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6 **Time-scarcity, ready-meals, ill-health and the**
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8 **obesity epidemic**
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11 Authors (alphabetically listed)

12
13 Celnik D* BSc MedSci – Medical Student
14 Gillespie L* BSc MedSci – Medical Student
15 Lean MEJ** – Professor of Human Nutrition

16
17
18
19 * School of Medicine, University of Glasgow
20 **School of Medicine, Life-Course Nutrition & Health, University of Glasgow, Royal
21 Infirmary, Glasgow
22
23
24

25 **Daniel Celnik is a CT1 at Glasgow Royal Infirmary, but at the time of writing the**
26 **manuscript was a Medical Student at University of Glasgow (danielcelnik@hotmail.com)**

27
28 **Laura Gillespie is a CTI at Crosshouse Hospital, Kilmarnock but at the time of writing**
29 **the manuscript was a Medical Student at University of Glasgow**
30 **(lauragillespie@doctors.org.uk)**

31
32 **Michael Lean is Professor of Human Nutrition within Life-course Nutrition and Health,**
33 **University of Glasgow and is the corresponding author and can be contacted at**
34 **Mike.Lean@glasgow.ac.uk**
35

43 **Abstract**

44 In this 3-part paper, we firstly review the interaction of time-scarcity with food-choices,
45 specifically ready-meals, and potential health consequences from their consumption.

46 Secondly we review declared nutrients, in relation to the standard 30% of Guideline Daily
47 Amounts, concluding that popular ready-meals from major UK supermarkets are currently
48 nutritionally haphazard. Thirdly, we present a simple scheme to establish standards for
49 nutritional composition of ready-meals: unless otherwise specified, any meal (the smallest
50 unit of nutrition) *as recommended to be eaten* or *as offered* should provide 30%±10% of
51 GDA for energy and pro rata for key nutrients (e.g. sodium, sat fat, vitamin C).

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56 Keywords: Public Health, convenience foods, food-choice, nutritional standards, supermarket,
57 catering, nutrient profiling

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61 **Introduction – food, eating and convenience**

62 Convenience foods are increasingly popular. Defined as “any fully or partially prepared
63 foods in which significant preparation time, culinary skills or energy inputs have been
64 transferred from the home kitchen to the food processor and distributor”, they include ready-
65 meals, fast food, meals from restaurants or takeaways (Traub & Odland, 1979). Naturally
66 convenient foods, such as fruits, are usually excluded. The UK convenience-food market was
67 an estimated £26 billion in 2006 (Mahon *et al.*, 2006). Convenience is as important as taste,
68 “healthiness” and price in determining food-choices (Candel, 2001; Dave *et al.*, 2009).
69 However, convenience foods have been associated with less healthy diets, obesity and related
70 chronic diseases such as cardiovascular disease, diabetes and cancer (Jabs & Devine, 2006).

71
72 While consumers may view food-choices as essentially practical they are parts of intricate
73 integrations of attitudes, beliefs, biological needs and environmentally-led social behaviours.
74 Behavioural research methods and psychosocial models are required, together with physical
75 and biological measures, to explore *why* consumers value “convenience” so highly (Mahon *et*
76 *al.*, 2006). People recognise convenience in acquisition, storage and preparation of foods,
77 whether they eat them or not, and believe they permit time-savings for other activities (Costa
78 *et al.*, 2007). The perceived benefits extend beyond merely leaving more time for social
79 activities: they include stress-reduction, more relaxed lifestyle, and facilitation of hosting of
80 social events. These beliefs might reflect marketing messages which depend on, but may
81 generate, “perceived time-scarcity” with possible trade-offs between convenience against
82 “healthiness” and taste. Lack of skills or dislike of cooking, perceived value for money and
83 variable family eating times all encourage solutions such as ready-meals (De Boer *et al.*,
84 2004). The notion that marketing ready-meals may actually promote the concept of time-
85 scarcity resonates with the concept of a “Food –Related Lifestyle” (Brunso & Grunert 1995;
86 Perez-Cueto *et al.*, 2010; Hoek *et al.*, 2004).

87
88 The present paper has three sections. It presents first an overview of “time-scarcity”, then
89 illustrates nutritional analyses of selected supermarket ready-meals, and finally discusses
90 ready-meals health and obesity, with proposals for nutritional standards for ready-meals.

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95 **Time-scarcity: an overview**

96 “Time-scarcity” is a key determinant of many behaviours, including food-choice
97 (“convenience-foods”) in industrialized nations (Zuzanek *et al.*, 1998). Feelings of time-
98 scarcity within households relate to employment status, and poverty. Replacing gender-
99 defined roles as “home-maker” or “bread-winner”, both parents may now both work outside
100 the home (Jabs & Devine, 2006), meaning household tasks (e.g. feeding, housework, bill-
101 paying, relationship-maintenance, physical activity, creative arts, study, recreation etc) must
102 be completed in relatively short evening periods. People feel time-pressurised, with less time
103 for leisure and relaxation. These problems are exacerbated further for single-parents, and
104 families in poverty who cannot afford to “buy time” by employing household help, child-care,
105 or eating out (Cohen, 1998).

106

107 Consumers perceiving time-scarcity try to reduce time performing household tasks, such as
108 cooking. The food industry responded with convenience foods, dating from TV dinners in
109 the 1950s to the current wide range of ready-meals (Jekanowski, 1999). Time-scarcity is
110 largely a perception, possibly not equating to actual loss of free time. The American Time
111 Use Study showed that between 1965-1995, average meal preparation time fell from 44 to 27
112 minutes daily, the reduction attributed to busy lifestyles and varying schedules (Robinson &
113 Godbey, 1997). Over the same period, people have spent less time in all components of
114 domestic life, and feel pressurised by time-scarcity, yet have increased time spent watching
115 TV, more recently web-surfing (Sturm, 2004). Thus *perceptions* of busy lifestyles and time-
116 scarcity have resulted in shifts from traditional family meals towards convenience options.
117 Takeaways or ready-meals for microwaving, prepared for easy packaging, storage and
118 transportation and quick consumption, may satisfy perceived time-scarcity, but are often high
119 in dietary fat; calories; and sodium, and low in fruits; vegetables; fibre; calcium, and iron. In
120 the UK, meals and snacks eaten outside the home contained about 40% of calories from fat
121 (National Diet & Nutrition Survey, 2002), with a negative effect on health (Videon &
122 Manning, 2003).

123

124 Various perspectives have been explored to conceptualise relationships between time and
125 food-choice. Economic theory considers consumers as rational agents striving within market
126 economies to maximize satisfaction; and homes as factories producing commodities (food
127 and entertainment) by utilising market goods and services (ingredients), resources (equipment
128 and individual skills) and time (for shopping and food preparation). Within this framework,

129 time and money are interlinked, time-allocation dependent on available money and vice versa.
130 Economists have related the obesity epidemic to changes in time-allocation and available
131 income (Cawley, 2004). Many people choose the least expensive and most time-saving
132 options, which are likely to be energy-dense (high fat, sugar, etc) and contribute to obesity.
133 Those whose incomes fall eat cheaply and gain weight and say they would make healthier
134 food-choices if they had more money (Eley *et al.*, 1997). However, there is no simple
135 relationship between wealth and diet quality. More money would not necessarily buy
136 healthier food; nor more time cooking, as other factors such as taste and habit influence food-
137 choices, with variable discounting and time-preferences. More expensive foods are not
138 necessarily nutritionally superior (Cooper & Nelson, 2003), when incomes rise, diet quality
139 again often falls, and weight gain results (Eley *et al.*, 1997).

140

141 In psycho-social theory, time is considered a social construct, the purpose of which is to
142 regulate social behaviours (when meals are eaten, household tasks are carried out, journeys
143 commenced, etc). In richer, industrialised societies, time is viewed as scarce (Dickens &
144 Fontana, 2002). For any activity (based on complexity and need for precision) and individual
145 (based on motivation and personal preferences), modulated by the demands of others,
146 productivity is optimal at a certain level of perceived time-pressure, above or below which
147 productivity falls. Thus, employed parents may experience more time pressure than those
148 without children, and these feelings may be exacerbated in single-parent households and
149 those living in poverty. These people would, therefore, be more likely to utilise convenience
150 foods, (with marketing directed towards them), contributing to health inequalities if
151 nutritional quality is lower.

152

153 Role-theory relates social structures to behaviours. A person fulfilling multiple roles (worker;
154 parent, housekeeper, and cook) may experience “role-overload”, when demand is perceived
155 to exceed available time and resources. Sacrifices must then be made, including reduced time
156 for sleeping and leisure activities, further aggravating the feeling of time-scarcity. Under
157 these circumstances, obligatory activities, such as food preparation, are perceived as greater
158 burdens, with solutions in convenience. Marketing strategies recognise that role-overload
159 and time-scarcity are common problems, possibly carrying social cache, justifying personal
160 rewards through the purchase of added-value convenience items.

161

162 People affected by perceived time-scarcity, adopt “time-deepening” behavioural responses:
163 *speeding-up, shortening* and *substituting* activities, and *multi-tasking* (Godbey *et al.*, 1998).
164 Speeding-up food-related behaviour means eating faster. Shortening activities include
165 grazing to cut out time spent preparing and eating meals. Substituting a shorter activity for a
166 longer one might include ordering takeaways or ready-meals in place of preparing a home-
167 cooked meal. Multi-tasking includes eating while watching TV; driving; or working. While
168 some people may use time management strategies, and preserve conventional food and eating
169 habits, most adapt eating behaviours to increase convenience, and the marketing of
170 convenience foods map onto these strategies.

171

172 Perception of time-scarcity varies between individuals, within broad time-allocation
173 categories: at home (waking/sleeping), at work, in transport, and leisure-activities outside
174 home (National Diet & Nutrition Survey, 2002). Ranking these categories is influenced by
175 demands including employment; family/domestic role; sex and income. In industrialised
176 nations, most adults fulfil multiple roles, (e.g. worker and parent) reducing time for food
177 preparation and eating. Increased consumption of ready-meals and fast-foods (Naska *et al.*,
178 2011) can therefore be attributed to consumers perceptions of time-scarcity, and a food
179 industry ready to capitalise on opportunities to sell more (cheap) food with perceived added-
180 value (convenience) at the maximum price the market will permit. This raises important
181 issues for health promotion if such foods are energy-dense, high-fat foods associated with
182 increased risks of obesity, diabetes and other chronic diseases (Jabs & Devine, 2006; WHO,
183 2002). Nutritional advice often focuses on what to eat, without matching recommendations
184 to hectic lifestyles. Understanding how time-scarcity affects food-choices may lead to more
185 realistic and useful strategies to promote healthy behaviours. By settling for convenience
186 foods, consumers restrict their choices, compounding further the effect of poor cooking skills,
187 and dependence on a nutrient balance defined by manufacturers. By definition, “convenience
188 foods” such as ready-meals are purchased by consumers without time to read detailed
189 nutrient composition information. In some fields, food/catering industries have accepted
190 some responsibility for impact of their products on health and make appropriate changes. For
191 example, reduction in salt content was pioneered by a group of manufacturers (Neptune
192 Project website). Much more could be done through minor recipe and menu modification,
193 and examples of how to incorporate existing products into healthy, nutritionally-balanced
194 meals.

195

196 As populations become more overweight, people must eat more calories in order to remain
197 overweight and avoid weight loss. The rates of weight gain in Europe and the US are similar,
198 higher in younger people and averaging about 0.5kg/year up to age 60 years of age
199 (Heitmann & Garby, 2002; Ebrahimi-Mameghani *et al.*, 2008). This requires consumption of
200 only 3,500 kcal extra (1kg 200 carbohydrate or 0.5kg fat) (i.e. above the requirement for a
201 stable weight) each year - undetectably small for any individual. However, the effect of the
202 obesity epidemic has an even greater effect on food consumption through the increased
203 requirement to avoid weight loss. An adult population with an BMI averaging 27kg/m²
204 weighs only about 15kg more than a pre-1980s population with an average of 23kg/m²
205 (Floud, 2006). That extra 15kg increases metabolic rates and food requirement by 200 kcal/d,
206 representing a major selling opportunity for not only convenience foods. It is noteworthy that
207 fast-food outlets are located preferentially in areas of greater deprivation (Burns & Inglis,
208 2007; Macintyre *et al.*, 2005) where people are under greater economic and time stress,
209 where obesity is more frequent, and where low educational backgrounds make negotiating an
210 obesogenic environment more difficult.

211

212 **Evaluation of nutrient compositions of selected ready-meals**

213 Nutrient-profiling has been proposed as a tool for health promotion (Lobstein & Davies 2009)
214 but categorising individual foods as ‘healthy’/‘unhealthy’ is misleading since foods are eaten
215 in combination, in meals and snacks comprising the overall diet, and it is the overall diet that
216 affects long-term health. The quantities of nutrients in foods are inter-dependent, and subtly
217 different emphases towards certain nutrients can be portrayed as contradictions (Verhagen &
218 van der Berg 2008). Getting the energy content right is essential before other nutrients can be
219 considered. An appropriate first step would be to establish nutrient-based criteria for
220 complete meals, particularly pre-prepared meals where the consumer cannot influence
221 nutrient intake.

222

223 To illustrate the range of meal compositions, and nutritional issues, we first explored the
224 energy contents of some popular ready-meals from five major supermarkets (Table 1). Four
225 popular meal-types were chosen, within four ranges which are sold in UK supermarkets,
226 without any agreed definition (normal, value/economy, “healthy”, special/finest). The
227 declared on-packaging nutrient contents from the largest supermarket in Scotland, Tesco,
228 were studied in greater detail for examples from within its four ranges. Data were gathered
229 from on-product labelling, checked against the information provided on the supermarket

230 website for Tesco, Asda and Sainsbury. The data used for the present analyses were correct
231 in April 2012. The specific compositions of ready-meals bearing the same name may
232 fluctuate as recipes and ingredient sources change. The ready-meals chosen were all sold as
233 “meals” without any instruction to add other items, so analysed as representing the entire
234 meal. The acceptable energy content of “a meal” was predetermined to be 500-700kcal, an
235 arbitrary range about the FSA standard of 30% of a woman’s requirement or Guideline Daily
236 Amount (GDA) (600kcal). For the meal to be nutritionally balanced, 30% GDA should be
237 present for all other nutrients (Table 2), similar to the Caroline Walker Trust nutrient-based
238 standards (Anderson *et al.*, 2008).

239

240 **Energy contents**

241 Table 3 shows the energy contents per portion, from four supermarkets:

242 **Macaroni cheese:** Energy content ranged 271-765kcal, several being outside the meal-sized
243 500-700kcal, without any warning. ‘Healthy’ and ‘value’ ranges were consistently low.

244 **Lasagne:** ‘Healthy’ options tended to contain more calories than ‘value/economy’ and both
245 contained less calories than ‘normal’ and ‘special’ options. None exceeds 700 kcal.

246 **Cottage pie:** None reached 600kcal and several contained less than half of the calories
247 required to constitute a meal, without any warning to consumers. ‘Value’ options were
248 particularly low. ‘Healthy’ options could contain more, or fewer, calories than the other
249 ranges: one contained only 200kcal.

250 **Chicken tikka masala:** There was a wide range of energy contents, most exceeded 600kcal,
251 almost half above 700kcal. ‘Healthy’ options all contained well under 600kcal.

252

253 **Nutritional balance in ranges from one supermarket** (Table 4)

254 Complete information, about all essential nutrients, was not provided, with no assurance that
255 this has been considered in any of the recipes.

256 **Macaroni cheese:** Examples from both ‘normal’ and ‘special’ ranges both contained more
257 than 30%GDA of fat, and most calories and sugar. All options contained excess saturated fat
258 above 30%GDA; ‘normal’ and ‘special’ both approaching 100%GDA – i.e. more than an
259 adult should eat in an entire day, without warning and ‘special’ exceeded 30%GDA for salt.
260 Both the “healthy” and “value” could be potentially improved, as ‘meals’, by adding other
261 items, such as fruit, whilst the ‘normal’ and ‘special’ options could not be redeemed by
262 adding extra foods, since they already contained over 30%GDA for energy.

263 **Lasagne:** ‘Normal’ contained >30%GDA for fat. None contained under 30%GDA for
264 saturated fat. All contained over 30%GDA for salt, highest in ‘normal’. ‘Healthy’, ‘normal’
265 and ‘special’ lasagnes contained too few calories to be a satisfying meal without extra items,
266 but no guidance was provided.

267 **Cottage pie:** Despite small, low-calorie portion sizes, 30%GDA was exceeded for fat in
268 ‘normal’ and both saturated fats and salt in ‘normal’, and ‘special’ ranges.

269 **Chicken tikka masala:** Portion sizes varied widely, only ‘healthy’ provided less than
270 30%GDA for fat, saturated fat or salt.

271

272 **Labelling**

273 Most items sampled provided the recommended GDA of calories, sugars, fat, saturated fat
274 and salt, subject to available space on the packaging, but its presentation varied between
275 supermarkets. For example, Asda, gave recommended daily amounts for men and women,
276 while Tesco provided information for women. Tesco, but not Asda, showed nutritional
277 values of its products as %GDAs. The traffic light depiction was only used by Sainsbury.
278 Some packaging showed vegetables which were not included in the ready-meal.

279

280 **Discussion: Ready-meals and the Obesity Time Bomb**

281 There is little published specifically on the relationship between ready-meals and obesity,
282 although a Brazilian study of almost 50,000 subjects found statistically significant
283 correlations between obesity in women and intakes of sugar and soft drinks, ready-to-eat
284 meals, and potatoes (Lobato *et al.*, 2009). Food-choice depends on balancing advantages,
285 availability, accessibility, attractiveness and affordability. Health promotion campaigns
286 almost exclusively use educational approaches and whilst nutrient compositions labelling is
287 important it has led to minimal changes (Review of Scottish Diet Action Plan, 2006). Non-
288 verbal schemes have been developed to try to guide consumers towards better nutritional
289 balance (e.g. the Swedish ‘Green Keyhole’ (website), the UK Balance of Good Health or
290 “traffic light” system (website)). These remove the need to read and understand complex
291 factual information, with particular value for low socioeconomic group consumers. The UK
292 “traffic light” scheme was introduced to guide individuals towards foods low in fat
293 particularly saturated fat, low in sugar and low in sodium (website). For practical reasons,
294 other nutrients were not included. Moreover, the traffic light system provides no guidance
295 with respect to energy, which is relevant for obesity. There is some evidence that consumers
296 understand non-verbal schemes (Fjellstrom, 2004; Green Keyhole), but little that they affect

297 consumers' choices alone. Non-verbal guidance has rarely been applied to meals, although a
298 "Plate-Model" has been developed to guide meal construction using carefully estimated
299 optimal plate-segment sizes (Armstrong & Lean, 1993; Health Scotland) (Figure 1).

300

301 The meal is the smallest unit of human nutrition, and there is little justification for providing
302 nutritionally unbalanced meals if they can be improved and remain attractive and affordable.
303 It can be argued that all normal meals provided in catering, or as ready-meals, should be
304 nutritionally balanced, unless otherwise stated. The currently negative health-impact of
305 convenience foods be improved by modifying recipes to meet criteria for a healthful diet,
306 through agreed action between consumers, manufacturers, processors and retailers. The food
307 industry is usually portrayed as entirely demand-led, but it can clearly make or shape demand.
308 It is understandably viewed as having a responsibility to facilitate healthful choices, by
309 improving the nutritional quality of foods and meals, and then communicating the dietary
310 roles and potential health benefits of foods to consumers to allow healthy choices to be easy
311 choices (Roodenberg & Leenen, 2007). For this reason, voluntary nutritional labelling,
312 including GDAs, was introduced by major food retailers and manufacturers widely across
313 Europe. GDAs were based on Dietary Reference Values (COMA, 1991), as consumer-
314 friendly information to help consumers relate nutritional information to their overall diets.
315 Essentially, a sensible daily intake, for health, was defined for energy (calories) and essential
316 nutrients using an average woman's requirement of 2000 kcal. The content in a food or meal
317 is expressed as a percentage of that amount. Figures are similar for children aged about 11
318 upwards, and men need to scale up their intakes a little (COMA, 1991).

319

320 Assuming we eat three meals a day, a meal with >30%GDA, constitutes a potential problem
321 for nutrients which are hazardous in excess (e.g. energy, fat, saturated fat, sugar, salt). One
322 with <30% (or whatever the % energy RDA of that meal) is not balanced for that nutrient. In
323 principle, any food or ingredient, in appropriate amount, can be incorporated into a
324 nutritionally balanced meal. However, some relatively high-calorie foods (e.g. sausage rolls)
325 contain such a high proportion of saturated fat, or salt, that this becomes practically
326 impossible. The publicly-available data on four meal-types included in this review illustrate
327 several nutritional problems in common ready-meals. This is not a comprehensive survey of
328 all ready-meals, and other issues may exist. However, it is sufficient to draw some important
329 conclusions.

330 Over half (32/68) of our selected ‘ready-meals’ did not contain enough calories to constitute a
331 ‘meal’ (500-700kcal), while others, 10/68 meals were over 700kcal. Anderson *et al* (2008)
332 similarly found only 62 out of 300 “ready-meals” contained enough calories to constitute a
333 proper meal. The ‘value/economy’ and ‘healthy’ ranges tend to have smaller portion sizes,
334 accounting for some differences in energy contents, but they are still marketed as “meals”.
335 Meals in ranges labelled ‘light’ all contained below 400kcal – as low as 200 kcal for Tesco
336 Little Dish Salmon Macaroni Cheese. None of the ready-meals offered any advice for
337 serving, e.g. extra items to add to make a balanced meal when energy content is below what
338 is needed for a ‘meal’, so this becomes haphazard and could lead to imbalances in other
339 nutrients.

340

341 The population consumes too much fat, saturated fat, sugar and salt (Jabs & Devine 2006;
342 Sturm 2004), which is why components feature on food labels. Of the four ready-meals
343 ranges from Tesco, the ‘healthy’ options contained least sugars, fats, saturated fats and salt,
344 justifying the label only in comparison with the standard range. However there is clearly
345 more work to be done by manufacturers in reducing fat, saturated fat and salt contents to
346 bring them in line with nutritional recommendations. Some of the contents are inappropriate,
347 but the examples chosen for Table 2 are not the most extreme: Tesco Chicken Tikka and
348 Korma with rice contains 1395kcal per serving, with 98%GDA for saturated fat, 80%GDA
349 for salt, while Tesco ‘value’ Shepherd’s Pie only 210kcal per serving: even an inactive adult
350 would need at least 10 of these ‘meals’ to satisfy energy requirements. The ‘special’ or
351 ‘finest’ ranges include many meals which contain 80-100% of GDA for saturated fat. A
352 consumer with some understanding of nutrition and GDAs might realise that these meals are
353 unsuitable for normal/regular consumption. However, a manufacturer could easily modify
354 the recipes to satisfy nutritional criteria, without reference to the retailer or consumer. Slow
355 progress by manufacturers has been blamed on low demand from consumers, and the retail
356 sector, although dietary recommendation for health have changed little over 50 years. In
357 recent years there has been some calling of the worst nutrient excesses in ready-meals, but
358 still little to indicate that manufacturers of ready-meals understand dietary recommendations,
359 or access the readily-available simple food composition databases (Cannon, 1992). Labelling
360 foods as ‘extra special’ or ‘finest’ can be misleading for consumers, who might expect health
361 benefits a higher price-point. This does not seem to be the case.

362

363 Using only the limited data provided by manufacturers, the present results broadly agree with
364 Cooper and Nelson (Cooper & Nelson, 2003) in concluding that ‘value/economy’ lines are
365 not nutritionally inferior, and generally represent good value for money. However, the four
366 meal-types studied varied greatly. Using 30%GDA as a standard, based on the FSA’s
367 recommendations that a meal should contribute 30% energy intake for the day, is not a
368 requirement. Other meals in the day may compensate for an unbalanced ready-meal,
369 however this places a considerable burden of nutritional understanding, and application, with
370 the consumer. Serving suggestions could indicate appropriate accompaniments to make up a
371 balanced meal. Conscious compensation with other snacks and meals is not a plausible route
372 to achieve a healthy balanced overall diet for time-scarce ready-meal consumers. Moreover
373 some ready-meals have salt and saturated fat contents that exceed the amount an average
374 adult should consume in an entire day, making compensation impossible. Nutrition labelling
375 aims to help consumers make healthier choices. However, it is considered complicated and
376 time-pressed consumers become weary and confused. To understand the implications of a
377 meal which contains over 100%GDA for saturated fat is in practice beyond most consumers.
378 Nutritional labelling only contains information about a few nutrients that influence health. At
379 present, no assurance is provided that other important nutrients (e.g. vitamins, minerals) have
380 been considered in the recipes or meal preparation. If supermarkets fail to provide an
381 appropriate balance of the nutrients they disclose, it seems unlikely that ready-meals are
382 balanced for all the undisclosed nutrients.

383

384 **The way ahead**

385 **Proposals – nutritional standards for ready-meals**

386 Action is required to improve overall the national diet. The evidence collected by Anderson
387 *et al* indicates that food manufacturers need guidance, since even ready-meals labelled
388 “healthy” can be nutritionally undesirable . Only 27% of 300 popular ready-meals fulfilled
389 the Caroline Walker Trust nutrient-based standards (Anderson *et al.*, 2008). Specific action
390 should be well received to help consumers with increasing ranges of ready- and catered meals,
391 especially young people. Introducing simple nutritional standards for entire meals could be
392 effective and less contentious, than trying to categorise individual foods as “healthy” or
393 otherwise.

394

395 The first necessary step to help consumers should be to establish a sensible size for “meals”
396 in terms of energy content (Table 5). This scheme could be readily applied to re-labelling

397 existing ready-meals, provided suppliers are given time and support to do this. Customers
398 might tend to move towards the lower-energy, better-balanced, meals and new options would
399 be likely to be better nutritionally. A dish as purchased need not be nutritionally balanced, as
400 a meal on its own, but may still be acceptable if consumers are guided as to how to
401 incorporate it within a balanced meal (e.g. by adding potatoes, or fruit). Some meals very
402 high in energy, saturated fat or salt may not be salvageable in this way. As part of its strategy
403 to prevent obesity, the Scottish government announced in 2011 that it will be working with
404 producers, retailers and caterers to ensure that portion sizes served, or suggested by labels,
405 better reflect consumers' energy needs, and specifically that this will involve standardising
406 the sizes of ready-meals (The Route Map 2010). There are similar issues the catering industry
407 regarding eating out. Lachat *et al* have commented that Nutritional Policies in Europe are
408 'embryonic' (Lachat *et al.*, 2009). In Table 5 we propose a solution to ensure nutritional
409 balance of ready-meals that should not be costly or contentious. There are inevitably costs,
410 which could be burdensome for smaller companies, so any change in food supply to improve
411 health does require some support to the companies involved. This scheme could also be used
412 in restaurants very simply to illustrate, with examples, how nutritionally balanced meals (e.g.
413 containing 30% of daily energy and nutrient needs) can be provided from an available menu.
414 There should remain a right for consumers to choose, and caterers to provide very small, very
415 large or nutritionally unbalanced meals. However, these should be identified very clearly for
416 consumers, especially for consumers in a hurry.

417
418 This paper has presented firstly a brief overview of the concepts linking ready-meals and
419 perceived time-scarcity. It then illustrates how, using a snapshot of very popular ready-meals,
420 marketing for convenience has allowed nutritional principles to be ignored. How this
421 contributes to the obesity epidemic needs better documentation. Food-choices of both obese
422 and non-obese are driven by convenience, while the obese more often use “snack” foods
423 (Perez-Cueto *et al.*, 2010). Specific research is lacking on ready-meals in relation to weight
424 gain and maintenance of obesity. A comprehensive survey of all ready-meals and their
425 consumers would be needed to refine predictions, but the present results indicate a real
426 problem which is likely to be much more widespread than the 63 meals considered here.
427 Generating simple standards for ready-meals with the scheme in Table 5 would cost little,
428 upset few, and would help consumers.

429 **4240 words (main text only, not including abstract, refs)**

430 **891 (Tables and Figures)**

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Table 1 - What is a meal?

The word ‘meal’ describes not only food, but social actions surrounding food (Makela, 1991). Food is a social tool which can bring people together, sharing foods and the meanings surrounding them.

Food Standards Agency (FSA) guidance: Daily energy consumption should be split over 4 eating occasions, or meals, each day (FSA, 2006):

- Breakfast – 20% of daily energy intake
- Lunch – 30%
- Evening meal – 30%
- Food between meals (snacks)- 20%

Health-promoting meal

Using the same rationale as RDAs for daily nutrient intakes, “main meals” should each contain 30% of recommended daily energy and nutrient intake for women (2000 kcals) i.e. 600-700 kcals. Men need about 20% more. Ready-meals which contain <500 kcal are misleading consumers, unless there are clear instructions to add extra items, e.g. bread, fruit. A meal with >700 kcal provides >35% of RDA, risking weight gain unless consumers are unusually active. If meals contain nutrients with radically different % RDA than energy, then that meal is nutritionally unbalanced, and 24h nutrient-balance may be difficult to achieve.

EC guidance on ready-meals

Nutritional content of meals is provided for information. No limits are placed on what is sold. The EC propose “Ready-meals” to provide 200g as a serving size, with at least 2 ingredients of over 30g. Nutritional contents are not defined.

Supermarket ready-meals

“Ready-meals” are designed for “main meals” (lunch or evening time), typically in four ranges: (1) ‘healthy’ (2) ‘economy’ or ‘value’ (3) ‘normal’ and (4) ‘special’ “finest”. There are no agreed nutritional criteria within or between these ranges.

633 **Table 2 - Guideline Daily Amounts for men and women in UK** (IGD Working Group
634 Report, 2005)
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	Women	Men
Energy (kcal)	2000	2500
Sugar (g)	<90	<120
Fat (g)	<70	<95
Saturated Fat (g)	20	30
Salt (g)	6	6

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676 **Table 3 – Energy contents (kcal) of four common ready-meals in five major UK**
 677 **supermarkets (CO-OP – Cooperative Group)**

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680 Macaroni Cheese

Range	ASDA	TESCO	SAINSBURY	MORRISONS	CO-OP
Healthy	352	271	352	471	----
Value/economy	366	410	466	457	-----
Normal	400	765	755	720	500
Special	744	735	----	-----	----

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682 Lasagne

Range	ASDA	TESCO	SAINSBURY	MORRISONS	CO-OP
Healthy	433	425	319	381	335
Value/economy	366	340	381	393	330
Normal	476	554	600	----	515
Special	410	427	589	715	570

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684 Cottage Pie

Range	ASDA	TESCO	SAINSBURY	MORRISONS	CO-OP
Healthy	200	375	349	300	360
Value/economy	267	270	219	235	275
Normal	478	585	461	----	395
Special	590	440	371	446	455

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686 Chicken Tikka Masala

Range	ASDA	TESCO	SAINSBURY	MORRISONS	CO-OP
Healthy	366	415	400	300	345
Value/economy	-----	585	-----	-----	-----
Normal	731	875	552	771	525
Special	-----	835	652	827	----

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699 **Table 4 – Nutritional information expressed as % Guideline Daily Amounts per serving**
 700 **provided to consumers by one major supermarket (Tesco)**

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Macaroni Cheese

% GDA	Healthy/Light	Value/economy	Normal	Special
Portion size (g)	200	300	400	450
Energy	14	21	38	37
Sugars	-3	3	4	9
Fat	21	24	46	44
Saturated fat	44	54	91	90
Salt	-9	30	22	43

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Lasagne

% GDA	Healthy/Light	Value/economy	Normal	Special
Portion size (g)	400	300	400	700
Energy	21	17	28	21
Sugars	8	4	8	7
Fat	18	22	40	28
Saturated fat	32	39	74	33
Salt	33	33	42	37

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Cottage Pie/Shepherd's Pie

% GDA	Healthy/Light	Value/economy	Normal	Special
Portion size (g)	450	300	450	430
Energy	19	11	29	22
Sugars	4	<1	1	<1
Fat	10	14	41	27
Saturated fat	15	18	63	39
Salt	25	25	42	52

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Chicken Tikka Masala

% GDA	Healthy/Light	Value/economy	Normal	Special
Portion size (g)	400	400	550	500
Energy	21	29	44	42
Sugars	7	14	22	12
Fat	9	35	54	54
Saturated fat	14	41	67	68
Salt	22	37	58	50

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Footnote: precise contents of these and other meals may vary over time. Current data available
<http://www.tesco.com/>. Several different compositions are listed for the same meal in some cases. -

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Table 5 – Proposed steps to establish agreed nutritional standards for ready-meals

1. Establish a sensible bench-mark or ‘default size’ for all meals unless labelled otherwise – e.g. a notional standard of 600 kcals
2. Establish a sensible range – e.g. $\pm 10\%$, or ± 100 kcals
3. Establish sensible terminology to allow provision of larger or smaller meals for customers who want, or need them, and inform consumers
4. Assure consumers that unless clearly stated otherwise, all meals sold to the public are balanced for all nutrients - i.e. the same %RDA as for energy: $30\% \pm 10\%$.
5. Establish agreement that no meal should contain $>10\%$ GDA above the %GDA for energy, for salt, or saturated fat
6. Ensure that all caterers have basic training in nutrition and use of nutrient-content tables
7. Agree to independent random checking of nutrient content of meals.

