

Title	Nutrition measures and limits: the dominance of the USDA's Food Insecurity and Hunger Module and its adaptations
Authors	Furey , Sinéad;Beacom , Emma
Publication date	2023-08-15
Original Citation	Furey, S. and Beacom, E. (2023) 'Nutrition measures and limits: the dominance of the USDA's Food Insecurity and Hunger Module and its adaptations', in Caraher, M., Coveney, J. and Chopra, M. (eds.) Handbook of Food Security and Society. Cheltenham: Edward Elgar Publishing, pp. 84-97. doi: 10.4337/9781800378445.00019
Type of publication	Book chapter
Link to publisher's version	10.4337/9781800378445.00019
Rights	© 2023, the Editors. All rights reserved. Published by Edward Elgar Publishing Limited. This is a draft chapter. The final version is available in Handbook of Food Security and Society edited by Martin Caraher, John Coveney and Mickey Chopra, published in 2023, Edward Elgar Publishing Ltd: http://dx.doi.org/https://doi.org/10.4337/9781800378445 . The material cannot be used for any other purpose without further permission of the publisher, and is for private use only.
Download date	2026-09-24 13:01:46
Item downloaded from	https://hdl.handle.net/10468/15151

Chapter 6: Nutrition measures and limits: The dominance of the USDA's Food Insecurity and Hunger Module and its adaptions

Sinéad Furey and Emma Beacom

Introduction: Food Insecurity in the United Kingdom

The appropriate measurement of food poverty, the inability to afford or access a healthy diet (Radimer et al., 1990), is critical for targeting food and economic aid and informing cross-sectoral government policy. However, its progress is complicated by the complexity of the phenomenon and the multiple tools and approaches that exist to measure food poverty (Jones et al., 2013). In January 2019, the UK's Environmental Audit Committee published its latest report on the Sustainable Development Goals in the United Kingdom (UK), highlighting the need to ensure Government cross-departmental understanding and action on hunger, and implement strategies for improvement and monitor progress. Unsurprisingly there have been numerous calls for the official, standardized and routine collection and analysis of data to determine the extent of food poverty in the UK (Taylor and Loopstra, 2016; Scottish Government, 2016).

Until April 2019, having no agreed indicator, the UK Government had not measured the prevalence of food poverty over time to identify those who are unable to afford and access sufficient food. Indeed, there was a lack of 'frequent, regular and methodologically consistent' measurement of food insecurity in the UK (Pool and Dooris, 2021, p.1). Then, in

February 2019, a delegation of like-minded social justice partners presented data and representation to the Department for Work and Pensions (DWP) and the Office for National Statistics (ONS) and secured their agreement that food insecurity be measured in a standardised way across all four UK nations using the North American ten-question Household Food Security Survey Module (HFSSM) embedded within the Family Resources Survey, with first data reported in March 2021 (Butler, 2019). The formally-recognised measurement of food insecurity will enable national, annual monitoring, allowing for more focused strategies and targeted interventions to tackle diet-related health inequalities in society and direct food and economic aid. However, the measurement of food poverty should not be considered to be a panacea to achieving Zero Hunger. While measurement is an important and necessary contributor to the research agenda around food insecurity, it does not - in and of itself - provide solutions but contributes importantly to understanding the extent and severity of food insecurity (Furey, 2020). Therefore, parallel action must be taken to effect meaningful change on the ground.

Rights-based Approach to Food Security

Food insecurity is a citizen issue because food access is embedded in human rights language. Human rights literature has successively set a precedent for a rights-based approach to food justice (Beacom et al., 2020). Since 1948 food has been recognized in the Universal Declaration of Human Rights (UNDHR Article 25) wherein it is stated that “Everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family, including food ...” However, the UNDHR is not legally binding; instead it sets out basic standards to which all countries are expected to adhere. It has been followed and supported by several international legal instruments that are legally binding (for example, the

1966 International Covenant on Economic, Social and Cultural Rights (ICESCR Article 11), and the 1989 Convention on the Rights of the Child) because there has been a “general consensus among the nations that provision of this basic human right would be the primary responsibility of the States towards their citizens” (Bagchi and Ghosh, 2018, p.953). Additionally, the UK has signed up to the Sustainable Development Goals (SDGs) that call for an end to poverty (No Poverty) in all its forms everywhere to end hunger by 2030, achieve food security and improved nutrition (Zero Hunger) (Caraher and Furey, 2018, p.38).

Measuring Food Insecurity

There have been numerous calls for the official measurement of food insecurity in the UK (Taylor and Loopstra, 2016; Scottish Government, 2016; Beacom et al., 2019). Due to the multifaceted nature of food insecurity, no universal global indicator is currently applied (Becquey et al. 2010). Food insecurity has been measured annually in the US since 1995 (Rafiei et al., 2009) and in Canada since 2004 (Tarasuk, 2016) using standardized indicators, but until 2019, food insecurity had not been measured via an agreed tool in the UK (Loopstra et al., 2019).

Measuring food insecurity is important because it allows governments and development agencies to estimate the prevalence of food insecurity, identify causes, better target (geographically) high-risk populations, and monitor and evaluate programme intervention effectiveness at the household level. An effective food insecurity measurement needs to be simple to apply, cost-efficient, easy to evaluate and represent accurate indicators of the actual level of food insecurity in the home (Hackett et al., 2008). To this we would add the need for measurement to be government-endorsed, publicly reported and sufficiently regular to

facilitate meaningful comparisons across time and adjust strategies and action plans accordingly. Interestingly, measuring this phenomenon has revealed how food insecurity may be unexpectedly frequent even in a high-income country (Carlton et al., 1999). Recent studies have highlighted how food insecurity is a rising problem in affluent societies (Torheim et al., 2010; Davis and Geiger, 2017). This is particularly apt in the United Kingdom, which is recognised as the fifth richest world economy (OHCR, 2018; World Population Review, 2021).

There are many means by which to measure food insecurity including inter alia prevalence of undernourishment, share of food expenditure by the poor, relative dietary supply, domestic food price volatility, food consumption surveys, coping strategies indices, household dietary diversity scales, food insecurity access scale, food frequency questionnaires, and anthropometrical measures (Leroy et al., 2015). Typically, indicators are important for providing means to differentiate those with and without a characteristic to support the estimation of prevalence of food insecurity (Frongillo et al., 2013). Most food insecurity scales are based on similar theoretical frameworks and constructs of food insecurity, although the number and wording of the questions differ, as well as the reference period (FAO, ND.).

There now follows an overview of the Household Food Security Survey Module alongside other food insecurity measures in use internationally.

Household Food Security Survey Module

The HFSSM was devised following recommendations for a standardised approach to defining and collecting data to measure the prevalence of food insecurity in the United States (US).

The need for and feasibility of a measure was outlined in the National Nutrition Monitoring and Related Research Act of 1990, and at the subsequent National Conference on Food Security Measurement and Research in 1994 (Moshfegh, 1994; Coleman-Jensen, 2015). The HFSSM aims to estimate prevalence of food insecurity and monitor changes in incidence overall and for different groups, differentiating food insecurity from food security, assuming money as the constraint to food access (Frongillo et al., 2013). It has been used to monitor US household food security annually since 1995 (Coates et al., 2006; Rafiei et al., 2009) and Canadian household food security annually since 2004 (Tarasuk, 2016).

The HFSSM experiential measure consists of eighteen questions (in households with children), or ten questions (in households without children) which assess the degree of food security experienced by households over the past twelve months (Coleman-Jensen et al., 2015; Anderson et al., 2016). The HFSSM module questions focus on four underlying conditions or behaviours related to self-reported food insecurity status: (i) anxiety related to having enough food, (ii) the perception that food available is inadequate in either quality or quantity, (iii) reduced food intake in adults, and (v) reduced food intake in children (Kennedy, 2002). ‘Often’, ‘sometimes’ and ‘yes’ are considered affirmative (positive) responses (Leroux et al., 2018) (USDA, 2012). The module makes use of ‘skip’ patterns (Shropshire et al., 2009), therefore if respondents answer particular questions negatively, they will then skip a related subset of questions. Consequently, the number of questions asked will depend on the severity of the food insecurity experience and whether or not there are children present in the household, therefore reducing participant burden (Sharpe, 2016). When the scale was originally constructed, analytic software was used to compute a calibration score

for each question according to the severity of the food insecurity or hunger condition that the question represents. This then allowed questions to be grouped and anchored along a continuous scale and in categories which indicate varying levels of food security (Coates et al., 2006). Module questions proceed along the scale, beginning with questions indicating low severity, and from these, respondents are grouped into one of four food insecurity conditions: high food security, marginal food security, low food security and very low food security (USDA, 2019), according to the number of affirmative responses, assuming frequency to correspond with severity. Marginal food security is indicated for all household types by a raw score of 1-2. Low food security is indicated by a raw score of 3-5 in adult-only households, and by a score of 3-7 in households with children. Very low food security is indicated by a raw score between 6-10 for adult-only households (and between 8-18 for households with children) (USDA, 2018). Health Canada however uses a variation on this scoring methodology, classifying participants who respond affirmatively to at least two questions as having low food security (versus the minimum score of 3 required under USDA methodology for equivalent classification) (USDA, 2012). The content of the module questions has remained the same since it was first introduced (USDA, 2018), however the metrics of the classifications of varying severity of food insecurity experiences have been revised (Table 1). These revisions were made following recommendations from an expert panel that reference to hunger should be removed in order to make a clear distinction between food insecurity and hunger (Reichenheim et al., 2016, USDA, 2018).

Table 6.1: Original and revised HFSSM classifications and their related scores (Reichenheim et al., 2016; USDA, 2018)

Original classification (1995-2005)	Revised classification (2006-present)
-------------------------------------	---------------------------------------

Categorisation	Score	Categorisation	Score
Food secure	0-2	Food secure	0
Food insecurity without hunger	3-7	Marginal food security	1-2
Moderate food insecurity with hunger	8-12	Low food security	3-7
Severe food insecurity with hunger	13-18	Very low food security	8-18

In addition to the 18-item HFSSM (adult and children questions) and the 10-item HFSSM (adult only questions), a shorter 6-item version of the module has been constructed. A shorter module may have cost benefits (e.g. it may be less expensive to include in a population survey, and may require less analysis time), however it does not measure the most severe experiences of child and adult hunger, therefore the 18-item module is considered more specific and reliable (Kennedy, 2002). HFSSM questions have also been used for ‘rapid’ measurement of food insecurity, e.g. single- or two-item questionnaires when assessing food insecurity in a practitioner or specific community setting (Swindle et al., 2013; Urke et al., 2014; Knowles et al., 2018). Analyses on single- and two-item questionnaires have found these to be valid and feasible to identify food insecurity in a practitioner setting (Swindle et al., 2013; Urke et al., 2014); however due to the multi-faceted nature of food insecurity, potential issues of reliability and sensitivity associated with single-item scales, and the varying severity of the food insecurity experience, a multi-item validated version of the HFSSM is recommended for general population assessment (Urke et al., 2014; Archer et al., 2017; Beacom et al., 2020).

Further to USDA adaptations of the scale, various countries and populations have adapted the HFSSM (Vargas and Penny, 2010) for use in a particular culture or context (e.g. language translations or adaptations in terminology to increase understanding among the target population) (Beacom et al., 2020). The Brazilian Food Insecurity Scale was adapted from the HFSSM through focus group research, and the Latin American and Caribbean Food Security Scale was derived from the Brazilian Food Insecurity Scale (Leroy et al., 2015). Furthermore, an adapted HFSSM has been trialled in developing countries including Bolivia, the Philippines, Burkino Faso (Leroy et al., 2015), and Lebanon (Sahyoun et al., 2014). In 2016, the Food Standards Agency 'Food and You' survey administered in England, Wales and Northern Ireland (NI) began collecting data on food security using the ten-item adult HFSSM. The annual NI Health Survey included HFSSM questions from 2012-2016 (Department of Health, 2019).

Marques et al. (2014) reviewed various measurement tools used in food insecurity studies and found that the HFSSM and its variants were most commonly used. More recently, Beacom et al.'s (2020) rapid evidence assessment of the academic literature on food insecurity measurement similarly found that the HFSSM and its various adapted forms were the most commonly used indicator among the sample of primary and secondary studies, with 37 studies overall (out of a sample of 59) having used either the full 18-item version ($n = 22$), the 10-item adult version ($n = 1$), the 6-item short version ($n = 6$) or an adapted/modified version ($n = 8$) of the HFSSM.

Strengths of HFSSM

The predominant use of the HFSSM globally to measure food insecurity (Marques et al., 2014; Beacom et al., 2020) provides some standardization with regards to comparing food insecurity prevalence and severity across time and across locations. Standardization of reporting food insecurity prevalence (and severity) is important as it provides a consistent evidence base upon which policy decisions can be made, for example actions regarding tackling the contributors of food insecurity. For example, in Canada, where food insecurity has been consistently measured since 2005 using the HFSSM, researchers have been able to identify the effects of provincial policies and economic environments on food insecurity prevalence between 2005-2018, and correspondingly recommend policy levers (increased minimum wage, increased welfare income, and lower income tax rates for the lowest income bracket) that governments can use to reduce the prevalence of food insecurity in their jurisdictions (PROOF, 2021). In order for the most effective data analysis and related recommendations however, it is recommended that compliance with measurement of food insecurity is made mandatory across regions, as it has been noted that in Canada in particular, during years when compliance with food insecurity measurement is optional for provinces, there has been less engagement (PROOF, 2021). Therefore, it is positive to see the introduction of an official annual measure (HFSSM) for food insecurity across all regions of the UK.

Rigorous development and testing of the HFSSM have resulted in a scale which is highly specific and sensitive to capturing food insecurity, at varying levels of severity (Coates et al., 2006; USDA, 2012). Further, the module has been reviewed and corrected or changed as appropriate at various time points during its first introduction in 1995, in line with governmental recommendations regarding respondent burden and current practice regarding labelling of food insecurity severity levels (USDA, 2012). In practice, it has been

demonstrated to be a valid, inexpensive and easy to use measure of food security for households and individuals alike (Frongillo, 1999; Rose et al., 1999; Derrickson et al., 2000; Kaiser et al., 2002; Nord et al., 2002), with several countries returning similar results proportionally across the classifications, with ‘anxiety’ being the most prevalent response and ‘going hungry’ least reported (Coates et al., 2006), and more affirmative responses to questions pertaining to limitations in quality of food as opposed to decreasing quantities of food consumed (Melgar-Quinonez and Hackett, 2008).

Recent research (Beacom, 2019) among stakeholders working in various areas related to food poverty such as development and implementation of related policy, advocacy, and community response, in one region of the UK (NI) found the HFSSM to be preferred over an alternate indicator (The European Union Statistics on Income and Living Conditions (EU-SILC) food deprivation questions) used to measure food insecurity among the NI population. The HFSSM was preferred for reasons of perceived relevance to the food insecurity experience, being up to date in comparison to the EU-SILC questions, and providing useful insight in relation to the food insecurity experience. Likewise, an earlier study by Archer et al. (2017) which aimed to gather opinions from Australian stakeholders working in the area of food poverty to inform construction of a new food insecurity indicator, found that stakeholders preferred a multi-item indicator (such as the HFSSM) as opposed to alternate single-item indicators as multi-item indicators have the ability to gather data across different dimensions of the food insecurity experience (other than affordability), and to indicate severity of experience.

Limitations of HFSSM

The HFSSM, while widely used, is not without its dissenters. Interestingly, the measure is not viewed to be entirely comprehensive as it does not include within its scope the social and psychological indicators most relevant for mental health (Jones et al., 2013; Johnson et al., 2020). There further exists some controversy regarding HFSSM's method of measuring food insecurity on a unidimensional scale which categorises four cut-offs according to the severity dimension, rather than aiming to capture the multidimensional nature of food poverty in the classification approach (Wolfe and Frongillo, 2001; Maynard et al., 2018). Such a conservative approach recognises only the most severely food insecure (those who skip meals) thereby missing the range of familial food insecurity experiences and excluding the social and psychological indicators most relevant for mental health (Johnson et al., 2020, p.1256). There is also some discord related to the omission of child-specific questions in the 10-item and 6-item versions of the HFSSM, as it is considered that the 18-item module presents a more accurate picture and a stronger basis for conclusion of the familial food security situation (Urke et al., 2014). The omission of the child-focused questions is an important consideration since while food insecurity conditions may be similar among household members this cannot be assumed as adults' food insecurity status will likely precede any childhood food insecurity in the same household since caregivers will protect children against food insecurity in the same household (Ford, 2012).

It should also be noted that nationally representative population surveys, (e.g.) the Family Resources Survey in which the HFSSM is embedded in the UK, while robust, do not claim to be representative of the entire low-income population and therefore may under-estimate the prevalence of food insecurity among the sample. A further methodological consideration is measurement frequency. HFSSM in the UK survey relies on a respondent recall period of 30 days, but Loopstra (2019) and Ip et al. (2015) recommend that a longer recall period is

necessary to measure transient and persistent food insecurity. This accords with Johnson et al. (2020) who suggest that the HFSSM may not be fully capturing shifts in food insecurity.

Alternate measures - Food Insecurity Experience Scale Survey Module

The Food and Agriculture Organization's Food Insecurity Experience Scale Survey Module (FIES-SM) is an eight-item experiential scale that originates from two widely-used experience-based food security scales: the US HFSSM and the Latin American and Caribbean Food Security Scale. This module was constructed in 2013 with the aim of providing a new global standard measure of food insecurity that would be comparable across countries and culturally relevant in both developed and developing countries (Ballard et al., 2013; FAO, 2019).

The FIES-SM consists of eight questions which interrogate self-reported experiences and behaviours arising from problematic food access due to lack of money or other resources over a calendar-year recall period, irrespective of frequency of occurrence, thereby accounting for the food insecurity constructs of uncertainty/anxiety, changes in food quality, and changes in food quantity. The composite questions are based on "well-grounded empirical research regarding the experience of hunger and poor food access" (FAO, ND, p.6).

Affirmative answers are used to classify the severity of respondents' food insecurity experience into three categories anchored along a continuous scale representing severity of food insecurity: questions one to three relate to 'mild' food insecurity (experiencing anxiety regarding accessing enough food/inadequate food quality), questions four to six relate to 'moderate' food insecurity (insufficient food quantity) and questions seven and eight relate to

‘severe’ food insecurity (experiencing hunger) (Ballard et al., 2013; Sharpe, 2016). Results are typically reported at mild/marginal and moderate/severe thresholds to provide some differentiation between households with and without food. It has been identified as the measure used for progress tracking by the SDGs. It is also lauded because it resonates with the SDGs’ nutrition indicators, represents low-cost data collection, and is relevant to multiple countries (GAFSP and Voices of the Hungry, 2017). However, unlike the HFSSM it does not directly measure food insecurity among children, nor does it enquire how often in the 12-month period certain indicators of food insecurity occurred.

Alternate measures - European Union Statistics on Income and Living Conditions

The European Union Statistics on Income and Living Conditions (EU-SILC) is a survey developed to monitor deprivation and social exclusion across countries in the European Union (EU) (Alkire et al., 2014; Arora et al., 2015). Its strength is that it provides data on household income, poverty, social exclusion and living conditions in the EU, as well as information regarding household hardship (Deidda, 2015). Since 2004 it has become the reference source for comparative statistics on income distribution and social inclusion in the EU. It was devised by EU Member States and the European Commission to provide reliable and timely statistics and indicators to monitor social protection and social inclusion efforts, while ensuring flexibility for each country to accommodate the instrument into its own national system of social surveys (Atkinson and Marlier, 2010).

EU-SILC carries four questions pertaining to food insecurity, regarding affordability of food and minimal participation in social life: inability to afford a meal with meat or vegetarian

equivalent every second day; inability to afford a roast or vegetarian equivalent once a week; whether during the last fortnight, there was at least one day (i.e. from getting up to going to bed) when the respondent did not have a substantial meal due to lack of money; and inability to have family or friends for a meal or drink once a month. However, EU-SILC does not take account of food access, an important contributor to food insecurity (Carney and Maître, 2012).

As these four food deprivation measures were constructed as part of a longer twenty-item survey which included questions on markers of deprivation other than food consumption, these four questions have not been validated as a separate construct to measure food insecurity (Whelan and Maitre, 2006). Furthermore, unlike the HFSSM and FIES-SM, the EU-SILC food deprivation questions have not been validated comparably in terms of categorising respondents into varying levels or categories of food insecurity (Whelan and Maitre, 2006). However, the Republic of Ireland (ROI) has adopted a ‘two out of four’ or ‘one out of three’ index for analysis when detecting whether a household is food insecure (Carney and Maitre, 2012). The ‘two out of four’ index classifies a household as experiencing food insecurity if they answer affirmatively to at least two of the four deprivation items. Data analysis of responses to the four deprivation questions across the EU showed that question four which refers to the household being unable to invite family/friends to their home for a meal was responded to affirmatively by a large proportion, therefore it was decided that using a ‘two out of four’ approach would be better than ‘one out of four’, as this question would be likely to dominate the scale (Carney and Maitre, 2012). The ‘one out of three’ index excludes question four relating to having family/friends over for food/drink, and instead categorises a household as food insecure if they answer affirmatively to questions one to three (Carney and Maitre, 2012). Rather than analysing the EU-SILC questions in a

way similar to their ROI counterparts by following this method of categorising or generalising overall food insecurity status from the construct responses, the NI Health Survey data are instead reported by stating the results of each question separately (Department of Health, 2018). This means that statistics on food security in NI are reported, for example, as follows “4% of NI households cannot afford to eat a meal with meat, chicken, fish or equivalent every second day”, as opposed to “4% of NI households are food insecure”.

In terms of food insecurity domains represented by the module questions, unlike the HFSSM and the FIES-SM, the EU-SILC does include an explicit reference to the social dimension of food insecurity. However, it does not enquire about the psychological dimension, focusing instead on quality and quantity.

Comparisons of reported food insecurity measurement

Food insecurity has been measured across the UK via various tools, notably those cited above, and in various surveys, including the NI Health Survey, Food and You 2 (Food Standards Agency) and the Family Resources Survey (ONS). For example, Food and You 2 (Food Standards Agency, 2021) classified 16% of respondents in England, Wales and NI as food insecure, while the Family Resource Survey found 13% to experience marginal, low or very low food security (ONS, 2021). While these analyses and reporting are welcome, they can present differing data that serve to confuse the state of knowledge around the prevalence of food insecurity, leaving their interpretation open to misreporting.

While the differentiation between surveys is most clear in the ‘very low’ classification, the issue is more pronounced when analysis relies on different indicators. This is illustrated in reporting of results from the NI Health Survey 2015/16, which reported percentage agreement in the population with EU-SILC and HFSSM questions rather than classifying responses as having high, marginal or low food security. The issue is further complicated when other tools (Food and You Wave 4) report the results from the positive perspective reporting the percentage of respondents who have never experienced difficulty affording food. (Table 2 refers using NI data for 2015-16 when respondents were asked all question formats).

Table 6.2: Food (in)security responses for different indicator questions

EU-SILC (Department of Health, 2019)	Result
During the last fortnight was there ever a day (i.e. from getting up to going to bed) when you did not have a substantial meal due to lack of money?	4%
Could not afford to have a roast joint (or its equivalent) once a week?	3%
Could not afford to have family or friends for a drink or a meal once a month	3%
Could not afford to eat meals with meat, chicken, fish (or vegetarian equivalent) every second day?	1%
HFSSM (Department of Health, 2019)	
There had been at least one day in the last fortnight that they did not have a substantial meal due to a lack of money.	4%
Often or sometimes did not have enough to eat	3%
Had enough to eat but not always have the kinds of foods they wanted	13%

Food and You (Wave 4) (Food Standards Agency, 2017)	
Household had never worried in the last 12 months about running out of food before there was money to buy more	82%
In the last 12 months they had never experienced food running out and they did not have money to get more	88%
Household had never experienced not being able to afford to eat balanced meals in the last 12 months	88%

Another issue with the reporting of food insecurity is the time lag between data collection and reporting of results. For example, although headline statistics from 2019/20 are available, the most recent fully available NI Health Survey dataset is from 2014/15 (as of July 2021), and food insecurity data collected from April 2019 using the newly endorsed HFSSM was not available until March 2021. While the visibility of headline statistics is helpful, the inability to access freely the raw data in a timely way reduces the potential to inform policy making with the necessary impetus to effect change with the required immediacy.

Conclusions: Recommendations and Implications

Food insecurity is complex and requires measurement because we need to understand the prevalence and severity of food insecurity if we are to reduce/eradicate it (inter)nationally. This is an important distinction because what gets measured gets done! Furthermore, it is useful to apply a singular food insecurity measure to articulate the severity of its existence and avoid the potential for confusion that can come with having a plurality of indicators available. Irrespective of the indicator in use, food insecurity measurement should be protected as a module on robust, government-endorsed surveys that are collated and reported

upon regularly to maintain the impetus to achieve No Poverty and Zero Hunger.

Additionally, these food insecurity data should be made publicly available for secondary analysis.

This chapter presents the extant literature detailing how HFSSM dominates food insecurity measurement in the developed nations. It has been introduced (since February 2019, with first data reported on 25 March 2021) into UK food insecurity measurement as the indicator of choice but there remains scope to refine it further to present the most comprehensive picture of food insecurity prevalence. Notably this includes the merits of introducing into the Family Resources Survey the full 18-item module, inclusive of children-specific questions, and longer recall periods to monitor chronic and transitional food insecurity trends.

Again, irrespective of the indicator applied, food insecurity and its measurement should be embedded in rights-based language and action must be taken to address it in parallel with ongoing and valid research efforts to quantify and describe it. Measuring food insecurity is important to understand the extent and severity of the problem. As discussed above, there are various indicators available to enumerate food insecurity but extant research (Archer et al., 2017; Johnson et al., 2020) recognises the requirement to broaden food insecurity comprehensions (beyond primary focus on affordability and quantitative deprivation to include physical access, qualitative and social aspects including mental health considerations), in order to understand better the experiences of our most vulnerable citizens. This is particularly important given the emerging food insecurity and Covid-19 data that indicate that there are newly emerging subgroups of people who are at risk of food insecurity

(Food Foundation, 2020). Additionally, there needs to be a balance between measurement of the problems, devising solutions and evaluating the solutions (Caraher and Furey, 2018, p.7).

References

Alkire, S., Apablaza, M. and Jung, E. (2014) Multidimensional poverty measurement for EU-SILC countries. OPHI Research in Progress: Oxford University, 36c.

Anderson, P.M., Butcher, K.F., Hoynes, H.W. and Whitmore Schanzenbach, D.W. (2016) Beyond income: what else predicts very low food security among children? *Southern Economic Journal*, 82 (4), 1078-1105.

Archer, C., Gallegos, D. and McKechnie, R. (2017) Developing measures of food and nutrition security within an Australian context, *Public Health Nutrition*, 20 (14), 2513–2522.

Arora, V.S., Karanikolos, M., Clair, A., Reeves, A., Stuckler, D. and McKee, M. (2015) Data Resource Profile: The European Union Statistics on Income and Living Conditions (EU-SILC). *International Journal of Epidemiology*, 44 (2), 451-461.

Atkinson, A.B. and Marlier, E. (2010) *Income and living conditions in Europe*. Luxembourg: Publications Office of the European Union, doi:10.2785/53320.

Beacom, E. (2019) Defining, measuring and predicting food insecurity in Northern Ireland: a stakeholder approach to inform business and policy implications and response. Thesis, (PhD). Ulster University.

Beacom, E., Furey, S., Hollywood, L. and Humphreys, P. (2019) Improving societal health through measurement and monitoring of food poverty: a comparison of US HFSSM and EU-SILC measurement modules. Unpublished poster presentation at: 18th International Society of Behavioral Nutrition and Physical Activity Annual Meeting, June 4-7, Prague. DOI: 10.13140/RG.2.2.19103.10407

Beacom, E., Furey, S., Hollywood, L.E. & Humphreys, P. (2020) Investigating food insecurity measurement globally to inform practice locally: a rapid evidence review, Critical Reviews in Food Science and Nutrition. <https://doi.org/10.1080/10408398.2020.1798347>

Becquey, E., Y., Martin-Prevel, P., Traissac, B., Dembele, A., Bambara, A. and Delpeuch, F. (2010) The Household Food Insecurity Access Scale and an index-member Dietary Diversity Score contribute valid and complementary information on household food insecurity in an urban West-African setting. *The Journal of Nutrition* 140 (12):2233–40. doi: 10.3945/jn.110.125716.

Butler, P. (2019) UK hunger survey to measure food insecurity. *The Guardian*, 27 February 2019. Available from: <https://www.theguardian.com/society/2019/feb/27/government-to-launch-uk-food-insecurity-index>. [Accessed: 14.07.2021].

Caraher, M. & Furey, S. (2018) The economics of emergency food aid provision: a financial, social and cultural perspective. 1 edn, London: Palgrave Macmillan eBook ISBN: 978-3-319-78506-6; DOI: 10.1007/978-3-319-78506-6; Hardcover ISBN: 978-3-319-78505-9. Available from: <https://doi.org/10.1007/978-3-319-78506-6>.

Carlton, S.J., Andrews, M.S. and Bickel, G.W. (1999) Measuring food insecurity and hunger in the United States: Development of a national benchmark measure and prevalence estimates. *Journal of Nutrition*, 129:510S-516S.

Carney, C. and Maitre, B. (2012) Constructing a food poverty indicator for Ireland: social inclusion technical paper no. 3. Dublin: Department of Social Protection. Available from: <https://www.esri.ie/publications/constructing-a-food-poverty-indicator-for-ireland-using-the-survey-on-income-and> [Accessed 14.07.2021].

Coates, J., Frongillo, E.A., Rogers, B.L., Webb, P., Wilde, P.E. and Houser, R. (2006) Commonalities in the experience of household food insecurity across cultures: what are measures missing? *American Society for Nutrition*, 1438S-1448S.

Coleman-Jensen, A. (2015) Commemorating 20 years of U.S. food security measurement. Washington: USDA. Available from: <https://www.ers.usda.gov/amber-waves/2015/october/commemorating-20-years-of-us-food-security-measurement/> [Accessed 14.07.2021].

Davis, O. and Geiger, B.B. (2017) Did food insecurity rise across Europe after the 2008 crisis? An analysis across welfare regimes. *Social Policy and Society* 16, pp.343-60.

Deidda, M. (2015) Economic hardship, housing cost burden and tenure status: Evidence from EU-SILC. *Journal of Family and Economic Issues*, 36 (4), 531-556. DOI:10.1007/s10834-014-9431-2

Department of Health (2019) Health survey trend tables Northern Ireland. Belfast: Department of Health. Available from: https://www.health-ni.gov.uk/sites/default/files/publications/health/hsni-trend-tables-19-20_1.xlsx [Accessed 15.07.2021].

Derrickson, J.P., Fisher, A.G. and Anderson, J.E. (2000) The core food security module scale measure is valid and reliable when used with Asians and Pacific Islanders. *Journal of Nutrition*, 130: 2666-74.

Environmental Audit Committee. (2019) Sustainable Development Goals in the UK follow-up: Hunger, malnutrition and food insecurity in the UK. London: House of Commons. Available from: <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1491/149102.htm> [Accessed 14.07.2021]

Food and Agriculture Organization. (nd) The food insecurity experience scale: frequently asked questions. Available from: <http://www.fao.org/3/a-bl354e.pdf>. [Accessed 14.07.2021]

Food Standards Agency. (2017) The Food and You survey: Wav 4. Available from: https://www.food.gov.uk/sites/default/files/media/document/food-and-you-northern-ireland-report_0.pdf [Accessed 15.07.2021]

Food Standards Agency. (2021a) Food and You 2 Wave 1 key findings. Available from: https://www.food.gov.uk/sites/default/files/media/document/fy2-wave-1-report-_key-findings_1.pdf [Accessed 15.07.2021]

Food Standards Agency. (2021b) Food security in Northern Ireland. Available from: <https://www.food.gov.uk/sites/default/files/media/document/fy2-wave-1-ni-food-security-short-report-doi.pdf> [Accessed 15.07.2021]

Ford, J.D. (2012) Indigenous health and climate change. *American Journal of Public Health*. 102(7), 1260-66.

Frongillo, E.A. (1999) Validation of measures of food insecurity and hunger. *Journal of Nutrition*; 129, S506-9.

Frongillo, E.A., Fishbein, E.M. and Fram, M.S. (2013) Assessment and surveillance of child food insecurity and hunger. Washington DC: USDA.

Furey, S. (2020) Food Poverty: Zero hunger and the right to food. in Encyclopedia of the UN Sustainable Development Goals. Springer Cham. <https://doi.org/10.1007/978-3-319-69626-3>

Hackett, M., Melgar-Quinonez, H. Perez-Escamilla, R. and Segall-Correa, A.M. (2008) Gender of respondent does not affect the psychometric properties of the Brazilian Household Food Security Scale. *International Journal of Epidemiology*, 37: 766-774. Doi: 10.1093/ije/dyn084.

Ip, E. H., S. Saldana, T. A. Arcury, J. G. Grzywacz, G. Trejo, and S. A. Quandt. (2015) Profiles of food security for US farmworker households and factors related to dynamic of change. *American Journal of Public Health* 105 (10):e42–e47. doi: 10.1177/0379572116653509

Johnson, C. M., Ammerman, A. S., Adair, L. S., Aiello A. E., Flax, V. L., Elliott, S., Hardison-Moody, A. and Bowen, S. K. (2020) The Four Domain Food Insecurity Scale (4D-FIS): development and evaluation of a complementary food insecurity measure. *TBM*;10:1255–1265 doi: 10.1093/tbm/ibaa125

Jones, A.D., Ngiere, F.M., Pelto, G. and Young, S.L. (2013) What are we assessing when we measure food security? A compendium and review of current metrics. *Advanced Nutrition*, 4, 481-505; doi: 10.3945/an.113.004119.

Kaiser, L.L., Melgar-Quinonez, H.R., Lamp, C.L., Johns, M.C., Sutherlin, J.M. and Harwood, J.O. (2002) Food security and nutritional outcomes of preschool-age Mexican-American children. *Journal of the American Dietetic Association*, 102: 924-929.

Kennedy, E. (2002) Keynote paper: qualitative measures of food insecurity and hunger. Rome: FAO. Available from: <http://www.fao.org/3/Y4249E/y4249e0c.htm> [Accessed 14.07.2021].

Leroux, J., Morrison, K. and Rosenberg, M. (2018) Prevalence and predictors of food insecurity among older people in Canada. *International Journal of Environmental Research and Public Health*, 15, 2511-2528.

Leroy, J.L., Ruel, M., Frongillo, E.A., Harris, J. and Ballard, T.J. (2015) Measuring the food access dimension of food security: a critical review and mapping of indicators. *Food and Nutrition Bulletin*, 36 (2), 167-195.

Loopstra, R. (2019) Food insecurity measurement on the Family Resources Survey. Evidence and Network on UK Household Food Insecurity. Available from:

<https://enuf.org.uk/research-blogs/food-insecurity-measurement-family-resources-survey>

[Accessed 13.07.2021]

Loopstra, R., A. Reeves, and V. Tarasuk. (2019) The rise of hunger among low-income households: An analysis of the risks of food insecurity between 2004 and 2016 in a population-based study of UK adults. *Journal of Epidemiology and Community Health* 73 (7):668–73. doi: 10.1136/jech-2018-211194

Marques, E.A., Reichenheim, M.E., de Moraes, C.L., Antunes, M.M.L., and Salles-Costa, R. (2014) Household food insecurity: a systematic review of the measuring instruments used in epidemiological studies. *Public Health Nutrition*, 18 (5), 877-892.

Maynard, M., Andrade, L., Packull-McCormick, S., Perlman, C., LeosToro, C. and Kirkpatrick, S. (2018) Food insecurity and mental health among females in high-income countries. *Int J Environ Res Public Health*; 15(7):1424.

Melgar-Quinonez, H. and Hackett, M. (2008) Measuring household food security: The global experience. *Rev Nutr Campinas*, 21: Supplement: 27s-37s.

Moshfegh, A.J. (1994) The national nutrition monitoring and related research program: progress and activities. *The Journal of Nutrition*, 124 (9), 1843S-1845S.

Nord, M., Andrews, M. and Winicki, J. (2002) Related articles: Frequency and duration of food insecurity and hunger in US households. *Journal of Nutrition Education Behavior*, 34: 194-200.

Pool, U. and Dooris, M. (2021) Prevalence of food security in the UK measured by the Food Insecurity Experience Scale, *Journal of Public Health*, <https://doi.org/10.1093/pubmed/fdab120>

PROOF (2021) Provincial policy levers to reduce household food insecurity. Toronto: PROOF. Available from: https://proof.utoronto.ca/wp-content/uploads/2021/05/PROOF_FACTSHEET_Provincial-policies-052021.pdf [Accessed 28.7.2021].

Radimer, K.L., Olson, C.M., Campbell, C.C. (1990) Development of indicators to assess hunger. *Journal of Nutrition* 120, 1544–1548.

Rafiei, M., M. Nord, A. Sadeghizadeh, and M. H. Entezari. (2009) Assessing the internal validity of a household survey-based food security measure adapted for use in Iran. *Nutrition Journal* 8 (28):28–11. doi: 10.1186/1475-2891-8-28.

Reichenheim, M.E., Interlenghi, G.S., Moraes, C.L., Segall-Correa, A.M., Perez-Escamilla, R. and Salles-Costa, R. (2016) A model-based approach to identify classes and respective cutoffs of the Brazilian household food insecurity measurement scale. *The Journal of Nutrition*, 146 (7), 1356-1364.

Rose, D. (1999) Economic determinants and dietary consequences of food insecurity in the United States. *Journal of Nutrition*, 129: S517-20.

Sahyoun, N.R., Nord, M., Sassine, A.J., Seyfert, K., Hwalla, N. and Ghattas, H. (2014) Development and validation of an Arab family food security scale. *The Journal of Nutrition*, 144 (5), 751-757.

Sharpe, L. (2016) Time to count the hungry: the case for a standard measure of household food insecurity in the UK. London: Food Research Collaboration. Available from: <https://foodresearch.org.uk/roundtables/mapping-the-way-forward-on-food-poverty/> [Accessed 10 September 2019].

Shropshire, K.O., Hawdon, J.E. and Witte, J.C. (2009) Web survey design. *Sociological Methods and Research*, 37, 344-70.

Scottish Government. (2016) Dignity: Ending hunger together in Scotland. The report of the independent working group on food poverty. Edinburgh: The Scottish Government.

Swindle, T. M., L. Whiteside-Mansell, and L. McKelvey. 2013. Food insecurity: Validation of a two-item screen using convergent risks. *Journal of Child and Family Studies* 22 (7):932–41. doi: 10.1007/s10826-012-9652-7.

Tarasuk, V. (2016) Advancing food insecurity research in Canada. In: Advancing food insecurity research in Canada, 17-18 November 2016, Toronto. Available from: <https://proof.utoronto.ca/conference/> [Accessed 14.07.2021].

Taylor, A., and Loopstra, R. (2016) Too poor to eat: Food insecurity in the UK. London: The Food Foundation.

Torheim, L.E., Ferguson, E.L, Penrose, K. and Arimond, M. (2010) Women in resource-poor settings are at risk of inadequate intakes of multiple micronutrients. *Journal of Nutrition*. 140, 251-258. DOI:10.3945/jn.110.123463

United States Department of Agriculture. (2012) U.S. adult food security survey module: three-stage design, with screeners. Washington: Economic Research Service, USDA. Available from: <https://docplayer.net/2788907-U-s-household-food-security-survey-module-three-stage-design-with-screeners-economic-research-service-usda-september-2012.html> [Accessed 14.07.2021].

United States Department of Agriculture. (2018) Measurement. Washington: USDA Economic Research Service. Available from: <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/measurement.aspx> [Accessed 14.07.2021].

United States Department of Agriculture. (2019) Definitions of food security. Washington: USDA Economic Research Service. Available from: <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/> [Accessed 14.07.2021].

Urke, H.B., Cao, Z.R. and Egeland, G.M. (2014) Validity of a single item food security questionnaire in Arctic Canada. *Pediatrics*, 133(6):e1616-23. doi: 10.1542/peds.2013-3663.

Vargas, S. and Penny, M.E. (2010) Measuring food insecurity and hunger in Peru: a qualitative and quantitative analysis of an adapted version of the USDA's food insecurity and hunger module. *Public Health Nutrition*, 13 (10), 1488-1497.

Whelan, C.T. and Maître, B. (2006) Comparing poverty and deprivation dynamics: Issues of reliability and validity. *J Econ Inequal* 4, 303–323. <https://doi.org/10.1007/s10888-005-9017-1>

Wolfe, W.S. and Frongillo, E.A. (2001) Building household food security measurement tools from the ground up. *Food and Nutrition Bulletin*, 22 (1), 5-12.

World Population Review. (2021) Richest countries in the world – 2021. Available from: <https://worldpopulationreview.com/country-rankings/richest-countries-in-the-world> [Accessed 20.06.2021]