Consumer willingness to pay for low acrylamide content


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Consumer willingness to pay for low acrylamide content

Abstract

Purpose: Evidence of acrylamide causing tumours in rodents has led to the chemical being classified as ‘probably carcinogenic to humans’ by the International Agency for Research on Cancer. The purpose of this paper is to examine consumers’ willingness to pay (WTP) for a reduction in the acrylamide content of baby food and therefore a reduction in the risk of cancer.

Design/methodology/approach: A discrete choice experiment (DCE) is conducted on UK consumers incorporating different levels of seven attributes: packaging, production method (organic, GM and conventional), acrylamide level, sugar, salt, one of five portions of fruit and vegetable per day and price. Consumer WTP for low acrylamide content is estimated using a mixed logit (MXL) model.

Findings: The empirical results indicate consumers assign a high value to safer baby food, with low acrylamide content. The WTP premium for baby food with low acrylamide (105%) is the highest of all attributes assessed. Consumers also have a preference for organic baby food, in contrast to an aversion towards GM. The study results indicate that reducing the acrylamide content in baby food is desirable for consumers.

Originality/value: This is the first study to estimate consumers’ WTP for reducing the acrylamide content of baby food in the UK. Existing research has been limited to examining the exposure of young children, in addition to the potential health risks.

1. Introduction

In recent years, food safety has become an increasingly pertinent issue for the UK food industry. Health concerns are often considered a motivation in consumers paying a premium for organic or pesticide-free produce (Popp et al. 2013), with chemical residues perceived as a significant health risk by many consumers (Eom, 1994; Bernard and Bernard, 2010). Parents of young children are
often found to demand more organic food, regarded as a safer and healthier alternative (Pearson et al., 2010; Krystallis and Chryssohoidis, 2005). Studies examining WTP for organic baby food in the U.S. have found large price premiums over conventional products. Smith et al.’s (2009) study suggests the premium for organic baby food increased between 2004 and 2006, from 12-49 percent, up to 30-52 percent. In addition, Peterson and Li (2011) found consumers were willing to pay a premium for organic baby food, as well as products which restricted the use of pesticides and GMOs.

Organic baby food has attained success in the UK market, holding a majority share at almost 60% in 2015, the largest of any organic food product (Soil Association, 2016). This achievement is often considered a result of a parent’s desire to provide safe food for their children alongside reducing any risk of chemical contamination (Maguire et al. 2004; Pearson et al. 2010).

1.1 Acrylamide exposure

Following animal studies, acrylamide has been found to cause several health problems, including developmental toxicity and carcinogenicity (Erkekoğlu and Baydar 2010; Mojska et al. 2012; EFSA, 2015). Acrylamide has been classified as ‘probably carcinogenic to humans (group 2A)’ by the International Agency for Research on Cancer, albeit there is inadequate evidence from human studies for the carcinogenicity of acrylamide (IARC, 1994). In 2015, both the Food Standards Agency (FSA, 2015) and the European Food Safety Authority (EFSA, 2015) published an opinion on acrylamide, highlighting the possible harmful effects from dietary exposure based on animal studies. Acrylamide is produced naturally when cooking food high in starch at high temperatures (FSA, 2015) and the FSA advises ‘regularly eating foods containing high levels of acrylamide can increase the risk of cancer’ (FSA 2015, p.8). Particular concern has arisen regarding the levels found in baby food and starchy food consumed by young children, who are the most exposed aged group, due to their high consumption of carbohydrate-rich foods and low body weight (Mojska et al. 2012; FSA, 2015; EFSA, 2015). There are no maximum limits for acrylamide in food, however ‘indicative values’ are set out by the European Commission (EC). Baby foods, not containing prunes, have an indicative value of 50
μg/kg (EC, 2013). On 9th June 2017, the EC published draft regulation for consultation with the food
industry, requiring Food Business Operators to engage in measures reducing acrylamide in baby food
below a benchmark level of 40 μg/kg (EC, 2017).

This paper estimates consumers’ WTP for a reduction in the acrylamide content of baby food and
therefore a reduction in the risk of cancer using a discrete choice experiment (DCE). This is the first
study to estimate consumers’ WTP for reducing the acrylamide content of baby food in the UK.

Existing research has been limited to examining the exposure of young children and the potential
health risks (Erkekoğlu and Baydar, 2010; Mojska et al., 2012).

The paper is organised as follows. Section 2 describes the materials and methods. Section 3 presents
the results of the econometric analysis and the WTP estimations. Section 4 provides a discussion of
these results and section 5 conclusions.

2. Methods

2.1 Survey

A web-based survey was designed and distributed using the software ‘Qualtrics’ [1]. A convenience
sample of UK residents over the age of 18 with children aged 5 and under was used [2]. The final
sample was 169 respondents, resulting in 1352 choices (169 × 8) and 5408 observations (1352 × 4).

Choice modelling literature indicates a minimum of 500 choices is generally adequate for valid
estimation of the MXL model (Enneking et al., 2007; Profeta et al., 2008).

In the DCE participants choose between 3 baby food products: option 1 (status quo), 2 and 3 along
with a fourth option not to buy any (opt-out). An opt-out choice is often included in food preference
studies (Balcombe et al., 2010; Van Loo et al., 2011) to make choices realistic (Lusk and Schroeder,
2004; Lancsar and Louviere, 2008). However, may lead respondents to avoid making demanding
choices (Dhar, 1997; Beattie and Barlas, 2001). In this set up, a full factorial design would result in
1080 possible alternatives (3^3 × 2^3 × 5). To reduce this to a feasible number of choice sets, a D-
optimal design is implemented to produce 48 choice sets. The respondents are presented with 8
choice sets randomly selected from the 48 designed. An example choice set is shown in Figure 1. The
attributes and levels included in the DCE are reported in Table I.

[Insert Figure 1]

[Insert Table I]

2.2 Acrylamide levels

For acrylamide level & lifetime cancer risk, since a published consensus is not available, estimated
cancer risks are based on risk estimates provided in the literature. Several studies observe that
children or infants are exposed to a mean acrylamide intake of approximately 1µg/kg bw/day
(Konings et al., 2003; EFSA, 2015). Risk models estimate this exposure poses a lifetime cancer risk of
13 in 10,000 people (Dybing and Sanner, 2003). Therefore, this risk is considered the status quo or
‘typical’ lifetime cancer risk for consumption of baby food and included as the medium level in the
choice card [3]. Acrylamide studies also report maximum exposures for children are approximately
3µg/kg bw/day, three times greater than the mean intake (Konings et al., 2003; EFSA, 2015).
Therefore, the high level is assigned a lifetime cancer risk of 39 in 10,000; three times the medium
risk. The low acrylamide level is assigned a lifetime cancer risk of 4 in 10,000, approximately one
third of the medium risk and acknowledging that acrylamide exposure from food cannot be
eliminated (FSA, 2015).

2.3 Econometric analysis

The DCE data is analysed using the MXL model which is considered highly flexible and able to
approximate any random utility model (McFadden and Train, 2000). Coefficients are considered
randomly distributed across individuals (Ghosh et al., 2013). The MXL model has been used
frequently in WTP studies for organic food (Van Loo et al., 2011; Janssen and Hamm, 2012) and is
particularly valuable, requiring less restrictive behavioural assumptions than applied in conventional logit models (Illichmann and Abdulai, 2013; Balogh et al. 2016).

The model estimation in this study uses 100 Halton draws, observed in other DCE studies (Boxall et al., 2009; Campbell et al., 2009; Illichmann and Abduhai, 2013) and found to provide more precise results than 1,000 random draws (Bhat, 2003). As illustrated by Train (2003) and Van Loo et al. (2011), where respondents make repeated choices, one for each time period $t$, the simplest method to account for the panel nature, is to treat the coefficients as varying over respondents, but constant over choices for each individual

$$U_{ijt} = \beta_i x_{ijt} + \varepsilon_{ijt}$$

where $i = 1, \ldots, N$ is the number of respondents; $j$ is the alternative and $t$ is the choice situation; $x_{ijt}$ is a column vector of variables related to alternative $j$ and respondent $n$; $\beta_i$ is the row vector of individual parameters and $\varepsilon_{ijt}$ is the extreme value error term, iid (independently distributed) over people, alternatives and time.

2.4 Model specification

The utility function is composed of several explanatory variables included in the DCE:

$$U_{ijt} = \alpha_{1,2,3} + \beta_{1} \text{price}_{ijt} + \beta_{2} \text{jar}_{ijt} + \beta_{3} \text{pot}_{ijt} + \beta_{4} \text{GM}_{ijt} + \beta_{5} \text{conventional}_{ijt} + \beta_{6} \text{acrylow}_{ijt} + \beta_{7} \text{acryhigh}_{ijt} + \beta_{8} \text{no labels sugar}_{ijt} + \beta_{9} \text{lows}_{ijt} + \beta_{10} \text{one offive}_{ijt} + \varepsilon_{ijt}$$

where $i = 1, \ldots, N$ is the number of respondents, $j$ is option 1, 2, 3, 4 (opt-out), $t$ is the choice index; $U_{ijt}$ is the utility each respondent $i$ receives from alternative $j$ for each choice $t$; $\alpha_{1,2,3}$ is an alternative specific constant (ASC) of option 1, 2 and 3, with reference to 4; $\text{price}_{ijt}$ is the price for 100g of baby food of alternative $j$ in choice situation $t$; $\text{jar}_{ijt}$ (glass jar), $\text{pot}_{ijt}$ (plastic pot), $\text{GM}_{ijt}$, $\text{conventional}_{ijt}$, $\text{acrylow}_{ijt}$ (low acrylamide), $\text{acryhigh}_{ijt}$ (high acrylamide), $\text{no labels sugar}_{ijt}$ (no label sugar), $\text{lows}_{ijt}$ (low salt) and $\text{one offive}_{ijt}$ (1 of 5-a-day) are attributes of alternative $j$; and $\varepsilon_{ijt}$ is error term. The model specification includes an ASC for J-1 alternatives, capturing the average
effect from factors not incorporated within the model, with option 4 (opt-out) normalised to zero 
(Kjær, 2005). All the variables are estimated by effects coding, except for the ASCs and price. The 
ASCs are dummy coded, and price is a continuous numeric variable, in GBP. A normal distribution for 
the random parameters is assumed allowing the distribution of the coefficient estimate without a 
strict sign (Ghosh et al., 2013; Yao et al., 2014), since certain attributes (e.g. GM and high 
acrylamide) may not provide positive utility in comparison to the status quo. Price is modelled as a 
fixed parameter ensuring WTP for each attribute has the same distribution as the coefficient (Train 
and Croissant, 2013), providing a negative coefficient sign [4] and retaining stability within the MXL 
model (Revelt and Train, 2000; Gao et al., 2010). The mean WTP is estimated by the following 
equation:

\[
WTP = \frac{(\beta_k - \beta_{k0})}{-\beta_{price}}
\]  

(3)

Where \( \beta_k \) is a coefficient of an attribute, \( \beta_{k0} \) is a coefficient of an effects coded reference level 
(status quo) for \( \beta_k \), and \( \beta_{price} \) is a coefficient of price. \( \beta_{k0} \) is subtracted to convert the effects coded 
coefficients to dummy coded coefficients (Jaung et al., 2016). Coefficients for the status quo (\( \beta_{k0} \)), 
are calculated as the negative sum of the other levels for the attribute (Wongp rawmas and Canavari, 
2017). The WTP calculation in equation (3) has been used frequently in DCE studies employing 
effects coding and an ASC, providing the marginal (dis)utility change from the status quo (Jaung et 
el., 2016; Wongp rawmas and Canavari, 2017).

The MXL model is applied to analysed data using the package mlogit (Croissant, 2013), available in R 
version 3.3.3 (R Core Team, 2017).

3. Results

3.1 Sample characteristics

The sample socio-demographic data is provided in Table II. The majority of the respondents are 
female (84%), which may have been anticipated since women are argued to be the main decision
makers concerning food purchases in a UK household (Silayoi and Specce, 2004; Krystallis and Chrysohooidis, 2005). Most respondents are university educated, with 40% holding an undergraduate degree and 21% holding a postgraduate degree. The majority of the respondents are aged 30 to 39 (75%) and have a household income of more than £50,000.

[Insert Table II]

Nearly 40% of respondents are familiar with acrylamide (n = 67), however only 7% are aware it is present in certain baby foods (n =12). The majority indicate they would be in favour of seeing acrylamide levels displayed on baby food, with 37% stating ‘definitely yes’ (n =62) and 46% stating ‘probably yes’ (n =78).

The respondents made 1352 (169 × 8) choices, choosing to opt-out on 209 occasions (15%). The frequencies of attribute levels chosen are reported in Table I. The status quo levels were chosen more frequently, with ‘no added sugar’ the most frequently chosen (903 choices; 67%). This may have arisen since the status quo levels were presented more often in the design of the DCE, however, the status quo was also chosen most frequently among the alternatives (457 choices), indicating a bias. Whilst the inclusion of a status quo is considered important to best represent real-life choices (Hoyos, 2010), this may result in a status quo bias (Boxall et al., 2009; Bonnichsen and Ladenburg, 2015). Any systematic effect of the status quo is captured through the inclusion of the ASC for option 1 (Scarpa et al., 2005).

3.2 MXL model

The results of the MXL model are presented in Table III. The ASCs are positive and significant at the 5% level, signifying consumers prefer to purchase the product, rather than opt-out and are willing to pay a price to purchase baby food. The coefficient for option 1 is a larger positive figure than for options 2 and 3, indicating that the status quo provides greater utility than other alternatives. As expected, the coefficient for price is negative and significant at the 1% level; as price increases, the
consumer’s utility decreases. All coefficient means, with exception of the pot packaging, are
significant at the 5% level. The following status quo levels all have a positive coefficient (note to
Table III): pouch, organic, medium acrylamide and a ‘no added sugar’ label. In contrast to baby food
which did not include a label for ‘low salt’ or ‘1 of 5-a-day’, which have negative coefficients.

The coefficients for acrylamide reveal a strong preference for low acrylamide along with a significant
aversion towards high acrylamide content. A strong aversion towards GM is also found, whereas
organic is preferred to conventional. With regards to the nutritional attribute labelling, the following
labels: ‘no added sugar’, ‘low salt’ and ‘1 of 5-a-day’, are all preferred to the no label alternatives.
Consumers also exhibit a preference for the pouch packaging.

[Insert Table III]

The standard deviations of the random parameters (Table III) show there is significant heterogeneity
in consumers’ preferences towards baby food attributes. In addition, the standard deviations of the
ASCs are all significant at the 5% level, demonstrating heterogeneity towards the choice of
alternative, as well as, a non-constant status quo bias across respondents, as observed in Meyerhoff
(2009).

The estimated mean WTP (£) and 95% confidence intervals are presented in Table IV.

[Insert Table IV]

3.3 WTP for acrylamide level & lifetime cancer risk

Each acrylamide level is described by an associated lifetime cancer risk for that exposure. Table V
illustrates the change in risk following exposure to high or low acrylamide content, in comparison to
medium (status quo or base risk level).

[Insert Table V]
A high acrylamide content results in an increased lifetime cancer risk of 26/10,000 (200%), whereas low acrylamide reduces the risk by 9/10,000 (69%). This illustrates the change in risk between a medium and high level is greater than the change between a medium and low level.

However, the equivalent change in WTP for acrylamide shows an insignificant variation in comparison to the change in risk. Consumers are willing to pay £1.31 less for high acrylamide content associated with an increased cancer risk of 200% from the status quo. Conversely, consumers are willing to pay £1.05 more for low acrylamide content, corresponding to a premium of 105% above the typical price of baby food employed in this experiment (£1.00) and largely exceeding the associated cancer risk reduction (69%).

4. Discussion

The results of this study show UK consumers have a relatively high WTP for baby food with low acrylamide content. The results indicate a significant aversion towards a high level of acrylamide, with consumers willing to pay £1.31 less than the same product with medium acrylamide content (£1.00). This result suggests consumers would not be willing to purchase baby food reported to contain a high level of acrylamide, in a real-life situation. An alternative approach to the MXL model design could involve censoring the normal distribution of the random parameters at zero, resulting in the marginal utility for high acrylamide being equal to zero and implying the respondent is indifferent to the attribute (Balcombe et al., 2010). However, given the nature of acrylamide and the risk it poses to human health, it is considered important to allow negative WTP estimates to measure negative preferences associated with disutility, as seen in Illichmann and Abdulai (2013).

WTP for a reduction in acrylamide is non-proportional to the change in cancer risk. We found consumers are willing to pay a higher price for a low acrylamide content (105% premium), in return for a smaller reduction in risk (69%). Therefore, the proportionality assumption of standard economic theory (Jones-Lee, 1974; Weinstein et al., 1980) does not hold which is a common finding in the literature (Hammitt and Haninger, 2010). Under this assumption it is expected that WTP to reduce the small probability of an adverse health effect (e.g. cancer) should be nearly proportional
to the change in risk. WTP to reduce the cancer risk from acrylamide exposure appears insensitive to
the magnitude of the change in risk, also referred to as scale-bias (Andersson and Svensson, 2008).
As observed in Eom (1994), this may represent consumers’ desire to acquire safer food, rather than
reflecting the risk itself; with consumers regarding the acrylamide content as levels of ‘food safety’
per se and demonstrating less consideration of the associated probabilities [5].

This study reveals consumers are willing to pay more for organic baby food, which parents are often
considered to regard as a healthier and safer alternative for their children (Pearson et al., 2010;
Krystallis and Chrysohooidis, 2005), in comparison to conventional or GM products. This result is also
consistent with previous WTP studies, which found organic baby food attracts a price premium in
the U.S. (Maguire et al., 2004; Smith et al., 2009). The results also indicate a significant aversion
towards GM baby food. Consumers are willing to pay £1.00 less for GM than organic, representing a
large reduction from the typical price of baby food employed in this experiment (£1.00). As observed
for high acrylamide, this may indicate consumers would not be willing to purchase GM baby food, in
a real-life situation. Previous studies examining attitudes towards GM food have also found
consumers are opposed to these products (Shaw, 2002; Saher et al., 2006). Reported health risks
from GM food may have increased the number of consumers choosing organic food for their
children, with a view to reducing this risk (Saher et al., 2006). With regards to packaging, consumers
are willing to pay more for a pouch than a jar. The pouch is often the preferred packaging since it is
more convenient for feeding (Hansen and Kristensen, 2013). Given the importance of nutritious and
safe food for a child’s health in their early years (Erkekoğlu and Baydar, 2010), the estimate that
consumers are willing to pay more for baby food labelled with ‘low salt’, ‘1 of 5-a-day’ or ‘no added
sugar’, than for an unlabelled alternative is not surprising.

5. Conclusion

UK consumers may have a high WTP for baby food with low acrylamide content. Acrylamide content
is therefore considered an important aspect of UK consumers’ preferences for baby food. WTP for
low acrylamide also appears insensitive to the magnitude of the change in risk. This scale-bias may be indicative of consumers’ desire to acquire safer food, regarding the acrylamide content as descriptive indicators of food safety, without significant consideration for the associated probability of risk.

The results of this study indicate to policy advisors that regulation to reduce the acrylamide content in baby food is highly desirable for consumers. Albeit, if reducing the acrylamide in all baby food products to a low level is not achievable, a product labelling policy would assist consumers in making informed choices, enhancing the market. Producers who reduce the acrylamide content in baby food could attract premium prices, which may also seek to cover any additional costs of producing safer baby food. In addition, advertising baby food which highlights a low acrylamide content could aid in differentiating products from their competitors and increasing demand.

Consumers’ preference for organic baby food suggests the market potential for GM baby food in the UK may be limited. Consumers are also willing to pay a premium of 41% for a ‘low salt’ label and 50% more for a ‘1 of 5-a-day’ label on baby food packaging, as well as 52% less for an unlabelled product, in comparison to a ‘no added sugar’ label. These results suggest producers may have the opportunity to increase demand for baby food products which include nutritional content labels and sell these at a premium price.

Appendix A. Information given prior to DCE

Acrylamide

Since you may not be familiar with acrylamide, in comparison to other attributes of baby food, information is given below:

Acrylamide is a chemical naturally produced from cooking certain starchy foods (grains, potatoes and fruits) at a high temperature. It is not deliberately added to foods, but is a natural by-product of the cooking process.
Acrylamide has been found to cause cancer, as well as a number of other health problems in animals and is classified as 'probably carcinogenic to humans' by the International Agency for Research on Cancer. The Food Standards Agency (FSA) advises: "Regularly eating foods containing high levels of Acrylamide can increase the risk of cancer".

Notes:

1. A pilot survey was conducted to test the functionality and comprehension of the survey, focusing on the choice card information.

2. 327 individuals visited the survey, 169 individuals had a child aged 5 and under and provided full responses. We use snowball sampling reflecting the exploratory nature of the research. We contacted UK residents over the age of 18, with children aged 5 and under, via email and Facebook, to voluntarily take part in the study. Although the distribution of respondents by age is similar to the Office for National Statistics (ONS, 2011), female is overrepresented. We acknowledge there may be low precision and some bias present due to the relatively small sample. Future research should ensure the use of representative sampling in order to generalise our findings.

3. The cancer risk is a result of regular consumption over a lifetime. Respondents are provided with an outline of acrylamide and the cancer risk from regular consumption prior to the DCE (appendix A), which is subsequently described as acrylamide level & lifetime cancer risk. We acknowledge the possibility of bias derived from giving respondents health information only related to acrylamide.

4. A normal distribution for the price coefficient would not ensure a negative coefficient, whereas a lognormal distribution may result in values close to zero and unrealistically large WTP values (Revelt and Train, 2000).

5. It is well established that people have difficulty understanding low risk levels tending to overestimate small probabilities (Hammitt and Graham, 1999).
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<td>Glass jar</td>
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<td>Conventional</td>
<td>GM</td>
</tr>
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<td>Medium 13 in 10,000</td>
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<td>Price</td>
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Figure 1: Example of a choice set included in the choice experiment
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</tbody>
</table>

Notes: in italics are the attribute levels for the status quo alternative; \(^a\)these attributes are shown as blank (unlabelled) in the choice card; \(^b\)the attribute ‘1 of 5-a-day’ refers to one of five portions of fruit and vegetable per day; the prices shown represent the range of prices observed in UK supermarkets in April 2017; the frequency of options chosen: option 1 (status quo) = 457, option 2 = 340, option 3 = 346, option 4 (opt-out) = 209

Table I Choice frequency of attribute levels within the DCE, no. of choices = 1352
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>27</td>
<td>16%</td>
</tr>
<tr>
<td>Female</td>
<td>142</td>
<td>84%</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No qualifications</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>GCSE</td>
<td>13</td>
<td>8%</td>
</tr>
<tr>
<td>National diploma/NVQ</td>
<td>23</td>
<td>14%</td>
</tr>
<tr>
<td>A-levels</td>
<td>18</td>
<td>11%</td>
</tr>
<tr>
<td>Undergraduate degree</td>
<td>67</td>
<td>40%</td>
</tr>
<tr>
<td>Postgraduate degree</td>
<td>35</td>
<td>21%</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>26</td>
<td>15%</td>
</tr>
<tr>
<td>30-39</td>
<td>126</td>
<td>75%</td>
</tr>
<tr>
<td>40+</td>
<td>17</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Household income (£/year)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10,000</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>10,001-20,000</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>20,001-30,000</td>
<td>10</td>
<td>6%</td>
</tr>
<tr>
<td>30,001-40,000</td>
<td>27</td>
<td>16%</td>
</tr>
<tr>
<td>40,001-50,000</td>
<td>29</td>
<td>17%</td>
</tr>
<tr>
<td>50,001+</td>
<td>96</td>
<td>57%</td>
</tr>
</tbody>
</table>

Table II Socio-demographic characteristics of the sample, no. of respondents = 169
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:(intercept)</td>
<td>1.899***</td>
<td>0.414</td>
</tr>
<tr>
<td>2:(intercept)</td>
<td>1.516***</td>
<td>0.254</td>
</tr>
<tr>
<td>3:(intercept)</td>
<td>0.689*</td>
<td>0.272</td>
</tr>
<tr>
<td>Price</td>
<td>-2.267***</td>
<td>0.272</td>
</tr>
<tr>
<td>Jar (pouch)</td>
<td>-0.372**</td>
<td>0.116</td>
</tr>
<tr>
<td>Pot (pouch)</td>
<td>-0.049</td>
<td>0.141</td>
</tr>
<tr>
<td>GM (organic)</td>
<td>-1.387***</td>
<td>0.156</td>
</tr>
<tr>
<td>Conventional (organic)</td>
<td>0.516***</td>
<td>0.126</td>
</tr>
<tr>
<td>Acrylow (acrymed)</td>
<td>2.570***</td>
<td>0.158</td>
</tr>
<tr>
<td>Acryhigh (acrymed)</td>
<td>-2.772***</td>
<td>0.176</td>
</tr>
<tr>
<td>No label sugar (no added sugar)</td>
<td>-0.586***</td>
<td>0.098</td>
</tr>
<tr>
<td>Lows (no label salt)</td>
<td>0.468***</td>
<td>0.096</td>
</tr>
<tr>
<td>1 of 5 (no label 1 of 5)</td>
<td>0.563***</td>
<td>0.098</td>
</tr>
<tr>
<td>Standard deviation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:(intercept)</td>
<td>1.163***</td>
<td>0.237</td>
</tr>
<tr>
<td>2:(intercept)</td>
<td>2.812***</td>
<td>0.244</td>
</tr>
<tr>
<td>3:(intercept)</td>
<td>2.877***</td>
<td>0.247</td>
</tr>
<tr>
<td>Jar (pouch)</td>
<td>0.983***</td>
<td>0.124</td>
</tr>
<tr>
<td>Pot (pouch)</td>
<td>0.611***</td>
<td>0.120</td>
</tr>
<tr>
<td>GM (organic)</td>
<td>1.067****</td>
<td>0.131</td>
</tr>
<tr>
<td>Conventional (organic)</td>
<td>0.682***</td>
<td>0.114</td>
</tr>
<tr>
<td>Acrylow (acrymed)</td>
<td>0.460***</td>
<td>0.125</td>
</tr>
<tr>
<td>Acryhigh (acrymed)</td>
<td>1.344***</td>
<td>0.165</td>
</tr>
<tr>
<td>No label sugar (no added sugar)</td>
<td>0.173</td>
<td>0.102</td>
</tr>
<tr>
<td>Lows (no label salt)</td>
<td>0.214*</td>
<td>0.098</td>
</tr>
<tr>
<td>1 of 5 (no label 1 of 5)</td>
<td>0.287*</td>
<td>0.112</td>
</tr>
</tbody>
</table>

Number of observations: 5408
Log-likelihood: -1198.7
McFadden pseudo R²: 0.344
LR test $\chi^2$: 1256.1***
Halton draws: 100

***significant at 0.1%; ** significant at 1%; *significant at 5%

Notes: *Reference levels of the attributes (means): pouch = 0.420; organic = 0.871; acrymed = 0.202; no added sugar = 0.586; no label salt = -0.468; no label 1 of 5 = -0.563

Table III Estimation of MXL model results
<table>
<thead>
<tr>
<th>Attribute level</th>
<th>WTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jar (pouch)</td>
<td>-0.350 (-0.482; -0.249)</td>
</tr>
<tr>
<td>Pot (pouch)</td>
<td>-0.207 (-0.331; -0.080)</td>
</tr>
<tr>
<td>GM (organic)</td>
<td>-0.996 (-1.215; -0.842)</td>
</tr>
<tr>
<td>Conventional (organic)</td>
<td>-0.156 (-0.266; -0.030)</td>
</tr>
<tr>
<td>Acrylow (acrymed)</td>
<td>1.045 (0.818; 1.398)</td>
</tr>
<tr>
<td>Acryhigh (acrymed)</td>
<td>-1.312 (-1.698; -1.060)</td>
</tr>
<tr>
<td>No label sugar (no added sugar)</td>
<td>-0.517 (-0.641; -0.427)</td>
</tr>
<tr>
<td>Low salt (no label salt)</td>
<td>0.413 (0.329; 0.519)</td>
</tr>
<tr>
<td>1 of five (no label 1 of 5)</td>
<td>0.497 (0.400; 0.633)</td>
</tr>
</tbody>
</table>

Note: reference category in brackets.

Table IV Consumer WTP and 95% confidence intervals for baby food attributes (£/100g)
<table>
<thead>
<tr>
<th>Acrylamide content</th>
<th>WTP (£)</th>
<th>Base risk level</th>
<th>New risk level</th>
<th>Risk reduction</th>
<th>Risk reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>-1.312</td>
<td>13/10,000</td>
<td>39/10,000</td>
<td>-26/10,000</td>
<td>-200%</td>
</tr>
<tr>
<td>Medium</td>
<td>0.000</td>
<td>13/10,000</td>
<td>-</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Low</td>
<td>1.045</td>
<td>13/10,000</td>
<td>4/10,000</td>
<td>9/10,000</td>
<td>69%</td>
</tr>
</tbody>
</table>

Note: negative risk reduction figures represent an increase in risk (medium to high)

Table V Change in lifetime cancer