

**Defining, identifying and regulating dark kitchens in the North of England: Perspectives from consumer, local authority and food business stakeholders**

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1 **Defining, identifying and regulating dark kitchens in the North of England: Perspectives**  
2 **from consumer, local authority and food business stakeholders**

3

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13

14 **Abstract**

15 *Aim*

16 Dark kitchens – technology-enabled commercial kitchen(s) operating primarily for delivery, to  
17 fulfil remote, on demand, consumer online orders of food for immediate consumption – are a  
18 contemporary addition to the food environment. There are growing concerns around the impact  
19 of these food businesses on wider determinants of health, with paucity of guidelines, regulation  
20 and oversight of the dark kitchen sector. This work explored the perceptions of dark kitchens  
21 from multiple stakeholder perspectives.

22

23 *Method*

24 The present study recruited key stakeholders (consumers, those working in local authorities  
25 and dark kitchens), and applied mixed methods approaches to explore the definition,  
26 identification and regulation of dark kitchens.

27

28 *Results*

29 Results show confusion and inconsistencies in the way that consumers, local authority  
30 departments and other stakeholders define, identify and regulate dark kitchens resulting in  
31 current regulation being difficult to implement. Where local authorities worked cross-  
32 departmentally, a more consistent approach to regulating dark kitchens was observed.

33

34 *Conclusion*

35 The potential risks of dark kitchens to food safety, food hypersensitivities and public health  
36 agendas are not fully known and warrant further research and policy development.

37

38 **Keywords:** Delivery-only kitchens; Environmental health; Planning policy

39

40 **Plain Language Summary**

41 **Defining, identifying and regulating dark kitchens in the North of England**

42 This research explored the perceptions of dark kitchens held by consumers, people working in  
43 local authorities, and those working in food businesses. Dark kitchens are food businesses that  
44 offer food for delivery through online order made via mobile or web applications. Participants  
45 had different opinions on what dark kitchens were. Participants working in local authorities  
46 applied different approaches to identifying and regulating dark kitchens, and found it difficult to  
47 do this within current regulation frameworks. Dark kitchens may pose a risk to food safety, food  
48 hypersensitivities and allergies, and public health which requires further research and policy  
49 development.

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51

52

## 53 **1. Introduction**

54 In the UK, local authorities (local government organisations who are responsible for delivering a  
55 range of services including health and social care) are responsible for the identification,  
56 surveillance and regulation of food outlets (e.g., cafes, bars, restaurants and takeaways) with  
57 direction and oversight provided by national bodies such as the Food Standards Agency <sup>1</sup>. A  
58 relatively novel addition to the UK and global food environment are dark kitchens <sup>2,3</sup>, defined as  
59 “*technology-enabled commercial kitchen(s) operating primarily for delivery, to fulfil remote, on*  
60 *demand, consumer online orders of food for immediate consumption*” <sup>4</sup>. The main local  
61 authority departments which contribute to the monitoring and regulation of dark kitchens are  
62 planning, environmental health, and public health. Planning are often the initial team alerted to  
63 new food outlets as they receive applications for new business premises or change of use for  
64 existing premises. While a new planning policy framework was published in December 2024  
65 Ministry of Housing, Communities and Local Government, <sup>5</sup>, there is no mention of dark  
66 kitchens within this meaning planning teams lack clear guidance on how to respond to  
67 application from dark kitchen businesses.

68

69 Current planning applications for dark kitchens are categorised into one of three categories  
70 (i.e., Class E, Class F1 and Sui generis) with no unique identifier for dark kitchen businesses <sup>6</sup>,  
71 potentially due to the lack of a clear definition <sup>4</sup>. The categorisation and distinction as a dark  
72 kitchen may also vary within and between local authorities. Therefore, there is no register of  
73 dark kitchens in the UK, and the scale of these businesses is unknown. While it is generally  
74 assumed that there are a large number of dark kitchens following the COVID-19 pandemic <sup>7</sup>,  
75 where dark kitchens proliferated due to lockdown restrictions, there is no trend data available  
76 to support this. There is, however, clear trend data for the out-of-home food environment <sup>8</sup>. It is  
77 estimated that around 15% of food retailers across the three major online food delivery  
78 platforms (Just Eat, Deliveroo, Uber Eats) in England are dark kitchens <sup>9</sup>. The out-of-home

79 sector is constantly evolving <sup>10</sup>, and it is likely that this number does not fully represent all dark  
80 kitchens as some may operate outside of these major platforms.

81

82 The recent Wider Determinants of Health update shows the number of fast-food outlets has  
83 grown from 98.3 per 100,000 population in 2017 to 115.9 per 100,000 population in 2024 <sup>11</sup>. The  
84 prevalence of fast-food outlets was strongly correlated with level of deprivation, and higher  
85 levels of obesity in more deprived neighbourhoods. To address the unhealthy physical food  
86 environment, strategies have been implemented to limit exposure to fast-food outlets. One  
87 example is the school exclusion zone, where no additional fast-food premises can be  
88 established within 400 metres of schools and other premises frequented by children <sup>12</sup>. Where  
89 these guidelines have been implemented effectively by local authority planning teams,  
90 particularly in areas with the highest concentration of fast-food outlets, recent work has  
91 demonstrated positive outcomes such as reduced levels of childhood obesity <sup>13</sup>. However, dark  
92 kitchens predominantly affect the digital food environment which has limited current research  
93 and is complex in its regulation <sup>14</sup>.

94

95 There is currently little communication with consumers as to whether food outlets are  
96 operating as dark kitchens, and consumer awareness of dark kitchens is thought to be low <sup>15-17</sup>.

97 Our research has demonstrated that consumers, particularly those with food hypersensitivities  
98 and specific food preferences, would like to know where their food is being prepared and would  
99 be less likely to purchase from dark kitchens where multiple cuisines (and therefore more risk  
100 of cross-contamination) may be prepared in the same kitchen environment <sup>17</sup>. When a new food  
101 business is registered at a local authority, it triggers a food hygiene inspection from their  
102 environmental health team, which is graded on a zero-to-five scale across England <sup>18</sup>. These  
103 ratings are made available on a publicly accessible website <sup>19</sup> and by using stickers on the

104 doors and windows of food outlets. However, such information is not always easily accessible  
105 to consumers across the online food delivery platforms.

106

107 The proliferation of these businesses poses potential implications for policy, practice and  
108 public health, with little information on their overall impact on wider determinants of health. As  
109 such, current regulatory frameworks applied to other business types (e.g., traditional  
110 takeaways) may not fully reflect the way in which dark kitchens operate. There is a paucity of  
111 guidelines, regulation and oversight of the dark kitchen sector and a lack of awareness in  
112 consumers and other stakeholders (e.g., Nield, Martin <sup>17</sup>). Together, this suggests a need to  
113 identify the scale of dark kitchens, explore existing knowledge held by key stakeholders,  
114 understand current monitoring and regulatory processes, and identify any gaps in the existing  
115 regulatory frameworks when applied to dark kitchens which should be addressed.

116

### 117 **1.1. Aim and Objectives**

118 This study aimed to understand the scale and scope of dark kitchens within the North of  
119 England, how these businesses are identified and regulated in line with local authority priorities  
120 (e.g., environmental health, food safety, food security), and current knowledge and practice of  
121 key stakeholders, including consumers and the dark kitchen workforce. Specifically, the study  
122 looked to:

123

- 124 ● Explore the awareness and opinions of dark kitchens held by key stakeholders.
- 125 ● Assess the extent to which existing regulatory frameworks are applicable to and  
126 experienced by dark kitchens and explore emergent challenges in regulating these  
127 businesses.
- 128 ● Co-develop frameworks with stakeholders for the identification and management of risk  
129 for dark kitchens against planning, public and environmental health priorities.

130

## 131 **2. Method**

### 132 **2.1. Patient and Public Involvement**

133 Patient and public involvement (PPI) was embedded throughout the project. The research team  
134 consulted individuals working within local authorities across Yorkshire and the Humber and the  
135 Public Involvement in Research Group (PIRG) – a PPI network at Sheffield Hallam University –  
136 during project development. Two PIRG members sat on the project steering committee and had  
137 oversight of the project.

138

### 139 **2.2. Study Design**

140 The study applied a mixed methods approach, blending cross-sectional online surveys with in-  
141 depth semi-structured interviews and focus groups. Procedures were approved by the Sheffield  
142 Hallam University research ethics committee on 06 February 2024 (ethics ID: ER61546845). All  
143 participants were provided with an information sheet and gave informed consent prior to their  
144 participation. The study procedures were pre-registered via Research Registry (ID:  
145 [researchregistry10007](#)) and a copy of the study protocol has been published on NIHR Funding  
146 Awards (ID: [NIHR160326](#)).

147

### 148 **2.3. Participants**

149 Three participant groups (stakeholders) were recruited to take part in this work: consumers  
150 (i.e., members of the general public), those working in relevant local authority roles, and those  
151 affiliated to dark kitchen businesses.

152

#### 153 **2.3.1. Consumers**

154 Independent adults (18 years of age or older) who were living in the United Kingdom were  
155 recruited via the Prolific platform and word-of-mouth. A representative sample of the national

156 population was recruited, based on sex, age and ethnicity<sup>17</sup>. The study aimed to recruit a  
157 minimum sample size of 2,000 individuals.

158

### 159 *2.3.2. Local Authorities and National Bodies*

160 Purposive sampling was used to recruit those working in public health, environmental health  
161 and planning teams within local authorities across Yorkshire and the Humber and the North  
162 West of England. Participants were recruited through established networks within local  
163 authorities, via the Office for Health Improvement and Disparities (OHID) and by contacting  
164 local authorities directly. All 52 local authorities in the regions of Yorkshire and the Humber and  
165 the North West of England invited to participate. Firstly, e-mails were sent to all contacts with  
166 the recruitment poster attached and information regarding the study. This was followed up by  
167 telephone calls to each local authority. Additional participants, including those who worked in  
168 food regulatory organisations, were recruited via word-of-mouth.

169

### 170 *2.3.3. Dark Kitchens*

171 Premises aligned with the definition of a 'dark kitchen'<sup>4</sup> were invited to participate; these were  
172 identified through referral from consumers or local authorities, via visits to dark kitchen  
173 businesses, and through internet searches. The study was open to any individual who owned or  
174 managed a dark kitchen or was involved in the dark kitchen sector. Participants were recruited  
175 from a range of geographic locations, with a sample drawn from a range of dark kitchen types to  
176 capture variation in, for example, size and ownership.

177

## 178 **2.4. Procedures and Materials**

### 179 2.4.1. Consumers

180 Members of the general public were invited to complete a brief (15 minute) online Qualtrics  
181 survey. Demographic characteristics (e.g., age, gender, ethnicity, household income) were

182 captured in line with census question format <sup>20</sup>. The survey looked to capture participants'  
183 knowledge of dark kitchens (e.g., familiarity with the term, awareness of any dark kitchens in  
184 their local area), engagement with traditional takeaways and dark kitchens (e.g., frequency of  
185 purchase and typical spend), and decision-making behaviours (e.g., reason for purchase,  
186 factors considered when purchasing) through closed-ended questions. Open-ended questions  
187 supplemented these, where further context was required. Following completion of the survey,  
188 participants were invited to follow-up interviews or focus groups (depending on availability of  
189 participants) to further explore themes emerging from the survey. Interviews/focus groups were  
190 held via an online videoconferencing platform and lasted between 30 and 60 minutes.  
191 Questions focussed on participants' understanding of the dark kitchen business model,  
192 definitions of these businesses, comparisons with other business models, and their  
193 expectations and priorities around regulation of dark kitchens.

194

#### 195 2.4.2. Local Authorities

196 Participants working in public health, environmental health and planning roles within local  
197 authorities were invited to complete an online survey focussing on current definitions of dark  
198 kitchens and local practices for identifying and regulating these businesses. Participants were  
199 invited to attend an online, follow-up, semi-structured interviews, lasting up to 40 minutes.  
200 Interviews further explored current local practices for identifying and regulating dark kitchens  
201 within public health, environmental health or planning priorities. Questions focussed  
202 specifically on awareness of dark kitchens locally and the varying business models used by  
203 these businesses, the extent to which existing regulatory frameworks apply to dark kitchens,  
204 emergent challenges in regulating these businesses and how these could be mitigated, and  
205 whether and how a transdisciplinary approach was in place in relation to dark kitchens.

206

#### 207 2.4.3. Dark Kitchens

208 Participants within the dark kitchen sector were invited to participate in semi-structured  
209 interviews, lasting approximately 60 minutes. To reduce risk of attrition due to issues with  
210 recruiting from the food sector <sup>21</sup>, interviews were conducted at a time and place suitable for  
211 the participant. This included a range of formats; face-to-face, online and go-along walking  
212 interviews. Questions explored perceptions of being a 'dark kitchen', standard practices (e.g.,  
213 food hygiene, staff development, delivery process), understanding of and engagement with  
214 regulatory processes, and priorities around regulation.

215

#### 216 2.4.4. Stakeholder Event

217 At the end of the study, stakeholders from each participant group were invited to attend a half-  
218 day event to sense-check findings, consolidate best practice, and explore how current  
219 practices for identifying and regulating dark kitchens could be improved. This event involved the  
220 co-creation of shared understanding of the role that public health, environmental health and  
221 planning teams have for regulating dark kitchens in light of respective priorities. The event  
222 focussed on two specific processes of importance identified through the present work – the  
223 consumer ordering and food delivery process, and the establishment of a new dark kitchen  
224 business. Stakeholders were asked to identify key stages in the processes, potential issues or  
225 loopholes for regulation, and where current regulation was working effectively or ineffectively.

226

#### 227 **2.5. Data Analysis**

228 Quantitative data were verified by one author (JB, JP or RR) and were analysed using descriptive  
229 statistics to explore frequencies. Interviews were recorded either via video conferencing  
230 platforms or using a voice recorder for face-to-face and go-along interviews. Recordings were  
231 transcribed and verified by one author (JB, CW, SB, HM) and independently analysed by two  
232 authors using thematic analysis <sup>22</sup>. Themes and codes for each participant group were  
233 generated through discussion, and these were synthesised and presented under three umbrella

234 themes: defining dark kitchens, identifying dark kitchens, and regulating dark kitchens. A copy  
235 of study materials, raw quantitative datasets and thematic analysis codebook are available via  
236 the Open Science Framework (<https://doi.org/10.17605/OSF.IO/6SWBK>). Anonymised  
237 transcripts are available on request via the Sheffield Hallam University Research Data Archive  
238 (SHURDA) (<https://shurda.shu.ac.uk/id/eprint/217>).

239

### 240 **3. Results and Discussion**

241 Data collection ran between March and June 2024. A total of 2,023 consumers responded to the  
242 online survey (see Supplemental Material for demographic data), with seven participating in a  
243 follow-up interview. A total of 36 participants from 25 local authorities (n = 16 in the Northwest,  
244 n = 8 in Yorkshire and the Humber, n = 1 other) responded to the online survey, representing  
245 environmental health (n = 22), public health (n = 7) and planning teams (n = 5), or national food  
246 regulatory organisations (n = 2). Sixteen of these participants were recruited to follow-up  
247 interviews. This included individual working within local authorities (n = 6 from Yorkshire and  
248 the Humber, n = 3 from the Northwest; n = 7 working in environmental health, n = 5 working in  
249 public health, n = 2 working in planning), and those working in a national regulatory role or  
250 consultancy role across local authorities (n = 2). Nine dark kitchens or associated businesses  
251 (e.g., consultant to dark kitchens, third-party online food delivery platform) were recruited to  
252 online or in-person interviews. These represent independent dark kitchens (n = 6), a national  
253 pub chain with branches across the Northwest that house dark kitchens, a virtual brand  
254 company that operates between dark kitchens and third-party online delivery platforms, and a  
255 leading third-party online delivery platform company.

256

#### 257 **3.1. Defining Dark Kitchens**

258 Most of the local authority participants (n = 26, 72%) were familiar with dark kitchens; however,  
259 only 25% of consumers (n = 496) had heard of the term<sup>17</sup>. This level of awareness is lower than

260 a recent Brazilian study, where 46.1% of participants had heard of the term ‘dark kitchen’ and  
261 27.3% reported knowing what a dark kitchen was <sup>16</sup>. While the term ‘dark kitchen’ was the most  
262 recognised amongst all stakeholder groups, participants also used the terms ‘ghost kitchen’,  
263 ‘virtual kitchen’, ‘remote kitchen’, and ‘delivery-only kitchen’. This plethora of terminology has  
264 previously been discussed as being confusing <sup>15</sup> which was also reflected in this study.

265

266 Townshend et al. <sup>21</sup> noted that dark kitchens are commonly seen as a ‘London-based’  
267 phenomena despite evidence of known dark kitchens operating in other local authorities. Only  
268 six local authorities reported having an official standard working definition of a dark kitchen (see  
269 Supplemental Material). Local authorities provided unofficial definitions (i.e., not used as  
270 standard by their department), with most participants agreeing that a dark kitchen would  
271 involve delivery-only food service (n = 27), operating virtually through third-party applications (n  
272 = 18) with no customer-facing storefront (n = 24) and no dining area (n = 22). Additional  
273 responses suggest that dark kitchens included “*several brands operated from a single*  
274 *business*” or that dark kitchens were “*repurposed existing food premises that have removed the*  
275 *publicly accessible areas*”. A small number of participants thought dark kitchens would run  
276 exclusively from purpose-built units (n = 8). Some of the local authority participants noted their  
277 familiarity with dark kitchens was due to use by other teams and/or within mass media, rather  
278 than as part of their role. Indeed, Townshend et al. <sup>21</sup> found that dark kitchens were seen to be a  
279 minor part of some local authority roles. Likely as a result, participants working in local  
280 authorities illustrated inconsistencies across and within departments when defining dark  
281 kitchens (See Table 1).

282

**Table 1:** Illustrative quotes from interviews and focus groups with each stakeholder group

Theme	Consumer Perspective	Local Authority Perspective	Dark Kitchen Perspective
Defining dark kitchens	<p><i>“I’ve also heard about ghost kitchens, these these being called as ghost kitchens I think. Like since they don’t, since we as a customers don’t see them so it’s like a ghost for us. And that’s that’s funny.” (WP1.01)</i></p> <p><i>“So I think cloud kitchen sounds more positive.” (WP1.01)</i></p> <p><i>“A food kitchen where you can get your nutrition, nutritious meals and then you don’t have to walk in it’s it’s at the top of your like, it’s just at the tip of your fingers. You can order and then you have your nutritious meal been delivered to you. Within time frame, a good time frame, I believe.” (WP1.02)</i></p> <p><i>“It kind of gives that kind of feeling of it being hidden, doesn’t it? Cause like immediately I’m thinking, well, if there’s no front facing shop, you can’t see the kitchen area and you can’t see how food’s being prepared and like, is it literally just a kitchen in the back of somebody’s house somewhere or something like that?” (WP1.03)</i></p>	<p><i>“I hate it. It sounds because it sounds seedy. It sounds like a business is up to no good.” (WP3.03, environmental health role)</i></p> <p><i>“That is what I would call a true dark kitchen where they have one building and within it there are nine kitchens.... there is no customer collection there, it is just delivery drivers.” (WP3.04, environmental health role)</i></p> <p><i>“And it’s hard to do one definition that will bring all these myriad of different businesses together. .... So it will have to be quite.... not vague, I think looser or broader term.” (WP3.07, environmental health role)</i></p> <p><i>“You know, I think we need to rule out the fact that businesses are only using...online platforms. ... I think we we’re missing a lot of businesses if we use just that definition. I think that definition should say any business that doesn’t have a shop front on the high street.” (WP3.10, environmental health role)</i></p>	<p><i>“Some of the QSR restaurants who will have bricks and mortar restaurants which are not dark kitchens, but in essence the dark kitchen element still exists there because they do so much delivery as well. So they’re creating the food, but it’s the online sales which is, in many cases, keeping these businesses alive... the definition of a dark kitchen really gets muddled because there are dark kitchens which do have front doors.” (WP4.02, consultant to food sector)</i></p> <p><i>“It’s something that’s just fallen into standard definition now, and standard terminology. I don’t think anybody gets upset about it. They understand as well that most customers are aware... It’s like when they’re ordering their food is that it is coming from a production unit, effectively.” (WP4.02, consultant to food sector)</i></p> <p><i>“We don’t use dark kitchens... so we like to call them virtual kitchens, or virtual brands, which are basically using existing kitchen space which has a front facing which has done all of the hygiene checks, which has all of those things in</i></p>

	<p><i>“It seems a bit spooky. The fact that you can't go in person. The word dark connotes very negatively in my head. I mean, I didn't know what it was to start with, but it definitely wasn't a good thing... I think dark is just so negative. It's quite like gloomy. Hidden is more like is it called covert, one of them, are closed. Well, closed suggests that the business isn't running but something not open to the public, but not dark. I think that suggests a bit of mystery. I think maybe a more clear descriptive word I don't know. Delivery-only.” (WP1.04)</i></p> <p><i>“I guess and again maybe it's more from the term dark kitchen, but I guess like with anything there's also risks or people miss misusing the model. If it's somewhere that's not public facing and harder audit or police, I imagine the risk to public health are bigger, and there's probably, and there might be some nefarious stuff going on like you know where where they're getting the food, some of the produce from and what else is going on in that building there? Are there other other links to organised crime?” (WP1.07)</i></p>	<p><i>“A dark kitchen also...in our view it would be someone catering somewhere at home. For even commercial or the domestic market, that wouldn't necessarily have a retail element, but they might have their own website and they might have their own ordering system so that that I would, I mean personally I'd classify that as a dark kitchen.” (WP3.10, environmental health role)</i></p> <p><i>“Dark kitchens are really negative. And you know, they're just going to be serving burgers and really awful quality food. But it's not necessarily the case, is it?” (WP3.11, public health role)</i></p> <p><i>“If you put the word dark in front... in front of anything, it's a presumption that it's covert, it's not seen and it's not regulated.” (WP3.16, national regulatory role)</i></p>	<p><i>place already, but they're just optimising and trying to diversify their income.” (WP4.03, virtual brand company)</i></p> <p><i>“We're trying to move away from being called dark kitchens because it's quite a sinister name and it makes it sound illicit, which it's not.” (WP4.04, dark kitchen)</i></p> <p><i>“And so we are a dark kitchen, but... quite different to other ones... we're darkish... you're asking about definition of dark kitchen.... for me it's a very simple. It's a restaurant where customers don't go... it's where you have no customers coming on site. All deliveries are for home delivery service.” (WP4.05, dark kitchen)</i></p> <p><i>“There is a negative perception of dark kitchens with the name, dark kitchen. People view it as being something which is dark... some tiny little shipping container in some industrial estate where you've got somebody working with no real regulation about what they're doing... but there are different types of operation.” (WP4.06, dark kitchen).</i></p> <p><i>“...it means we just work behind the scenes. Nobody sees what we're doing... It makes you sound mysterious.”</i></p>
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			(WP4.08, delivery-only catering business)
Identifying dark kitchens	<p><i>“So at that time I heard about these terms becoming more popular, like, even like big hotel chains they were acting like a cloud kitchen as well at that time. So that's how it came into a place, like people started cloud kitchens from homes as well.”</i> (WP1.01)</p> <p><i>“Are we even aware of all the dark kitchens that are out there, and are there some that are under the radar? And then for who's picking up checking those premises and checking food hygiene and checking the activities and therefore there's a risk there isn't there for the consumer that potentially you could be having unsafe food.”</i> (WP1.03)</p> <p><i>“I guess you maybe you feel more secure sometimes knowing where the take away is and you you've seen them work in there or whatever, although sometimes maybe that's quite worrying.”</i> (WP1.07)</p>	<p><i>“We do not have a specific usage to record dark kitchens on our database”</i> (WP2 survey respondent)</p> <p><i>“There are many food businesses that operate in this manner 'under the radar', and do not understand the legal requirement to register.”</i> (WP2 survey respondent)</p> <p><i>“If there are two businesses under the same ownership operating at two different sites with the same name - if there was a food complaint, it may be difficult to ascertain which kitchen the food was prepared in.”</i> (WP2 survey respondent)</p> <p><i>“They do sort of go under the radar a little bit and they're very difficult to find out where they are.”</i> (WP3.05, environmental health role)</p> <p><i>“It's more trying to identify them because we don't know about them until we stumble across them by accident or someone complains about them.... Because you don't know the names or anything, so you can't really search through the databases or Google or</i></p>	<p><i>“All of these [different DK models] should be under local authorities and their registration of food businesses, it's not a perfect system. There's going to be people who go under that radar.”</i> (WP4.02, consultant to food sector)</p> <p><i>“A requirement to get on to those particular platforms is that you're registered in your local authority as a food business.”</i> (WP4.02, consultant to food sector)</p> <p><i>“From my experience of setting up restaurants, they never come out in advance unless you contact them if have specific questions. They're too busy, too underfunded to be able to... They have given us some advice for moving forward about once we get the second site on board that we can become registered across the whole of the country.”</i> (WP4.05, dark kitchen)</p> <p><i>“Well, first thing you need to do is register... a food business operating from A particular space. So if we was gonna... say develop 4 brands... I'd have an overarching business which does 4 brands would come under. So, we wouldn't need to register all the different</i></p>

		<p>anything.” (WP3.08, environmental health role)</p> <p>“So every week when we get these new ones cropping up sometimes, I mean it's literally sometimes just a teenager from a bedroom.... It's very transient and we hear of these virtual brands coming in going back out coming in, going back out” (WP3.08, environmental health role)</p>	<p>businesses, we just registered the one holding company that would then look after these four brands. And then as a food business owner, you need to have your Level 3 HACCP which I have and Level 3 food hygiene, which I have. And obviously you get insurance in place and you're pretty much good to go.” (WP4.06, dark kitchen)</p>
Regulating dark kitchens	<p>“Dark kitchens are not takeaways here, so I think in that way, with the like the like in the particular area, how many dark kitchens should be there really shouldn't come under those legislations because people cannot walk into randomly and take, like order from that kitchen, so they have to always go through the app or anything so it all it all depends on how much area that the dark kitchen is serving...” (WP1.01)</p> <p>“I think you have to get us tick, dot all the I's, cross all the T's as when it comes to getting all all authorisation and working on on the approval of all authorization in setting up the restaurant or the kitchen.” (WP1.02)</p> <p>“I think by a manager should always be wary of things that are not following procedures. But every single worker has this responsibility and they should</p>	<p>“There's a bit of digging that needs to be done and then how we input that on our computer database to make sure it's inputted correctly and uploaded and inspected correctly. That's more of a challenge I think really. Rather than inspecting them in any different way.” (WP3.03, environmental health role)</p> <p>“They've got a carrot because if you don't register, you don't get on the platform. If you don't get on the platform, you can't sell your food and you don't get any money... They have more incentive to get on the platforms than they do to listen to us in some ways.” (WP3.03, environmental health role)</p> <p>“We don't specifically record it because we're not required to by the Food Standards Agency. There's not been a like an internal push like we need to know where all these [Dark Kitchens]</p>	<p>“Any food safety aspects in any part of our business including dark kitchens is run past primary authority, which will rubber stamp it which then backs us up from a local authority perspective. We as a business have to register every dark kitchen with the local authority to say that we're operating takeaway at that Slug and Lettuce, for example.” (WP4.01, national pub chain)</p> <p>“That isn't exclusive to dark kitchens because there are many shop fronted restaurants who either are not visited by local authorities because of... resources. They're not necessarily aware of, they're not registered. Even taking back to my days as an EHO... I was out going up and down the high streets... and if it was a business I didn't recognise, I just walk in. Hello. I'm from environment health and either you get shock, horror, panic. Or alternatively. Ohh brilliant. Great to see</p>

	<p><i>obviously do their food safety, hygiene, whatever qualifications they need. But there probably does need to be someone overseeing and authority cheques, EHO or something.” (WP1.04)</i></p> <p><i>“Well you can't really blame the government for everything, the person then said the person who is starting the business should have the knowledge before starting the business, because if they're gonna feed hundreds of people, they should know that there's always a risk that comes with it.” (WP1.05)</i></p> <p><i>“I think that the owner should know what to do because I think before anyone will open up a business, he or she would have gone through some training and would have gone through some first hand experiences about how the company, or how the industry the person is getting into his and the pros and cons. So I think the person or the owner should know what to do and how to do it on time and everything necessary.” (WP1.06)</i></p>	<p><i>are, you know, to make us we don't really record data if we don't need to.” (WP3.07, environmental health role)</i></p> <p><i>“It got to the stage a few years ago where we were having businesses with multiple names and we as a service we decided no, we're not going to do that. Each premises is only allowed one record, but they can combine the business name.... Because it then affects the FHRS ratings. It caused a lot of confusion on all the different systems. So we just decided one premises, one name end off.” (WP3.08, environmental health role)</i></p> <p><i>“I think you've got to think of it from a health inspector's perspective. We can't get into those businesses every day because they don't run every day, same that kitchens are not there all the time. Certain days might be there. So that you know, they decide when they're going to run that kitchen. It's not like a high street presence where they've got to open 9 to 5 when they're a caterer or a dark kitchen, whether they've got online platforms or not.” (WP3.10, environmental health role)</i></p> <p><i>“What we're trying to do is make our environments healthier, aren't we? And with our takeaway guidance, we look at</i></p>	<p><i>you.” (WP4.02, consultant to food sector)</i></p> <p><i>“[The delivery platforms] they do spend an absolute fortune in trying to make certain that their platforms are as clean as they can be and that they've got properly registered businesses with good and decent EHO standards.” (WP4.02, consultant to food sector)</i></p> <p><i>“We take our responsibility as a business very seriously and we obviously work very closely with the government but also with local authorities to look at exactly what you're talking about. So whether it's hygiene, whether it's safety and of course, food and nutrition as well. So, displaying calories, for example, all of that stuff which has come into force, we're already doing. So yeah, as things move, we will move with it... There are definitely differences between some dark kitchens and others. We are a much more professionalised service... As I said at the beginning, we really do see them as an opportunity for local growth.” (WP4.04, dark kitchen)</i></p> <p><i>“I know the pressure for me to make sure things are done to a certain standard would be much less in a dark kitchen. ... I think it probably needs to be a separate</i></p>
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		<p><i>proximity to schools, child obesity, deprivation, proliferation of takeaways and we can kind of say, if that take away is in that place it could have an impact on the health and well-being of the population and the immediate area or people who visit that area. But it's a completely different story with online deliveries and things like that and you can get a delivery from a shop 2 miles away to your house.” (WP3.11, public health role)</i></p> <p><i>“The key for me for any of this is registration. If that delivery only kitchen is registered, then they will get that local authority visit. The local authority officers are the experts, and they will help and support them through.” (WP3.16, regulatory role)</i></p> <p><i>“This is the problem. You know, we don't know who's using them. We don't know what the foods that's being served is. Is it more takeaway, you know, the typical high fat, salt, sugar food, we don't know. And we don't know if [Local Authority] has any [Dark Kitchens] even.” (WP3.21, public health role)</i></p> <p><i>“So you could end up with an area that has access to...100 different fast food options and none of them have got</i></p>	<p><i>registration process for a dark kitchen and then it's down to the FSA [Food Standards Agency] inspectors... But I wouldn't be against some form of higher registration level for dark kitchen and then a little bit more regulation if you want to have more than one on the one site.” (WP4.06, dark kitchen).</i></p> <p><i>“There is no reason why dark kitchens should not be better and safer than everywhere else because there are no customers. Customers bring in germs. They bring in mess and disorder. Whereas the Dark Kitchen, which is regulated by the same authorities in the same way should be much easier to get very hygienic.” (WP4.06, dark kitchen)</i></p>
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		<i>public facing venues, but it's then going to have a knock on effect on the public health side.” (WP3.28, public health role)</i>	
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284

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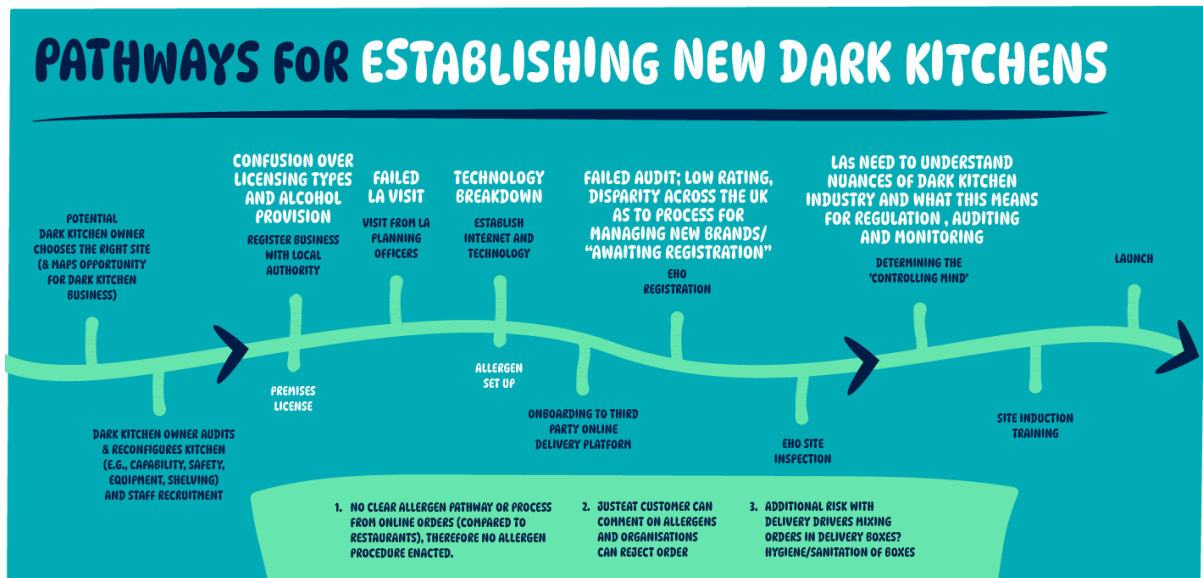
286 The term 'dark kitchen' was perceived by consumers as having potentially negative  
287 connotations and/or implications that businesses are seedy, covert, hidden or unregulated and  
288 offering a certain type of poor-quality food (Table 1). Food quality and food safety were seen to  
289 be accurate predictors of consumer purchase intent from dark kitchens in prior literature <sup>16</sup>. In  
290 some cases, businesses were reluctant to use the term 'dark kitchen' due to the negative  
291 connotations or because the term did not accurately capture their business model. However,  
292 others working in the dark kitchen sector felt that the term was now established and  
293 recognisable, and had been widely adopted. For several local authority participants, this  
294 reflected their perceptions of businesses that were less visible, with some participants stating  
295 that they strongly disliked the term due to unfair and inaccurate negative connotations for many  
296 well-run businesses and the term 'delivery-only kitchen' was generally preferred by these  
297 participants. Despite this, during consensus discussions, stakeholders agreed that 'dark  
298 kitchens' was the preferred terminology as other suggested wording did not encapsulate the  
299 nuances of the particular business model it described <sup>4</sup>. Therefore, similar to the debate posed  
300 by Hakim, Dela Libera <sup>16</sup>, we use the term 'dark' in reference to the lack of visible physical  
301 presence of a kitchen to the consumer only.

302

### 303 **3.2. Identifying Dark Kitchens**

304 Sixteen (44%) participants from local authorities were aware of one or more dark kitchens  
305 operating within their region. Participants from the same local authority did not always report  
306 the same number of dark kitchens, suggesting a lack of consensus, collaboration and  
307 information-sharing between departments. This may potentially arise from the lack of clear and  
308 consistent definition across departments and local authorities, and the inability to develop a  
309 registry of dark kitchen businesses (Table 1). Qualitative data from local authority participants  
310 identified three key routes to identifying dark kitchens; through existing regulatory processes  
311 (e.g., business registration, planning processes), through inspections (e.g., food hygiene

312 inspections for new businesses, inspections by planning or environmental health), and through  
 313 external notification (e.g., complaints or reports from members of the general public, request  
 314 for support or directly contacted by a business) (Figure 1) (data summary available in  
 315 Supplemental Material).  
 316



317  
 318 **Figure 1:** Pathways for establishing new dark kitchens with key points for regulation. EHO,  
 319 environmental health officer; LA, local authority.

320  
 321 Local authority participants noted several challenges with the identification and classification  
 322 of dark kitchens. Some local authority representatives lacked processes to identify dark  
 323 kitchens, either due to the absence of mechanisms to support identification and recording of  
 324 businesses or because it was not a current local authority priority. Participants noted a  
 325 particular challenge was engaging some dark kitchens in regulatory processes and with food  
 326 safety standards. Local authority and consumer participants felt this impacted the general  
 327 public (e.g., concerns around transparency of information and informed choice), dark kitchen  
 328 workforce (e.g., employment conditions), and the local environment (e.g., increased litter), but

329 also the wider economy (e.g., impacting the success of other food businesses) (see  
330 Supplemental Material).

331

332 Participants in the stakeholder workshops agreed that the identification of dark kitchens should  
333 start with planning processes for new buildings, or change of use notifications, but that these  
334 processes were not always robust. Also noted was the difficulty in identifying different business  
335 types due to the current planning classification system <sup>6</sup>, which does not provide a distinction  
336 between hot food takeaways and dark kitchens. As discussed above, due to the diversity of  
337 modes in which dark kitchens operate, premises can fall into at least three different potential  
338 planning classifications: Class E, Class F1 and Sui generis <sup>21</sup>. Therefore, current planning  
339 systems are unable to monitor how many of these businesses are in operation and/or under  
340 which land use classification they are operating, meaning that the planning process cannot  
341 underpin the identification and regulation of dark kitchens in its current format.

342

343 While the recent National Planning Policy Framework fails to reference dark kitchens or the  
344 changing dynamic food environment, it does state: “*Local planning authorities should refuse*  
345 *applications for hot food takeaways and fast food outlets: a) within walking distance of schools*  
346 *and other places where children and young people congregate, unless the location is within a*  
347 *designated town centre; or b) in locations where there is evidence that a concentration of such*  
348 *uses is having an adverse impact on local health, pollution or anti-social-behaviour”* Ministry of  
349 Housing, Communities and Local Government, <sup>5</sup>. At present, this policy framework is difficult to  
350 implement as there is little evidence to show whether dark kitchens have an adverse impact on  
351 factors such as local health, pollution or anti-social behaviours. However, emerging evidence  
352 from planning appeals demonstrates concerns over noise disturbance and air quality <sup>21</sup>.

353

354 Many of the perceived risks are transposed from traditional takeaways, with higher prevalence  
355 of takeaway outlets observed in areas of higher deprivation and contributing to poor health  
356 outcomes (e.g., higher rates of obesity) <sup>23-26</sup>. However, the nutritional quality of food provided by  
357 dark kitchens is as yet unknown, and the variable delivery radiuses (i.e., in response to  
358 availability of delivery drivers, demand from consumers) means that the geographical impact of  
359 dark kitchens is difficult to measure. It is therefore imperative that identification of dark  
360 kitchens by local authorities is streamlined and consistent to allow the appropriate  
361 implementation of guidelines and policy development across the UK and globally. Despite this,  
362 planning teams in local authorities have reported little interest in dark kitchens, unless there  
363 was a specific breach of planning regulation, despite dark kitchens having impacts on the  
364 neighbourhoods and communities that they sit within <sup>21</sup>. Encouragingly, there was a better  
365 understanding of dark kitchen sites within those local authority where cross-departmental  
366 relationships were more developed and structured approaches to broad public health agendas  
367 were in place. This is consistent with the Health in All Policies approach <sup>27</sup> which advocates for  
368 more joined up thinking across local government roles, private sector organisations and local  
369 voluntary, community and social enterprise organisations. This also aligns with findings from  
370 O'Malley, Lake <sup>28</sup> around regulatory mechanisms to restrict hot food and the planning appeals  
371 process.

372

### 373 ***3.3. Regulating Dark Kitchens***

374 Local authority participants had mixed opinions on whether existing frameworks and guidance  
375 were fit for purpose for regulating dark kitchens, particularly given the rapid innovation within  
376 this area of the food industry. Examples were given where the existing legislation does not cover  
377 delivery-only food business models and how business innovation evolves quicker than  
378 statutory processes, leaving gaps in legislation and guidance, and inconsistency in its  
379 implementation (Table 1). During the stakeholder workshops, key 'fail points' were identified

380 within the regulatory system including managing allergens and food hypersensitivities and  
 381 loopholes around failed food hygiene visits (Figure 1 and 2). Participants also raised concerns  
 382 around 'local legends' on third-party food delivery platforms, which gave preferential treatment  
 383 to food businesses which generated large income.  
 384



385  
 386 **Figure 2:** Key points of regulation in the food ordering and delivery process for dark kitchens.

387  
 388 Some examples of dark kitchens which aim to positively impact the local community were also  
 389 shared, such as dark kitchens running from school kitchens and offering healthy foods <sup>29</sup>. This,  
 390 however, is another fast-food takeaway provider which overrides the school exclusion zone  
 391 guidelines <sup>29</sup>. While participants noted there was no national guidance relating to dark kitchens,  
 392 they reported this would be more challenging to produce than pre-existing guidance for  
 393 traditional takeaway establishments. The Primary Authority scheme <sup>30</sup>, where businesses can  
 394 receive tailored support around regulatory compliance, was mentioned by several participants  
 395 as a way of ensuring consistency in advice given to businesses across local authority areas, and  
 396 so that dark kitchens can be supported to manage risks alongside innovation. However, until a

397 consistent definition and regulatory approach for dark kitchens is adopted nationally, the  
398 advice provided by Primary Authority schemes is likely to be variable.  
399  
400 It was largely agreed between local authority participants that environmental health teams  
401 were responsible for identifying (n = 20, 56%) and regulating (n = 22, 61%) dark kitchens, with  
402 public health, planning and trading standards playing a smaller role. However, these  
403 participants noted that limited time, resources and budget were significant barriers to  
404 undertaking proactive work with food businesses. Some (n = 3, 9%) felt the responsibility for  
405 identifying and reporting dark kitchens lay with the businesses themselves. Indeed, some dark  
406 kitchen businesses placed importance in their adherence with regulatory frameworks, e.g.,  
407 *“We make sure that sites have the correct FSA [Food Standards Agency] rating... so that we*  
408 *know that where our brand is going is safe and healthy.”* (WP4.03) and saw the need for more  
409 stringent regulation. Consumers also discussed how the business owners were responsible for  
410 the safety and quality of the food they were providing (Table 1). When considering the  
411 experience of dark kitchens in the regulatory processes, participants noted differences  
412 between dark kitchen businesses in terms of both adherence with legislation and guidance, but  
413 also how dark kitchens are regulated. Stakeholder groups identified several areas of concern  
414 where improved regulation can be embedded (Figure 1).  
415  
416 When consumers are choosing to order food from a food business via a third-party food delivery  
417 platform (Figure 2), participants felt there was a need for explicit access to information –  
418 particularly food hygiene rating and allergen information. This links with consumers’ decisions  
419 around the food type, which is impacted by this hygiene rating in addition to promotions or  
420 offers, position of a business on the app (e.g., sponsored placements), the stated location of  
421 the business or speed of delivery, and the additional cost of delivery<sup>17</sup>. To address concerns,  
422 participants felt any information relating to allergens and special dietary requirements should

423 be made available at the point of sale by standard, rather than relying on consumers to contact  
424 the business. Additionally, participants felt mandatory food hygiene training was needed for  
425 food businesses and individual staff preparing the food. Importantly, participants felt these  
426 issues were not specific to dark kitchens, but applied to wider food businesses, and that a  
427 “one-size-fits-all” model is not necessarily appropriate.

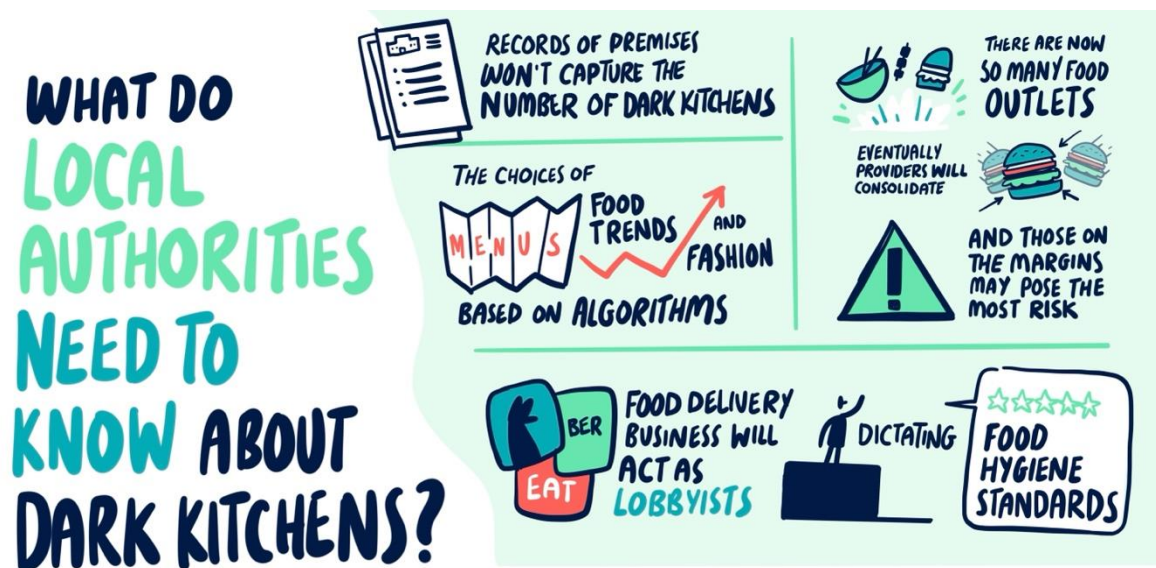
428

429 Of particular relevance to dark kitchens is the delivery process, which was of specific concern  
430 for stakeholders given this is often unregulated and may increase the risk of cross-  
431 contamination<sup>31</sup>. Participants felt greater food hygiene, food safety and allergen training were  
432 required for delivery drivers, particularly given the potential for multiple food orders to be  
433 placed together by the delivery driver and thus increasing the risk of contamination. More  
434 stringent allergen and contamination management was deemed important, such as ensuring  
435 separate storage or the use of precautionary allergen labelling. As such, consumers felt that  
436 they would like to know if their food was being produced in a dark kitchen, and that this  
437 information should be made available on the aggregator platforms<sup>17</sup>.

438

439 Overall, regulation of traditional food providers (e.g., restaurants and takeaways) was deemed  
440 appropriate for the dark kitchens, as was the process for auditing these businesses and  
441 providing food hygiene ratings. In most areas, current regulation was believed to be  
442 successfully adapted and implemented within the dark kitchen sector. However, there were  
443 broader concerns that mainly arose from the lack of customer-facing order processes and  
444 using third-party food delivery platforms and drivers which increased the risk of cross-  
445 contamination and allergen risk for those consumers who were particularly vulnerable. The  
446 biggest pitfall in the current regulation is around the initial identification of the dark kitchen  
447 premises within the planning system and having no consistent or reliable way of measuring the  
448 scale and scope of dark kitchens within the UK or at specific local authority level. In addition,

449 there are several considerations for local authority teams when identifying and regulating dark  
450 kitchen business (Figure 3), particularly relating to the way in which dark kitchens operate and  
451 how these differ from traditional takeaways (e.g., choice of foods and brands change based on  
452 trends and algorithms, third-party food delivery platforms may likely dictate acceptable food  
453 hygiene standards).



27<sup>th</sup> SEPTEMBER 2024



455  
456 **Figure 3:** Additional considerations for local authority teams when identifying and regulating  
457 dark kitchens.

458  
459 **5. Conclusion**

460 To the best of our knowledge, this is the first study to explore the perceptions of dark kitchens  
461 from multiple stakeholder perspectives. The research has identified confusion and  
462 inconsistencies in the way that consumers, local authorities and other stakeholders define,  
463 identify and regulate dark kitchens. The potential risks of dark kitchens to food safety, food  
464 hypersensitivities and public health agendas are not fully known and warrant further research  
465 and policy development.

466

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473

474 **Author Contributions**

475 **Jordan D. Beaumont:** Conceptualisation, Data Curation, Formal Analysis, Funding Acquisition,  
476 Investigation, Methodology, Project Administration, Resources, Supervision, Validation,  
477 Visualisation, Writing – Original Draft, Writing – Review and Editing; **Jo Pearce:**  
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491 Acquisition, Investigation, Methodology, Project Administration, Resources, Supervision,  
492 Validation, Writing – Review and Editing.

493

#### 494 **Statements and Declarations**

495 Not applicable.

496

#### 497 **Ethical Considerations**

498 Procedures were approved by the Sheffield Hallam University research ethics committee on 06  
499 February 2024 (ethics ID: ER61546845).

500

#### 501 **Consent to Participate**

502 All participants were provided with an information sheet and gave informed consent prior to  
503 their participation.

504

#### 505 **Declaration of Conflicting Interest**

506 The authors declare that the research was conducted in the absence of any commercial or  
507 financial relationships that could be construed as a potential conflict of interest.

508

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515

#### 516 **Data Availability**

517 A copy of study materials, raw quantitative datasets and thematic analysis codebook are  
518 available via the Open Science Framework (<https://doi.org/10.17605/OSF.IO/6SWBK>).  
519 Anonymised transcripts are available on request via the Sheffield Hallam University Research  
520 Data Archive (SHURDA) (<https://shurda.shu.ac.uk/id/eprint/217>).

521

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552 [update/wider-determinants-of-health-statistical-commentary-february-2025](https://www.gov.uk/government/statistics/wider-determinants-of-health-february-2025-update/wider-determinants-of-health-statistical-commentary-february-2025) (2025, accessed  
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