

## Extended Abstract

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<b>Paper/Poster Title</b>	<b>Insights on the relationship between food waste and food security at household level</b>
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<b>Abstract</b>	<b>200 words max</b>
<p>The research analyses the relationship between food waste and food security using two case studies. These are testing the hypothesis that actual and/or perceived food insecurity may influence household food waste, and the use of social supermarkets (SSM). The relationship may be enhanced during shocks (e.g., Covid-19) and fluctuate in relation to other factors e.g., social reforms and financial markets volatility linked to cuts to public finances and social benefits.</p> <p>We used two survey datasets collected in 2020 and 2021 and behavioural economics techniques (structural equation models) to estimate the impact of observed and latent factors on food waste related behaviours under shock (e.g., Covid-19 pandemic) and food redistribution aspects (intentions to use social supermarkets).</p> <p>Results suggest that having experienced food insecurity significantly influences the intention to use a SSM among other factors such as attitudes, perceived 'normality' of the shopping experience, price consciousness, perceptions of the risks of SSMs contributing to the normalisation of the systemic causes of food poverty and food waste, being aware of the food assistance and sustainability aims of SSMs, food quality and safety perceptions. Similarly, perceived food insecurity has a significant effect on household food waste behaviours and intentions, and self-reported food waste, together with other factors including food waste attitudes, need for cognitive closure, shopping patterns (proxy for indicators of overpurchasing/stockpiling), perceived behavioural control, subjective norms, and the good provider identity.</p>	
<b>Keywords</b>	Food waste; food security; structural equation modelling; consumer behaviour
<b>JEL Code</b>	D910; C380; Q180 see: <a href="http://www.aeaweb.org/jel/guide/jel.php?class=Q">www.aeaweb.org/jel/guide/jel.php?class=Q</a>
<b>Introduction</b>	<b>100 – 250 words</b>
<p>There are conflicting food waste related behaviours under food security-related shocks, for instance stockpiling and panic buying leading to higher levels of household food waste (Hamilton et al., 2020) in contrast to behaviours such as meal planning and leftover utilisation resulting in improved household food waste</p>	

management (WRAP, 2021). Emerging research has examined the relationship between shock and food waste behaviours during the Covid-19 pandemic (Brizi & Biraglia, 2020; Cosgrove et al., 2021; WRAP, 2021; Fischer et al., 2021). Separately, behavioural models e.g., Theory of Planned Behaviour (TPB) estimate influences on household food waste behaviours and intentions (outside of a shock) (La Barbera & Verneau, 2016). An opportunity exists to further disentangle the relationship between household food waste behaviours and potentially enhanced food insecurity during a shock by examining contributing variables through a behavioural model lens.

The relationship between food security and food waste is apparent also in terms of food shopping behaviours. An emergent model of food redistribution, social supermarkets (SSMs) hold considerable potential for facilitating social development in deprived areas while diverting food waste. SSMs take high quality surplus food, not sellable in the mainstream market, and provide it to low-income consumers for greatly discounted prices in a more dignified shopping experience. SSM emergence can be sporadic – with the first one in the UK having opened in 2013 – and the little research done on this redistribution model has almost exclusively focused on exploratory work for their classification and mapping. There is no research, as of yet, which takes a focused look at the consumer experience of SSMs, or their feasibility in providing adequate nutrition or success in reaching their aims to help people transition out of food poverty. Similarly, little is known about the consumer demand for SSMs.

The research analyses the relationship between food waste and food security using two case studies. These are testing the hypothesis that actual and/or perceived food insecurity may influence household food waste, and the use of social supermarkets (SSM). The relationship may be enhanced during shocks (e.g., Covid-19) and fluctuate in relation to other factors e.g., social reforms and financial markets volatility linked to cuts to public finances and social benefits.

## Methodology

100 – 250  
words

We used two survey datasets collected in 2020 (676 responses) and 2021 (595 responses) and behavioural economics techniques (structural equation models) to estimate the impact of observed and latent factors on food waste related behaviours under shock (e.g., Covid-19 pandemic) and food redistribution aspects (intentions to use social supermarkets). Sample quotas for both surveys included household income distribution below and above the poverty line, gender, region and food shopping responsibility (full/partial).

To test relationships *a priori* identified in the literature, hypotheses and a conceptual model were built around Theory of Planned Behaviour (Ajzen, 2013), with questionnaire items including essential observed variables (socio-demographics) and latent (attitudinal) variables (measured on Likert scales). The structural equation model (SEM) with observed and latent variables was estimated

in the Diagonally Weighted Least Squares (DWLS) method using the Lisrel software.

**Results**

**100 – 250 words**

Conceptual models are presented in Figures 1 and 2.

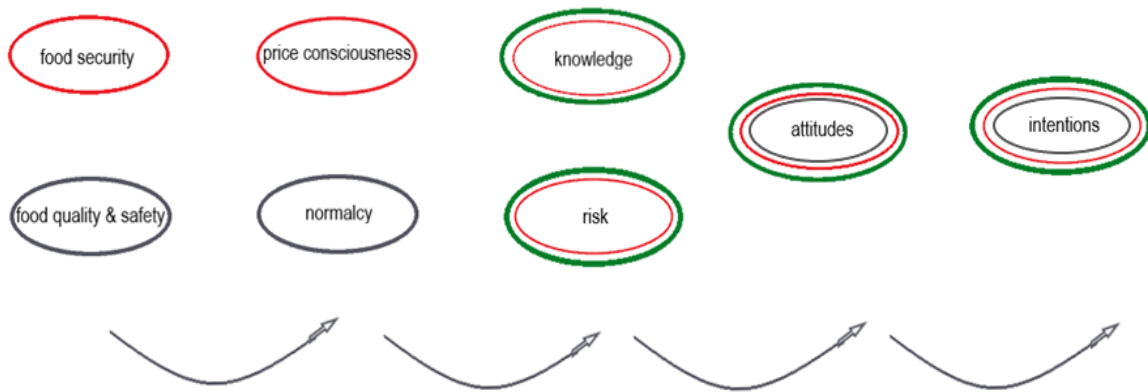


Figure 1. Conceptual model food redistribution (SSMs)

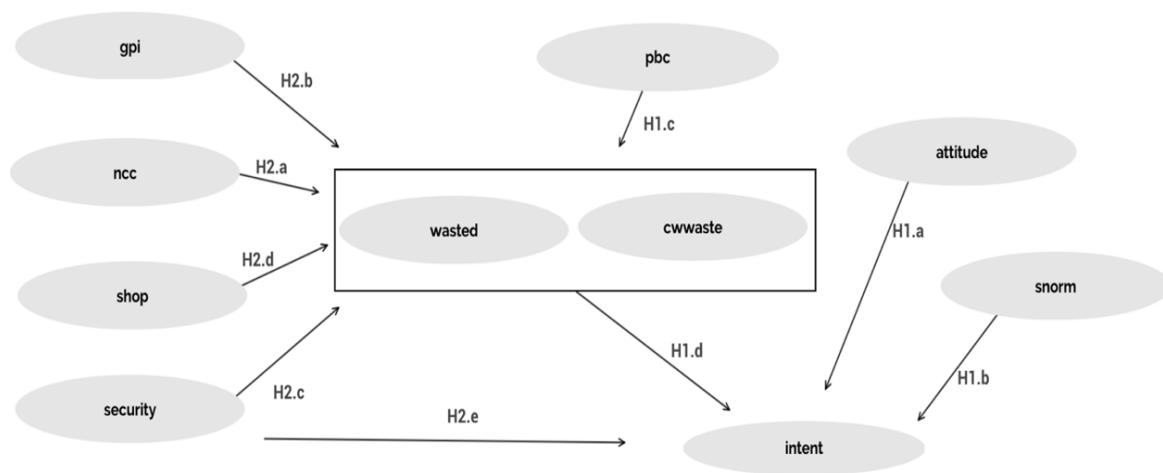


Figure 2. Conceptual model food waste related behaviours under shock

Goodness of fit indicator values for the the food redistribution (SSMs) and food waste related behaviours under shock models are presented in Tables 1 and 2, respectively.

Table 1. Goodness of fit values for the food redistribution (SSMs) model

Goodness of Fit Indicator	Estimated value	Recommended range
Normed $\chi^2$ ( $\chi^2/df$ )	2.84	1 – 3 (Kline, 2015)
RMSEA	0.055	0.0 - 0.1 (Kline, 2015)
SRMR	0.073	0.0 - 0.1 (Kline, 2015)

GFI	0.95	0.9 – 1.0 (Westland, 2016)
AGFI	0.94	0.9 – 1.0 (Westland, 2016)
CFI	0.97	0.9 – 1.0 (Westland, 2016)
NFI	0.96	0.9 – 1.0 (Westland, 2016)

Table 2. Goodness of fit values for the food waste related behaviours under shock model

Goodness of Fit Indicator	Estimated Value	Recommended Range
Normed Chi-Square	2.79	1-3
RMSEA	0.055	0.0 -0.1 (Kline, 2015)
PNFI	0.9	0.9-1.0
PGFI	0.88	0.9-1.0
IFI	0.97	0.9-1.0
RFI	0.96	0.0 -0.1 (Kline, 2015)
SRMR	0.073	0.9-1.0 (Westland, 2016)
GFI	0.97	0.9-1.0 (Westland, 2016)
AGFI	0.97	0.9-1.0 (Westland, 2016)
CFI	0.97	0.9-1.0 (Westland, 2016)
NNFI	0.97	0.9-1.0 (Westland, 2016)
NFI	0.96	0.9-1.0 (Westland, 2016)

Structural coefficients values for the food redistribution (SSMs) and food waste related behaviours under shock models are presented in Tables 3 and 4, respectively.

Table 3. Structural coefficients for the food redistribution (SSMs) model

Observed/ Latent Variable	Total effect on 'price'	Total effect on 'know'	Total effect on 'normal'	Total effect on 'risk'	Total effect on 'attitude'	Total effect on 'intent'
security	-0.22 (- 3.23)	-0.37 (- 7.40)	-0.09 (- 2.99)	-0.07 (- 2.80)	-0.07 (- 2.87)	-0.29 (- 6.19)
price	-	0.34 (5.87)	0.42 (7.10)	0.33 (5.67)	0.33 (6.02)	0.44 (9.55)
know	-	-	-	-	-	0.14 (3.18)
qualsafe	-	-	0.12 (2.45)	0.09 (2.27)	0.09 (2.37)	0.06 (2.28)
normal	-	-	-	-0.79 (- 14.49)	0.78 (18.67)	0.49 (11.73)
risk	-	-	-	-	-0.67 (- 5.88)	-0.43 (- 5.46)
attitude	-	-	-	-	-	0.63 (13.17)

R-Square	0.05	0.25	0.19	0.62	0.78	0.64
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Table 4. Structural coefficients for the food waste related behaviours under shock model

	attitude	cwbehav	wasted	intent
security	-0.17 (-2.67)	-0.06 (-2.20)	-0.27 (-3.16)	0.49 (8.86)
pbc			0.42 (2.72)	-0.05 (-2.69)
snorm			0.26 (2.42)	-0.03 (-2.04)
gpi			-0.16 (-2.93)	0.02 (2.72)
ncc	0.61 (6.43)	0.27 (3.12)	0.03 (2.31)	0.30 (6.62)
shop		-0.28 (-4.14)	0.16 (2.83)	-0.08 (-3.93)
attitude		0.34 (4.90)	0.03 (2.65)	0.47 (8.86)
cwbehav			0.09 (2.57)	0.22 (5.05)
wasted				-0.11 (-2.20)
R-Square	0.34	0.54	0.41	0.63

Results suggest that having experienced food insecurity significantly influences the intention to use a SSM among other factors such as attitudes, perceived ‘normality’ of the shopping experience, price consciousness, perceptions of the risks of SSMs contributing to the normalisation of the systemic causes of food poverty and food waste, being aware of the food assistance and sustainability aims of SSMs, food quality and safety perceptions.

Similarly, perceived food insecurity has a significant effect on household food waste behaviours and intentions, and self-reported food waste, together with other factors including food waste attitudes, need for cognitive closure, shopping patterns (proxy for indicators of overpurchasing/stockpiling), perceived behavioural control, subjective norms, and the good provider identity.

<b>Discussion and Conclusion</b>	<b>100 – 250 words</b>
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The findings are relevant to the current discourse on household food waste during Covid-19 and, in a broader sense, food waste and food security during shock. Future research may build on these findings, specifically as the world is still reeling from the shock of Covid-19, and uncertainty around the future of the pandemic and emerging variants remains unclear.

The findings are relevant for food waste reduction policies as they indicate factors potentially influencing the use of an emerging avenue for food surplus. Although more research is needed to further detangle to what extent SSMs fulfil their social and environmental sustainability goals, and what is the risk of their contributing to the normalisation of the systemic causes of food poverty and food waste.