

1 **Food plate waste: factors influencing insinuated intention in a university food service**
2 **setting**

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7 **1.0 Introduction**

8 In the United Kingdom (UK), one-third of consumer expenditure is in the food service
9 sector (National Archives, 2007). On average, one in six meals is eaten outside the home
10 (British Nutrition Foundation, 2016) with consumption increasing (Public Health England,
11 2017). In UK food service, the cost of food waste is reported as £3 billion per annum (GOV,
12 2017), which is unnecessary for society, the environment and the economy (Bond *et al.*, 2013).
13 Multiple definitions of food waste exist (see Busby *et al.*, 2014; FAO, 2016; Stenmarck *et al.*,
14 2016; FSA 2017a; Clark and Manning, 2018 and others). Food waste can be differentiated
15 between edible food which could be eaten in the future (avoidable), leftovers or discarded food
16 perhaps on plates e.g. potato skins i.e. possible avoidable or in cooking utensils and food that
17 is inedible (unavoidable) e.g. sour milk, banana skins (Wenlock *et al.* 1980; Parfitt *et al.*, 2010;
18 Quedsted *et al.*, 2011; Kranert *et al.*, 2012). Over-nutrition and diverting food away from human
19 consumption to animal feed is also seen by some as a source of wasted food (Parfitt *et al.*,
20 2010). Food waste can also be described as recoverable for human consumption or non-
21 recoverable (Kantor *et al.*, 1997). In this study, food waste is determined as the unconsumed
22 edible item that is safe and nutritious and is rejected by customers either as plate waste or via
23 other activities and interactions during food service.

24 The food supply chain needs to be more sustainable in terms of its economic, environmental
25 and social impact. This means reducing food waste through careful planning, recording, and
26 communication (Silvennoinen *et al.*, 2015; Raak *et al.*, 2016; Redlingshofer *et al.*, 2017). In a
27 study in Sweden, 80% of food wasted in a works canteen was avoidable (Betz *et al.*, 2015).
28 Three types of food waste occur in food service: kitchen waste, serving loss and plate waste
29 i.e. food on a plate left uneaten (Heikkila *et al.*, 2016). Approximately thirty percent of total
30 food waste is estimated to come from plate waste in food service in the UK (The House of
31 Commons, 2017). Factors that influence food waste in food service include: food type and
32 quantity, poor prediction of the number of meals required at a meal serving (Eriksson *et al.*,
33 2018). Inefficiency in food service management is also influenced by a lack of attention to
34 dietary habits, rigid food procurement specifications, menu composition, and meal presentation
35 with these latter four factors causing 15.3% of food waste in school catering (Falasconi *et al.*,
36 2015). Indeed, a pre-ordering system by students could be an option to reduce food waste
37 (Fastrak, 2015). Numerous studies have attempted to explain the relationship between food
38 waste behaviour in food service and associated situational and individual factors. These are
39 now explored.

40 **2.0 Situational factors influencing food waste behaviour.**

41 Situational factors include communication within the food service environment and
42 choice architecture and choice design such as *plate size* (Brian and Koert, 2013) or *portion size*.
43 Communication including the welcome to the food area, and any repeated messaging and logos
44 focusing on food waste may influence individuals (Ferreira *et al.*, 2013; Aschemann-Witzel *et*
45 *al.*, 2015). Similarly, in an educational setting, peers, teachers, and canteen staff may influence
46 unfavourable food intake or alternatively sometimes encourage behaviour that contributes to
47 less food waste (Heikkilä *et al.*, 2016; Kuo and Shih, 2016). Although participants who have
48 bigger plate eat 45% more they also have 135% more food leftovers than those that have smaller
49 plate (Wansink and Ittersum, 2013). Similarly, offering a large plate size may influence

50 perceived behavioural control regarding eating all food on a plate (Berkowitz *et al.*, 2016).
51 Therefore, varied portion sizes and plate sizes, palatable food, and providing food waste related
52 information in the canteen serving area may reduce consumer-related food waste (Aschemann-
53 Witzel *et al.*, 2016; Lorenz *et al.*, 2017).

54 **3.0 Individual factors influencing food waste behaviour.**

55 Individual factors such as palatability (Eertmans *et al.*, 2001; Gase *et al.*, 2014; Betz *et*
56 *al.*, 2015); acceptability, knowledge and awareness (Principato *et al.*, 2015; Aschemann-Witzel
57 *et al.*, 2018); price or value, gender and age are now considered.

58 **3.1 Palatability**

59 Palatability simply means those foods that are acceptable to an individual's palate. Studies
60 have examined specific food types and waste during food service e.g. fruit and vegetables to
61 explain the differentiated nature of people's waste behaviour. Among all food waste, fruit and
62 vegetables have the highest wastage rate (45%-51.4% see Byker *et al.* 2014; FAO, 2017), and
63 in food service specifically, salad fruit and vegetables account for over 25% of waste
64 (Silvennoinen *et al.*, 2015) and in a school setting this rises to 40% (Gase *et al.*, 2014). Further,
65 vegetables pose a challenge to reduction, reuse and recycling the waste due to their higher
66 biodegradability representing a loss of nutrients, money and biomass (Plazzotta *et al.*, 2017).
67 In the wider context, potatoes, rice and pasta account for 29% of food waste; salad vegetables
68 and fruit (25%), bread and grains (14%); meat (for meat eaters 9%); fish (5%), dairy products
69 (3%) and the rest is classed as other products (Silvennoinen *et al.*, 2015).

70 Ferreira *et al.*, (2013) point out that food acceptability is positively related to energy and
71 protein content of food. The changing behaviour of students into consuming less healthy food,
72 may lead to more waste in the food service environment (Lazell, 2016). Zepeda and Balaine
73 (2017) disagree stating participants in their study were willing to waste more animal products

74 than plant products, particularly whole plant products driven by environmental concern more
75 than health concern.

76 **3.2 Knowledge and awareness**

77 Richter (2017) divided people who waste food into three groups (guilty, unwitting, and
78 careless) based on their understanding of the level of the food waste problem and indicated that
79 the more information they are given the more this may influence their food waste behaviour.
80 Social media may influence students' food waste behaviour in a university setting (Lazell,
81 2016). However, Young *et al.*, (2016) argued and confirmed that there is no significant decrease
82 in food waste after interaction with social media. In their study, after using a retailer's
83 Facebook, digital magazine, and e-newsletter for five months, there was no significant different
84 in self-reported food waste reduction comparing the control group and test group. Grainger and
85 Stewart (2017) question the methodology that Young *et al.* used and this is supported by Adams
86 *et al.*, (2005), who argue that although self-reporting methods give good documentary records,
87 as a methodology it is not as accurate as actually weighing the plates to determine food waste
88 behaviour. Similarly, Buzzard *et al.*, (1996) argued that a self-reporting method is reliant on the
89 honesty of the subjects in reporting their consumption. This conflicts with the view held by
90 Gaiani *et al.*, (2018) that a self-reporting method provides less bias due to feeling less observed
91 or a sense of being judged by the researcher.

92 **3.3 Price**

93 Cost remains the key motivator for reducing food waste (WRAP, 2013). Price-focused
94 consumers have a lower tendency to waste food and their decision is based on a price versus
95 quality trade-off with knowledge as a mediating factor (Aschemann-Witzel *et al.* 2017). Whilst
96 this research did not consider food service the price versus quality dynamic is worthy of
97 consideration in this setting.

98 **3.4 Gender**

99 In a university-based study, average female plate waste was twice males' plate waste in both
100 the control week and experimental week (Kuo and Shih, 2016). Conversely, Sauer *et al.*, (2012)
101 suggest that there is no significant difference in food waste by gender. However, in another
102 study female and lower income participants tended to express a greater price-focus and higher
103 self-reported level of food waste (Aschemann-Witzel *et al.*, 2017).

104 **3.5 Age**

105 Age influences plate waste with older people less inclined to waste food (Aschemann-
106 Witzel *et al.*, 2017). In a study of Spanish and Italian youths (n=380), researchers reported that
107 over 60% of their food was wasted (Mondejar-Jimenez *et al.*, 2016) and the younger generation
108 is reported as being higher wasters of food when compared with other age groups (WRAP,
109 2014; Derqui and Fernandez, 2017; Principato *et al.*, 2017). However, there is indication that
110 as the younger generation shows increased awareness, their willingness to waste food decreases
111 (Principato *et al.*, 2015).

112 **3.6 Multiple factorial effects on food waste**

113 Awareness of the negative consequences of food waste, educational level, peer influences
114 and perceptions of the university's waste management processes result in different amounts of
115 waste around campus (Zhang *et al.*, 2017). After an intervention of showing posters about food
116 waste, female plate waste reduced by 20%, while males' plate waste increased from 54.7g in
117 the control week to 81.5g which is a 50% increase after the intervention, and argued as males
118 being more rebellious than females (Kuo and Shih, 2016). However, Sauer *et al.*, (2012)
119 rejected the hypothesis and indicated that the overall waste by each gender decreased by 41.1%
120 (female) and 39.0% (male), even though there is no statistically significant gender difference
121 on food wastage before and after the posting of slogans in a canteen setting.

122 Suboptimal quality is a factor that leads to food waste. Consumers' determination of
123 suboptimal quality is caused by the food's visual appearance, and is influenced by demographic

124 (age, nationality) and personality characteristics such as value orientation, effectiveness in
125 environment consideration (Hooge *et al.*, 2017). Educating consumers that “ugly” fruit and
126 vegetables carry the same amount of nutrients as standard vegetables may increase awareness
127 of the minimal impact of cosmetic quality issues (Beausang *et al.*, 2017). Time spent eating a
128 meal correlates with the amount of food waste as when students’ meal times are limited to less
129 than 20 minutes, they waste more food than they waste when they have five minutes more to
130 eat (Cohen *et al.*, 2016).

131 After reviewing previous research, only two studies have considered UK students’
132 household food waste awareness (Clark and Manning, 2018; and Lanfranchi *et al.*, 2016). The
133 other studies on university students’ intentions on food waste in food service sector focus on
134 Italy (Principato *et al.*, 2015), Finland (Silvennoinen *et al.*, 2015) and Sweden (Engstrom and
135 Carlsson-Kanyama 2004; Lorenz *et al.*, 2017). In the studies reviewed here, plate leftovers have
136 been estimated to contribute between 25% (Silvennoinen *et al.*, 2015) to 60% (Engstrom and
137 Carlsson-Kanyama 2004) of all food waste. Only one study (WRAP, not dated) has sought to
138 investigate what makes people leave food on their plate in food service, and in primary and
139 secondary school (WRAP, 2011), thus food waste intention of UK students in a university food
140 service area has not been investigated in detail. This leads to the research question this research
141 has sought to address:

142 What are the causes of food waste in a university setting and the factors that influence the
143 insinuated intention to waste food among staff and students?

144 The next section considers the methodology.

145 **5.0 Methodology**

146 This study is grounded in the literature and seeks to consider the themes that arise in the context
147 of a food service setting. The unit of analysis is therefore “the student”, although the rationale
148 for the research recognises that the student does not exist in isolation, but is also influenced by

149 the environment in which they purchase a plated meal in terms of both the physical facilities,
150 and also the other individuals with whom a person may consume food. A quantitative approach
151 was employed using an on-line survey (Bristol Online Survey), distributed by email and by
152 Facebook to the student group pages, which although the approach is rigid and formal
153 (Saunders, *et al.* 2012), enables the examination of relationships between variables using both
154 descriptive and inferential statistics (survey available on request). Based on the consideration
155 of the total number of staff (n=650) and students (n=4800) at the university of study to achieve
156 a 90% confidence level with a 5% margin of error, the ideal sample size is 258. Convenience
157 sampling was used (between February and March 2018) and the sample (n = 260) was split into
158 four age groups (18 to 26, 27 to 35, 36-45, and above 46) as staff were also considered. A pilot
159 study (n = 26) found clarity of response and minimum changes were required to grammar within
160 the questionnaire. The design and analysis of each question was based on the review of
161 secondary literature (Lusk and Briggeman, 2009; Ferreira *et al.*, 2013; Cohen *et al.*, 2015; Kuo
162 and Shih, 2015; Silvennoinen *et al.*, 2015; British Nutrition Foundation, 2016; Heikkila *et al.*,
163 2016; Aschemann-Witzel *et al.*, 2017; Plazzotta *et al.*, 2017; Public Health England, 2017;
164 Zepedu and Balaine, 2017).

165 Descriptive analysis used included frequency, percentage and mean rank for each
166 question and inferentially by IBM SPSS Statistics version 22. Inferential analysis to test
167 associations (bivariate analysis) and correlation between variables used the Chi-squared test,
168 Kruskal-Wallis and Pearson correlation considering gender, age, salary, education, frequency
169 of eating plated meals, reported knowledge of food waste, plate size and portion size and
170 influence of peers.

171 **6.0 Results and analysis**

172 The results section is structured using four themes: demographic description, eating habits,
173 knowledge of food waste and insinuated intention to waste food.

174 **6.1 Respondent demographics (gender, age, occupation, salary, and education)**

175 There were 260 respondents to the questionnaire more than two thirds (72.7%) were
176 females, and the rest were male. More than one in ten (n = 28) were academic staff (10.8%)
177 administration and support staff (23.1%) and the rest were students (66.2%). The age of
178 respondents was between 18 and 26 (66%) with from 27 to 35 (6.2%), 36-45, (11.2%) and
179 above 46 (16.5%). More than 60% of participants (61.2%) stated they had an income under
180 £15,000 annually, and about 15% of them earned £15,001 to £25,000, and the rest (23%) had
181 an income of more than £25,001 per annum. Nearly half of the participants had A-Level or
182 below as their highest education qualification (49.2%), and the remainder had a bachelor's
183 degree or higher degree (50.8%). The data profile of the survey when analysed meant that the
184 possible inferential analysis for occupation and income was limited.

185 **6.2 Eating habits**

186
187 Interestingly, nearly 40% of participants had a meal less than once a week on campus,
188 and almost one third bought a meal 1-3 times weekly. Some respondents (n=18) did not eat a
189 meal on campus but their attitude toward plate waste is included in the analysis for inclusiveness
190 but may be a potential limitation in the study. The average meal time at lunch was 32 minutes
191 while the dinner time (evening meal) was shorter, at 19 minutes. Figure 1 shows respondents
192 were broadly split into three groups regarding length of time spent on lunch: 20 minutes, 30
193 minutes and 60 minutes, respectively. Similarly, there were two main groups of respondents
194 that either spent 30 minutes or less on eating the evening meal, or instead spent 60 minutes
195 eating.

196 **Take in Figure 1**

197 More than half of the students always had their meal with friends (51.9%) and nearly
198 one third of them sometimes ate with friends (29.2%). Only 19% ate alone. Using the Kruskal
199 Wallis test, it was found that eating with friends did not influence food waste at $p < 0.05$.

200 **6.3 Knowledge of food waste**

201 Half of the respondents (53.1%) had not read about the environmental impact of food
202 waste, and 66% of students had not studied food waste on their course. Only 29% of academic
203 staff (n = 8) taught about food waste in class.

204 **6.4 Insinuated intention to waste food**

205 The insinuated willingness to waste different categories of food showed that 73.1% of
206 participants would waste potato and rice, more than fruit and vegetables (52.6%), while more
207 than half of respondents would choose to eat meat (69.6%), and fish (56.5%) when they were
208 nearly full rather than waste it. Almost half of the participants would always eat dairy products
209 (48.8%) and the remainder would be willing to waste them (40.4%) with 10.8% of respondents
210 indicating they would not put dairy products on their plate due to allergy or ethical reasons.

211 The influence of gender on willingness to waste food, by food category, was considered
212 and also associated factors of influence. The twelve hypotheses tested were:

- 213 • H1: Gender influences the intention to waste meat when on plate
- 214 • H2: Gender difference influences the intention to waste fruit and vegetables when on
215 plate
- 216 • H3: Gender difference influences the intention to waste dairy (cheese, yogurt, milk)
217 when on plate.
- 218 • H4: Gender influences the intention to waste potato and rice when on plate.
- 219 • H5: Gender difference influences the intention to waste fish when on plate.
- 220 • H6: Gender influences whether the intention to waste food is influenced by the cost of
221 the meal.
- 222 • H7: Gender influences whether individuals will continue eating even if they are full.
- 223 • H8: Gender influences whether vegetables would be left on the plate in preference to
224 meat.

- 225 • H9 Gender influences whether bread/potato would be left on the plate in preference to
226 meat.
- 227 • H10 Gender influences whether an individual will put more food on their plate if they
228 have a bigger plate.
- 229 • H11 Gender influences whether if an individual will say yes if the person will say yes
230 if a serving person asks if I would like more food on my plate
- 231 • H12: Gender influences whether I will waste more food if I have a bigger plate.

232 There was no association with gender found for H1, H2 and H3, but for H4, and H5 there was
233 a statistically significant difference by gender at $p < 0.05$. There was a significant difference for
234 potato and rice (H4, $p = 0.029$) and fish (H5, $p = 0.037$), where females are statistically
235 significantly more likely than males to leave these foods on their plates. Interestingly women
236 in the study are also three times more likely not to put fish on their plate in the first place (Table
237 1).

238 **Take in Table 1**

239 There was no difference by gender on the influence of the cost of the meal on intention to waste
240 food (H6: $p = 0.467$). Males (64.8%) are more likely than female (43.4%) to continue eating
241 when they are full and clear their plate (H7) and this is statistically significant at $p < 0.05$ (see
242 Table 2). However, there was no statistically significant difference by gender as to whether it
243 was asserted that vegetables or bread and potatoes (H8, H9) would be left on the plate over and
244 above the meat portion (Table 2).

245 **Take in Table 2**

246 The size of plate did have an influence where females reported they would be affected by plate
247 size (H10), and were statistically significantly more likely to have more food if they had a
248 bigger plate and also to waste more food (H10, H12 see Table 2). When asked for the level of
249 agreement or disagreement with the statement “If I spend more money on my meal, I am less

250 likely to waste it” two thirds (63.8%) agreed or strongly agreed with the statement with a quarter
251 of respondents strongly agreeing (24.6%). Gender was not found to be an influencing factor in
252 the response (H6 see Table 2). However, when the influencing factor of income was evaluated
253 and the relationship found as statistically significant ($p=0.008$) at $p < 0.01$. Thus, the level of
254 income influences willingness to waste food with 67% of individuals who earn less than
255 £25,000 per annum indicating willingness to waste less food if they spend more money on their
256 meal compared with 53% of people who earn above that amount. When asked if they would
257 waste food if encouraged to have a portion by the server 48.2% of females agreed or strongly
258 agreed and 56.4% of males so there was no difference by gender.

259 **7.0 Discussion**

260 The secondary research reviewed in this paper identified a number of causes and factors that
261 influence food waste in a food service and in some instances within an educational setting.
262 These factors are considered here in light of the empirical data analysis and synthesised into a
263 conceptual map (Figure 2). The causes of food waste (in blue), the influencing factors on food
264 waste (green) and the solutions (red) circles combine within the map.

265 **Take in Figure 2**

266 One of the potential causes of food waste was suggested that eating with friends will
267 influence the amount of food leftovers (Young *et al.*, 2016). However, in this study, no
268 association between eating with friends and the influence on the amount of food waste by
269 category was identified. Kuo and Shih (2016) suggest that females waste twice as much food
270 as males whilst Sauer *et al.*, (2012) found no difference. The findings of this study have
271 extended this further into considering categories of food waste intention and how they are
272 influenced by gender. Of the hypotheses tested, this study shows that gender has a statistically
273 significant influence on the waste of potato and rice, and on fish. However, it is noted by a
274 previous study (Betz *et al.*, 2015) that food palatability is of impact and females have been

275 shown here to be less likely to put fish on their plate in the first place. Further, Silvennoinen *et*
276 *al.*, (2015) found that a 25% rise of food waste in school canteen was found when fish was
277 served in the menu. This is supported as a potential issue in this study so further work should
278 be done at the university to see if serving fish increases plate waste.

279 Research by Silvennoinen *et al.*, (2015) found gender difference in intention to waste
280 the main course and salad. The finding in this study with intention to waste, salad, fruit and
281 vegetables suggest there is no difference by gender. However, the work did concur with the
282 gender influence on waste potato and rice. Males are more likely than females to continue eating
283 when they are full and clear their plate and this is statistically significant at $p < 0.05$. The results
284 indicate that plate size positively influences the plate waste, it concurred with previous studies
285 (Ferreira *et al.*, 2013; Cohen *et al.*, 2014; Berkowitz *et al.*, 2016; Lorenz *et al.*, 2017). Further,
286 this research indicated that females strongly suggested that they are more influenced by plate
287 size and more likely to waste food if they have a bigger plate. Therefore, a recommendation to
288 reduce the food waste in the food service environment is to provide a variety plate sizes and
289 associated pricing structure. This approach could also consider the differentiated intention to
290 waste food of different types. Currently at the university, plated breakfast meals are priced
291 according to the number of portions on the plate. This could be extended to the lunch-time and
292 dinner and if combined with differentiated plate size could reduce food waste.

293 The literature suggests the use of videos, social media and greater communication with
294 food service customers is of value to reduce food waste (Zhang *et al.* 2017). Consideration of
295 nutrient value and calorific content will also influence perceptions of food choice and food
296 waste behaviour. Aschemann-Witzel *et al.*, (2015) support this asserting that communicating
297 with consumers about food waste by poster or video during lunch-time in the canteen can trigger
298 consumers to waste less. The influence of the length of meal-time and its impact on plate waste
299 is identified in the literature (Cohen *et al.*, 2016) and was quantified in this research but is
300 worthy of more investigation. A recommendation from this research is that there should be a

301 wider strategy to increase awareness of food waste both in the food service setting (posters,
302 notices, videos) and during fresher's induction at the start of university with perhaps a welcome
303 pack on "reducing food waste". Communicating with customers about reducing plate food
304 waste is important. Interactive posters and prompts can nudge behaviour towards resource
305 saving, but this needs to include clear messages and feedback (Agha-Hosseini *et al.*, 2015).
306 Visual prompts are designed to communicate information and encourage a particular response,
307 decision or behaviour and include notices, videos, infographics, posters, signs, stickers
308 (Bartram, 2009; Shearer *et al.*, 2017). The value of visual prompts increases if text and pictures
309 are used together either to promote certain behaviour or to prohibit others although
310 indiscriminate use of such cues can limit their effectiveness (Shearer *et al.*, 2017). Further work
311 should be done in the food service environment to see which cues are of most benefit.

312 **8.0 Conclusion**

313
314 The aim of this research was to consider the factors that influence plate waste in a university
315 food service setting and the insinuated intention to waste food among staff and students. The
316 study demonstrated that the insinuated intention to waste food is influenced by multiple factors
317 including gender, different categories of food, plate size, portion size, and palatability. The
318 dataset meant that the factors of age and knowledge awareness could not be assessed in detail,
319 but this is worthy of further study. Two recommendations to reduce food waste in the university
320 food service setting include providing a variation in plate size and pricing strategy by portion
321 rather than a whole meal, and communicating with staff and students in the food service setting.
322 This study focused on reported knowledge and intention of respondents. However, empirical
323 work that now looks at actual behaviour rather than self-reported intention can examine the
324 actual level of plate food waste and the effectiveness of the adoption of the recommendations
325 in this study when implemented in practice. Most specifically this should look at in-situ prompts
326 and messaging that can influence behaviour and reduce food plate waste. This should include

- 327 the type of media and its influence i.e. static or interactive, the tone (polite or direct) and how
- 328 different cues are perceived by consumers in given situations.

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524 Table 1: Respondents self-reported intention to eat or leave on plate by food type (percentage)

	Potato & Rice		Fish	
	Female	Male	Female	Male
Would not put on my plate (e.g. allergy or ethical reason)	0	0	21.7	7.0
Always eat	22.8	38.0	52.4	67.6
Might leave	59.3	52.1	20.6	21.1
Very likely to leave	17.9	9.9	5.3	4.3

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526 Table 2: Respondents self-reported intention regarding food waste

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	H6: If I spend more money on my meal, I am less likely to waste my food. (Data merged due to data analysis requirement)	H7: Even if I am full I always clear my plate.	H8: I will waste more vegetables than meat if I have food left over after a meal.	H9: I will waste more bread/potato than meat if I have food left over after a meal.	H10: I will put more food on my plate if I get a bigger plate.	H11: I will say yes if the person putting food on my plate encourages me to have more.	H12: I will waste more food if I have a bigger plate.
p	0.467	.000**	0.191	0.876	0.019*	0.156	0.000**
Strongly agree female	65.6	6.9	9.5	13.8	8.5	6.3	7.4
Agree female		36.5	40.7	46.6	51.3	41.8	36.0
Neither agree or disagree female	15.9	18.0	16.4	10.6	12.2	15.3	25.9
Disagree female	18.5	32.3	25.4	23.8	21.2	28.6	27.0
strongly disagree female		6.3	7.9	5.3	6.9	7.9	3.7
Strongly agree male	59.2	31.0	12.7	13.8	8.8	8.1	7.3
Agree male		33.8	52.1	47.7	48.1	42.3	32.7
Neither agree or disagree male	15.5	9.9	11.3	11.2	14.6	16.2	23.8
Disagree male	25.4	23.9	14.1	22.3	18.8	25.0	27.3
Strongly disagree male		1.4	9.9	5.0	9.6	8.5	8.8

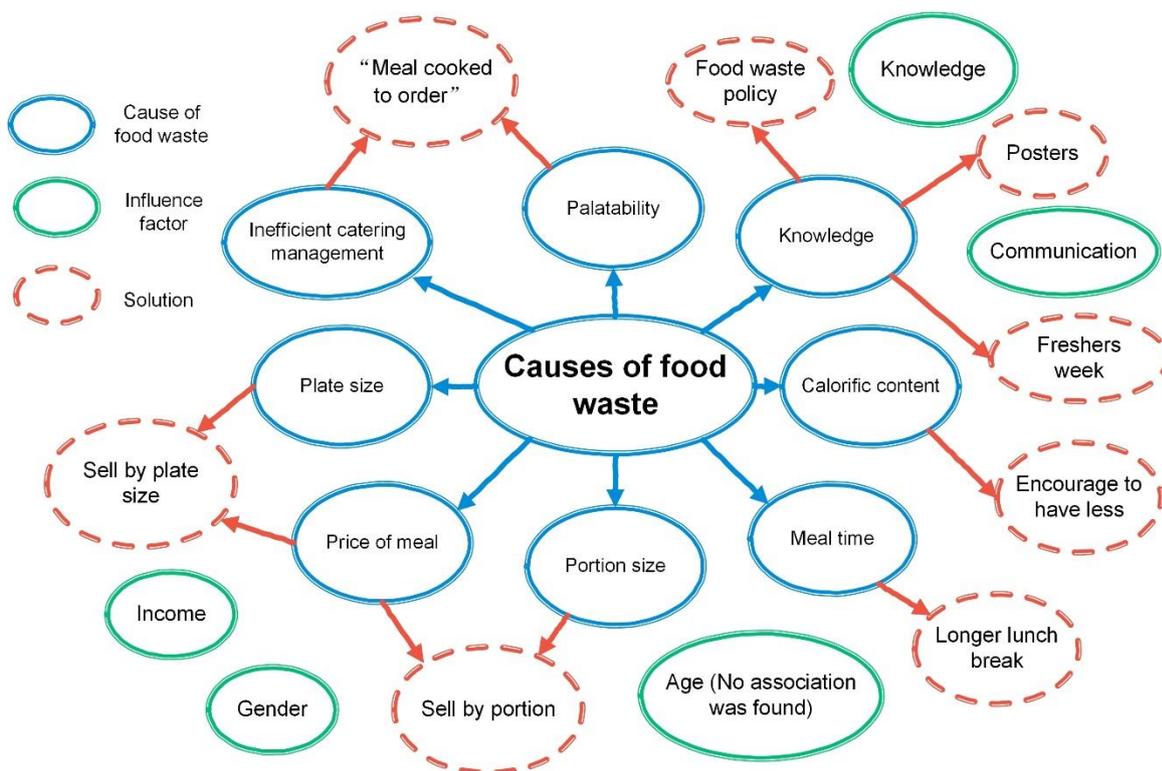
529 * significant at $p < 0.05$ ** significant at $p < 0.001$

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534 Figure 1: Time spent at lunch-time for eating a meal

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540 **Figure 2: Causes, influencing factors and solutions for food waste in an educational food**
541 **service setting**

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