

















## ORIGINAL RESEARCH

# Food insecurity in adults with severe mental illness living in Northern England: A co-produced cross-sectional study

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## Abstract

**Aim:** This study aimed to explore food insecurity prevalence and experiences of adults with severe mental illness living in Northern England.

**Methods:** This mixed-methods cross-sectional study took place between March and October 2022. Participants were adults with self-reported severe mental illness living in Northern England. The survey included demographic, health, and financial questions. Food insecurity was measured using the US Department of Agriculture Adult Food Security measure. Quantitative data were analysed using descriptive statistics and binary logistic regression; and qualitative data using content analysis.

**Results:** In total, 135 participants completed the survey, with a mean age of 44.7 years (SD: 14.1, range: 18–75 years). Participants were predominantly male (53.3%), white (88%) and from Yorkshire (50.4%). The food insecurity prevalence was 50.4% ( $n = 68$ ). There was statistical significance in food insecurity status by region ( $p = 0.001$ ); impacts of severe mental illness on activities of daily living ( $p = 0.02$ ); and the Covid pandemic on food access ( $p < 0.001$ ). The North West

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had the highest prevalence of food insecurity (73.3%); followed by the Humber and North East regions (66.7%); and Yorkshire (33.8%). In multivariable binary logistic regression, severe mental illness' impact on daily living was the only predictive variable for food insecurity (odds ratio = 4.618, 95% confidence interval: 1.071–19.924,  $p = 0.04$ ).

**Conclusion:** The prevalence of food insecurity in this study is higher than is reported in similar studies (41%). Mental health practitioners should routinely assess and monitor food insecurity in people living with severe mental illness. Further research should focus on food insecurity interventions in this population.

#### KEYWORDS

food insecurity, food poverty, mental health, psychosis, severe mental illness

## 1 | INTRODUCTION

Food insecurity can be described as a lack of the financial resources required to ensure reliable access to food to meet dietary, nutritional, and social needs.<sup>1</sup> In the United Kingdom, 18% of households (9.7 million adults) experience food insecurity with Northern England experiencing some of the highest levels of food insecurity in the United Kingdom.<sup>2</sup> The physical and mental health impacts of a poor-quality diet have been well documented.<sup>3</sup> Food insecurity causes considerable psychological distress, which may lead to mental health conditions<sup>4</sup>; exacerbations of pre-existing mental illnesses,<sup>5</sup> and increased risk of individuals making a suicide attempt.<sup>6</sup> Individuals experiencing food insecurity may present as underweight, overweight, or having obesity<sup>7</sup>; or with hypertension<sup>8</sup>; diabetes or hyperlipidaemia.<sup>9</sup> Nevertheless, in higher income countries, food insecurity is more likely to result in undernourishment through lack of access to a healthy diet,<sup>7</sup> with a large price disparity between cheap, palatable food and healthy alternatives.<sup>10</sup> The annual prevalence of food insecurity in the United Kingdom is increasing.<sup>11</sup> There are several potential explanations for this, including the COVID-19 pandemic,<sup>12</sup> the current global cost-of-living crisis,<sup>13</sup> and soaring energy bills in the United Kingdom.<sup>14</sup>

Severe mental illness defines the most serious mental health conditions that share the same basic characteristics including significant symptom severity, severe functional impairment, and an enduring impact on a person's daily life.<sup>15</sup> Examples of severe mental illness include schizophrenia, bipolar affective disorder, and other forms of psychosis. In England, there are approximately 574 000 people with severe mental illness.<sup>16</sup> Individuals with severe mental illness are likely to die 15–25 years earlier than the general population<sup>17</sup> mainly due to preventable health conditions.<sup>18</sup> Northern England is

home to 80% of towns with the highest directly standardised mortality rates for premature mortality in people with severe mental illness living in England.<sup>19</sup> People with severe mental illness are at a higher risk of developing obesity, diabetes and cardiovascular diseases when compared to the general population.<sup>20</sup> The factors leading to this stark health inequality are complex and include a lack of physical activity, higher levels of smoking, alcohol use, and a poor-quality diet.<sup>18</sup> Furthermore, people with severe mental illness are less likely to be in employment<sup>21</sup> and are therefore more likely to experience poverty than people without severe mental illness.<sup>22</sup>

A systematic review by Smith et al. (2023) reported that 41% (95% CI: 29%–53%,  $I^2 = 99.9%$ ,  $n = 13$ ) of people with severe mental illness experience food insecurity in high or upper-middle income countries. People with severe mental illness were found to be 3.31 (95% CI: 2.03–5.41) times more likely to report food insecurity than non-psychiatric controls/the general population.<sup>23</sup> However, none of the studies in the review by Smith et al. were undertaken in the United Kingdom, and the majority were of a cross-sectional nature.<sup>23</sup> Having a severe mental illness in conjunction with food insecurity remains an under-researched area worldwide, and particularly in the United Kingdom. This potentially leads to food insecurity being undetected and under-managed in mental health clinical practice and across the wider health and social care system.<sup>24</sup>

Northern England is defined geographically as the North West; North East and North Cumbria; Yorkshire; and the Humber. It has long-standing persistent poor health compared to the rest of England, with this gap widening in recent years.<sup>25</sup> This includes high rates of both food insecurity<sup>2</sup> and severe mental illness.<sup>19</sup> Despite these stark health inequalities, Northern England receives less health research funding than other areas of England.<sup>26</sup>

This study aimed to explore the food insecurity prevalence and experiences of adults with severe mental illness living in Northern England. The research questions were: (1) What is the prevalence of food insecurity in adults with severe mental illness living in Northern England? (2) What are the experiences of adults with severe mental illness in relation to food insecurity in Northern England? and (3) What are the possible approaches that adults with severe mental illness think would be useful to support them to access adequate healthy, affordable food? The study was a mixed-methods study, with a cross-sectional survey and semi-structured interviews. Both arms of the study were co-produced with people living with severe mental illness. This paper reports on the survey phase of the study, with the qualitative findings reported elsewhere.<sup>27</sup>

## 2 | METHODS

The cross-sectional phase of this multi-site study was undertaken between March and October 2022. Ethical approval was obtained from the North-East Newcastle and North Tyneside 1 Research Ethics Committee (Reference: 22/NR/0010); and the Health Research Authority and Health and Care Research Wales (IRAS ID: 306281). The study complies with the Strengthening the Reporting of Observational Studies in Epidemiology statement for observational studies (see completed checklist).<sup>28</sup>

Participants were adults aged 18 years and above, with a self-reported diagnosis of severe mental illness and resident in Northern England. Participants with bipolar affective disorder, schizophrenia, schizoaffective disorder, or another form of psychosis were included. The following International Statistical Classification of Diseases and Related Health Problems 10th Revision codes<sup>29</sup> were considered other forms of psychosis in this study: acute and transient psychotic disorders (F23); shared psychotic disorder (F24); and other non-organic psychotic disorders (F28). Additional questions on the impact of participants' severe mental illness on activities of daily living were asked in the survey to confirm the severity of their mental illness. Participants under 18 years were excluded, or if they did not have severe mental illness; live in Northern England; or provide informed consent. An online survey was distributed by Equally Well UK (The Centre for Mental Health) and promoted on social media by their partner organisations, leading to onward dissemination. Paper surveys and consent forms were available upon request and distributed by NHS sites. Seven NHS sites were involved in recruiting participants, with site staff providing support to participants who required help completing the survey questions. Sites covered the following regions: the North

East and North Cumbria ( $n = 2$ ); the North West ( $n = 1$ ); and Yorkshire and Humber ( $n = 4$ ).

The study was co-produced from its conception to dissemination. Four Peer Researchers with lived experience of severe mental illness were employed to undertake the interview phase of this study (reported elsewhere).<sup>27</sup> These Peer Researchers were involved in designing the survey; supporting with survey distribution; overseeing the data analysis; and acted as co-authors on dissemination outputs. Further lived experience voices were included as part of the steering group for this study.

The anonymous survey was hosted on the Jisc Online Surveys platform (March to October 2022 version). Questions were a mix of quantitative and free-text questions. The survey included the US Department of Agriculture Adult Food Security Module.<sup>30</sup> In the absence of a UK food insecurity tool, the US Department of Agriculture Adult Food Security Module is the tool of choice for UK surveys.<sup>31</sup> The 10-item tool was selected for this study instead of the 18-item version due to the reduced participant burden (advised by the researchers with lived experience of severe mental illness). The recall period was the previous 12 months. The food security status was assigned as follows: raw score zero—high food security; raw score 1–2—marginal food security; raw score 3–5—low food security; raw score 6–10—very low food security. For this study, the food security status of the first two categories in combination was described as food secure and the latter two as food insecure. This is in line with the studies included in the systematic review by Smith et al.<sup>23</sup> Binary outcomes of food insecure/food insecure were selected due to the anticipated small sample size.

Further questions were a combination of Likert scale, open-ended questions and self-reported demographic questions including age, sex, gender identity, ethnicity, geographical region, marital status, and living arrangements (number of adults and children in the household). Self-reported clinical data included specific severe mental illness diagnosis, duration of severe mental illness diagnosis, impact of severe mental illness on daily living, weight, height, perceived BMI category, and physical health conditions. Further self-reported data on financial status were collected including household income over the past 12 months and government benefits received. Clinical and food insecurity data were checked by the Registered Mental Health Dietitian, with support from a Consultant Psychiatrist. Data such as severe mental illness, physical health and BMI were all self-reported as the survey was anonymous, and the study team did not have the resources to employ a researcher to measure weight and height or check clinical records. Instead, as is common in a lot of research, we included specific survey questions asking participants to self-report their weight

and height (free text allowing them to add this in their preferred metric). Furthermore, we asked participants to specify (by ticking a box) whether they had schizophrenia, bipolar affective disorder, or another form of psychosis to verify that they met the inclusion criteria. Qualitative open-ended questions focused on participants' experiences of food insecurity, including its impact on their general health and weight. Further questions were about interventions to address food insecurity.

A post-hoc sample size calculation<sup>32</sup> was carried out based on a reported 18% prevalence of food insecurity in the general population<sup>2</sup> and an anticipated 41% prevalence in the study group<sup>23</sup> to ensure the sample had sufficient statistical power. With statistical power set at 90%, and Alpha set at 0.05, the sample size was calculated to be a minimum of 36 participants. SPSS version 25 was used for statistical analysis. Analysis included descriptive statistics and chi squared tests for categorical variables, or Fisher–Freeman–Hamilton Exact Test where cells had an expected count of less than five. Statistical significance was set at  $p < 0.05$ . Binary logistic regression analyses were undertaken to determine odds ratios for variables associated with food insecurity that had at least 10 events per variable,<sup>33</sup> with variable categories being collapsed where possible to increase the number of events. Missing data were excluded from descriptive statistics tables to provide a valid food insecurity percentage for each variable.

Content analysis<sup>34</sup> was used to analyse the open-ended survey questions. Data were uploaded to NVivo Pro version 12 and coded for content by two researchers. Codes were checked by a third researcher. The collated data were examined to detect patterns and develop categories identifying the experiences of people with severe mental illness in relation to food insecurity and the possible approaches to address food insecurity, as outlined in the research questions. Categories were developed based on the most frequently coded content, with content reported by at least five participants included in the final analysis categories. This number was discussed and agreed with the qualitative methodologists on the research team. Supporting quotes were used to contextualise the categories.

### 3 | RESULTS

In total, 158 participants completed the survey, with 135 included after reviewing participant information against inclusion/exclusion criteria. Exclusion reasons are outlined in Figure 1. Table 1 shows demographic, financial, and health characteristics of participants. The mean age was 44.7 years (SD: 14.1, range: 18–75 years). Participants were predominantly male (53.3%,  $n = 72$ ). Ethnicities were 88% white ( $n = 117$ ), 5.3% black ( $n = 7$ ),

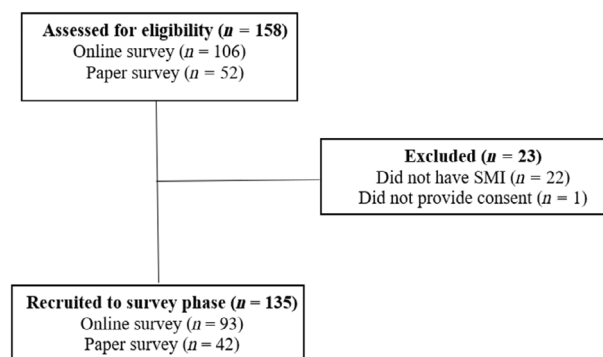


FIGURE 1 Study flow diagram.

3.7% mixed ( $n = 5$ ), 1.5% Asian ( $n = 2$ ), 0.7% Arab ( $n = 1$ ), and 0.7% British Somali ( $n = 1$ ). Over 50% (50.4%,  $n = 68$ ) were from Yorkshire, 28.9% from the Humber ( $n = 39$ ), 11.1% from the North West ( $n = 15$ ), 8.9% from the North East ( $n = 12$ ), and 0.7% from North Cumbria ( $n = 1$ ). Over 59% (59.5%) of participants lived in a single-adult household ( $n = 78$ ), and 87.7% had no children aged under 18 years in their household ( $n = 114$ ).

Fourteen percent of participants received a household income of less than £5200 over the last 12 months ( $n = 15$ ); 60.7% received £5200 to £20 799 ( $n = 64$ ); 22.4% received £20 800 to £51 999 ( $n = 24$ ); and 3.7% received £52 000 or more ( $n = 4$ ). More than half of participants (53.2%) were in receipt of more than one government benefit ( $n = 67$ ). Over 17% of individuals (17.5%) received Personal Independence Payment benefit in isolation ( $n = 22$ ); 14.3% received Universal Credit in isolation ( $n = 18$ ); and 15.1% received one other benefit in isolation for example Employment Support Allowance; Disability Living Allowance; an occupational or private pension; or State Retirement Pension ( $n = 19$ ).

The most common self-reported diagnoses were bipolar affective disorder (34.1%,  $n = 46$ ) and schizophrenia (31.1%,  $n = 42$ ). Other severe mental illness diagnoses were another form of psychosis (27.4%,  $n = 37$ ) and schizoaffective disorder (7.4%,  $n = 10$ ). Over 82% (82.6%) of participants felt that their severe mental illness reduced their ability to carry out day-to-day activities 'a little' or 'a lot' ( $n = 109$ ). Over 59% (59.4%) of participants reported having other illnesses, disabilities, or health conditions in addition to their severe mental illness diagnosis ( $n = 80$ ), with the most common being Type 2 Diabetes (14.2%,  $n = 19$ ); and Musculoskeletal Disorders (13.4%,  $n = 18$ ). Thirty-eight percent of participants had multiple comorbidities in addition to their severe mental illness ( $n = 51$ ). The mean BMI of participants was 29.2 kg/m<sup>2</sup> (SD: 6.7, range: 14.1–52.2 kg/m<sup>2</sup>), with 6.0% of participants being underweight ( $n = 8$ ); 25.4% being a healthy weight ( $n = 34$ ); 26.1% being overweight ( $n = 35$ ); and 42.5%

TABLE 1 Demographic, financial, and health characteristics of participants.

Variable (number of responses)	Total sample ( <i>n</i> = 135)	Food secure ( <i>n</i> = 67)		Food insecure ( <i>n</i> = 68)		<i>p</i> value <sup>a</sup>
	<i>n</i> (%)	<i>n</i>	%	<i>n</i>	%	
Demographic						
Age (years) ( <i>n</i> = 135)						
Mean	44.7					0.975
SD	14.1					
Range	18–75 years					
Sex ( <i>n</i> = 135)						
Male	72 (53.3)	37	51.4	35	48.6	0.662
Female	63 (46.7)	30	47.6	33	52.4	
Ethnicity ( <i>n</i> = 133)						
White	117 (88.0)	59	50.4	58	49.6	0.692
Black	7 (5.3)	3	42.9	4	57.1	
Mixed	5 (3.7)	1	20.0	4	80.0	
Asian	2 (1.5)	1	50.0	1	50.0	
Other	2 (1.5)	2	100.0	0	0.0	
Region of residence ( <i>n</i> = 135)						
The Humber	39 (28.9)	13	33.3	26	66.7	
North West	15 (11.1)	4	26.7	11	73.3	0.001**
North East	12 (8.9)	4	33.3	8	66.7	
Yorkshire	68 (50.4)	45	66.2	23	33.8	
North Cumbria	1 (0.7)	1	100.0	0	0.0	
Living arrangements ( <i>n</i> = 131)						
Single adult	78 (59.5)	36	46.2	42	53.8	0.336
>1 adult	53 (40.5)	29	54.7	24	45.3	
Children in household (<18 years) ( <i>n</i> = 130)						
No children	114 (87.7)	59	51.8	55	48.2	0.124
≥1 child	16 (12.3)	5	31.2	11	68.8	
Marital status ( <i>n</i> = 134)						
Never married	84 (62.7)	43	51.2	41	48.8	0.355
Married/civil partnership	23 (17.2)	13	56.5	10	43.5	
Divorced/separated/widowed	27 (20.1)	10	37.0	17	63.0	
Financial						
Annual household income ( <i>n</i> = 107)						
Less than £5200	15 (14.0)	4	26.7	11	73.3	
£5200–£10 399	28 (26.2)	11	39.3	17	60.7	0.112
£10 400–£15 599	26 (24.3)	12	46.2	14	53.8	
£15 600–£20 799	10 (9.3)	3	30.0	7	70.0	
£20 800–£25 999	12 (11.2)	7	58.3	5	41.7	
£26 000–£36 399	5 (4.7)	3	60.0	2	40.0	
£36 400–£51 999	7 (6.5)	5	71.4	2	28.6	
£52 000–£77 999	2 (1.9)	2	100.0	0	0.0	
£78 000 or above	2 (1.9)	2	100.00	0	0.0	

(Continues)

TABLE 1 (Continued)

Variable (number of responses)	Total sample ( <i>n</i> = 135)	Food secure ( <i>n</i> = 67)		Food insecure ( <i>n</i> = 68)		<i>p</i> value <sup>a</sup>
	<i>n</i> (%)	<i>n</i>	%	<i>n</i>	%	
Benefits received ( <i>n</i> = 126)						
Personal independence payment	22 (17.5)	11	50.0	11	50.0	0.693
Universal credit	18 (14.3)	7	38.9	11	61.1	
Other	19 (15.1)	11	57.9	8	42.1	
Multiple benefits	67 (53.2)	31	46.3	36	53.7	
Impact of COVID-19 pandemic on food access ( <i>n</i> = 124)						
More difficult to access food	60 (48.4)	22	36.7	38	63.3	<0.001**
Little difference in food access	56 (45.2)	38	67.9	18	32.1	
Easier to access food	8 (6.4)	1	12.5	7	87.5	
Health						
SMI diagnosis ( <i>n</i> = 135)						
Bipolar affective disorder	46 (34.1)	25	54.3	21	45.7	0.06
Other form of psychosis	37 (27.4)	14	37.8	23	62.2	
Schizoaffective disorder	10 (7.4)	1	10	9	90	
Schizophrenia	42 (31.1)	27	64.3	15	35.7	
Duration of SMI ( <i>n</i> = 126)						
0–5 years	45	19	42.2	26	57.8	0.407
6–10 years	18	10	55.6	8	44.4	
11–15 years	15	10	66.7	5	33.3	
16–20 years	7	3	42.9	4	57.1	
Over 20 years	41	24	58.5	17	41.5	
Impact of SMI on daily living ( <i>n</i> = 132)						
SMI impacts on activities of daily living	109 (82.6)	49	45.0	60	55.0	0.020*
SMI does not impact on activities of daily living	23 (17.4)	17	73.9	6	26.1	
Physical health ( <i>n</i> = 134)						
Type 2 diabetes	19 (14.2)	9	47.4	10	52.6	0.923
Musculoskeletal disorder	18 (13.4)	7	38.9	11	61.1	
Other Health condition	48 (35.8)	24	50.0	24	50.0	
No physical health condition	54 (40.3)	28	51.9	26	48.1	
BMI ( <i>n</i> = 129)						
Mean BMI (kg/m <sup>2</sup> )	29.2					
SD	6.7					
Range	14.1–52.2					
BMI category ( <i>n</i> = 134)						
Underweight (<20.0 kg/m <sup>2</sup> )	8 (6.0)	2	25.0	6	75.0	0.468
Healthy (20.0–24.9 kg/m <sup>2</sup> )	34 (25.4)	17	50.0	17	50.0	
Overweight (25.0–29.9 kg/m <sup>2</sup> )	35 (26.1)	20	57.1	15	42.9	
Obesity (≥30.0 kg/m <sup>2</sup> )	57 (42.5)	28	49.1	29	50.9	

Abbreviation: SMI, severe mental illness.

<sup>a</sup>Chi squared or Fisher Freeman–Hamilton (if cell count less than 5) tests for between group differences.\**p* < 0.05; \*\**p* < 0.01.

**FIGURE 2** Food security status by household income category.

having obesity ( $n = 57$ ). Participants' perception of their BMI was different to the actual BMI data collected, with 7.4% reporting to be underweight ( $n = 10$ ); 29.6% reporting to be of healthy weight ( $n = 40$ ); and 58.5% reporting they were overweight/had obesity ( $n = 79$ ).

The overall food insecurity prevalence of the sample was 50.4% ( $n = 68$ ). Furthermore, 31.1% experienced very low food security ( $n = 42$ ) and 19.3% had low food security ( $n = 26$ ). Overall 13.3% of the sample had marginal food security ( $n = 18$ ) and 36.3% were food secure ( $n = 49$ ). There were no significant differences in food insecurity status between categories of sex, ethnicity, living arrangements, household income, benefits received, physical health diagnoses, severe mental illness diagnosis or BMI group (Table 1). However, a high proportion of people who were underweight had food insecurity (75%) and food insecurity prevalence generally reduced with increasing income (Figure 2). Food insecurity prevalence varied by region and was statistically significant (Fisher-Freeman-Hamilton Exact: 16.871,  $p = 0.001$ ). Participants living in the North West had the highest prevalence of food insecurity (73.3%,  $n = 11$ ), followed by the Humber (66.7%,  $n = 26$ ) and the North East (66.7%,  $n = 8$ ). Yorkshire had a lower prevalence of food insecurity (33.8%,  $n = 23$ ) and the sole participant from North Cumbria did not have food insecurity. The impacts of severe mental illness on activities of daily living and the Covid pandemic on food access were statistically significant for food insecurity (chi squared: 6.371,  $p = 0.02$  for the impact of severe mental illness; chi squared: 15.881,  $p < 0.001$  for the impact of Covid). In the binary logistic regression (Table 2), severe mental illness impacting on activities of daily living was the only predictive variable for food insecurity (odds ratio = 4.618, 95% CI: 1.071–19.924,  $p = 0.04$ ). The prevalence of food insecurity in participants who felt severe mental illness impacted on their activities of daily living was 55% ( $n = 60$ ) compared to 26.1%

( $n = 6$ ) for those who did not. One other variable in the regression found food insecurity to be significantly less likely—living in Yorkshire (odds ratio = 0.253, 95% CI: 0.096–0.663,  $p = 0.005$ ).

The following data represents main categories of free-text responses provided by all survey participants, regardless of their food security status ( $n = 135$ ) relating to experiences of food insecurity and interventions to tackle food insecurity. Table 3 provides a full overview of the categories and their frequencies.

Whilst some participants felt that food insecurity did not affect them or impact on their health, other participants described its consequences. The main content was the perceived reduction in diet quality. Participants reported reduced intakes of protein-based foods, fruit, vegetables, and micronutrients:

I do not eat enough quality protein, fruit and vegetables because of cost and perishability issues.

Male, 52 years

Some participants reported no change to their weight, however several expressed concerns about losing weight:

Loss of weight so much my clothes no longer fit me but cannot afford to replace them.

Male, 59 years

That said, some respondents also described weight gain due to food insecurity:

I gained a lot of weight as I was eating a lot of processed food and easy to access food such as pot noodles. It was a combination of my medication I was put on and the poor diet that led me to put on many stones when I left hospital.

Male, 29 years

TABLE 2 Comparison of demographic characteristics by food security status.

Variable	Food secure		Food insecure		Difference <sup>a</sup> (p)	Binary logistic regression		
	n	%	n	%		OR	95% CI	p value
Aged 18–49	40	50.0	40	50.0	1.000	0.964	0.485–1.916	0.912
Aged 50 or above	27	49.1	28	50.9		1.037	0.522–2.061	
Male	37	51.4	35	48.6	0.731	0.860	0.437–1.692	0.379
Female	30	47.6	33	52.4		1.163	0.591–2.288	
White	59	50.4	58	50.6	0.791	0.765	0.267–2.190	0.553
Non-white	7	43.8	9	56.2		1.308	0.457–3.745	
Live in North East and North Cumbria	5	38.5	8	61.5	0.561	1.653	0.512–5.340	0.488
Live in North West	4	26.7	11	73.3	0.098	3.039	0.916–10.083	0.5710
Live in Yorkshire	45	66.2	23	33.8	<0.01**	0.253	0.096–0.663	0.005**
Live in the Humber	13	33.3	26	66.7	0.022*	2.571	1.181–5.600	0.963
Never married/civil partnership	43	51.2	41	48.8	0.596	0.812	0.403–1.638	0.849
Married	13	56.5	10	43.5	0.497	0.703	0.284–1.737	0.537
Separated/divorced/widowed	10	37.0	17	63.0	0.197	1.867	0.783–4.448	0.408
BMI <25 kg/m <sup>2</sup>	19	45.2	23	54.8	0.577	1.321	0.635–2.747	0.488
BMI ≥25 kg/m <sup>2</sup>	48	52.2	44	47.8		0.757	0.364–1.575	
Bipolar affective disorder	25	54.3	21	45.7	0.471	0.751	0.368–1.533	0.298
Schizophrenia or schizoaffective disorder	28	53.8	24	46.2	0.725	0.861	0.430–1.724	0.075
Another form of psychosis	14	37.8	23	62.2	0.247	1.658	0.770–3.570	0.420
Diagnosed with SMI 0–10 years	29	46.0	34	54.0	0.212	1.668	0.824–3.377	0.122
Diagnosed with SMI 11–20 years	13	59.1	9	40.9	0.639	0.719	0.283–1.829	0.388
Diagnosed with SMI over 20 years	24	58.5	17	41.5	0.349	0.692	0.326–1.469	0.384
SMI impacts on activities of daily life	49	45.0	60	55.0	0.020*	4.618	1.071–19.924	0.040*
SMI does not impact on activities of daily life	17	73.9	6	26.1		0.288	0.106–0.787	
At least one physical health condition	39	49.4	40	50.6	0.860	1.105	0.553–2.208	0.811
No physical health conditions	27	52.9	24	47.1		0.905	0.453–1.809	
Has type 2 diabetes	9	47.4	10	52.6	1.000	1.111	0.421–2.935	0.645
Has a musculoskeletal disorder	7	38.9	11	61.1	0.449	1.654	0.600–4.563	0.991
Household income ≤£15 599	27	39.1	42	60.9	0.071	2.139	0.956–4.785	0.243
Household income ≥£15 600	22	57.9	16	42.1		0.468	0.209–1.046	
Receiving universal credit in isolation	7	38.9	11	68.1	0.457	1.514	0.546–4.199	0.177
Receiving personal independence payment in isolation	11	50.0	11	50.0	0.819	0.891	0.355–2.236	0.955
Receiving multiple benefits	31	46.3	36	53.7	0.858	1.123	0.557–2.262	0.891
Receiving another form of benefit in isolation	11	57.9	8	42.1	0.455	0.614	0.229–1.648	0.268
Single adult household	36	46.2	42	33.8	0.376	1.410	0.700–2.840	0.947
Living with one or more adult	29	54.7	24	45.3		0.709	0.352–1.429	
No children in the household	59	51.8	55	48.2	0.182	0.424	0.138–1.298	0.124
Living with one or more child <18 years	5	31.2	11	68.8		2.360	0.771–7.227	
Covid pandemic made it more difficult to access food	22	36.7	38	63.3	0.008**	2.695	1.303–5.572	0.281
Covid pandemic made little difference to food access or made food access easier	39	60.9	25	39.1		0.371	0.179–0.767	

Abbreviation: SMI, severe mental illness.

<sup>a</sup>Between group difference tested using chi squared tests.\**p* < 0.05. \*\**p* < 0.01.



**TABLE 3** Content analysis categories and frequencies.

Categories	Frequency of content in survey responses ( <i>n</i> )
<b>Experiences of food insecurity</b>	
Reduction in diet quality	33
Weight loss	32
Weight gain	24
Food insecurity had no impact on weight	20
Food insecurity had no impact on participant	21
Exacerbation of mental illness	18
Difficulty going shopping due to mental illness	11
Increased binge eating	10
Lack of cooking skills making food insecurity worse	8
Exhaustion and/or fatigue	7
Increased reliance on takeaways or eating out	7
Impact on participants' children	6
Having to rely on carers more to access food	6
Not being able to afford energy (gas/electric) to cook healthy food	6
<b>Interventions to address food insecurity in adults with SMI</b>	
Education on healthy eating, cooking skills and/or budgeting	20
Improving access and referrals to foodbanks	19
Food vouchers	16
Improving the government benefits system	15
Support worker or services to help with shopping and/or cooking	7
Delivered meals	7
Food parcels delivered to people's homes	5
Oral nutritional supplements being prescribed	5

The impact on mental health, and symptom severity was a major point of discussion within the free-text responses. In particular participants discussed the increase in severity of mental illness when they were experiencing food insecurity, such as increased stress, anxiety, or depression:

It makes me really stressed if I can't afford to eat. It increases my depression and makes me anxious.

Female, 46 years

Participants discussed the impact the food insecurity on their family and the knock-on effect that had on their mental health. It seemed as though parents could accept food insecurity for themselves, but when they started to worry about not having enough money to buy food for their children the stress and anxiety of this had a detrimental impact on their mental health:

One time a friend had to sell his X-box so I could afford to buy food for my children. I also suffer with anxiety and depression and worrying about if I will have enough food for my children gets me in a really low state.

Female, 33 years

Additional impacts of food insecurity were identified. For instance, physical and/or mental health conditions can severely impact on an individual's ability to access shops to buy food. Similarly, poor transport links limited the availability of participants' food options to local shops and takeaway outlets, which may not have the same range of nutritious food compared to large supermarkets. Some people relied on carers (paid or unpaid) to obtain food. This lack of access to food can also lead to feelings of fatigue and exhaustion:

Not eating leads me to being exhausted and fatigued. I have little energy and my body feels weak.

Female, 24 years

The most frequently proposed approach was education on healthy eating, cooking skills and budgeting, particularly for people with severe mental illness in hospital before being discharged into the community:

People should have continual access to support and assistance from the medical experts and Government initiatives to aid cooking and shopping for nutritious food and how to make meals with it on a budget.

Female, 58 years

Improving referrals and access to food banks was also strongly recommended by participants:

Signpost to local food banks/donation centre for people who are identified to be at risk of minimal access to food.

Female, 24 years

Commonly recommended emergency support for food insecurity included food vouchers, food parcels, and delivered meals:

I feel there should be support for people who are unable to get out to food banks, such as free meals on wheels.

Male, 55 years

Other recommendations included improving the government benefits system; providing support workers to help with shopping, meal planning, equipment, and cookery skills; and providing oral nutritional support in the form of a nutritional supplement drink, similar to those prescribed by General Practitioners for malnourished patients:

Ability to be prescribed supplement drinks e.g., Ensure when acutely unwell to ensure nutrition is still being provided (they may get free prescriptions meaning nutrition could be provided at no extra cost).

Female, 24 years

## 4 | DISCUSSION

This survey found the prevalence of food insecurity in our sample to be 50.4%. The meta-analysis by Smith et al., reported a prevalence estimate for food insecurity in adults with severe mental illness living in high or upper-middle income countries of 41%, with searches undertaken up to August 2022.<sup>23</sup> Our prevalence was 9.4% higher than Smith et al., although there were no UK based studies in that review. One potential explanation for this is the COVID-19 pandemic and global cost-of-living crisis that have substantially increased the number of UK households experiencing poverty. In winter 2021/22, 62% of UK households had higher energy bills than the previous winter.<sup>14</sup> Access to food during the pandemic was significantly associated with food insecurity, which reflects general population data.<sup>12</sup> Another possible explanation being this study intentionally targeted English regions where food insecurity exceeded the UK average. Nevertheless, the prevalence of food insecurity in this study is significantly higher than in the UK general population with 18% of households<sup>11</sup> and 20.7% of adults<sup>35</sup> experiencing food insecurity. The results indicate that of those participants experiencing food

insecurity ( $n = 68$ ), more ( $n = 42$ ) experienced very low food security than experienced low food security ( $n = 26$ ), indicating the severity of food insecurity in this population. This is supported by a 2016 study in the UK general population reporting 53.5% of people with ill-health or a disability had food insecurity (95% CI: 47.7%–59.3%).<sup>35</sup> Whilst marginal food insecurity was considered food security in this study, 13.3% of the sample experienced marginal food security ( $n = 18$ ) and may have been at risk of developing food insecurity. Our survey suggested concerns about the impact of food insecurity on participants' diet quality, particularly reduced intakes of protein-based foods, fruit, vegetables, and micronutrients. This is supported by data from the Broken Plate (2023) report, that the most deprived fifth of the UK population would need to spend 50% of their disposable income on food to meet the Government guidelines for a healthy diet.<sup>36</sup>

Geographical region was significantly associated with food insecurity. The prevalence of food insecurity was highest for participants living in the North West region (73.3%), and this is in line with general population data. The Trussell Trust distributed 347 976 emergency food parcels in the North West compared to 173 625 in Yorkshire; 154 403 in the North East; and 26 937 in the Humber between 1st April 2022 and 31st March 2023.<sup>2</sup> Other significant variables were the impacts of the Covid pandemic on food access and of severe mental illness on activities of daily living. Furthermore, the only predictive variable for food insecurity in the binary logistic regression was severe mental illness impact on participants' activities of daily living, with odds of food insecurity being over four times higher for those who experienced an impact on their daily living skills. This reflects UK general population data reporting that people with disabilities (physical and mental health) were five times more likely to experience food insecurity than those without disabilities (31.1% vs. 6.4%).<sup>14</sup>

Whilst there was no statistical difference found between food security status and income category (Fisher–Freeman–Hamilton Exact = 13.50,  $p = 0.112$ ), Figure 2 indicates that food insecurity prevalence generally decreases by rising income category. This is similar to the general population trend.<sup>37</sup> Most participants (85.0%) had an annual household income below the median UK household income of £32 300 for the same period<sup>38</sup> which may partly explain the increased prevalence of food insecurity. There were no significant differences in food insecurity status between government benefit categories. However, UK general population statistics show people receiving Universal Credit have the highest prevalence (31%) of food insecurity,<sup>37</sup> and participants in our study receiving Universal Credit in isolation also had the highest prevalence of food insecurity

(61.1%). Several participants felt that the government benefits system required attention in order to address the root cause of food insecurity, with some stating they required more money from benefits to afford to eat healthily. Upstream policy reform is therefore vital to prevent people with severe mental illness becoming food insecure. This could include increasing entitlement for people with severe mental illness to various government benefits, removing barriers to accessing benefits, or increasing benefit entitlement checks in mental health settings.

There were no significant differences in food security status by severe mental illness diagnosis (Fisher–Freeman–Hamilton Exact = 12.414,  $p = 0.06$ ), although people with schizoaffective disorder had the highest prevalence (90%), and those with schizophrenia had the lowest (35.7%). Three quarters of underweight participants experienced food insecurity compared to 50% of participants with a healthy weight. This finding is reflected in general population data, where underweight individuals are likely to experience food insecurity, predominantly due to undernourishment through lack of access to a healthy diet.<sup>7</sup> Many participants reported unintentional weight loss, even if they were living with overweight or obesity. Whilst there has been an increased focus on physical health monitoring for people with severe mental illness in recent years,<sup>18</sup> the primary focus of this work is managing obesity. Unintentional weight loss due to food insecurity may therefore be potentially overlooked by mental health practitioners. Screening for food insecurity is therefore vital in mental health services to detect and manage food insecurity.

The most commonly suggested intervention to address food insecurity in adults with severe mental illness was education on healthy eating, cooking skills and budgeting. Other commonly recommended emergency support to address food insecurity included improving access to emergency food insecurity support. At present, there are no UK studies on the effectiveness or acceptability of food insecurity interventions for people with severe mental illness, and very few UK-based general population studies. Published general population evidence predominantly relates to food banks.<sup>39–41</sup> Further longitudinal research involving food insecurity interventions for people with severe mental illness is therefore required to confirm our findings and better understand how to address food insecurity in this population.

A limitation of this study is the cross-sectional design that prevents causal conclusions being drawn. Additionally, the small sample size is likely to affect the validity of the results. The lack of comparator group prevented comparisons to the general population at the same point in time. However, comparing our prevalence to previous literature shows a similar and heightened prevalence level. Furthermore, the use of social media and existing

service user groups for recruitment may have resulted in harder to reach people with severe mental illness being excluded, especially given that survey completion required a certain degree of digital and other literacy skills. However, we did provide one-to-one support with completion through NHS sites to mitigate this. The self-reporting of severe mental illness is a further limitation. As the recruitment strategy did not involve access to participants' health records, we are unable to verify their diagnosis. Similarly, another limitation is self-reporting of height and weight. Lastly, the US Department of Agriculture Adult Food Security Module food insecurity screening tool is not validated for use in the United Kingdom nor in severe mental illness populations, however it remains the gold standard and recommended UK based tool for food insecurity. Strengths of our research include being one of the first UK studies to report food insecurity prevalence data in people with severe mental illness. Furthermore, our findings about geographical differences in food insecurity and the impact of severe mental illness on daily living reflect general population data, despite our small sample.

Further research should include a larger sample size, comparators without severe mental illness, and use targeted recruitment through mental health community teams to ensure a more representative sample. Future longitudinal studies using rigorous statistical analysis are required to develop and evaluate food insecurity interventions in adults with severe mental illness, and a validated tool is urgently required to assess food insecurity in adults with severe mental illness. Furthermore, future research could include the impact of patient reported outcome measures relating to food insecurity in community mental health services. At present, mental health practitioners may not prioritise asking about food insecurity.<sup>24</sup> It is therefore vital that mental health practitioners routinely assess and monitor food insecurity in people living with severe mental illness. If food insecurity is identified, practitioners should work with people with severe mental illness to co-produce interventions that are acceptable, accessible and can be tailored to individual circumstances. Particular attention should be given to people with severe mental illness who require support with activities of daily living.

In conclusion, this study found that 50.4% of adults with severe mental illness in Northern England experienced food insecurity. This is higher than the prevalence reported in the UK general adult population (18%), and higher than reported in similar studies undertaken with participants with severe mental illness in high/upper-middle income countries (41%). People living in the North West of England and those experiencing difficulties with activities of daily living were more likely to experience food insecurity. Further research is required, with a particular focus on

interventions to address this stark health inequality. Mental health practitioners should routinely assess and monitor food insecurity in people living with severe mental illness. If food insecurity is identified, practitioners should work with people with severe mental illness to co-produce interventions that are acceptable, accessible and can be tailored to individual circumstances.

### AUTHOR CONTRIBUTIONS

All authors listed meet the authorship criteria according to recommendations of the International Committee of Medical Journal Editors (May 2023). All authors have contributed to and agree with the manuscript. The author contributions are as follows: lead author (JS), joint Chief-Investigators (JS, ELG), senior academic support (ELG, AAL), concept (JS, ELG, AAL), grant application (JS, ELG, AAL, GJM, SS, VW), design of protocol and survey (JS, ELG, GJM), research ethics and governance (JS, GJM, SBT, DE, KW, SK, SS), data collection (FE, AA, NLS, CL, HM) data analysis (JS, FE, VW, JR, ELG, GJM), data management (JS, FE), project management (JS, ELG, AAL, GJM), drafting paper (JS, ELG), reviewing paper (FE, GJM, SBT, AAL, SK, KW, AA, NLS, CL, HM, SS, DE, VW, JR, ELG).

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### CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### ETHICS STATEMENT

Ethical approval for this study was obtained from the North-East Newcastle and North Tyneside 1 Research Ethics Committee (Reference: 22/NR/0010); and the Health Research Authority and Health and Care Research Wales (IRAS ID: 306281).

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