

## University of Dundee

Factors influencing mothers' decisions on whether to provide seafood during early years' feeding

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*Published in:*  
Appetite

*DOI:*  
[10.1016/j.appet.2016.10.010](https://doi.org/10.1016/j.appet.2016.10.010)

*Publication date:*  
2017

*Licence:*  
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*Document Version*  
Peer reviewed version

[Link to publication in Discovery Research Portal](#)

*Citation for published version (APA):*

Carstairs, S. A., Craig, L. C. A., Marais, D., & Kiezebrink, K. (2017). Factors influencing mothers' decisions on whether to provide seafood during early years' feeding: A qualitative study. *Appetite*, *108*, 277-287. <https://doi.org/10.1016/j.appet.2016.10.010>

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1 **FACTORS INFLUENCING MOTHERS' DECISIONS ON WHETHER TO PROVIDE**  
2 **SEAFOOD DURING EARLY YEARS' FEEDING: A QUALITATIVE STUDY**

3

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5

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12

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14

15

16 **Abstract**

17

18 The first year of a child's life is a key period of transition from an exclusive milk diet to solid  
19 foods to meet growing nutritional demands. An increased requirement for nutrients includes  
20 the introduction of protein-rich solid foods, such as seafood, which additionally provides  
21 valuable omega-3 fatty acids. However, consumption of seafood is low in the British child  
22 population. The aim of this study was to identify maternal perceptions of the factors that can  
23 influence the decision on whether to provide seafood during early years' feeding using a  
24 multi-method qualitative study design. A total of 26 discussions posted by mothers on  
25 parenting websites; Mumknowsbest, Mumsnet and Netmums, accessed July 2013, together  
26 with discussions from six focus groups (February-July 2014) in the North East of Scotland  
27 were included for thematic qualitative analysis. Discussions on the inclusion of seafood  
28 during the early years were centred across four interrelating themes; - food-related attributes,  
29 mother-centred aspects, family-centred aspects, and external information sources. Concerns  
30 regarding safety and mothers' limited knowledge and skills on seafood were apparent from  
31 discussions; however, the practicalities of providing a cost effective family meal were also  
32 issues raised by mothers. An understanding of the numerous and sometimes contradictory  
33 influences on mothers' decisions to include seafood during early years' period could be used  
34 to develop strategies to help increase regular seafood consumption. In particular, ensuring  
35 formal information and guidance clearly addresses the safety concerns of mothers and the  
36 development of practical education schemes to encourage and teach cooking skills should be  
37 considered.

38

39 **Keywords:** seafood, infant feeding, early years, mothers, concerns, online forums

40

41 **Abstract word count:** 250

42 **Word count:** 6181 (Including quotes)

43

44

## 45 **Introduction**

46 During the early years the nutritional needs of infants markedly increase to meet the  
47 physiological demands for growth and development (World Health Organization 2009). This  
48 key life period involves the transition from an exclusive milk diet to the introduction of solid,  
49 complementary foods which provides essential nutrients to meet growing demands (World  
50 Health Organization 2009). This complementary feeding phase, also known as weaning, is a  
51 period in a parent's life when dietary views and behaviours may change and when parents  
52 receive a wide range of advice and information on feeding practices (Bloomingdale et al.  
53 2010). Parents both actively seek and passively gain advice and information on infant feeding  
54 from a variety of sources, such as health professionals, family and friends, and varying forms  
55 of media (Pridham 1990, Carruth and Skinner 2001, Sylvester and Wade 2004, Horodyski et  
56 al. 2007, Hoddinott et al. 2010, Hoddinott et al. 2012). Evidence suggests that mothers often  
57 use multiple and concurrent sources of information over time (Carruth and Skinner 2001);  
58 however, infant feeding decisions may also be influenced by parents' socioeconomic  
59 backgrounds, with mothers of differing socioeconomic status relying on advice from different  
60 sources (Carruth and Skinner 2001, Gildea and Sloan 2009, Heinig et al. 2009). Amongst  
61 these resources, the rise of the internet has provided an expansive source of information and  
62 guidance for parents. Commercial and parenting websites have become an appealing method  
63 for parents in finding direction and advice in regards to many different aspects of early years'  
64 feeding, such as the timing of introducing solid foods (Horodyski et al. 2007, Hoddinott et  
65 al. 2010, Porter and Ispa 2013). Interactive discussions, where there is an opportunity to share  
66 experiences with other parents, are described as vital resources and provide a forum for  
67 parents to anonymously ask questions they may deem as embarrassing or trivial (Hoddinott et  
68 al. 2010).

69

70 A healthy, varied diet is recommended for all age groups and should include a variety of  
71 protein sources (Pan American Health Organization and World Health Organization 2003,  
72 World Health Organization 2005, Public Health England in association with the Welsh  
73 Government, Food Standards Scotland and FSA in Northern Ireland 2016). Seafood provides  
74 essential nutrients and omega-3 fatty acids and the regular consumption of oil-rich fish is  
75 recommended to confer cardiovascular benefits (World Health Organization/FAO 2003,  
76 Scientific Advisory Committee on Nutrition 2004, World Health Organization 2009) and  
77 plays an important role during complementary feeding (World Health Organization 2009)

78 due to the role of docosahexaenoic acid (DHA) in the development and function of the  
79 nervous system (Innis, Gilley and Werker 2001, McCann and Ames 2005, Innis 2007).  
80 However, current UK consumption rates fail to meet the once a week oil-rich fish  
81 recommendations (Public Health England and Food Standards Agency 2014, Scottish  
82 Government 2015a) and we see a lower seafood intake compared to other meat types, such as  
83 red meat and meat products, in young children aged 4 to 18 months (Department of Health  
84 2011). Despite a vast expanse of literature discussing the influences on seafood consumption  
85 in adult consumers (Leek, Maddock and Foxall 2000, Myrland et al. 2000, Olsen 2003, Olsen  
86 2004, Verbeke and Vackier 2005, Olsen et al. 2007, Vardeman and Aldoory 2008,  
87 Bloomingdale et al. 2010, Pieniak, Verbeke and Scholderer 2010, Birch and Lawley 2014),  
88 there is a clear gap in evidence on the influencing factors on seafood consumption during the  
89 early years period within the UK. The aim of this study was to explore the factors that  
90 mothers perceive influence their decisions on whether to provide seafood during early years'  
91 feeding. To investigate this aim a qualitative approach was employed.

92  
93

#### 94 **Material and methods**

95 Focus group discussions with mothers of young children from the North East (NE) of  
96 Scotland and parenting internet discussion forums were used to explore the factors  
97 influencing their decisions on whether to provide seafood during the early years. The  
98 exploratory nature of this study demanded a qualitative approach to identify a broad range of  
99 factors that mothers perceived to influence their decision-making, thus focus group  
100 discussions were employed (Hennink, Hutter and Bailey 2011). However, with evidence  
101 indicating mothers commonly use parenting websites for information and advice (Skea et al.  
102 2008, Hoddinott et al. 2010), this study also included online discussions. The natural  
103 discussions allowed a clear view of seafood-related discussions by mothers without the  
104 presence of the researcher possibly influencing the discussions (Tiene 2000). A lack of detail  
105 regarding the characteristics and demographics of the mothers engaging with online  
106 discussions however meant this method could not solely be used. The multiple methods  
107 permitted a broad scope of factors to be identified and thus saturation of themes could  
108 additionally be validated.

109  
110

## 111 **Data collection**

### 112 *Internet discussions on parenting websites*

113 The range of parenting websites and online social networking sites reviewed was identified  
114 from previous research which identified commonly used and cited websites by UK mothers  
115 (Skea et al. 2008, Hoddinott et al. 2010) and comprised; Netmums, Mumsnet, Facebook  
116 (Emma’s Diary), Ask a Mum, Mumknowsbest, and Mumszone. We deemed publicly open  
117 discussions as ethically sound to include in this study. Websites were thus reviewed for their  
118 inclusion of a publicly open discussion forum or chat room where users and readers can  
119 search for topical information or post questions without requiring a membership. One  
120 website, Facebook (Emma’s Diary), was excluded from the survey due to the membership  
121 required to access the discussions.

122

123 Discussion threads were identified from the full website using the search terms; “fish” OR  
124 “seafood” AND “weaning” OR “toddler” OR “feeding” OR “introduction of foods”. Thirteen  
125 discussion threads including fish/seafood within the thread title were identified from the  
126 search in July 2013 and 13 further threads on general foods to give during weaning, which  
127 included discussions of seafood inclusion, were included for analysis. A total of 26  
128 discussion threads from Mumknowsbest, Mumsnet, and Netmums were extracted for data  
129 analysis (Mumsnet n=17, Netmums n=8, Mumknowsbest n=1). Discussions were copied and  
130 pasted into Microsoft Word documents, citing the source, date of search and terms searched,  
131 where they were later cleaned of names and slang terms. Further details on the dates of  
132 discussion threads and the number of responses within these threads are provided in  
133 Appendix 1.

134

### 135 *Focus group discussions*

136 Six focus group discussions (FGD) were held in pre-existing baby/toddler groups across the  
137 NE of Scotland (n = 29 participants) where parents meet to gain support and allow children to  
138 play and take part in activities (February-July 2014). Groups were identified through internet  
139 searches (www.google.co.uk) and through Netmums.com ‘Local to You’  
140 (www.netmums.com/local-to-you) group searches. The target population was mothers of  
141 children aged six months to four years across various socio-demographic variables, including  
142 groups in areas of; the least and most deprivation (Scottish Index of Multiple Deprivation  
143 (Scottish Government 2012e)); urban and rural areas (Scottish Government 2012e); and  
144 fishing and non-fishing communities (Scottish Sea Fisheries Statistics (Scottish Government

145 2011b)). The recruited groups achieved a selection of the socio-demographic variables (Table  
 146 1); however, due to the lack of rural areas classified within the most deprived quintiles equal  
 147 numbers for each variable was not achieved. Two fathers were present at two separate  
 148 discussion groups; however, their data was excluded to provide a single gender perspective.

149

150 **Table 1:** Focus Group Demographics

<b>Focus group</b>	<b>SIMD quintile<sup>a</sup></b>	<b>Urban/Rural classification</b>	<b>Fishing/Non-fishing community</b>	<b>Number of participants</b>
Old Torry, Aberdeen	1	Large urban	Fishing	3
Charleston, Dundee	1	Large urban	Non-fishing	3
Mastrick, Aberdeen	2	Large urban	Fishing	7
Johnshaven, Aberdeenshire	3	Accessible rural	Fishing	6
Charleston, Angus	4	Accessible rural	Non-fishing	5
Broughty Ferry, Dundee	5	Large urban	Non-fishing	5

151 <sup>a</sup> Scottish Index of Multiple Deprivation (SIMD) quintile refers to the most deprived areas of  
 152 Scotland (quintile 1) to the least deprived areas (quintile 5)

153

154

155 Potential focus group participants were provided with an information sheet via a visit  
 156 arranged with the organisers of the parent and child groups. A follow-up visit or telephone  
 157 call was conducted with the group organiser to determine if the members of the group wished  
 158 to participate. Written consent was obtained from each participant prior to the start of the  
 159 FGD.

160

161 A topic guide (Appendix 2) was developed and piloted to guide the discussion. This topic  
 162 guide was developed from the literature with a focus on the research question - to explore the  
 163 perceived influences to mothers' decision-making regarding seafood provision or exclusion.  
 164 A single researcher (SC) facilitated each of the discussion groups to ensure consistency,  
 165 whilst a trained observer (KK/LC) noted group dynamics. Each FGD took place at the pre-  
 166 existing baby/toddler group at the group's normal scheduled time and location. Qualified  
 167 childcare was provided by the research team to allow the parents to take part in the discussion  
 168 whilst the child continued in the normal group session. FGD were audio-recorded with the  
 169 permission of the participants for accuracy of transcription and analysis.

170

171 ***Data coding and analysis***

172 The focus group audio recordings were transcribed verbatim for thematic analysis. After  
173 initial reading of the transcripts and the copied internet discussion threads, the lead researcher  
174 (SC) developed a manual colour coding system. This system identified patterns and emergent  
175 themes across both data sources. Further immersion and exploration of the data by the lead  
176 researcher confirmed themes and further sub-themes. A second researcher (KK) reviewed the  
177 themes identified to confirm appropriateness and number.

178

179 ***Ethical approval***

180 The study received ethical approval from the University of Aberdeen College Ethics Review  
181 Board (Project no: CERB/2013/11/958).

182

183 **Results**

184

185 Four main themes were identified from the focus group and internet discussions; - food-  
186 related attributes; mother-centred aspects; family-centred aspects; and external information  
187 sources (Table 2). A breakdown of the emergence of themes across the focus group  
188 discussions and internet forums is presented in Appendix 3.

189



190 **Table 2:** The influences on mothers' decisions on whether to provide seafood during early  
 191 years' feeding.

Main theme	Sub-theme	Topic
Food-related attributes	Safety	Age appropriateness
		Salt content†
		Mercury content
		Bones
		Food poisoning
	Sensory attributes	Smell
		Appearance
		Taste
	Cost/value for money	Texture
		Quality
Mother-centred aspects	Convenience	Wastage
		Quantity#
	Own preferences	Quick to make
		Ease to make
		Availability
	Own instincts	Previous experience
		Likes/dislikes
	Confidence	
	Knowledge	
	Moral obligation	Health
Food variety		
Environment		
Social norm	Tradition*	
Family-centred aspects	Infant response	Likes/dislikes
	Family meal	
Family members' preferences	Partner	
	Other children	
Habit	Frequency of consumption	
	Species consumed	
External information Sources	Family advice	} Mixed messages
	Friends advice	
	Media	
	Health professionals advice	

192 \* denotes the factors raised by fishing community focus group discussions only † denotes the factors raised by  
 193 internet discussion forums only # denotes the factors raised only by focus group discussions

194 ***Food-related attributes***

195 Mothers used the internet forums to ask their peers what foods are age appropriate to give  
196 during weaning and the early years:

197 *“Remind me! DS2 [dear son 2] is just being weaned at 4.5 months, pureed carrots and the*  
198 *like, but I recall there are some things he shouldn’t have but can’t quite remember!! Can he*  
199 *have eggs at all – is it just soft boiled eggs he can’t have; honey is a no-no; wheat is a no-no;*  
200 *fish? Help!”* (Netmums, P1)

201

202 ***Safety***

203 Mothers were concerned with the safety of foods and the safety of providing seafood into the  
204 diet of their infant was mentioned across both the internet discussion forums and FGDs. In  
205 particular, mothers looked towards their fellow peers for guidance and reassurance of their  
206 choices, with the age of introducing different seafood species often being discussed as well as  
207 the types (i.e. different preservation types of seafood, such as canned, frozen, fresh) to give:

208 *“offered them some prawns from my plate at the weekend (slathered in mayo) which they*  
209 *went for – that’s ok at 14months now isn’t it?”* (Mumsnet, P1)

210

211 Mothers in the internet discussion forums mentioned the high salt content in tinned and  
212 smoked seafood as something to avoid giving their child, and across both focus groups and  
213 internet discussions the presence of contaminants/toxins, such as mercury, within seafood  
214 was a concern. In addition, the presence of bones which could cause choking, and the risk of  
215 food poisoning and allergic reactions was also discussed in regards to the safety and  
216 suitability of seafood:

217 *“it’s the little thin bones that are the trouble – don’t mind him crunching up the spine bones*  
218 *in tinned fish, but yesterday I had a lovely piece of fresh mackerel I’d grilled but ended up*  
219 *not giving him any because every time I thought I’d found a chunk to give him it turned out to*  
220 *have lots of nasty long little bones in.”* (Mumsnet, P2)

221

222 *“Prawns were a bit dubious to start with. I didn’t know when to give them prawns, because I*  
223 *was like “what if it’s wrong you know, a prawn and he gets sickness or something through it,*  
224 *or can get an allergic reaction”. It was probably a year and a half before he had it”*  
225 (Johnshaven FGD, P7)

226 The possibility of seafood being unsafe to give their child resulted in some mothers being  
227 fearful and sometimes resulted in the avoidance of providing it to their young child:

228 *“I’ve a phobia about allergies because my cousin, her little one when she turned five, she had*  
 229 *nuts and she took an allergy and I just think “well no”. I know shellfish and nuts are two*  
 230 *things that you cannot tell until they take it, so I don’t give him it” (Mastrick FGD, P2).*

231

### 232 ***Sensory attributes***

233 The sensory attributes of seafood was mentioned across the discussions with the smell often  
 234 being described as off putting and “*fishy*” whilst the appearance of raw and whole seafood  
 235 was portrayed as a barrier for some to consumption and provision: *“There’s one with skin*  
 236 *that puts me right off!”* (Mastrick FGD, P1). It was apparent that mothers often placed their  
 237 own perceptions of these attributes onto what their child accepted and could have:

238 *“my son didn’t always have fish, he is a brilliant eater but I found fish to be quite a strong*  
 239 *flavour for him.”* (Mumsnet, P3)

240

241 However, the texture of seafood was considered for the infant and their response, and  
 242 mothers often discussed that the light texture of seafood was a good protein-food to try first:  
 243 *“We started ours on fish as it was easier to gum”* (Netmums, P2).

244

### 245 ***Cost/value for money***

246 Seafood was often perceived as expensive by mothers; however, the availability of cheaper  
 247 seafood options through different preservation methods, such as frozen and canned, was  
 248 discussed between mothers as a less expensive option, enabling provision:

249 *“oh, yeah it’s [seafood] dearer but you get frozen stuff from [shop name] 2 for £5”*  
 250 *(Charleston Dundee FGD, P1)*

251

252 When discussing the cost of purchasing seafood, the quality of seafood was raised by mothers  
 253 where they felt that seafood was a good quality food and could explain differences in cost  
 254 compared to other meat types:

255 *“But, you know that’s the thing, if you go and look at value on things fish can be a little bit*  
 256 *more pricey than some meat because of the value meats you can get.”* (Johnshaven FGD, P3)

257

258 Furthermore, many mothers felt secure with the quality of seafood due to the transparency of  
 259 seafood species, referring to how other meat types can be untrustworthy and mentioning  
 260 recent media reports on the horsemeat scandal:

261 *“You can’t mistake a prawn and you couldn’t mistake a bit of salmon for something else, you*  
 262 *know? It’s very, you wouldn’t find horse meat in fish”* (Old Torry FGD, P2).

263

264 Whilst discussing the cost and expense of seafood, mothers were often concerned with the  
 265 effort spent trying to introduce seafood to their child and food wastage:

266 P6 - *“I think you’re also scared to buy things, if they don’t like it then you’ve wasted money*  
 267 *isn’t it, it’s just getting over that”*

268 P5 – *“It’s the time isn’t it, you know to feed them something and they don’t eat it! It’s hard”*  
 269 *(Johnshaven FGD)*

270

271 In addition, it was inferred by mothers in FGDs that seafood’s *“lightness”* resulted in a  
 272 greater quantity required for a meal compared to red meat types. This added to mothers’  
 273 perception of poor value for money for providing seafood.

274 P3 - *“It’s like to feed just me [pause] because it’s only two portions and they’re little.*  
 275 *Normally if I have boil in the bag I just get the [supermarket name] own parsley sauce one*  
 276 *and you can have two of them to yourself easily.”*

277 P2 – *“Yes, I think it [fish] shrinks a bit.”* (Mastrick FGD)

278

### 279 **Convenience**

280 The convenience of providing seafood was often discussed by the mothers with some  
 281 referring to the quickness of seafood and others referring to the use of canned seafood as an  
 282 easy meal option:

283 *“Of course the good thing about fish is that it doesn’t take long to cook.”* (Old Torry FGD,  
 284 P2)

285 *“What about tinned fish, super easy and no cooking required!”* (Mumsnet, P4)

286

287 The availability of seafood was mentioned by mothers where a limited range of seafood-  
 288 based infant meals was noticed:

289 *“I don’t think there’s a huge amount of fishy jars. I know there’s like a tuna bake. I can’t*  
 290 *think of anything else that there is fish wise.”* (Old Torry FGD, P2)

291 *“not many fishy ones. I just remember a tuna pasta one.”* (Charleston Dundee FGD, P3)

292

293

294 Furthermore, mothers across internet discussion forums and FGDs discussed where they  
 295 purchased their groceries and seafood if bought, with many making a single shop at the  
 296 supermarket:

297 *“we shop in the supermarket, we don’t have a fish van coming out to us at all and we don’t*  
 298 *make a special trip to the fishmongers or the butchers or anything.”* (Charleston Angus FGD,  
 299 P1).

300

301 However, for those mothers residing in fishing communities the local fishmongers were  
 302 mentioned by mothers for purchasing seafood: *“you go along the road and get fresh [fish]*  
 303 *from the market that day”* (Johnshaven FGD, P6).

304

### 305 ***Mother-centred aspects***

#### 306 ***Own preferences***

307 The mothers’ own history and relationship with seafood was evident in their decision-making  
 308 process of including seafood: *“I don’t have the motivation to give fish as I don’t eat it.”*  
 309 (Broughty Ferry FGD, P2).

310

311 Some mothers were content at their infant’s rejection of seafood, which may be explained by  
 312 the mother’s own dislike of seafood and the desire to exclude it from their infant’s diet to  
 313 mimic their own dietary lifestyle:

314 *“Last night I gave her some fish, it was plaice and she didn’t seem to like it too much. Any*  
 315 *new food she has had excluding fish and meat she has loved it. She does not seem very*  
 316 *interested on fish and meat at the moment which makes me a bit happy”* (Mumsnet, P6)

317 In contrast, some mothers discussed possible positive impacts of changing their own diet by  
 318 providing seafood to their child:

319 *“it is all a childish hang up about the boil in the bag fish my mother gave me. Hopefully*  
 320 *[child] will like her fishy supper and help me get over my seafood issues”* (Mumsnet, P7)

321

#### 322 ***Own Instincts***

323 Across the internet discussion forums mothers were seeking advice or confirmation that what  
 324 they were doing was right. The advice replied to these mothers often suggested gaining  
 325 information from a variety of sources and then encouraged mothers to decide for themselves  
 326 following their own instincts. Reliance on the mother’s own instincts was also discussed

327 throughout the FGDs but mothers talked about using their own previous experience and what  
 328 others may be doing in helping them to make their decision:

329 *“I would be happier to give her a prawn now because, so we were told when she was a baby*  
 330 *not until five, but then, through experience, what other people are doing [pause]. You don’t*  
 331 *maybe need to be quite so [pause] well I don’t think you need to stick to it, you know.”*

332 (Johnshaven FGD, P6)

333

### 334 **Knowledge/confidence**

335 What was apparent from the internet forums and FGDs was that mothers’ knowledge and  
 336 confidence in knowing what seafood to give and how to cook it influenced their seafood  
 337 choices: *“It’s maybe because I don’t eat it, I don’t know how to cook it”* (Old Torry FGD,  
 338 P2). This lack of knowledge and skills was often linked to a concern with food poisoning and  
 339 thus the safety of providing seafood, resulting in many avoiding providing seafood. It was  
 340 also apparent that mothers perceived a lack of confidence in cooking seafood and wished to  
 341 avoid food wastage due to the expense, thus they often saw seafood and unfamiliar species as  
 342 a treat to experience in an environment out of the home.

343

### 344 **Moral obligation**

345 Mothers across internet forums and FGDs discussed a moral obligation to provide seafood for  
 346 their child which often conflicted with their lack of knowledge:

347 *“I should probably be feeding my family more fish. I am totally confused about what I should*  
 348 *or should not be buying.”* (Mumsnet, P5)

349

350 This moral obligation was linked to providing a healthy diet for their young child and  
 351 wanting them to try seafood as part of a varied diet, with some mothers discussing the benefit  
 352 of omega-3:

353 *“I always think fish as good for your brain. That’s why I give a lot to [child’s name] I dunno*  
 354 *if it’s true or not”* (Old Torry, FGD, P4)

355

356 *“it’s so good for them, great to get them to have a taste for it before they can decide they*  
 357 *don’t like it”* (Mumsnet, P8)

358

359 *“I’m keen to feed [child’s name] (9 months) oily fish cos of the omega 3”* (Mumsnet, P9)

360

361 A further aspect which was mentioned by the mothers was the issue of environmental  
362 sustainability which they had become aware of and felt an obligation towards heeding:

363 P1- *“nobody’s talking about there not being enough cod anymore. No, but, actually I think I*  
364 *probably would pick haddock over cod because I still have that ringing in my head*  
365 *somewhere, that there’s not enough cod in the world. I don’t know why”.*

366 P2 – *“You do want them to grow up and have that and it does stick in the back of your head*  
367 *that you think if it’s running low at this age are they going to have, like, is [child’s name]*  
368 *going to have that when she’s, do you know what I mean?”* (Charleston Angus FGD)

369

### 370 **Social norm**

371 Mothers from fishing community discussion groups implied a societal influence on including  
372 seafood into the diet of their child, whereby tradition and local availability of seafood made  
373 an impact on providing seafood and different varieties of seafood to their child:

374 *“I think living in Johnshaven they have to like fish, simple as that”* (Johnshaven FGD, P1),  
375 *“So I once made something with tinned salmon, which I went to buy tinned salmon because I*  
376 *got a recipe for making, like, salmon fishcakes, but I’d never bought –so I stood there at the*  
377 *supermarket for ages going, “tinned salmon”. But I don’t know if we’re spoilt in this area*  
378 *that we would just go straight and buy fresh salmon and that it’s quite normal”*

379 (Johnshaven FGD, P7)

380

381

### 382 **Family-centred aspects**

#### 383 **Infant response**

384 The child’s preferences and previous response to being given seafood was often perceived as  
385 an influence on whether mothers provided seafood.

386

387 It was apparent from the internet and FGDs that some mothers provided separate meals for  
388 their first infant during weaning:

389 *“I remember making him a fish pie, stood over the cooker making this milk and fish and veg*  
390 *stuff and he absolutely hated it. He wouldn’t even entertain it.”* (Old Torry FGD, P2),

391

392 with some discussing the use of commercial infant meals as a method to introduce and try  
393 seafood:

394 “it was like “oh fisherman’s pie”, oh well we’ll try it, we’ll give it a go, and she loved it”  
 395 (Johnshaven FGD, P1)

396

### 397 **Family meal**

398 Providing just one family-shared meal and the difficulty of getting something that everyone  
 399 will eat was discussed with a particular consideration given to partner’s preferences and those  
 400 of other children. This often acted as a barrier to seafood provision despite mothers feeling  
 401 that seafood would be a nutritious option for the family.

402 “But yeah, if all my family would sit and eat a fish pie I would happily do it because then I  
 403 would know they were eating something good and it was one meal. But because they don’t it  
 404 kind of puts me off doing it” (Old Torry FGD, P2)

405

### 406 **Habit**

407 Mothers often discussed the role of habit in their shopping and meal decisions. Habit  
 408 impacted on the how often seafood was provided, with some mothers discussing particular  
 409 days and situations when seafood would be selected as a meal option. Habit was also  
 410 discussed in terms of which seafood was chosen by mothers to provide for their family, with  
 411 familiarity being discussed as playing a role in shopping and eating habits and often resulting  
 412 in the avoidance of new of different seafood species.

413

### 414 **External information sources**

#### 415 **Family and friends advice**

416 Although mother’s own instincts and knowledge were identified as influencing their  
 417 decision-making of food choices for their young child, the discussions revealed that advice  
 418 mothers received from a variety of different sources also influenced their decision on whether  
 419 to provide seafood. These information sources included friends and family members:

420 “I’m the youngest of four so all my brothers and sisters have children that are older than  
 421 mine so kind of what they did or what my mum says, because no matter how much that  
 422 annoys you, you still listen to your mum, don’t you? She’s always right.” (Charleston Angus  
 423 FGD, P1)

424

#### 425 **Media**

426 Mothers often discussed the use of targeted weaning books: “Annabel Karmel, I used to use  
 427 that” (Charleston Angus FGD, P2), “There are Annabel Karmel recipes regarding both of



428 *these [cod and salmon] options*” (Mumsnet, P10). The reliance on these books in the first  
 429 stages of weaning was discussed by mothers and was additionally used to confirm choices to  
 430 include seafood types:

431 P4 - *“Tinned tuna OK for 8 month old?”*

432 P5 - *“there’s a tuna pasta recipe in my weaning book so I’d say it must be ok”* (Netmums)

433

#### 434 **Health professional advice**

435 Mothers additionally cited that the formal advice they received was often in the form of  
 436 information leaflets provided by health professionals (in particular the health visitor (HV)):

437 P7 - *“I think you get quite a lot of leaflets when you start weaning.”*

438 P1 - *“Yes, you get leaflets and stuff”* (Johnshaven FGD)

439

440 However, differences in the advice between sources were often discussed by mothers, where  
 441 mixed messages often led to confusion, particularly when concerning the safety of providing  
 442 seafood:

443 *“The health visitors all suggest six months for them and when you go in the supermarkets*  
 444 *and all the jars are saying different things - from four months”* (Charleston Angus FGD, P4)

445

446 *“Hi. My baby was weaned at 17 weeks under advice from the HV. I was wondering how old*  
 447 *he has to be before I can give him tinned tuna (and other fish)? I have been getting*  
 448 *conflicting advice, some say it is OK from about 8 months others have told me you should not*  
 449 *give tinned fish until a child is 6 years due to high mercury and potassium”* (Netmums, P4)

450

#### 451 **Discussion**

452 Exploring the perceived influences to mothers’ decisions on whether to provide seafood  
 453 during early years’ feeding revealed the complex nature of maternal decision-making and  
 454 how many different factors can interrelate and often contradict one another. Our findings  
 455 suggest that there are four central themes to these influencing factors; - food-related  
 456 attributes; mother-centred aspects, family-centred aspects, and external information sources.  
 457 The scope and interrelated nature of these influencing factors mirror many of those identified,  
 458 such as social and personal norms, habit, past experiences and health benefits, in previous  
 459 studies (Leek, Maddock and Foxall 2000, Trondsen et al. 2003, Trondsen et al. 2004b,  
 460 Verbeke and Vackier 2005).

461

462 The food-related attributes of seafood found in our study support previous findings which  
463 indicated that there is often both a positive and negative perception of the sensory attributes  
464 of seafood, in particular smell (Leek, Maddock and Foxall 2000, Neale et al. 2012) and taste  
465 (Myrland et al. 2000, Verbeke and Vackier 2005, Neale et al. 2012) with some mothers liking  
466 these attributes and others disliking them. However, the role of texture in the mothers'  
467 decisions to give seafood to their infant or young child was an additional aspect to emerge  
468 from our study. Interestingly, mothers perceived the texture of seafood to be suitable for  
469 young children due to the light, flaky consistency which was easy for the child to gum or  
470 chew. The mothers' own dislike of the sensory properties of seafood however often  
471 influenced their decision to not provide seafood in their child's diet, a finding supporting  
472 previous evidence that there is a relationship between mothers' food consumption and that of  
473 their child (Skinner et al. 2002).

474

475 Our findings indicated that mothers often highlighted the expense and a perceived lack of  
476 value for money of seafood, mirroring previous studies with mothers (McManus et al. 2007)  
477 and pregnant women (Bloomingdale et al. 2010). However, many mothers found solutions to  
478 this perceived expense indicating that cheaper seafood options, such as frozen seafood, are  
479 readily available and provide an affordable, convenient meal option. Thus, despite a negative  
480 attitude to price this did not necessarily act as a barrier to provision, matching previous  
481 conclusions (Verbeke and Vackier 2005). The perceived convenience of seafood considered  
482 by mothers in this study and others (Leek, Maddock and Foxall 2000, Olsen et al. 2007) may  
483 interrelate with familiarity and habitual food purchasing and consumption. Familiarity has  
484 been shown to be positively associated with seafood consumption in an Australian consumer  
485 study (Birch and Lawley 2014). Furthermore, knowledge and familiarity with seafood are  
486 learned through experiences and can result in a perception of lower effort of preparing and  
487 cooking seafood, resulting in the perception of a convenient meal option. It can be  
488 considered that mothers from fishing communities, who discussed the role of tradition on  
489 their decision-making, may have a greater familiarity with seafood due to previous  
490 experiences and exposures. A familiarity with seafood can also develop confidence in  
491 knowing that seafood is properly cooked, reducing the risk of food poisoning, a concern  
492 which was evident particularly for mothers unaccustomed to cooking seafood. A lack of  
493 knowledge of seafood also highlighted a concern for knowing when and what types of  
494 seafood to introduce throughout the early years for some mothers. A previous study with  
495 pregnant women found the mercury exposure of seafood was a concern (Bloomingdale et al.

496 2010), a finding also seen in the mothers in our study. These concerns may come from advice  
497 based on the recommendations for infants and pregnant women to avoid high mercury  
498 containing seafood, such as shark, marlin and swordfish, and for pregnant women to restrict  
499 tuna consumption (Scientific Advisory Committee on Nutrition 2004). Furthermore,  
500 discussions within internet forums highlighted a concern for high salt intakes associated with  
501 canned and smoked seafood and discussions from both sources revealed a concern for  
502 allergic reactions, particularly for shellfish. The confusion about if and when you can provide  
503 shellfish found across the discussions mirrors concerns by pregnant women in a US study  
504 (Bloomingdale et al. 2010). The confusion on shellfish may be a result of different messages  
505 portrayed on shellfish's inclusion during the early years across the different information  
506 sources available to mothers. However, global recommendations do not stipulate an  
507 avoidance of shellfish or other seafood, except before six months of age and with raw  
508 shellfish (World Health Organization 2009). Despite many mothers being concerned with the  
509 safety of seafood, it was perceived as a healthy food with benefits of omega-3 and brain  
510 development being cited as a reason to consider providing seafood in their child's diet. This  
511 finding supports previous work summarising that European consumers have a strong belief  
512 that seafood is healthy (Verbeke et al. 2005, Pieniak, Verbeke and Scholderer 2010). The  
513 interrelation found between mothers' desire to provide this healthy food and the perceived  
514 contradictory messages portrayed on seafood safety during the early years highlights the  
515 complex nature of decision-making.

516

517 It was also apparent from this study that some mothers had a concern with the environmental  
518 impact of seafood consumption raising the issue of overfishing of cod in particular. This  
519 perceived moral obligation towards the environment has not been raised in previous seafood  
520 consumption research to our knowledge and may be the result of media attention to this issue  
521 in the past few years (Black 2012, The Telegraph 2012). Interestingly, FGDs held in fishing  
522 communities revealed that tradition was a further influence for many mothers on their  
523 decision-making. Seafood tradition could be an interest to these mothers due to current and/or  
524 previous family generations relying on it as a livelihood. Furthermore, it may be that the past  
525 experiences and exposure to seafood experienced by these mothers provided a knowledge of  
526 preparing and cooking it, more so than for those in non-fishing communities. Mothers from  
527 these fishing areas felt that residing in these areas resulted in a social norm and expectation to  
528 eat seafood and this may have also impacted on their perceptions and desire for good quality  
529 seafood, which is often associated with fresh seafood (Leek et al, 2000).

530 Finally, mothers portrayed that having a shared family meal often influenced the regular  
531 provision and offering of seafood to their young child. The preferences of their  
532 husband/partner and the presence of other children in the household were discussed as  
533 influences to the decision to provide seafood, as found in other studies (Myrland et al. 2000,  
534 Verbeke and Vackier 2005). These family preferences acted as an enabler for those whose  
535 family enjoyed seafood and a barrier for others when trying to provide a shared, seafood-  
536 based meal. Despite many mothers desiring a shared family meal, some raised the fact that  
537 separate meals and foods offered to their infant during the early stages of weaning provided  
538 an opportunity to offer foods which they themselves did not like. Some mothers also held the  
539 hope of changing their own diet by including perceived healthful foods, such as seafood,  
540 more often.

541

542 The multiple data collection methods used in this study, known as ‘Multiple Operationism’  
543 (Campbell and Fiske 1959) or ‘Methodology Triangulation’ (Denzin 1978), provided a means  
544 to gain a broad view of the perceived influences on mothers decisions on whether to provide  
545 seafood. The use of publicly-accessible parenting discussion forums provided an opportunity  
546 to passively observe natural conversations between mothers without the intrusion of the  
547 researcher. Previous research has identified that interactive discussions, where there is an  
548 opportunity to share experiences with other mothers, are seen as vital resources and provide a  
549 chance for mothers to anonymously ask questions they deem embarrassing or trivial  
550 (Hoddinott et al. 2010). Thus, by reading posted discussions instead of guiding the topic of  
551 conversation, the researcher was able to observe the types of questions and discussions  
552 normally posted by mothers on seafood and young child feeding, gaining a naturalistic view.  
553 In particular, mothers using internet discussion forums raised concerns about the salt content  
554 of smoked and canned seafood which was not an issue discussed across the FGDs.

555

556 Previous research has indicated that parents’ socioeconomic status appears to relate to the  
557 access and use of the internet (Martin and Robinson 2007, Rothbaum, Martland and Janssen  
558 2008); however, others have found no evidence of a socio-economic divide (Carroll et al.  
559 2005, Sarkadi and Bremberg 2005). Unfortunately the nature of internet discussions meant  
560 that we are unable to conclude the diversity of this sample as demographic characteristics and  
561 details were not provided. However, by including parent and baby groups from a range of  
562 urban/rural, fishing and non-fishing based communities, and deprivation areas we attempted  
563 to include a diverse sample of mothers. It should be considered that the findings from our

564 FGDs may be limited by participant bias as we relied on volunteers to take part. The natural  
565 discussions initiated on internet forums resulted in an inability of the discussion to  
566 concentrate specifically on the research topic of this study and often resulted in a narrow  
567 discussion on the concerns and influences of seafood inclusion. However, the inclusion of  
568 FGDs provided the opportunity to explore many of these areas further and revealed further  
569 perceived influences reducing this limitation. Furthermore, it is important to consider that the  
570 inclusion of historical discussions from internet forums may be important when considering  
571 any advice and information mothers shared with each other in respect to the timing of feeding  
572 guidelines. Nevertheless, only one discussion was dated within the same year as the Scientific  
573 Advisory Committee on Nutrition's advice on fish consumption (Scientific Advisory  
574 Committee on Nutrition 2004), thus the formal information provided to the majority of  
575 mothers should have been in line with recommendations and with those from global  
576 complementary feeding guidelines (World Health Organization 2005, World Health  
577 Organization 2009). However, it is impossible to know what advice these mothers had been  
578 provided and very few could remember the specific source of the information and knowledge  
579 they had gained.

580

581 Providing the discussion in the normal time and location of the pre-existing mother and child  
582 group minimised any inconvenience for the mother in taking part; however, this did result in  
583 some poor audio quality for two discussions resulting in an inability to fully capture quotes  
584 and data from these sessions. Despite the anonymity offered by a group of strangers (Finch  
585 and Lewis 2003, Hennink, Hutter and Bailey 2011), the familiarity of the pre-existing group  
586 and the homogeneity of socio-demographic characteristics, such as deprivation area, provided  
587 a comfortable environment where participants may feel they have shared backgrounds and  
588 experiences and could therefore express their concerns and experiences without the fear of  
589 judgement. It is possible however that the presence of the researcher impacted on the  
590 opinions and experiences the mothers shared during the discussions.

591

## 592 **Conclusion**

593 This study of mothers highlighted that there are a combination of factors influencing the  
594 decisions on whether to provide seafood to young children that include; - food-related  
595 attributes, mother-centred and family-centred aspects, and external information influences.  
596 This study provided an exploratory view of the perceived influences to the provision of  
597 seafood during the early years providing some understanding of mothers' decision-making.

598 Findings indicated a concern for the safety and expense of seafood, thus clear, consistent  
599 guidelines highlighting inexpensive seafood options should be reiterated by health  
600 professionals working with parents of young children and in the information they provide.  
601 The knowledge and skills to prepare and cook seafood often acted as a barrier to provision  
602 exacerbating concerns of food safety thus, community-based projects to encourage and  
603 educate, using practical cooking experiences, are required. Further research investigating the  
604 importance of these factors in driving infant feeding decisions is key to understanding how  
605 mothers balance and value these influencing factors in their decisions on whether to include  
606 seafood into the diet of their child.

607

608

609 **Transparency declaration**

610 The lead author (SC) affirms that this manuscript is an honest, accurate, and transparent  
611 account of the study being reported; that no important aspects of the study have been omitted;  
612 and that any discrepancies from the study as planned have been explained.

613

614 **Acknowledgements**

615 The authors would like to thank participants of the focus group discussions.

616

617 **Conflict of interest**

618 The authors confirm there are no conflicts of interest. The funding for this research study was  
619 for a PhD scholarship by the Seafish Authority and Interface Food and Drink Scotland which  
620 do not financially benefit from this research or have any influence on the results found and  
621 presented here.

622

623 **Sources of funding**

624 This study was funded by the Seafish Authority and Interface Food and Drink Scotland as  
625 part of a PhD scholarship for SC.

626

627 **Disclaimer**

628 The authors views expressed in the submitted article are their own and are not an official  
629 position of the University of Aberdeen or any of the funding bodies.

630

631 **Contributorship**

632 Substantial contributions to the conception or design of the work; data collection, analysis,  
633 and interpretation of data for the work were conducted by Sharon Carstairs (SC) under the  
634 supervision of Dr K Kiezebrink (KK), Dr L Craig (LC) and Dr D Marais (DM). Drafting of  
635 the publication was done by SC with the revision for important intellectual content and final  
636 approval of the version to be published given by KK, LC and DM. There is agreement  
637 between the authors that SC is accountable for all aspects of the work in ensuring that  
638 questions related to the accuracy or integrity of any part of the work are appropriately  
639 investigated and resolved.

640

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## 792 **Appendices**

### 793 **Appendix 1: Details of internet discussion threads**

794 A search of discussion threads in June 2013 identified 26 discussion threads which took place  
795 from March 2004 to June 2013. The majority of discussion threads (n=17, 65%) identified in  
796 the search were dated from 2012 onwards (Table 3). Furthermore, discussion threads were  
797 responded to by mothers over the course of a few days; however, some threads spanned  
798 across the duration of a month from the date of posting. The length of threads ranged from  
799 only two responses up to 101 responses. Parent identifiers were removed from quotes as it  
800 was deemed unethical to provide these where parents may be identified. A sequential number  
801 was assigned to each quote used in this study, checking the parent identifier for each to depict  
802 multiple quotes by the same mother.

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805 **Table 3:** Range of dates of internet discussion threads

<b>Post date</b>	<b>End of thread date</b>	<b>Source</b>	<b>Number of responses</b>
23 March 2004	20 April 2004	Mumsnet	27
21 January 2007	9 February 2007	Mumknowsbest	9
23 April 2007	24 April 2007	Mumsnet	17
6 January 2009	6 January 2009	Mumsnet	4
19 February 2010	23 February 2010	Mumsnet	6
10 September 2010	10 September 2010	Mumsnet	10
6 December 2010	6 December 2010	Netmums	7
5 November 2011	5 November 2011	Netmums	2
23 November 2011	28 November 2011	Netmums	101
29 January 2012	30 January 2012	Netmums	30
2 March 2012	4 March 2012	Mumsnet	6
27 May 2012	1 June 2012	Mumsnet	17
19 October 2012	19 October 2012	Netmums	14
9 November 2012	9 November 2012	Mumsnet	7
9 November 2012	9 November 2012	Mumsnet	6
12 November 2012	13 November 2012	Mumsnet	5
13 November 2012	18 November 2012	Mumsnet	30
14 November 2012	23 November 2012	Mumsnet	6
15 November 2012	19 November 2012	Mumsnet	24
28 November 2012	28 November 2012	Mumsnet	13
6 April 2013	6 April 2013	Netmums	2
29 April 2013	30 April 2013	Mumsnet	5
5 May 2013	9 May 2013	Netmums	62
15 May 2013	19 May 2013	Mumsnet	12
6 June 2013	6 June 2013	Netmums	6
19 June 2013	19 June 2013	Mumsnet	8

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## 808 Appendix 2: Focus group topic guide

***Research Question: What factors influence mothers' decisions whether to provide seafood in the diet of their infant?***

I'd like to start by asking each of you to tell me what is the biggest thing that influences what you feed your little one?

- PROMPTS
- what others (family and friends) say
  - You and your family's eating preferences
  - Cost/your budget
  - Time/convenience

What are your thoughts on giving seafood to your little one/child?

*By seafood I mean, fish, fish fingers, prawns, tuna etc.*

PROBE: For you, what are the benefits/advantages of giving seafood to your little one?

Are there any disadvantages/barriers to you giving fish to your little one?

- Prompts:
- what you have done with all your kids/children
  - What your family and friends/partner say/do
  - What the health visitor/professional say
  - What baby foods and recipes are available

Do you eat fish yourself?

Do you eat different fish to your little ones?

When you first starting giving your little one food what baby jars, packets, and pouches did you use?

- What brand did you use?
- Was there any fish options in these?

What types of meals do you make with seafood?

- Evening meals/lunch
- Weekday vs weekend
- Batch cooking and freezing

What things on food label do you look at when you buy seafood?

- Origin
- Catch type (line vs net)

Who tells you to give/not give seafood to your little one/child?

PROMPTS    its what you have done with all your kids/children  
                   What your family and friends say/do  
                   What the health visitor/professional say  
                   What baby foods and recipes are available

What things would make it easier for you giving seafood to your little one/child?

PROMPTS    knowledge of seafood types  
                   Cooking methods and recipes  
                   Pre-prepared options  
                   Less expensive options

Let's summarise what we've said.....

Have we missed anything? Is there anything more you would like to add?

***I'd just like to take this opportunity to thank you again for coming today and taking part in this group discussion.***

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811 **Appendix 3: The emergence of topics across the data sources**

Topic	Focus group discussion						Internet discussion forum
	Fishing community			Non-fishing community			
	Old Torry	Mastrick	Johnshaven	Charleston, Dundee	Broughty Ferry	Charleston, Angus	
Age appropriateness	✓	✓	✓	✓	✓	✓	✓
Salt content							✓
Mercury content			✓		✓	✓	✓
Food poisoning	✓		✓	✓		✓	✓
Bones	✓	✓		✓	✓	✓	✓
Smell	✓		✓	✓	✓	✓	✓
Appearance	✓	✓		✓			✓
Taste	✓				✓		✓
Texture	✓	✓				✓	✓
Quality	✓	✓	✓	✓			✓
Wastage	✓	✓	✓		✓	✓	
Quantity	✓	✓			✓		
Quick to make	✓	✓	✓	✓	✓	✓	✓
Easy to make	✓	✓	✓	✓	✓	✓	✓
Availability	✓	✓	✓	✓	✓	✓	✓
Previous experience	✓	✓	✓	✓	✓	✓	✓
Own likes/dislikes	✓	✓	✓	✓	✓	✓	✓
Confidence	✓	✓	✓	✓		✓	✓
Knowledge	✓	✓	✓	✓		✓	✓
Health	✓	✓	✓	✓	✓	✓	✓
Food variety	✓	✓	✓			✓	✓
Environment	✓					✓	✓
Tradition	✓		✓				
Infant likes/dislikes	✓	✓	✓	✓	✓	✓	✓
Family meal	✓		✓	✓	✓	✓	✓
Partner preferences	✓	✓	✓		✓	✓	✓
Other children preferences	✓	✓	✓		✓		
Frequency of consumption	✓		✓	✓	✓		✓
Species consumed	✓	✓		✓			✓
Family advice	✓					✓	✓
Friends advice	✓		✓		✓		
Media	✓	✓	✓	✓	✓	✓	✓
Health professional advice	✓	✓	✓	✓	✓	✓	✓

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