



# *Standard versus baby-led complementary feeding: a comparison of food and nutrient intake in 6-12 month old infants in the UK*

Article

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1 **ABSTRACT**

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**Objective:** To compare food and nutrient intake of infants aged 6-12 months following a baby-led complementary feeding (BLCF) approach to infants who followed a standard weaning (SW) approach.

**Design:** Participants completed an online questionnaire consisting of socio-demographic questions, a 28-day food frequency questionnaire (FFQ) and a sample of participants completed a 24-hour dietary recall.

**Setting:** UK.

**Participants:** 134 infants aged 6-12 months ( $n=88$ , BLCF;  $n=46$ , SW).

**Results:** There was no difference between weaning method and food groups for “fruits”, “vegetables”, “all fish”, “meat and fish”, “sugary” or “starchy” foods. The SW group were offered “fortified infant cereal” ( $p<.001$ ), “salty snacks” at 6-8 months ( $p=.03$ ), “dairy and dairy based desserts” at 9-12 months ( $p=.04$ ) and pre-prepared infant food at all ages ( $p<.001$ ) more often than the BLCF group. The SW group were offered “oily fish” at all ages ( $p<.001$ ) and 6-8 months ( $p=.01$ ), and “processed meats” at all ages ( $p<.001$ ), 6-8 months ( $p=.003$ ), and 9-12 months ( $p<.001$ ) less often than the BLCF group. In the BLCF group there was a significantly greater intake of sodium ( $p=.028$ ) and fat from food ( $p=.035$ ), and a significantly lower intake of iron from milk ( $p=.012$ ) and free sugar in the 6-8 month subgroup ( $p=.03$ ) compared to the SW group. Iron intake was below the RNI for both groups and sodium was above the RNI in the BLCF group.

**Conclusion:** Compared to the SW group the BLCF group were offered foods higher in sodium and lower in iron, however the foods offered contained less free sugar.

**Keywords:** baby led weaning, infants, nutrition, complementary feeding

35 **INTRODUCTION**

36

37 Optimal nutrition in infancy is crucial for growth and development, and for establishing good eating  
38 habits for long-term health <sup>(1)</sup>. At around six months of age, infants should be introduced to  
39 complementary foods in addition to breast or formula milk, as infant milk alone will not satisfy an  
40 infant's energy and nutrient needs <sup>(2)</sup>. Iron and zinc stores in breast milk are almost depleted by six  
41 months, so complementary foods that provide these micronutrients are of particular importance to  
42 the breast fed infant <sup>(2; 3)</sup>.

43

44 The UK Department of Health guidelines on infant feeding recommend breastfeeding exclusively  
45 for the first six months, after which a variety of complementary foods can be introduced alongside  
46 continued breastfeeding (and/or formula milk), but cow's milk should not be offered as a main  
47 drink until after twelve months. Vitamin A, C and D supplements are recommended from six  
48 months unless the child is formula fed, and foods should contain no added salt or sugar <sup>(4)</sup>.

49 Traditionally, infants in the UK have been spoon-fed pureed foods and infant cereals as 'first  
50 foods', but over the past ten to fifteen years an alternative method of complementary feeding (CF),  
51 known commonly as 'Baby-Led Weaning' (BLW) has increased in popularity in countries such as  
52 the UK, Canada and New Zealand <sup>(5)</sup>. In essence, baby-led complementary feeding<sup>1</sup> (BLCF)  
53 involves finger foods being offered to the infant from the age of six months, in addition to  
54 continued breastfeeding. The infant is encouraged to join in with family meal times and to self-feed  
55 as much or as little as their appetite allows at each meal <sup>(6)</sup>.

56

57 It has been suggested that BLCF could be considered a continuation of breastfeeding on demand,  
58 which promotes self-regulation of milk volume by the infant <sup>(7)</sup>. Proponents of this method assert  
59 that because the infant, rather than the adult, is responsible for their own feeding, it enables the  
60 infant to self-regulate their appetite, potentially lowering the risk of obesity later in life <sup>(6; 8)</sup>, whilst  
61 encouraging the development of chewing and fine motor skills <sup>(9)</sup>. It has also been suggested that  
62 this method introduces infants to a wider variety of foods and textures and may lead to less fussy  
63 eating as the child matures <sup>(6; 10)</sup>.

64

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<sup>1</sup> The term baby-led complementary feeding will be used throughout this manuscript as babies who are still being breastfed, are not yet weaned, but they have been introduced to complementary feeding.

65 Books and websites on BLCF abound, but due to the lack of research into the nutritional and safety  
66 aspects of this method, health professionals are reluctant to recommend BLCF, and the main  
67 sources of information for parents are BLCF websites and parenting forums <sup>(10)</sup>. BLCF primarily  
68 involves the consumption of finger foods, the main concerns of health professionals are that finger  
69 foods could increase the risk of choking, and that the energy and iron intake of infants might be too  
70 low. The advice given by the NHS since 2010 <sup>(11)</sup> recommends the introduction of soft finger foods  
71 from six months. Fortified infant cereals such as baby rice are a popular first food for spoon-fed  
72 infants, but make impractical finger foods. Therefore, another concern is that BLCF infants would  
73 lack micronutrients such as zinc and iron, which fortified cereals contain <sup>(12)</sup>. In contrast, parents  
74 who are successful in using BLCF report benefits such as it being a less stressful method of feeding  
75 than standard weaning <sup>(12; 13)</sup>.

76  
77 In the UK there have been several large studies investigating the relationship between CF style and  
78 behavior by Brown and Lee <sup>(10; 14; 15)</sup>, but research into the nutritional adequacy of different feeding  
79 methods is scant. One pilot study for a randomized controlled trial has been undertaken in New  
80 Zealand to compare nutrient intake and safety concerns of BLCF and traditionally spoon-fed infants  
81 <sup>(16)</sup>. This trial concluded that energy intake was similar across both groups, but vitamin A and  
82 selenium intake was lower and sodium intake higher in the modified BLCF group <sup>(16)</sup>. Another  
83 small study from New Zealand by Morison *et al.* <sup>(17)</sup> compared nutrient intakes and choking risk of  
84 BLCF and traditionally spoon fed infants, and concluded that, although energy intake was similar in  
85 both groups, the BLCF group had higher intakes of fat and saturated fat, and lower intakes of iron,  
86 zinc and vitamin B12. A further set of studies recently published from the Baby-Led Introduction to  
87 Solids (BLISS) trial in New Zealand found that compared to a control group, BLISS infants  
88 consumed more sodium and fat at 7 months, and less saturated fat at 12 months <sup>(18)</sup>. They also found  
89 no differences in zinc intake <sup>(19)</sup> but a larger variety of foods offered compared to a control group  
90 <sup>(20)</sup>. However this intervention was designed to resolve many of the issues believed to be associated  
91 with BLCF and provided guidance and education on the types of foods that could be used to  
92 improve the nutritional adequacy of the infants diet with particular emphasis on iron.

93  
94 Due to the paucity of UK studies comparing food and nutrient intake of BLCF infants, health  
95 professionals and parents have little evidence to recommend this method of CF. The first aim was to  
96 investigate the demographic characteristics of parents in the SW and BLCF groups. The second aim  
97 of this study was to compare whether there are any differences in the foods offered to BLCF and  
98 SW infants using data from a validated food frequency questionnaire. The third aim was to compare

99 the energy and nutrient intake of infants in each food group (protein, carbohydrate, free sugar, fat,  
100 saturated fat, sodium, iron, zinc) using 24-hour dietary recall data.

101

## 102 **MATERIALS AND METHODS**

103

104 **Study design:** This UK population-based study of infants aged six to twelve months used data  
105 collected from parents completing an online questionnaire, consisting of pretested demographic  
106 questions, questions on feeding style, a food frequency questionnaire (FFQ) and a 24-hour dietary  
107 recall.

108

109 **Participants:** Following obtaining ethical approval from X University research ethics committee,  
110 320 parents with a child aged 6-12 months were recruited via online parenting websites and posters  
111 in nurseries and pre-schools within 10km of X University. The poster and information about the  
112 study was advertised in a research thread on the websites for ‘Mumsnet’ and the National Childbirth  
113 Trust (NCT). Participants were directed to a link to the questionnaire and were invited to complete  
114 the questionnaire online or using a paper copy between 31<sup>st</sup> May and 10<sup>th</sup> July 2017.

115

116 **Exclusion criteria:** Parents had to be 18 years of age or over with an infant aged six to twelve  
117 months on completion of the questionnaire. They were excluded if their infant was born before 37  
118 weeks gestation (premature infants can sometimes be slower to reach milestones such as sitting up  
119 or self-feeding<sup>(21)</sup>), or had a physical or developmental condition or disability likely to affect their  
120 feeding or growth.

121

122 **Questionnaire:** The questionnaire was formatted using Qualtrics software (Qualtrics©, 2017 Provo,  
123 UT, USA) and consisted of three main blocks of questions, which took approximately 45 minutes to  
124 complete. The first block consisted of socio-demographic questions about age, ethnicity, academic  
125 background and employment status. The questions were devised by the researchers based on similar  
126 previous studies<sup>(22; 23)</sup>.

127

128 The second block of questions pertained to the infant, including their age, sex, weight at birth,  
129 current weight, gestation when born, breastfeeding practices and CF methods. The questions  
130 regarding CF methods used percentage scales, such as those used by Brown and Lee<sup>(14)</sup>: 0%, 10%,  
131 25%, 50%, 75%, 90% and 100%. Parents who reported using spoon-feeding for 10% or less of the

132 time at the infant's current age were assigned to the BLCF group, whereas those who reported using  
133 spoon feeding more than 10% of the time were assigned to the SW group.

134

135 The third block of questions consisted of a food frequency questionnaire, validated by previous  
136 researchers<sup>(24; 25)</sup>. Permission was granted by Dr Sahota for use in this study. The FFQ addressed  
137 the frequency of consumption of food types and the approximate amount of each food consumed in  
138 the past 28 days. A subgroup of participants also completed a 24-hour dietary recall, which required  
139 participants to recall the foods and drinks their child had consumed in the previous 24 hours,  
140 excluding foods which were offered, but not eaten.

141

142 **Analysis of FFQ:** Foods offered per day, week or month were converted into food frequency per  
143 day, similar to that calculated by Bingham *et al.*<sup>(26)</sup> in the EPIC study. Foods were assigned to the  
144 following groups for analysis of data: all fruits; all vegetables; starchy foods (porridge, breakfast  
145 cereal, bread, crackers, breadsticks, chapattis, pita bread, potato, sweet potato, rice, pasta); fortified  
146 infant cereal; dairy and dairy based desserts (cheese, savoury white sauce, yoghurt/fromage frais,  
147 ice cream, custard, milk pudding); all fish; oily fish; all meat/fish; processed meats (ham, sausage,  
148 bacon, sausage rolls); sugary foods (cakes, biscuits, buns, pastries, sweets); salty snacks (including  
149 crisps); pre-prepared baby food (dried food excluding baby rice, jars, tins, pots or pouches), and  
150 sugary drinks (including baby juice, fruit juice, squash and fizzy drinks). Groups were broken down  
151 into age and CF method, because six to eight-month old infants will usually be obtaining a higher  
152 proportion of energy from milk than foods and are likely to consume less finger foods than nine to  
153 twelve-month old infants.

154

155 **Analysis of 24-hour recall:** 50 participants completed the 24-hour dietary recall (BLCF:  $n=29$ , SW  
156  $n=21$ ). All diet records were manually entered into Nutritics® dietary analysis software  
157 (Nutritics.com 2016, v4.315 Education, Dublin, Ireland). Foods, baby formula and supplements not  
158 listed in Nutritics were defined using supermarket website nutritional information for products per  
159 100g (Tesco, Asda, Sainsburys and Waitrose). Values for breast milk composition were obtained  
160 from McCance and Widdowson's *The Composition of Foods*<sup>(27)</sup>. To assess the volume of breast-  
161 milk consumed, the method of Mills and Taylor was applied as described in Lanigan *et al.*<sup>(28)</sup> and  
162 Cribb *et al.*<sup>(29)</sup>: 135g breast milk for infants aged 6–7 months and 100 g for those aged 8–12 months  
163 was calculated for each feed of at least ten minutes duration. Energy and nutrient intake were  
164 calculated and SACN 2015/COMA reports generated in Nutritics®. The proportions of food energy

165 from fat, protein and carbohydrate was calculated using 17kJ per gram of protein and carbohydrate,  
166 and 37.7kJ per gram of fat.

167

168 ***Statistical Analysis:***

169

170 Data were analysed using IBM SPSS Statistics version 23 (SPSS Inc., Chicago, IL, USA). A *p*-  
171 value of <.05 was considered to indicate statistical significance.

172

173 ***Demographic data:*** Chi-squared tests were conducted to test differences between the SW group and  
174 BLCF group where the variables were not a continuous measure (parents' education, ethnicity,  
175 working status, infant sex and breastfeeding status). Independent sample *t*-tests were carried out to  
176 examine differences between feeding methods on the continuous variables (parents' age and BMI,  
177 **no of children**, infant gestational age at birth, infant age at the onset of CF, current age, infant birth  
178 weight and current weight). Independent samples *t*-tests were used for all parametric data. Man-  
179 Whitney U tests were conducted where data were not parametric. Weight for age centiles were  
180 calculated using the WHO Growth Standard for 0-24 months and significant differences was  
181 checked using Mann-Whitney U tests.

182

183 ***FFQ:*** Independent sample *t*-tests for parametric data and Mann-Whitney U tests for non-parametric  
184 data were used to determine differences between CF groups and the mean number of times infants  
185 were offered a food group. A chi-squared test was used to test for differences in vitamin supplement  
186 use between groups.

187

188 ***24 hour recall:*** Independent sample *t*-tests for parametric data and Mann-Whitney U tests for non-  
189 parametric data were used to determine differences between CF groups and the mean macro-  
190 nutrient and micro-nutrient intake for total intake (food and infant milk), for infant milk only, and  
191 for food only.

192

193 **RESULTS**

194

195 The questionnaire was attempted by 320 participants (319 online, 1 paper copy by post). After  
196 removing partially completed questionnaires (*n*=173), those in which the infant was born at less  
197 than 37 weeks gestation (*n*=6) or was older than 12 months (*n*=2) or had allergies or medical  
198 conditions which affected feeding (*n*=5), 134 remained. A very limited number of participants



199 indicated the portion size offered at each occasion, so this section of the FFQ had to be discounted.  
200 Groups were: SW all ( $n=46$ ), BLCF all ( $n=88$ ); SW 6-8 months ( $n=27$ ), BLCF 6-8 months ( $n=37$ );  
201 SW 9-12 months ( $n=19$ ), BLCF 9-12 months ( $n=51$ ).

202

203 Fifty participants gave sufficient detail relating to food, quantity and breast-feeding duration, in the  
204 24 hour recall: SW all ( $n=21$ ), BLCF all ( $n=29$ ); SW 6-8 months ( $n=13$ ), BLCF 6-8 months ( $n=12$ );  
205 SW 9-12 months ( $n=8$ ), BLCF 9-12 months ( $n=17$ ).

206

207 **Demographics:** There was no significant association between groups and parent age, educational  
208 level, work status or ethnicity (Table 1). There was no significant association between CF method  
209 and initial breast feeding, gestation, age of child at time of filling in questionnaire, infant sex, birth  
210 order, birth weight, current weight or centiles for weight and height (Table 2). Infants who  
211 followed BLCF commenced weaning significantly later than SW ( $p<.001$ ) and significantly more  
212 BLCF infants were breastfed exclusively for six months ( $p<.001$ ). At the time of the study in the  
213 BLCF group 52% were consuming breast milk only, 24% formula only and 24% were combination  
214 feeding (formula and breast milk) whereas in the SW group 43% were being breast fed, 43%  
215 formula fed, 14% mixed.

216

217

218 **Food Frequency:** There was no significant difference between weaning method and food groups  
219 for fruits, vegetables, fish, meat and fish, sugary foods or starchy foods (Table 3). The SW group  
220 (all ages) were offered significantly more fortified infant cereal ( $p<.001$ ), salty snacks at 6-8 months  
221 ( $p=.03$ ), dairy and dairy based desserts at 9-12 months ( $p=.04$ ) and pre-prepared baby food at all  
222 ages compared to the BLCF group ( $p<.001$ ). Conversely, the BLCF group were offered  
223 significantly more oily fish at all ages ( $p<.001$  and 6-8 months  $p=.01$ ), and processed meats at all  
224 ages and 9-12 months ( $p=.001$ ) and 6-8 months ( $p=.003$ ) than the SW group.

225

226 **24-hour recall:** There was no significant difference between weaning method and nutrient intake  
227 for energy, carbohydrate, protein, saturated fat or zinc (Table 4). There was a significantly greater  
228 intake of free sugar in the 6-8 month SW group ( $p=.030$ ), iron in infant milk in the SW group  
229 ( $p=.012$ ), fat in food in the BLCF group ( $p=.035$ ), and sodium in the BLCF group for food ( $p=.028$ ).  
230 Data were also compared to RNI data for 7-12 month old infants (Table 5) <sup>(30)</sup>. Whilst mean zinc  
231 intake met the RNI for both groups, 50% of BLCF infants fell below the RNI of 5mg. Iron intake  
232 were lower than the RNI in both groups but considerably so in the BLCF group.

233

234

235 ***Proportion of food energy from macronutrients:*** The BLCF group obtained a greater percentage of  
236 energy from fat (34%) than the SW group (26%), and less from carbohydrate (50%) than the SW  
237 group (57%). The proportion of energy from protein was similar in both groups (BLCF 16%, SW  
238 17%). Free sugars in the SW group accounted for 9% of energy intake, considerably higher than the  
239 BLCF figure of 1%.

240

241 ***Supplements:*** Seventy percent of BLCF infants were given multivitamin or vitamin D supplements,  
242 compared to 48% of SW infants, which showed a trend towards statistical significance ( $p=.05$ ).

243

244 ***Salt:*** The proportion of parents who reported never adding salt during the preparation of infants'  
245 food was similar for the SW group (84%) and the BLCF group (85%).

246

247

## 248 **DISCUSSION**

249

250 Our findings indicate some differences in food and nutrient intake between BLCF and SW infants.  
251 **This discussion will first consider the demographic data of the population and their feeding styles,**  
252 **then any differences in macronutrients and micronutrients and food sources between the groups,**  
253 **before examining the limitations of the study.**

254

255 The questionnaire tended to attract parents with a preference towards BLCF, with 66% of  
256 participants following a BLCF approach, despite CF methods not being mentioned on the  
257 recruitment poster. Whilst the demographic in this study was well matched for age, education, work  
258 status, ethnicity and sex of infant, it is not representative of the UK population as a whole.  
259 Comparing Office for National Statistics <sup>(31)</sup> figures from the 2011 census with results from our  
260 study, 94.8% of the participants were white, compared to the national average of 86%, and 83.7%  
261 had held a University degree compared to 27% nationally. There is evidence that parents who  
262 choose BLCF in the UK have more years of education <sup>(14)</sup>.

263

264 In our study, and in previous research <sup>(10; 14; 17; 32)</sup>, BLCF was associated with a longer duration of  
265 breastfeeding and a later introduction of complementary foods, both of which are considered  
266 beneficial to infant health <sup>(14)</sup>. Sixty-four percent of BLCF infants were breast fed exclusively for

267 the first six months, compared to 32 % of SW infants and only 1% in the 2010 Infant Feeding  
268 Survey <sup>(33)</sup>. BLCF infants were first introduced to complementary foods at an average of 5.8  
269 months, which was later than the SW group (5.5 months) but in line with the recommended age of  
270 around six months. However in 2010 in the UK, 75% infants had been introduced to CF by the age  
271 of five months <sup>(33)</sup>. Seventy percent of BLCF parents reported giving their infants vitamin  
272 supplements as recommended for all breast-fed infants compared to only 48% of SW parents,  
273 although **some parents noted that they did not remember to do this every day.**

274

275 The study indicated that there were no differences between BLCF and SW in terms of energy  
276 intake, but the proportion of energy in food from macronutrients and the types of foods offered was  
277 different. **BLCF infants were offered significantly more fat in food than SW infants which agrees**  
278 **with the findings of Morison *et al.* <sup>(17)</sup>.** From the age of two onwards, fat as a percentage of energy  
279 intake should be no more than 35% <sup>(30)</sup>. Both BLCF and SW infants met this guidance: BLCF  
280 infants (all ages) derived 34% food energy from fat, compared to 26% SW infants. Although these  
281 are just estimates of the dietary intake, 26% of energy from fat in the diet is relatively low as studies  
282 have shown that infants on a low fat diet (25% or less energy from fat) commonly fail to thrive <sup>(34;</sup>  
283 <sup>35)</sup>.

284

285 The SACN 2015 report <sup>(36)</sup> states that from the age of two years, free sugars should amount to no  
286 more than 5% of total energy (there is no guidance for children under two years). Free sugars  
287 accounted for only 1% total energy in the BLW group, however this was 9% in the SW group.  
288 Commercially prepared baby foods were offered 11.6 times a week for SW infants compared to  
289 only 3.4 times a week for BLCF infants, potentially providing less free sugar. Crawley and  
290 Westland <sup>(37)</sup> criticized manufacturers of commercially prepared baby foods in the UK for adding  
291 fruit to provide sweet flavours to vegetable-based purees resulting in a high concentration of sugar.  
292 The authors also commented that these foods are unlikely to replicate the taste and texture of  
293 homemade food and may have a negative influence on dental health if sucked directly from a baby  
294 food pouch. Studies by Coulthard *et al.* <sup>(38; 39)</sup> showed that introducing homemade foods with  
295 ‘lumps’ and varied textures before nine months increased both the range of foods, and the quantity  
296 of fruit and vegetables that a child will consume at seven years compared to infants fed solely on  
297 pureed foods. In contrast, Smithers *et al.* <sup>(40)</sup> used data from the Avon Longitudinal Study to show  
298 that six to eight month old infants who consumed more ready-prepared baby foods had lower  
299 sodium and higher iron intake than infants consuming breast milk and homemade food.

300

301

302 In this study, BLCF infants consumed a mean intake of 529.11mg sodium (or 1.3g salt) which is  
303 one third above the daily recommended maximum of 400mg. Results from the FFQ showed that  
304 BLCF infants were offered more processed meats a known source of sodium and nitrates in the diet  
305 <sup>(41)</sup> than SW infants. In the short term, sodium intake above 400mg per day in infants may cause  
306 harm to developing kidneys, and in the long-term a preference for salty foods may result in  
307 problems such as high blood pressure in adulthood <sup>(42)</sup>. Sodium intake ranged from 154mg to  
308 1102mg in the BLCF group, with two infants consuming almost three times the recommended  
309 intake of sodium in 24 hours (1102mg and 1082mg). In this case, the majority of the sodium was  
310 contained in baked beans, ham, crumpets and cheese. Added sodium is rarely present in  
311 commercially pureed baby foods, which represented a greater proportion of dietary intake in the  
312 SW group than the BLCF group, but could be present in family food unmodified for BLCF infants.  
313 Cribb *et al.* <sup>(29)</sup> calculated intake of sodium and iron from three-day dietary records of family foods  
314 offered to eight month old infants ( $n=1178$ ) and 70% consumed more than the daily maximum of  
315 400mg. However, 85% of BLCF parents in the current study reported that they never added salt to  
316 food, although the BLCF group was offered processed meats on average just over three times per  
317 week. The mean sodium intake for SW, 375mg, was in line with the RNI.

318

319 Iron is required for the development of red blood cells, immune function and cognitive development  
320 <sup>(43)</sup>. Iron deficiency anaemia, caused by insufficient dietary iron, can lead to delays in the  
321 development of cognitive function, which can be irreversible <sup>(44)</sup>. The UK has no screening policy  
322 for iron deficiency, which makes it difficult to estimate the prevalence in the population <sup>(45)</sup>, but in  
323 the 2011 Diet and Nutrition Survey of Infants and Children, iron intake was 10-14% below the  
324 Lower Reference Nutrient Intake <sup>(46)</sup>. In our study, iron intake was below the RNI for both groups:  
325 the SW group were 20% below the RNI and the BLCF group were 38% below the RNI. The lower  
326 iron intake in the infant milk portion of the BLCF group could be explained in part by a greater  
327 consumption of breast milk, which has a lower concentration of iron than formula milk  
328 (approximately 0.07mg per 100ml compared to 0.80mg per 100ml in formula milk <sup>(47)</sup>) and lower  
329 intake of commercially prepared baby foods and fortified infant cereals. This suggests that BLCF  
330 infants may need foods with a greater iron content, especially if breast milk is still a large part of  
331 overall energy intake. The FFQ showed significantly more fortified infant cereal (baby rice) offered  
332 to the SW group, which is a good source of iron, but is difficult for BLCF infants to consume when  
333 self-feeding. Compared to the RNI for 7-12 month old infants average zinc intake met the RNI for  
334 both groups, but 50% of BLCF infants fell below the RNI of 5mg. Red meat, such as beef and lamb,

335 is a good source of iron and zinc, but it can prove difficult to chew and parents may worry about  
336 infants choking if it is in finger food form.

337

338 Data for this study was self-reported and could be open subject to error (e.g. people misreporting or  
339 estimating body weight). **The participants for this study were also self-selected and the choice of**  
340 **weaning style was also selected by the participants.** Whilst internet recruitment is efficient, it may  
341 be biased towards participants who have a higher level of education <sup>(48)</sup>. Although 320 surveys were  
342 attempted, only 134 were fully completed. The length of the questionnaire was a limitation and  
343 many participants completed the demographic questions, but did not progress further to the FFQ.  
344 The 50 participants who completed the entire survey including the 24-hour dietary recall were those  
345 that were more motivated to do so, and this may have biased the results. The FFQ has not been  
346 validated for online use and as such the decision was taken to focus solely on the types of foods  
347 consumed from this data. The nutrients contained in breast milk are very difficult to standardize  
348 since the composition of breast milk changes between each feed, and the fat content of milk varies  
349 as the breast is emptied of milk <sup>(47; 49)</sup>. Assessing the accuracy of duration and volume of breast milk  
350 is difficult. It is likely that some participants overestimated the duration of feeds, or the time the  
351 infant was actively sucking. However, energy from milk and food was similar for both BLCF and  
352 SW infants, which suggests the method was consistent with volumes calculated for formula milk.  
353 The 24-hour recall data was dependent on participants recording the quantity of food actually  
354 ingested, which is problematic with infants, so the quantities stated can only be estimates. The  
355 habitual intake of foods consumed is difficult to estimate in a 24-hour food recall, and a longer (2  
356 day) weighed food diary would be a more accurate indicator of quantity ingested, but would require  
357 many more resources than were available in this study. The questionnaire was undertaken at any  
358 time between when the child was 6-12 months and it is known that babies will transition from a  
359 being spoon fed (SW) to self-feeding (BLCF) during this time <sup>(50)</sup>. Future studies should assess food  
360 intake at the point of weaning.

361

362 As an area in which research is limited, and the first study of this type in the UK, this study  
363 supplements the published evidence currently available on nutrient intake of infants following  
364 BLCF or SW approaches to CF. The survey was comprehensive, which meant a broad range of data  
365 could be collected. The sample size was larger than for similar studies, such as that of Morison *et*  
366 *al.* <sup>(17)</sup>, which gives the study more statistical power. Finally, all demographic data was consistent  
367 between groups for parents, and age, sex and weight of infants was consistent between groups.

368

369 **CONCLUSION**

370

371 Doctors, midwives and health visitors are reliant on evidence-based research to inform their advice  
372 to parents. This study adds to the small pool of knowledge relating to food and nutrient intake and  
373 CF methods. This study suggests that BLCF can have both positive and negative implications for  
374 the diets of infants. Parents need to be made more aware of the types of food they should or should  
375 not be offering their infant to ensure that sodium intake is not too high and that iron intake is  
376 sufficient. **In the current study the BLCF group were less likely to be offered commercially**  
377 **prepared baby foods and less free sugar than the SW in this study.** Parents using BLCF should be  
378 informed of the benefits and limitations and given advice to ensure optimal nutritional intake during  
379 this important time such as has been achieved during the BLISS studies <sup>(16)</sup>.

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381 **References**

- 382 1. Emmett PM, Jones LR (2014) Diet and growth in infancy: relationship to socioeconomic  
383 background and to health and development in the Avon Longitudinal Study of Parents and  
384 Children. *Nutr Rev* **72**, 483-506.
- 385 2. Agostoni C, Decsi T, Fewtrell M *et al.* (2008) Complementary feeding: a commentary by the  
386 ESPGHAN Committee on Nutrition. *J Pediatr Gastroenterol Nutr* **46**, 99-110.
- 387 3. Foote KD, Marriott LD (2003) Weaning of infants. *Arch Dis Child* **88**, 488-492.
- 388 4. NHS Start 4 Life Complementary feeding. <https://www.nhs.uk/start4life/first-foods> (accessed  
389 05/08/2017)
- 390 5. Cameron SL, Heath AL, Taylor RW (2012) How feasible is Baby-led Weaning as an approach to  
391 infant feeding? A review of the evidence. *Nutrients* **4**, 1575-1609.
- 392 6. Rapley G (2015) Baby-led weaning: The theory and evidence behind the approach. *Journal of*  
393 *Health Visiting* **3**, 144-151.
- 394 7. Paul IM, Bartok CJ, Downs DS *et al.* (2009) Opportunities for the primary prevention of obesity  
395 during infancy. *Adv Pediatr* **56**, 107-133.
- 396 8. Townsend E, Pitchford NJ (2012) Baby knows best? The impact of weaning style on food  
397 preferences and body mass index in early childhood in a case-controlled sample. *BMJ Open* **2**,  
398 e000298.
- 399 9. Carruth BR, Skinner JD (2002) Feeding behaviors and other motor development in healthy  
400 children (2-24 months). *J Am Coll Nutr* **21**, 88-96.
- 401 10. Brown A, Lee MD (2013) Early influences on child satiety-responsiveness: the role of weaning  
402 style. *Pediatr Obes* **10**, 57-66.
- 403 11. NHS (2015) When should I start giving my baby solids (weaning)?  
404 <https://www.nhs.uk/chq/pages/812.aspx?categoryid=62> (accessed 30th December 2017)

- 405 12. Cameron SL, Taylor RW, Heath AL (2015) Development and pilot testing of Baby-Led  
406 Introduction to SolidS--a version of Baby-Led Weaning modified to address concerns about iron  
407 deficiency, growth faltering and choking. *BMC Pediatr* **15**, 99.
- 408 13. Cameron SL, Heath AL, Taylor RW (2012) Healthcare professionals' and mothers' knowledge  
409 of, attitudes to and experiences with, Baby-Led Weaning: a content analysis study. *BMJ Open* **2**.
- 410 14. Brown A, Lee M (2011) A descriptive study investigating the use and nature of baby-led  
411 weaning in a UK sample of mothers. *Matern Child Nutr* **7**, 34-47.
- 412 15. Brown A, Lee M (2011) Maternal control of child feeding during the weaning period:  
413 differences between mothers following a baby-led or standard weaning approach. *Matern Child*  
414 *Health J* **15**, 1265-1271.
- 415 16. Daniels L, Heath AL, Williams SM *et al.* (2015) Baby-Led Introduction to SolidS (BLISS)  
416 study: a randomised controlled trial of a baby-led approach to complementary feeding. *BMC*  
417 *Pediatr* **15**, 179.
- 418 17. Morison BJ, Taylor RW, Haszard JJ *et al.* (2016) How different are baby-led weaning and  
419 conventional complementary feeding? A cross-sectional study of infants aged 6-8 months. *BMJ*  
420 *Open* **6**, e010665.
- 421 18. Williams Erickson L, Taylor RW, Haszard JJ *et al.* (2018) Impact of a Modified Version of  
422 Baby-Led Weaning on Infant Food and Nutrient Intakes: The BLISS Randomized Controlled Trial.  
423 *Nutrients* **10**.
- 424 19. Daniels L, Taylor RW, Williams SM *et al.* (2018) Modified Version of Baby-Led Weaning  
425 Does Not Result in Lower Zinc Intake or Status in Infants: A Randomized Controlled Trial. *J Acad*  
426 *Nutr Diet* **118**, 1006-1016 e1001.
- 427 20. Morison BJ, Heath AM, Haszard JJ *et al.* (2018) Impact of a Modified Version of Baby-Led  
428 Weaning on Dietary Variety and Food Preferences in Infants. *Nutrients* **10**.
- 429 21. Wright CM, Cameron K, Tsiaka M *et al.* (2011) Is baby-led weaning feasible? When do babies  
430 first reach out for and eat finger foods? *Matern Child Nutr* **7**, 27-33.



- 431 22. Pliner P (1994) Development of measures of food neophobia in children. *Appetite* **23**, 147-163.
- 432 23. Wardle J, Guthrie CA, Sanderson S *et al.* (2001) Development of the Children's Eating  
433 Behaviour Questionnaire. *J Child Psychol Psychiatry* **42**, 963-970.
- 434 24. Marriott LD, Robinson SM, Poole J *et al.* (2008) What do babies eat? Evaluation of a food  
435 frequency questionnaire to assess the diets of infants aged 6 months. *Public Health Nutr* **11**, 751-  
436 756.
- 437 25. Sahota P, Gatenby LA, Greenwood DC *et al.* (2016) Ethnic differences in dietary intake at age  
438 12 and 18 months: the Born in Bradford 1000 Study. *Public Health Nutr* **19**, 114-122.
- 439 26. Bingham SA, Welch AA, McTaggart A *et al.* (2001) Nutritional methods in the European  
440 Prospective Investigation of Cancer in Norfolk. *Public Health Nutr* **4**, 847-858.
- 441 27. Roe MA, Finglas PM, Church SM (2002) *McCance and Widdowson's the composition of foods:*  
442 *6th summary ed.* Cambridge/London: Royal Society of Chemistry/Food Standards Agency.
- 443 28. Lanigan JA, Wells JC, Lawson MS *et al.* (2004) Number of days needed to assess energy and  
444 nutrient intake in infants and young children between 6 months and 2 years of age. *European*  
445 *journal of clinical nutrition* **58**, 745-750.
- 446 29. Cribb VL, Warren JM, Emmett PM (2012) Contribution of inappropriate complementary foods  
447 to the salt intake of 8-month-old infants. *European journal of clinical nutrition* **66**, 104-110.
- 448 30. Department of Health. (1991) *Dietary Reference Values for Food Energy and Nutrients Report*  
449 *of the Panel on Dietary Reference Values of the Committee on Medical Aspects of Food Policy.* :  
450 Stationary Office, London.
- 451 31. Office for National Statistics (2012) 2011 Census: Key Statistics for England and Wales, March  
452 2011.  
453 [https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimat](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/2011censuskeystatisticsforenglandandwales/2012-12-11#toc)  
454 [es/bulletins/2011censuskeystatisticsforenglandandwales/2012-12-11#toc](https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/2011censuskeystatisticsforenglandandwales/2012-12-11#toc) (accessed 03/08/17)

- 455 32. Fu X, Conlon CA, Haszard JJ *et al.* (2018) Food fussiness and early feeding characteristics of  
456 infants following Baby-Led Weaning and traditional spoon-feeding in New Zealand: An internet  
457 survey. *Appetite* **130**, 110-116.
- 458 33. The Health and Social Care Information Centre (2012) Infant Feeding Survey report 2010.  
459 [https://files.digital.nhs.uk/publicationimport/pub08xxx/pub08694/infant-feeding-survey-2010-](https://files.digital.nhs.uk/publicationimport/pub08xxx/pub08694/infant-feeding-survey-2010-consolidated-report.pdf)  
460 [consolidated-report.pdf](https://files.digital.nhs.uk/publicationimport/pub08xxx/pub08694/infant-feeding-survey-2010-consolidated-report.pdf) (accessed 06/08/2017)
- 461 34. Uauy R, Castillo C (2003) Lipid requirements of infants: implications for nutrient composition  
462 of fortified complementary foods. *J Nutr* **133**, 2962S-2972S.
- 463 35. Brown KH, Sanchez-Grinan M, Perez F *et al.* (1995) Effects of dietary energy density and  
464 feeding frequency on total daily energy intakes of recovering malnourished children. *The American*  
465 *journal of clinical nutrition* **62**, 13-18.
- 466 36. Scientific Advisory Committee on Nutrition (2015) Carbohydrates and Health.  
467 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/445503/SACN\\_Carb](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf)  
468 [ohydrates\\_and\\_Health.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf) (accessed 14 June 17)
- 469 37. Crawley H, Westwood S (2017) *Baby foods in the UK. First Steps Nutrition Trust.*
- 470 38. Coulthard H, Harris G, Emmett P (2009) Delayed introduction of lumpy foods to children  
471 during the complementary feeding period affects child's food acceptance and feeding at 7 years of  
472 age. *Matern Child Nutr* **5**, 75-85.
- 473 39. Coulthard H, Harris G, Emmett P (2010) Long-term consequences of early fruit and vegetable  
474 feeding practices in the United Kingdom. *Public Health Nutr* **13**, 2044-2051.
- 475 40. Smithers LG, Golley RK, Brazionis L *et al.* (2012) Dietary patterns of infants and toddlers are  
476 associated with nutrient intakes. *Nutrients* **4**, 935-948.
- 477 41. Ni Mhurchu C, Capelin C, Dunford EK *et al.* (2011) Sodium content of processed foods in the  
478 United Kingdom: analysis of 44,000 foods purchased by 21,000 households. *The American journal*  
479 *of clinical nutrition* **93**, 594-600.

- 480 42. Derbyshire E, Davies G (2007) Sodium: can infants consume too much? *Nutrition & Food*  
481 *Science*, **37**, 400-405.
- 482 43. Baker RD, Greer FR, Committee on Nutrition American Academy of Pediatrics (2010)  
483 Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young  
484 children (0-3 years of age). *Pediatrics* **126**, 1040-1050.
- 485 44. Domellof M, Braegger C, Campoy C *et al.* (2014) Iron requirements of infants and toddlers. *J*  
486 *Pediatr Gastroenterol Nutr* **58**, 119-129.
- 487 45. Fewtrell M, Wilson DC, Booth I *et al.* (2010) Six months of exclusive breast feeding: how good  
488 is the evidence? *BMJ (Clinical research ed)* **342**, c5955.
- 489 46. Lennox A, Sommerville J, Ong K *et al.* (2013) *Diet and nutrition survey of infants and young*  
490 *children, 2011. A survey carried out on behalf of the Department of Health and Food Standards*  
491 *Agency.*
- 492 47. Garcia AL, Raza S, Parrett A *et al.* (2013) Nutritional content of infant commercial weaning  
493 foods in the UK. *Arch Dis Child* **98**, 793-797.
- 494 48. Gosling SD, Vazire S, Srivastava S *et al.* (2004) Should we trust web-based studies? A  
495 comparative analysis of six preconceptions about internet questionnaires. *The American*  
496 *psychologist* **59**, 93-104.
- 497 49. Bauer J, Gerss J (2011) Longitudinal analysis of macronutrients and minerals in human milk  
498 produced by mothers of preterm infants. *Clin Nutr* **30**, 215-220.
- 499 50. Watson S, Costantini C, Clegg ME (2018) The Role of Complementary Feeding Methods on  
500 Early Eating Behaviors and Food Neophobia in Toddlers. *Child Care in Practice.*

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505 **Table 1.** Demographic characteristics of parents following standard weaning (SW) and baby led  
 506 complementary feeding (BLCF)

Parental characteristics	SW (n=46)	BLCF (n=88)	P value
Parent Age in years [mean (SD)] *	31.7 (4.8)	34.0 (4.0)	.07
<19	0 (0.0)	0 (0.0)	
20-24	0 (0.0)	6 (7.0)	
25-29	7 (15.2)	23 (26.7)	
30-34	17 (37.0)	36 (41.9)	
>35	22 (47.8)	21 (24.4)	
Education [n (%)]			.70
No formal education	0 (0.0)	1 (1.1)	
School GCSEs <sup>a</sup>	3 (6.5)	5 (5.7)	
School A levels <sup>b</sup>	1 (2.2)	7 (8.0)	
College <sup>c</sup>	2 (4.3)	3 (3.4)	
University <sup>d</sup>	40 (87.0)	72 (81.8)	
Ethnicity [n (%)]			.34
White	43 (93.5)	84 (95.5)	
Asian/Asian British	1 (2.2)	0 (0.0)	
Black/Black African/Black British/Black Caribbean	0 (0.0)	1 (1.1)	
Mixed	1 (2.2)	3 (3.4)	
Other	1 (2.2)	0 (0.0)	
BMI [(kg/m <sup>2</sup> ) (SD)]	26.1 (5.7)	26.5 (4.8)	.35
<18.5	1 (2.2)	1 (1.1)	
18.5-24.9	20 (43.5)	36 (41.4)	
25.0-29.9	16 (34.8)	32 (36.8)	
30.0-34.9	6 (13.0)	12 (13.8)	
>35.0	3 (6.5)	6 (6.9)	
Number of children [n (%)]			.364
1	22 (47.8)	60 (68.2)	
2	21 (45.7)	19 (21.6)	
3	2 (4.3)	5 (5.7)	
>3	1 (2.2)	4 (4.5)	
Work status [n (%)]			.25
Full time	16 (34.8)	33 (37.5)	
Part-time	26 (56.5)	39 (44.3)	
Not in work	4 (8.7)	16 (18.2)	

507 \*data from two participants was excluded due to incorrect data entry

508 <sup>a</sup> qualification generally taken by school students in the UK aged 14–16 years

509 <sup>b</sup> School leaving qualification in the UK that can be used for University entrance

510 <sup>c</sup> Further education generally undertaken between 16-19 years that may or may not involve A level qualifications

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514 **Table 2.** Infant characteristics of those following standard weaning (SW) and baby led  
 515 complementary feeding (BLCF)

Infant characteristics	SW (n=46)	BLCF (n=88)	P value
Age [months (SD)]	8.5 (2.0)	9.1 (1.8)	.07
6-8 [n (%)]	27 (58.7)	37 (42.0)	
9-12 [n (%)]	19 (41.3)	51 (58.0)	
Sex			.47
Male [n (%)]	21 (45.7)	47 (53.4)	
Female [n (%)]	25 (54.3)	42 (47.7)	
Gestation [weeks (SD)]	39.5 (1.4)	40.0 (1.4)	.06
Weight for age centile at birth [mean (SD)]	60.6 (26.7) <sup>a</sup>	67.0 (27.2) <sup>a</sup>	.14
Weight for age centile at current age [mean (SD)]	58.2 (28.7) <sup>b</sup>	57.5 (33.0) <sup>b</sup>	.96
Initial breastfeeding [n (%)]	40 (87.0)	82 (93.2)	.23
Exclusively breast fed for 6 months [n (%)]	15 (32.6)	56 (64.4) <sup>c</sup>	<b>&lt;.001</b> <sup>e</sup>
Age of introduction of CF [months (SD)]	5.5 (0.5)	5.8 (0.4) <sup>d</sup>	<b>&lt;.001</b> <sup>e</sup>

516 <sup>a</sup> error in data entry final participant numbers are: n=45 SW, n=87 BLCF; <sup>b</sup> error in data entry: n=45 SW, n=86 BLCF; <sup>c</sup>  
 517 no data for one participant: n=87 BLCF; <sup>d</sup> error in data entry for one participant: n=87 BLCF; <sup>e</sup> P-values <.05 are  
 518 highlighted in bold and indicate statistical significance  
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**Table 3.** Food Frequency Questionnaire results: number of times each food type was offered per day over all ages groups (total), 6-8 months and 9-12 months for those following standard weaning (SW) and baby led complementary feeding (BLCF).

Nutrient	Total					6-8 Months					9-12 Months				
	SW (n = 21)		BLCF (n = 29)		p	SW (n = 13)		BLCF (n = 12)		p	SW (n = 8)		BLCF (n = 17)		p
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Fruits	2.77	0.35	2.37	0.15	.67	2.35	0.35	1.99	0.20	.49	3.36	0.66	2.65	0.21	.37
Vegetables	3.58	0.62	3.49	0.23	.11	3.22	0.37	3.15	0.56	.31	4.20	1.28	3.68	0.29	.33
Fortified infant cereal	0.26	0.58	0.032	0.18	<b>&lt;.001</b>	0.19	0.06	<0.001	0.003	<b>&lt;.001</b>	0.37	0.11	0.05	0.03	<b>&lt;.001</b>
All fish	0.50	0.12	0.50	0.07	.09	0.36	0.11	0.43	0.12	.26	0.69	0.20	0.56	0.08	.46
Oily fish	0.19	0.05	0.23	0.03	<b>&lt;.001</b>	0.13	0.05	0.22	0.06	<b>.01</b>	0.26	0.09	0.24	0.03	.12
All meat/fish	1.26	0.20	1.40	0.16	.33	0.80	0.21	0.91	0.15	.22	1.91	0.35	1.75	0.35	.44
Processed meats (ham/sausage/bacon)	0.15	0.05	0.45	0.08	<b>&lt;.001</b>	0.10	0.04	0.21	0.04	<b>.003</b>	0.22	0.10	0.62	0.12	<b>&lt;.001</b>
Sugary foods (cakes/biscuits/snacks)	0.20	0.08	0.22	0.07	.63	0.10	0.07	0.35	0.03	.54	0.33	0.15	0.35	0.12	.77
Salty snacks	0.19	0.05	0.13	0.03	.31	0.20	0.07	0.05	0.02	<b>.03</b>	0.18	0.07	0.19	0.04	.96
Starchy foods	3.39	0.40	3.34	0.20	.28	2.72	0.40	2.42	0.21	.88	4.34	0.74	4.01	0.28	.46
Dairy and dairy based desserts	1.23	0.15	0.98	0.07	.36	0.89	0.16	0.76	0.08	.80	1.72	0.25	1.14	0.09	<b>.04</b>
Sugary drinks	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	.16
Pre-prepared baby food	1.65	0.23	0.49	0.13	<b>&lt;.001</b>	1.20	0.23	0.34	0.14	<b>&lt;.001</b>	2.29	0.43	0.60	0.20	<b>&lt;.001</b>

\*P-values <.05 are highlighted in bold and indicate statistical significance

**Table 4.** 24-hour dietary recall: nutrient intake over all ages groups (total), 6-8 months and 9-12 months for those following standard weaning (SW) and baby led complementary feeding (BLCF).

Nutrient		Total					6-8 Months					9-12 Months				
		SW (n = 46)		BLCF (n = 88)		p	SW (n = 27)		BLCF (n = 37)		p	SW (n = 19)		BLCF (n = 51)		p
		Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Energy (kJ)	Total	3847.8	1205.9	4143.1	935.0	.33	2368.3	924.7	237.7	899.0	.99	1479.5	9354.6	1770.4	850.3	.26
	Infant Milk	2368.3	924.7	2372.7	899.0	.99	2649.8	836.4	2654.8	960.3	.99	1910.8	925.83	2173.5	823.7	.48
	Food	1479.5	935.6	1770.4	850.3	.26	1132.0	872.8	1127.9	498.8	.99	2044.3	778.7	2223.9	752.4	.59
Carbohydrates(g)	Total	111.2	32.6	112.5	30.2	.88	108.8	31.4	96.5	22.4	.40	115.2	36.1	121.9	32.0	.66
	Infant Milk	62.1	20.8	60.2	23.1	.77	68.7	18.1	60.6	23.6	.30	51.3	21.4	55.5	22.0	.66
	Food	49.1	30.3	52.3	30.4	.72	40.1	30.3	32.4	16.9	.45	63.9	25.4	66.3	30.3	.85
Protein (g)	Total	25.9	9.9	27.5	8.5	.47	23.5	9.3	22.6	5.5	.77	29.8	10.2	31.1	8.8	.75
	Infant Milk	11.1	3.8	10.8	4.0	.79	12.3	3.3	12.0	4.3	.84	9.0	4.0	9.9	3.7	.61
	Food	14.8	9.5	16.8	9.3	.46	11.2	8.9	10.6	6.3	.86	20.7	7.5	21.2	8.6	.91
Fat (g)	Total	41.0	16.9	47.7	13.7	.12	41.7	14.5	46.1	11.9	.54	39.7	21.3	48.8	15.1	.23
	Infant Milk	30.7	15.0	31.8	12.6	.64	34.9	14.1	35.8	13.71	.94	24.0	14.5	29.0	11.3	.19
	Food	10.2	8.4	15.9	9.8	<b>.04*</b>	6.8	6.2	10.2	5.1	.12	15.7	9.0	19.8	10.5	.55
Saturated Fat(g)	Total	16.7	7.6	19.8	6.9	.13	17.5	6.7	18.9	5.5	.57	15.2	9.3	20.5	7.9	.09
	Infant Milk	12.9	6.5	13.7	5.5	.56	14.6	6.2	15.6	5.9	.85	10.2	6.6	12.4	5.0	.22
	Food	3.7	3.4	6.1	5.3	.08	2.9	3.4	3.4	2.2	.41	5.1	3.1	8.0	6.1	.24
Free Sugar (g)	Total	5.2	7.5	3.6	5.1	.58	6.5	9.0	1.0	2.1	<b>.03</b>	3.0	3.4	5.5	5.8	.29
Iron (mg)	Total	6.2	4.9	4.8	2.6	.25	6.3	5.8	4.2	3.0	.57	6.0	3.2	5.3	2.2	.51
	Infant Milk	2.4	1.7	1.6	1.9	<b>.01</b>	2.1	1.5	1.8	2.1	.12	2.9	2.1	1.5	1.9	.08
	Food	3.8	4.5	3.2	2.2	.55	4.2	5.6	2.5	1.9	.85	3.1	2.0	3.7	2.3	.55
Zinc (mg)	Total	5.8	2.9	5.2	1.9	.40	6.0	3.3	5.0	2.1	.47	5.4	2.3	5.3	1.8	.95
	Infant Milk	5.4	2.3	5.3	1.8	.05	3.6	0.5	3.3	1.6	.66	2.9	0.9	2.8	1.5	.32
	Food	2.5	2.7	2.2	1.4	.52	2.5	3.3	1.7	1.4	.94	2.5	1.8	2.6	1.4	.92
Sodium (mg)	Total	375.5	219.4	529.1	224.8	<b>.01</b>	315.3	161.9	391.2	117.1	.10	473.4	273.7	626.5	233.9	.32



Infant Milk	134.6	42.3	129.9	55.6	.76	149.5	36.2	145.8	54.5	.84	110.3	50.1	118.8	55.2	.71
Food	240.9	218.0	399.1	237.0	<b>.03</b>	165.7	166.7	245.4	127.2	.23	363.0	246.3	507.6	238.7	.18

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\**P*-values <.05 are highlighted in bold and indicate statistical significance

**Table 5.** Comparison of total nutrient means from dietary recall and EAR/RNI for those following standard weaning (SW) and baby led complementary feeding (BLCF).

<b>Nutrient</b>	<b>SW 6-12 Mean (SD)</b>	<b>BLCF 6-12 Mean (SD)</b>	<b>RNI</b>
Energy (kJ)	3847.8 (1205.9)	4143.1 (935.0)	2853 <sup>a</sup>
Protein (g)	25.9 (9.9)	27.5 (8.6)	14.3 <sup>b</sup>
Iron (mg)	6.21 (4.9)	4.84 (2.6)	7.8
Zinc (mg)	5.8 (2.2)	5.2 (1.9)	5.0
Sodium (mg)	375.5 (219.4)	529.1 (228.8)	400
Calcium (mg)	588.9 (209.1)	579.9 (211.8)	525
Magnesium (mg)	80.9 (29.4)	90.7 (27.1)	75
Vitamin A(μg)	787.0 (327.5)	687.7 (192.1)	350
Vitamin B12 (μg)	1.43 (0.89)	1.47 (1.03)	0.4
Vitamin C (mg)	86.9 (36.9)	80.6 (30.3)	25

<sup>a</sup>Energy given as EAR (estimated average requirement). RNI (reference nutrient intake)

<sup>b</sup> Average of male and female requirements mixed feeding 7-12 months<sup>(30)</sup>