0)	7.0 (7,0 7.0)	2.06	(1.46, 2.90)	<0.001	2.04	(1.42, 2.94)	<0.001
Sugar-sweetened drinks (per week)*	7.0 (0.0, 4.0)	7.0 (0.0, 14.0)	1.79	(1.38, 2.32)	<0.001	2.03	(1.53, 2.70)	<0.001
Pure fruit juice (per week)**	0.0 (0.0, 7.0)	7.0 (0.0, 7.0)	1.89	(1.48, 2.41)	<0.001	1.82	(1.40, 2.35)	<0.001
Low-sugar drinks (per week)*	0.0 (0,014.0)	0.0 (0.0, 0.7)	0.54	(0.42, 0.70)	<0.001	0.51	(0.39, 0.67)	<0.001
Water (per day)**	1.0 (0.0, 3.0)	3.0 (1.0, 4.0)	3.48	(2.69, 4.49)	<0.001	3.24	(2.46, 4.25)	<0.001

*consumption of any vs none **consumption of >median vs <median

† Model adjusted for mother's and father's highest educational qualification and mother's age at the 18 month follow-up questionnaire and mother's ethnic group