

1 **Title page**

2 **Title** The accuracy of dietary recall of infant feeding and food allergen data

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4 \* These authors equally contributed to the manuscript

5 **Keywords:** dietary recall, food allergy, infant feeding, recall bias

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24 **Author contributions**

25 ZvZ collected, analysed data and assisted with drafting the manuscript. KM drafted the  
26 manuscript. CV designed the study. All authors critically reviewed and approved the final  
27 paper. The authors declare that they have no conflict of interests

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32

33

#### 34 **Abstract**

35 **Background:** Research investigating the association of infant dietary factors with later health  
36 outcomes often relies on maternal recall. It is unclear what the effect of recall bias is on the  
37 accuracy of the information obtained. The aim of this study was to determine the extent of  
38 recall bias on the accuracy of infant feeding and food allergen data collected 10 years later.

39 **Methodology:** Mothers were recruited from a prospective birth cohort from the Isle of Wight.  
40 Mothers were asked when their child was 10 years of age (2011/2012) to complete a  
41 retrospective infant feeding questionnaire asking the same questions that were asked in  
42 2001/2002.

43 **Results:** 125 mothers participated. There was substantial agreement for recollection of any  
44 breast feeding ( $k = 0.79$ ) and duration of breastfeeding from 10 years earlier ( $r = 0.84$ ). 94%  
45 of mothers recalled accurately that their child had received formula milk. The exact age at  
46 which formula milk was first given was reliably answered ( $r = 0.63$ ). The brand of formula  
47 milk was poorly recalled. Recall of age of introduction of solid food was not reliable ( $r =$   
48  $0.16$ ). The age of introduction peanuts was the only food allergen that was recalled accurately  
49 (86%).

50 **Conclusion:** This study highlights the importance of maternal recall bias of infant feeding  
51 practices over 10 years. Recall related to breast feeding and formula feeding were reliable,  
52 but not age of introduction of solid or allergenic foods, apart from peanut. Caution should be  
53 applied when interpreting studies relying on dietary recall.

54

55 **Keywords:** dietary recall, food allergy, infant feeding, recall bias

56

57 **Introduction**

58 Epidemiological research suggests early dietary exposure is a contributing factor in the  
59 development of non-communicable diseases such as obesity, diabetes and food allergy <sup>(1-4)</sup>.  
60 In health conditions with some latency period between dietary exposure and outcome, past  
61 dietary exposure is of more relevance than current dietary intake. However collection of data  
62 about prior dietary intake is often reliant on memory, either immediate or in the distant past.  
63 The accuracy, reliability and validity of retrospectively collected data compared to  
64 prospectively collected data is therefore a very important question for nutritional  
65 epidemiological research.

66         Although retrospective data collection has many potential advantages such as reduced  
67 study duration and cost, it is highly subject to recall bias. Recall bias is the tendency of  
68 subjects to report past events about exposure or outcome in a different manner between the  
69 two study periods <sup>(5)</sup>. This error in recall can lead to misclassification of study subjects with a  
70 resultant distortion of measure of association. Hence, recall bias contributes a major threat to  
71 the internal validity of studies using self-reported data <sup>(6)</sup> and potentially may lead to incorrect  
72 hypothesis generation.

73         Longitudinal research examining the effect of infant feeding habits on later health  
74 often rely on maternal recall as a proxy measure of infant dietary intake. Outcomes such as  
75 adult intelligence, obesity, serum cholesterol and risk of diabetes have all been investigated in  
76 their relationship with breast feeding and breast feeding duration <sup>(7)</sup>. Factors including the  
77 period of recall <sup>(8)</sup>, family size <sup>(9)</sup>, type of information recalled and mother's educational level  
78 <sup>(10)</sup> have been found to influence the accuracy of information recalled. Conversely, maternal  
79 age, race and the infant's gender does not appear to influence the accuracy of maternal recall.

80         Overall studies investigating recall of breastfeeding have had inconsistent findings.  
81 Bland *et al.* <sup>(9)</sup> reported that 72% of mothers did not recall the period of exclusive  
82 breastfeeding (EBF) accurately 6-9 months post-delivery; with 57% overestimating the  
83 duration and 15% underestimating the duration. Agampodi *et al.* <sup>(11)</sup> reported similar findings  
84 at nine months follow up, concluding that estimations of longer than observed EBF were  
85 likely to be due to social desirability bias than recall bias. With regard to longer durations of  
86 recall, Promislow *et al.* <sup>(7)</sup> assessed the validity of maternal recall of the duration of  
87 breastfeeding in elderly US women 34-50 years later, reporting a sensitivity for recall of  
88 having breast fed of 94%. Duration of any breast feeding therefore has been shown to be

89 more reliable than duration of EBF, which was also reported by Natland *et al.* <sup>(8,12,13)</sup> who  
90 assessed reporting accuracy over an 8 year period.

91 In terms of introduction of solid food, research suggests dietary recall is also  
92 unreliable. Gillespie *et al.* <sup>(14)</sup> reported that the age of introduction of solid foods tended to be  
93 overestimated in interviews 1 – 3.5 years after birth, compared to those within 3 weeks of the  
94 event. Recall accuracy appears to diminish with increasing time gap. Vobecky *et al.* <sup>(8)</sup>  
95 reported that age at introduction of solids was recalled very poorly after eight years, with a  
96 correlation of only 0.16 for meat and 0.35 for cereals. Barbosa *et al.* <sup>(15)</sup> also found little  
97 agreement in the age at introduction of solid foods over a 6 year period of recall. Tienboon *et*  
98 *al.* <sup>(16)</sup> examined mothers' recall of infant feeding practices after a period of 14 to 15 years,  
99 demonstrating the timing of the introduction of solids and duration of breast feeding was less  
100 accurately recalled than the recall of any breastfeeding.

101 Predictors for inconsistencies of recall with infant feeding practices have been shown.  
102 Questions described in the literature are not always valid or reliable, for e.g. asking a mother  
103 how long she breastfed exclusively for, without explaining exactly what EBF means as well  
104 as using the question 'When did you stop breast feeding' to find out when a mother started  
105 weaning. Another predictor for inconsistency of recall is when the criteria for agreement  
106 changes over the two time points, for example, recording in weeks when a mother started  
107 with the introduction of solid foods and asking her to recall in months.

108 Information regarding timing of introduction of solids food is of particular importance  
109 in food allergy as this has led to important hypothesis generation in the past <sup>(17)</sup>. Food allergy  
110 negatively impacts quality of life <sup>(18)</sup> and has a substantial impact on the health economy  
111 <sup>(19,20)</sup>. As there is currently conflicting evidence in the area of food allergy prevention <sup>(21,22)</sup>, it  
112 is particularly important that the evidence generated is robust. Of note, some studies that have  
113 investigated pregnancy, breast feeding and weaning practices and the potential effect on the  
114 development of food allergy have relied on parents reporting information up to 15 years  
115 retrospectively <sup>(23)</sup>. Despite suspecting that this period of recall in food allergy prevention  
116 studies may have an effect on the reliability of the data, it was still used to inform national  
117 policies <sup>(24)</sup>. There is paucity in the literature regarding the effect of recall bias on infant  
118 feeding information obtained retrospectively and how this may affect the development of  
119 allergic diseases. This study therefore investigated the impact of recall bias on the accuracy

120 of information obtained regarding breast feeding and weaning practices, specifically in  
121 relation to food allergy and the introduction of allergenic foods.

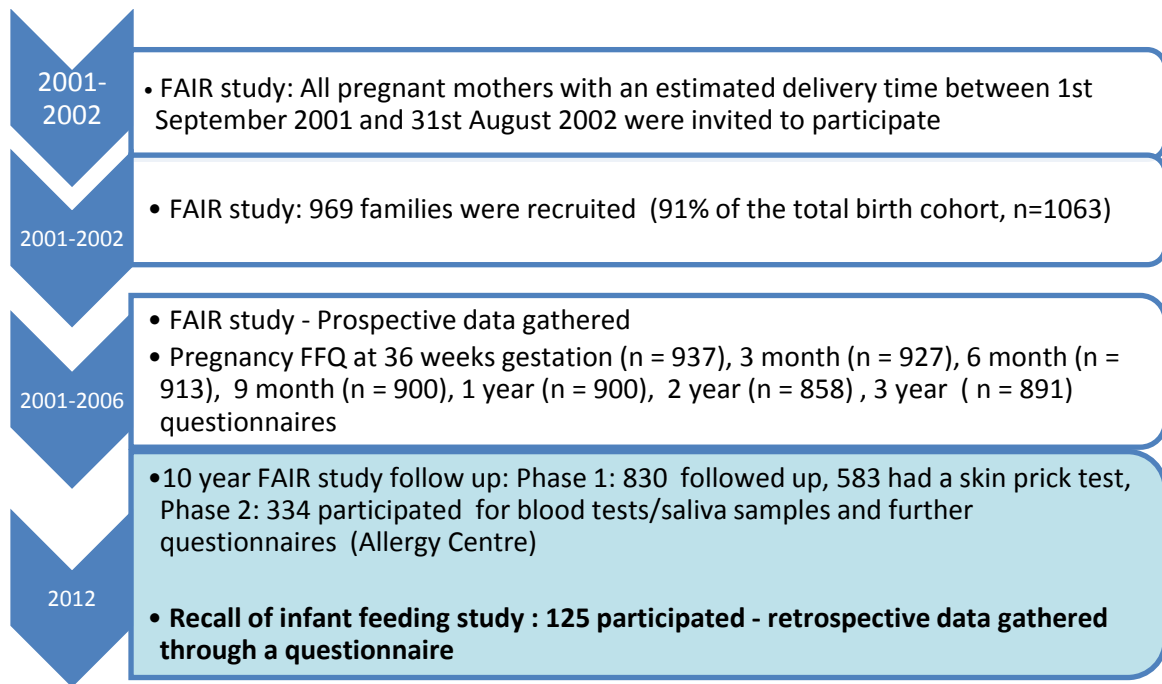
122

## 123 **Methodology**

### 124 **Parent study**

125 This study formed part of the Food Allergy and Intolerance Research (FAIR) study, an  
126 unselected birth cohort study from the Isle of Wight. Data was obtained in 2001/2002 from  
127 969 families investigating factors associated with maternal dietary intake, feeding and  
128 weaning practices in relation to the development of food hypersensitivity in the infant.  
129 Methods and data from this study have been published previously in detail <sup>(25-27)</sup>.

130 In brief, all pregnant mothers with an approximate delivery date between 1<sup>st</sup> September 2001  
131 and 31<sup>st</sup> August 2002 were approached at antenatal clinics. At 36 weeks gestation, a  
132 validated maternal food frequency questionnaire was completed <sup>(25)</sup>. At 3, 6, 9 and 12 months,  
133 information was obtained regarding feeding practices and reported symptoms of atopy, using  
134 a standardised questionnaire. Children were seen at 1, 2 and 3 years when a medical  
135 assessment was performed. Participants were invited for further follow up in 2012, when the  
136 children were between 9 and 11 years of age. A flow diagram of the study population  
137 showing the stages from recruitment to the 10 year follow up is shown in figure 1.



138  
139 Figure 1 Flow diagram of study population from recruitment

140

141

142 **Questionnaires**

143 The 2001/2002 questionnaires used at 3, 6, 9 and 12 months consisted of questions relating to  
 144 dietary intake when pregnant <sup>(25)</sup>, breast feeding practices in terms of exclusivity and  
 145 duration, age of introduction of formula and specific weaning foods and dietary avoidance.  
 146 Mothers were not informed that they would be answering some of these same questions at  
 147 any point again in the future. The questionnaires were tested for face validity by checking the  
 148 understanding of the questions with a separate group of mothers. Criterion-related validity  
 149 took place by comparing answers with those charted in participants' personal child health  
 150 record (also known as the child's "red book"). The personal child health record is given to  
 151 parents/carers at a child's birth in the United Kingdom and is the main record of a child's  
 152 health, growth and development. Answers from the 2001/2002 questionnaire are used as the  
 153 'gold standard' for comparison of the answers from the current (2012) feeding questionnaire.  
 154 At the 10 year follow up study in 2012, parents were asked to complete a feeding  
 155 questionnaire consisting of 18 of the same questions which were asked in 2001/2002.

156 **Sample**

157 Non-random, purposive sampling was used. All parents of the 969 children who participated  
158 in the original FAIR study (a non-selective group) and who attended the FAIR clinics during  
159 the 10 year follow-up were asked to take part. Parents/carers attending the clinic who did not  
160 complete the original feeding questionnaires were not included in the study. The sample size  
161 was calculated using power analyses for repeated measures experiment. The sample size for  
162 this study was calculated using power analyses for repeated measures experiment, which in  
163 this case equalled two repetitions. A paired t-test was used for this purpose. Power analyses  
164 were done yielding 90% power with a Cohen's D of 0.298. In order to detect the smallest  
165 standardised effect, a sample size of 121 was set as the minimum for this study.

## 166 **Ethical considerations**

167 Ethics approval was obtained from the NRES Committee South Central in Southampton, UK,  
168 for the larger FAIR follow-up study (10/H0504/11) and the study of recall bias. Ethical  
169 approval from the Health Research Ethics Committee of Stellenbosch University, South  
170 Africa was obtained (S12/01/002) for the study investigating the impact of recall on the  
171 accuracy of dietary information.

172 This study and the preparation of the manuscript complies with STROBE guidelines for  
173 transparent and accurate reporting of observational studies.

## 174 **Data analysis**

175 Data was entered into SPSS, then exported to MS Excel and STATISTICA (StatSoft Inc.  
176 [2012] STATISTICA, version 11). Descriptive statistics and frequencies were calculated.  
177 Accuracy or agreement of recall in all cases, unless specified otherwise, was calculated by  
178 testing for the agreement of the answer given in 2012 to the 'gold standard' answer given in  
179 2001/2002, based on a significant p-value < 0.05. The criterion for agreement was against the  
180 precise answer given in 2001/2002. The kappa coefficient and 95% confidence intervals were  
181 computed to measure the agreement before and later for categorical 2 x 2 responses (e.g.  
182 Yes/No). Sensitivity and specificity tests were used to compute the 'true positive' and 'true  
183 negative' for 2 x 2 tables where the answer was dichotomous.

## 184 **Results**

### 185 **Participant recruitment and demographics**

186 There were 830 participants recruited for the 10 year FAIR follow up study; of which 334  
187 attended the allergy centre for an appointment. Of these 334 participants, 125 took part in the  
188 dietary recall study. Table 1 shows participant demographic characteristics.

189



<b>Variable</b>	
Mean age of child (years)	10.5 (SD 0.32)
Gender (n)	60% male (75)
Mean maternal age at child's birth (minimum-maximum)	30.2 (19-43)
Maternal education level (n)	0.8% did not finish school (1) 33% School (41) 52.4% Further education (66) 13.7% Higher education (17)
First born (n)	46% (58)
Ever had eczema	31.6%
Ever had hayfever	27.6%
Maternal asthma	21.5%
Maternal eczema	28.6%
Maternal hayfever	37.8%
Maternal food allergy	13.3%
Sibling with food allergy (n)	19% (13)
Diagnosed to food allergy using DBPCFC at age 1 (n)	1.6% (2)
Diagnosed to food allergy using DBPCFC at age 2 (n)	0.8% (1)
Diagnosed to food allergy using DBPCFC at age 3 (n)	1.6% (2)

190 Table 1. Participant demographic characteristics. DBPCFC: Double Blind Placebo Controlled  
191 Food Challenge

192

193

194 **Accuracy of recall of breastfeeding**

195 Ninety three per cent (114/123) of mothers reported accurately that they had breast fed  
196 (kappa coefficient 0.79, 95% CI 0.63-0.90). The specificity of recall was 100% (i.e. mothers  
197 reported not to have breastfed were 100% accurate in the pre and post questionnaire). The  
198 sensitivity of breastfeeding recall was 91% meaning 9% of mothers who did breast feed  
199 reported not to have breast fed.

200 There was substantial agreement between the answers reported in 2012 for duration of any  
201 breastfeeding and those reported 10 years earlier ( $r = 0.84, p < 0.05$ ). In terms of duration of  
202 *exclusive* breastfeeding, a strong significant correlation was found between the answers over  
203 10 years ( $r = 0.70, p < 0.05$ ).

204 **Accuracy of recall of formula feeding**

205 The percentage of accurate answers to whether a child had a bottle of formula milk whilst in  
206 hospital was 84% (103/123) (kappa coefficient 0.67, 95% CI 0.54 – 0.80. Ninety four per  
207 cent (116/124) of mothers recalled accurately that their child had received formula milk at  
208 some stage, irrespective of when and how much. The specificity of the answers over this time  
209 period of recall was 95.7%. The sensitivity was 62.5%; therefore 37.5% of mothers recalled  
210 that their child had some formula milk even if they did not 10 years earlier.

211 There was a substantial agreement in the reported age at which mothers introduced formula  
212 milk ( $r = 0.63, p < 0.05$ ). The trend for both the gold standard answer in 2001/2002 and the  
213 reported answer in 2012 was for fewer mothers to introduce formula milk as time went on.  
214 Some mothers recalled introducing formula milk after their child was a year old, although  
215 this was not the case 10 years earlier.

216 Mothers who had given formula milk to their baby were asked to recall which formula milk  
217 was given. Only 17/125 (13.6%) mothers answered this question. Fifty nine per cent (11/17)  
218 recalled the exact brand name over this 10 year period. Forty one per cent (7/17) of mothers  
219 recalled accurately the exact variant of the brand of formula milk. Neither of these results are  
220 statistically significant due to low numbers.

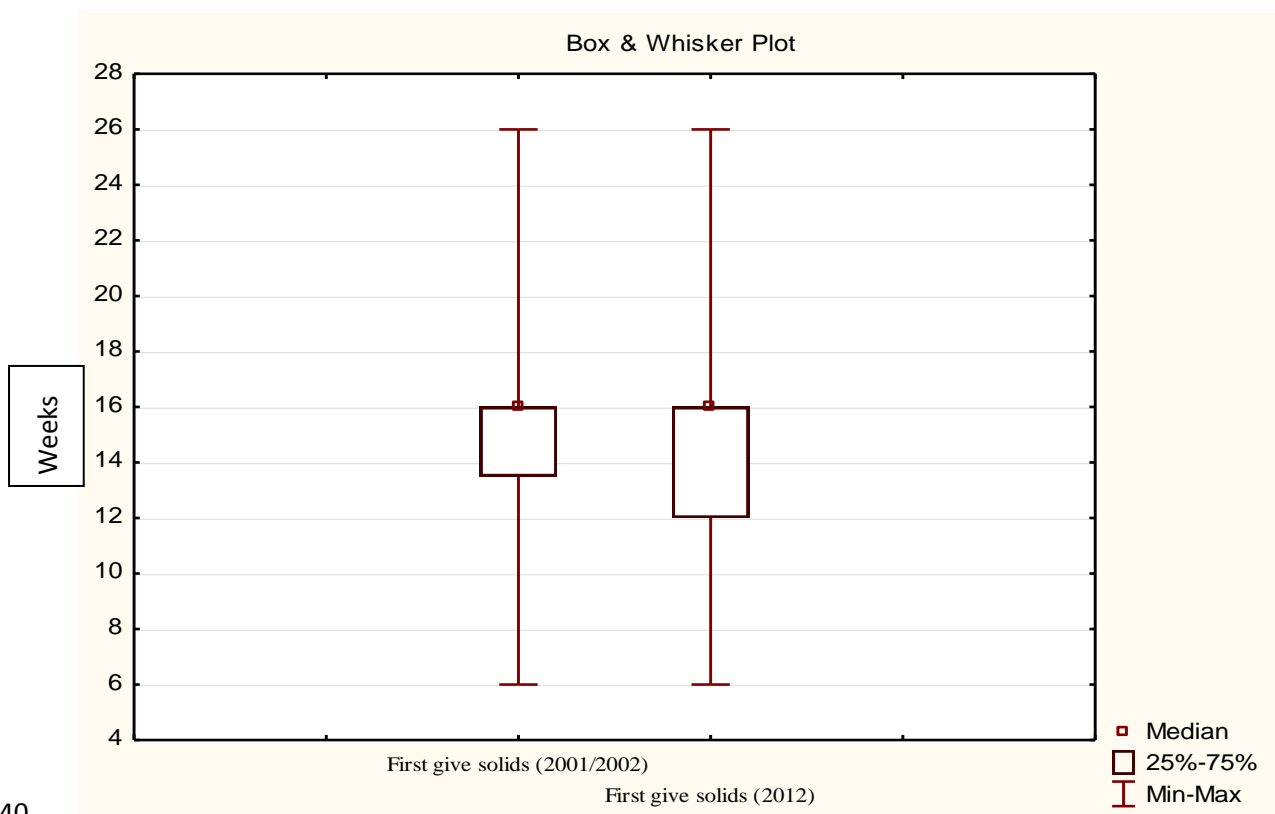
221 **Accuracy of recall of solid food introduction**

222 **Timing of solid food introduction**

223 Mothers were asked an open question about how old (weeks) their child was when first given  
 224 solid foods. There was weak agreement between the two periods of reporting ( $r = 0.16$ ).  
 225 Figure 2 shows the distribution of answers from the mothers in 2001/2002 and 2012. The  
 226 average age answered was 14.93 (SD = 2.48) weeks and 15.56 (SD = 4.57) weeks for  
 227 2001/2002 and 2012 respectively, showing that the answers in 2012 varied more than those in  
 228 2001/2002. More mothers recalled to have weaned earlier than they actually did. 76% of  
 229 mothers could accurately remember when they first gave solid foods to their child within a  
 230 four-week margin.

231 **Type of solid food introduced**

232 Mothers were asked an open question to determine which first three baby foods were  
 233 introduced at weaning. A food was either categorised as a standalone food item or a food  
 234 group, based on the categories set for the FAIR study<sup>(28)</sup>. Fifty three per cent ( $n = 66$ ) of  
 235 mothers were able to recall two or more of the foods/food groups accurately, leaving 47%  
 236 who recalled one or no foods/food groups accurately. Rice, non-citrus fruit/juice and  
 237 vegetables (not potato or tomato) were the most common foods/food groups that were  
 238 accurately recalled. 87% (101/116) of mothers recalled correctly whether they had given their  
 239 child commercial baby foods 10 years earlier.



240

241 Figure 2 Recall of when solid foods were first introduced

242 **Introduction of allergenic foods**

243 Mothers were asked the age of their child when they first introduced some major food  
244 allergen groups into their diet. Each major food allergen group was listed with an option for  
245 mothers to select a categorical age range of introduction (< 3 months, < 6 months, < 9 months  
246 and > 9 months). Table 2 shows the number and percentage of mothers that recalled correctly  
247 when they first introduced certain allergenic foods into their child's diet. Most foods were  
248 poorly recalled, apart from peanuts which showed 86% accuracy.

249 Table 2 Number and percentage of correct answers for introduction of allergenic foods/food  
250 groups in 2001/2002 and 2012

<b>At what age did you introduce the following foods into your child's diet?</b>	
<b>Allergenic food group options</b>	<b>% accurate (n)</b>
Wheat containing foods (e.g. baby rusk, baby cereals, cereals, pasta, bread, cakes, biscuits)	44.8 (52/116)
Dairy foods (e.g. yoghurt, fromage frais, custard, ice cream, butter, margarine, cow's milk in food, cheese)	50.9 (59/116)
Fish	34.5 (30/87)
Whole egg	30.8 (28/91)
Soya	34.5 (10/29)
Tree nuts – almonds, brazil nuts, pecan nuts, hazel nuts, walnuts etc. (e.g. in chocolate, crunchy nut cornflakes, choc chip cookies, pesto sauce, vegetarian meals)	66 (51/77)
Peanuts (e.g. Bombay mix, peanut butter, peanut	85.7 (72/84)

251

252 **Food avoidance**

253 Asking mothers to recall 10 years later whether they excluded any foods from their child's  
254 diet when their child was six months was not at all accurate (kappa coefficient 0.09 CI 0.07 –  
255 0.27). The specificity of the answers from the mothers in 2012 is 54.5%. Nearly half of  
256 mothers who therefore reported 'No' to avoiding food items were incorrect. The sensitivity  
257 was computed to be 54.5%; therefore just under half of mothers who reported that they did  
258 avoid food items 10 years earlier did not. From those mothers that were avoiding any foods,  
259 they were asked again which specific foods were avoided. Out of the seventy nine accounts  
260 of avoidance, 40.5 % (32/79) of the recalled food/food group matched the answers given 10  
261 years earlier.

### 262 **Recall of peanut consumption during pregnancy and in early childhood**

263 Mothers were asked about their consumption of peanuts at 36 weeks gestation and their  
264 child's consumption when they were two and 10 years old. Both the two-year and 10 year  
265 questionnaires also allowed for parents to provide an answer of why they avoided giving  
266 peanuts. The answers recalled by mothers from 36 weeks gestation to two years were shown  
267 to be substantially agreeable ( $k = 0.64$  CI 0.50 – 0.77). The agreement between mother's  
268 answers in 2012 from eight years earlier in 2003/2004 was 0.39 (CI 0.25 – 0.53), which is  
269 considered fair agreement.

### 270 **Birth order and accuracy of recall**

271 There was stronger agreement for recall of whether they breast fed or not for mothers of  
272 children who were born second or later compared to those for first born children ( $r = 0.85$   
273 versus  $r = 0.62$  respectively). There was substantial agreement for the reported duration of BF  
274 in all groups, irrespective of whether mothers were recalling for firstborns or children born  
275 second or later. A similar pattern was noted for introduction of formula, with mothers of  
276 children who were born second or later tending to provide more reliable answers than  
277 mothers of first born children.

278

279 **Discussion**

280 To our knowledge this study is unique as it is the first to demonstrate dietary recall bias in a  
281 food allergy cohort, it captures data from maternal diet pre pregnancy through to advanced  
282 stages of weaning and it specifically addresses recall bias in the age of introduction of  
283 allergenic foods. This study using longitudinal, descriptive cohort data with a retrospective  
284 analytical component was designed to explore recall bias relating to infant feeding practices  
285 over a 10 year period. Data on breast feeding and infant feeding practices was collected  
286 prospectively from mothers in the FAIR study <sup>(21)</sup> and the accuracy of recall was tested by  
287 asking some of the same questions 10 years later. The results showed that it is reliable to ask  
288 mothers questions related to breast feeding and formula feeding over a 10 year period. Less  
289 reliable is recall relating to introduction of solid and allergenic foods and whether certain  
290 foods were excluded from a child’s diet during weaning.

291 In agreement with previous research of breast feeding recall over a 15 or 22 year  
292 period <sup>(12,13,16)</sup>, the present study confirmed that asking a mother whether she breast fed her  
293 child after 10 years is highly reliable. Natland *et al.*<sup>(13)</sup> specifically reported that close to  
294 100% of mothers in Norway at the time were likely to have breast fed, even if for a week,  
295 therefore the strong accuracy of recall may not be entirely applicable to populations where  
296 BF rates are lower. Surprisingly in this study, results showed a sensitivity of 91%, meaning  
297 there were some mothers who breastfed that did not recall breast feeding. As the majority of  
298 mothers in the study breast fed for up to 1 month, it could be that some mothers didn’t feel  
299 that the short duration of breast feeding justified a ‘yes’ answer. We also found that it is  
300 highly reliable to ask a mother to recall over 10 years how long she breast fed for and  
301 whether exclusively or not. The influence of the duration of breast feeding has been  
302 investigated for many health outcomes such as adult intelligence <sup>(29,30)</sup>, obesity <sup>(3,31)</sup>, diabetes  
303 risk <sup>(32)</sup>, serum cholesterol <sup>(33)</sup>, and blood pressure <sup>(34)</sup> and for aspects of maternal health  
304 including risk of breast cancer <sup>(35)</sup>, ovarian cancers <sup>(36)</sup> and osteoporosis <sup>(37)</sup>. Due to the  
305 prolonged latency period between exposure and outcome, it is imperative to assess the  
306 validity of studies investigating the accuracy of recall over long periods. Although some long  
307 term recall studies reported good accuracy <sup>(8,12,13)</sup>, other studies with a shorter duration of  
308 recall did not find this question as reliable <sup>(9,11,14)</sup>.

309 It is suggested that in case control studies cases are more likely to remember past  
310 exposures owing to concern about their condition <sup>(5)</sup>. Cows’ milk allergy (CMA) often

311 presents when formula milk is introduced. An assumption could therefore be made that  
312 mothers of children with CMA are more likely to accurately recall when they first introduced  
313 formula milk into their child's diet compared to mothers of children who were not allergic to  
314 milk. We are not aware of any studies that have examined whether accuracy of recall of  
315 infant feeding practices is affected by a diagnosis of allergy in the child the recall is based  
316 upon. Unfortunately, due to low numbers of food allergic children, no significant conclusions  
317 could be drawn from this study. Overall recall of timing of introduction of formula was  
318 reliable, with 84% of mothers accurately recalling whether her child received a bottle of milk  
319 formula within the first 1-2 days of birth. This is noteworthy as intervention studies have  
320 previously reported that infants exposed to cows' milk formula in hospital immediately after  
321 birth have a higher risk of developing CMA compared to those fed pasteurised human milk,  
322 whey hydrolysate formula or are exclusively breastfed<sup>(2)</sup>.

323         The timing of introduction of solid and allergenic foods is a matter of significant  
324 debate in the allergy field. Advice for parents/carers has changed over time as research in this  
325 area has been conflicting<sup>(18,20,38)</sup>. The age at which solid foods were introduced into the diets  
326 of infants was poorly recalled by mothers. There was a tendency for mothers to report that  
327 they weaned earlier than they did a decade earlier, although there were also some mothers  
328 that reported to wean much later too. Previous studies investigating the accuracy of recall of  
329 the introduction of certain foods over time periods from 1-22 years also reported poor  
330 accuracy<sup>(8,12,14)</sup>. One study<sup>(14)</sup> acknowledged that a poorly constructed question was used;  
331 "When did you stop breast feeding" as the measurement for duration of breast feeding and  
332 time point when solid food was introduced. This underlines the importance of constructing a  
333 question appropriately to ensure that it extracts the answer it is intending to and making a  
334 clarification between exclusive breastfeeding and any breastfeeding.

335         Overall the recall of age of introduction of allergenic foods was poor, with the  
336 exception of peanuts. There was also a very poor agreement as to whether any foods were  
337 excluded from the child's diet at the age of six months ( $r = 0.09$ ). Gustafsson *et al.*<sup>(39)</sup> studied  
338 the impact of age of weaning and introduction of certain food allergens on the risk of the  
339 development of sensitisation and clinical allergy, relying on a recall period of up to 3 years.  
340 Based on the results of this study, their outcomes should be interpreted with caution. Two  
341 studies<sup>(40,41)</sup> that investigated the relationship between the timing of the introduction of  
342 peanuts and the development of peanut allergy relied on mothers to recall details up to two  
343 and three years later. Results of the present study, demonstrating that 86% of mothers

344 recalled correctly the timing of peanut introduction over an assessment period of 10 years,  
345 would suggest that recall of the timing of peanut introduction over 2-3 years should be  
346 reliable.

347 Food allergens cross the placenta from a mother to her child during pregnancy<sup>(42)</sup>.  
348 Results of a study that investigated the exposure of peanuts during pregnancy and the  
349 prevalence of peanut allergy<sup>(43)</sup> contributed to the development of national guidelines for  
350 pregnant mothers of high risk infants to avoid peanuts during their pregnancy<sup>(24)</sup>. This study  
351 relied on mothers reporting whether they consumed peanuts during pregnancy when their  
352 children were up to 18 years of age. Further studies by Dean *et al.*<sup>(44)</sup> and Hourihane *et al.*<sup>(23)</sup>  
353 were commissioned by the Food Standards Agency in order to investigate whether the  
354 guidance on peanut avoidance was being followed by the target group and whether it was  
355 having an impact on the prevalence of peanut allergy in the UK. Hourihane and colleagues  
356 reported no reduction in the prevalence of peanut allergy and only 3.8% of the mothers  
357 interviewed had followed the advice of stopping the consumption of peanuts during  
358 pregnancy, although this study relied on mothers recalling 5-6 years earlier whether they had  
359 avoided peanuts or not. According to this study, research examining the association between  
360 maternal consumption of peanuts and the development of peanut allergy can rely on mother's  
361 recall up to two years post pregnancy, but recall of maternal peanut consumption over a  
362 period of eight years was shown to be unreliable. These findings however, used recall at two  
363 years of age as the gold standard for comparison. Although results showed that answers up to  
364 two years are reliable, the level of agreement ( $r = 0.70$ ) was not perfect. The 'gold standard'  
365 answer that the 8-year recall answer is assessed against is therefore not 100% accurate.

366 Unlike the majority of existing studies that have assessed the accuracy of recall of  
367 infant feeding practices, this study also explores the duration of EBF, the introduction of  
368 solids and allergenic foods on recall bias. Participation bias cannot be ruled out as recall data  
369 was collected for 125 out of the 969 mothers; however recruitment stopped once adequate  
370 numbers for power were reached. It is possible that social desirability bias may have  
371 influenced the response to questions at either time points and that this influence could have  
372 changed over time. Time points were only explored at 36 weeks gestation, first year, second  
373 year and 10 years, and hence recall bias at other intervals could not be assessed. Whilst the  
374 study involved a good sample size, it was not sufficiently powered to explore bias in those  
375 specifically suffering from food allergy. Although the population on the Isle of Wight is



376 reflective of the population in the South of England, the results of this study need to be  
377 interpreted with caution in populations that are dissimilar.

### 378 **Conclusion**

379 The results of this study show that the accuracy of maternal recall over a 10 year period  
380 varies considerably according to the specific aspect of infant feeding being recalled. Recall of  
381 answers related to breast feeding and formula feeding agree substantially over these two time  
382 points. Whether commercial baby food was provided and the age of introduction of peanuts  
383 into a child's diet 10 years earlier is well recalled, however other aspects of introduction of  
384 solid foods is poorly recalled. Mothers recalled avoiding peanuts during pregnancy well over  
385 the two year period after birth, but a further 8 years on, peanut avoidance during pregnancy  
386 was not so well-recalled. Whether a family history of atopy/allergy or diagnosis of food  
387 allergy in the infant influences the ability to accurately recall infant feeding practices  
388 warrants further exploration, but a larger study population will be needed. Studies that use a  
389 retrospective collection of dietary data design need to carefully consider the strength of recall  
390 bias when interpreting results.

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