

PREVALENCE **OF FOOD INSECURITY** **IN BOTSWANA** **2022/23**

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STATISTICS BOTSWANA

Prevalence of Food Insecurity in Botswana 2022/23

PREFACE

Statistics Botswana conducts the Quarterly Multi-Topic Survey (QMTS) mainly to produce labour force indicators and to fill indicator gaps for stakeholder needs and developmental frameworks (Vision 2036, National Development Plans, Africa 2063 and Sustainable Development Goals (SDGs)).

During the third quarter of 2023, the Food Insecurity Experience Scale (FIES) module, was included in the QMTS as one of the rotational modules. The FIES module is used to estimate the SDG indicator 2.1.2 “prevalence of moderate or severe food insecurity” in the population.

This Statistical brief presents results from the analysis of the FIES data collected in the QMTS during the third quarter of 2023 (July to September 2023).

The results showed that at national level, Moderate or severe food insecurity, increased from 50.8 percent in 2018/19 to 51.1 percent in 2020/21, and to 53.3 percent in 2021/22. In the year 2022/23 the population proportion which experienced Moderate or severe food insecurity reduced from 53.3 to 49.4 percent.

The prevalence of moderate food insecurity in the population showed some fluctuations across the years with an increase from 28.6 percent in 2018/19 to 30.9 percent in 2020/21, followed by a decline to 27.1 percent in 2021/22 and reverting to an increase to 29.2 in 2022/23. The percentage of the population experiencing severe food insecurity decreased from 22.2 percent in 2018/19 to 20.2 percent in 2020/21, followed by an increase to 26.2 percent in 2021/22 before experiencing a significant reduction to 20.2 percent in 2022/23. The reduction in percentage of the population experiencing moderate and severe food insecurity and the increase in those who are food secure to mild food insecurity may be attributed to the recovery of food insecure population post COVID-19.

I wish to thank the Food and Agriculture Organization (FAO) of the United Nations, for training Statistics Botswana Staff in the technical analysis of FIES data to produce the Sustainable Development Goal (SDG) 2.1.2 Indicator, “Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale”.

Finally, I would like to thank the respondents who provided invaluable information for the quarterly survey, and all the other stakeholders who contributed to the success of the survey.



Dr. Lucky Mokgatine
Acting Statistician General
August 2024



INTRODUCTION

Statistics Botswana (SB) in its mandate to produce official statistics, conducts surveys to produce indicators that inform on the impact of programmes, policies and interventions targeting national priorities. The indicators produced assist in reformulation, monitoring and reprioritisation to achieve desired outcomes on national priorities, as espoused through national and international development frameworks, being National Development Plans, Vision 2036, Africa 2063 and Sustainable Development Goals. In 2019, Statistics Botswana commenced data collection on Food Insecurity Experience Scale (FIES) to produce the Sustainable Development Goals (SDGs) Indicator 2.1.2: Prevalence of moderate to severe food insecurity for the year 2018/19. Subsequent to the 2019 survey, FIES data was collected in 2021 and 2022, for which a Statistical brief was produced covering the two periods being 2020/21 and 2021/22. During quarter three (Q3) of 2023 the FIES questionnaire was administered for the past 12 months (2022/23), across Enumeration areas representative of the three national strata of Cities and Towns, Urban Villages, and Rural Areas.

The Food Insecurity Experience Scale (FIES) measures the severity of food insecurity using eight questions on households or individuals experiences regarding access to food. The questions are answered directly with a yes/no response. The responses were analysed to produce estimates of the proportion of the population facing moderate, and severe difficulties in accessing food, as well as those who were food secure to mildly food insecure.

According to the FIES module, with increasing severity of food insecurity, there is possibility for individuals to experience reduced quantity of food consumed as portion sizes are reduced. In some cases they eat less and meals are skipped. At the most severe level of food insecurity, they can go without eating for a day or more, with some members of the population experiencing hunger. The scale further reveals that the population's experience of food insecurity may be characterized by uncertainty and anxiety regarding food access, compromising of the quality of diet and having less balanced and more monotonous diet.

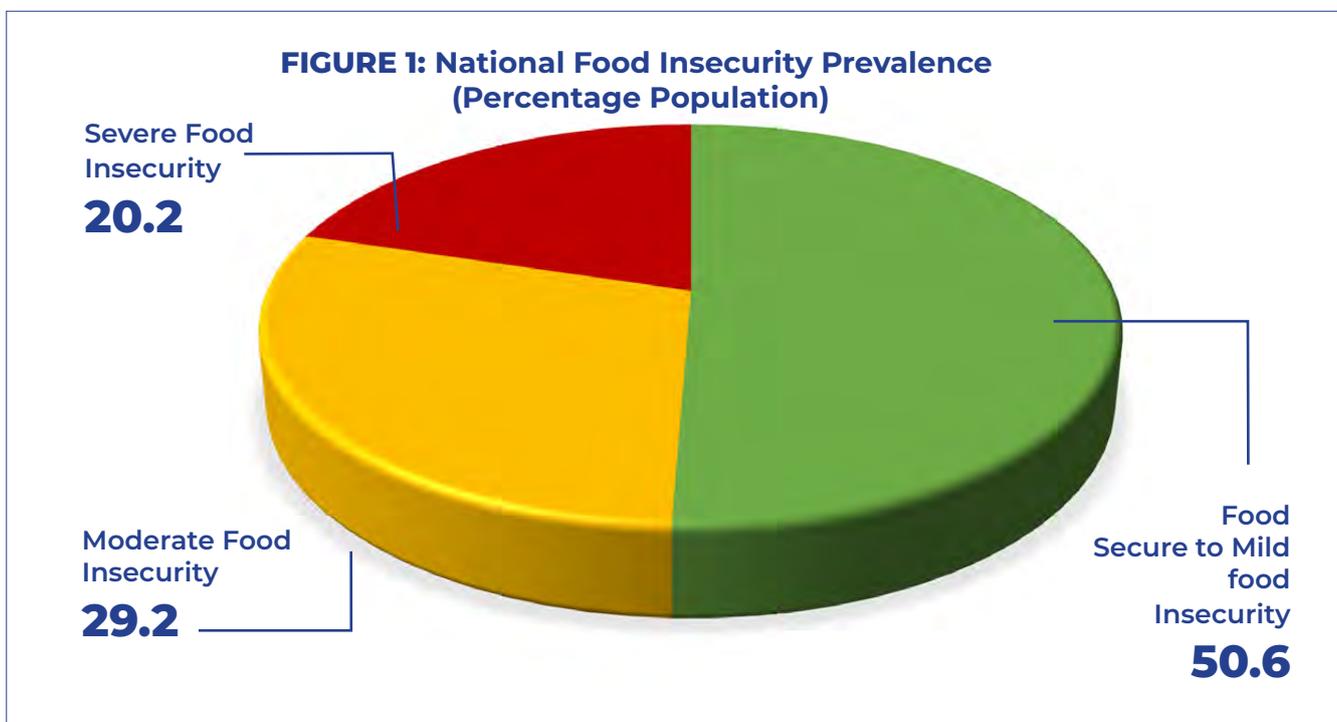
This statistical brief focuses on food insecurity for 2022/23 among members of the population and a summary of time series results from 2018/19 up to 2022/23. Within the said period data was not collected during the 2019/20 period due to COVID restrictions, as such the brief does not have the 2019/20 results.

SUMMARY OF RESULTS

This section gives a summary of results relating to three indicators of food insecurity prevalence, as the food secure to mild food insecurity, moderate and severe food security levels. Food secure to mild food insecurity happens when an individual occasionally lacks the ability to obtain sufficient amount and/or variety of food of their choice. Moderate or severe food insecurity occurs when a person has limited or uncertain access to sufficient and healthy food because of financial limitations or other constraints. As a result of financial or other constraints, people may have to compromise the quality and quantity of their diets, but they do not necessarily suffer from extreme hunger or starvation. People experiencing severe food insecurity are called the “hungry” they have run out of food and, at the most extreme, they go for days without eating.

National Food Insecurity Prevalence 2022/2023

The results presented in **Figure 1** showed that 50.6 percent of the population in Botswana were food secure to mild food insecurity at national level in 2022/23, with 29.2 percent experiencing moderate food insecurity, and 20.2 experiencing severe food insecurity.



Comparison between FIES 2018/19, 2020/21, 2021/22 and 2022/23

Figure 2 and **Table 1** illustrate a consistent national decline in the proportion of population that is food Secure to Mild food Insecurity between 2018/19 to 2021/22, followed by an increase in 2022/23. In 2018/19 the population proportion that was food secure to mild food insecurity was at 49.2 percent, declining to 48.9 percent in 2020/21, and 46.7 percent in 2021/22. The level increased to 50.6 percent in 2022/23.

The prevalence of moderate food insecurity in the population showed some fluctuations across the years, with an increase from 28.6 percent in 2018/19 to 30.9 percent in 2020/21, followed by a decline to 27.1 percent in 2021/22 and reverting to an increase to 29.2 in 2022/23. The percentage of the population experiencing severe food insecurity decreased from 22.2 percent in 2018/19 to 20.2 percent in 2020/21, followed by an increase to 26.2 percent in 2021/22 before experiencing a significant reduction to 20.2 percent in 2022/23.

The **SDG indicator 2.1.2**, Moderate or severe food insecurity, increased from 50.8 percent in 2018/19 to 51.1 percent in 2020/21, and went up to 53.3 percent in 2021/22. In the year 2022/23 the proportion went down by 3.9 percentage points, from 53.3 percent in 2021/22 to 49.4 percent in 2022/23.

The reduction in percentage of the population experiencing moderate and severe food insecurity and the increase in those who were food secure to mild food insecurity may be attributed to the recovery of food insecure population post COVID-19.

Between the years 2021/22 and 2022/23, there has been a noticeable improvement in severe food insecurity across strata. The data indicates that in cities and towns, the prevalence of severe food insecurity decreased from 17.6 percent in 2021/22 to 12.5 percent in 2022/23. Similarly, in Urban Villages, the rate dropped significantly from 24.8 percent in 2021/22 to 18.0 percent in 2022/23, while in Rural Areas it reduced from 33.5 percent in 2021/22 to 28.4 percent in 2022/23.

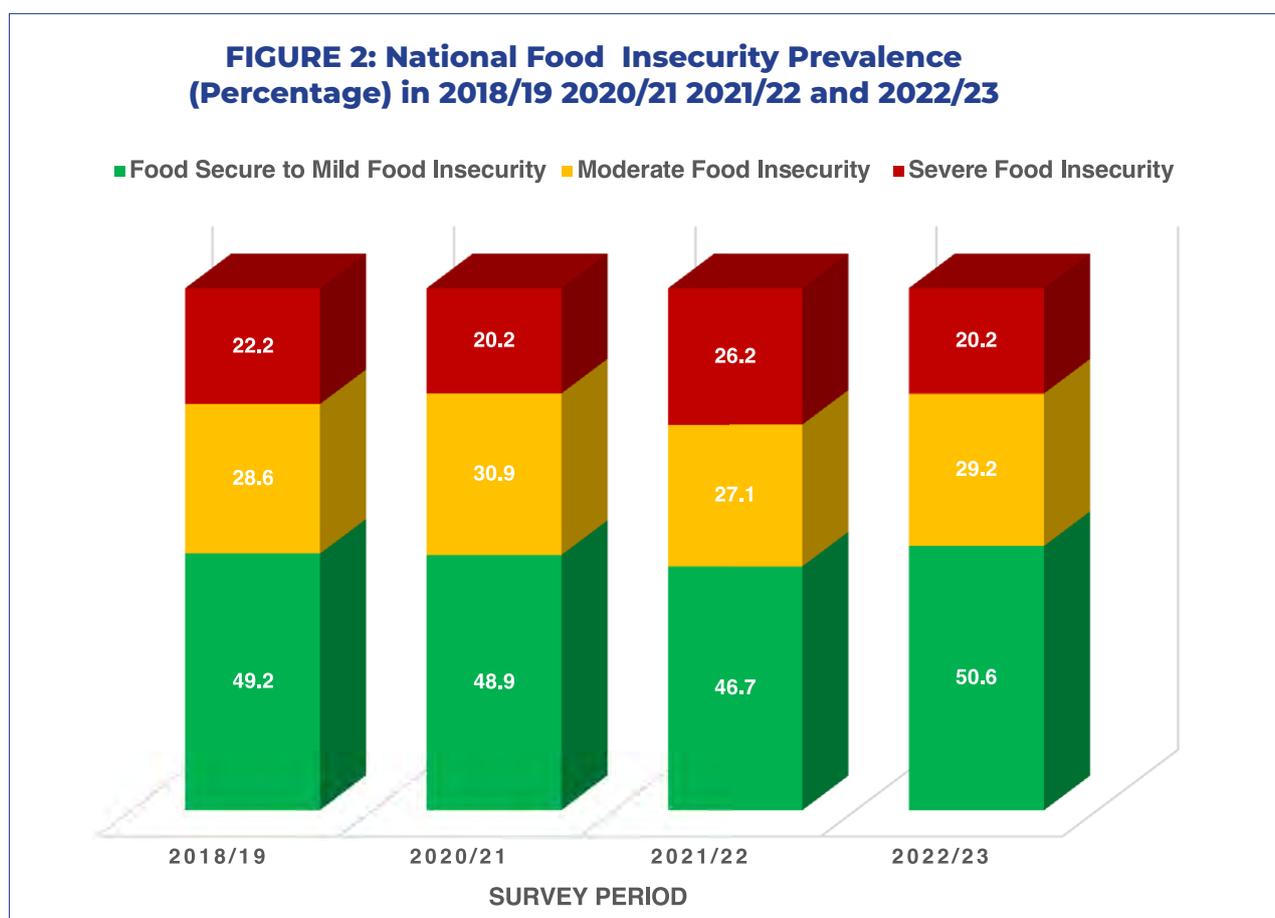
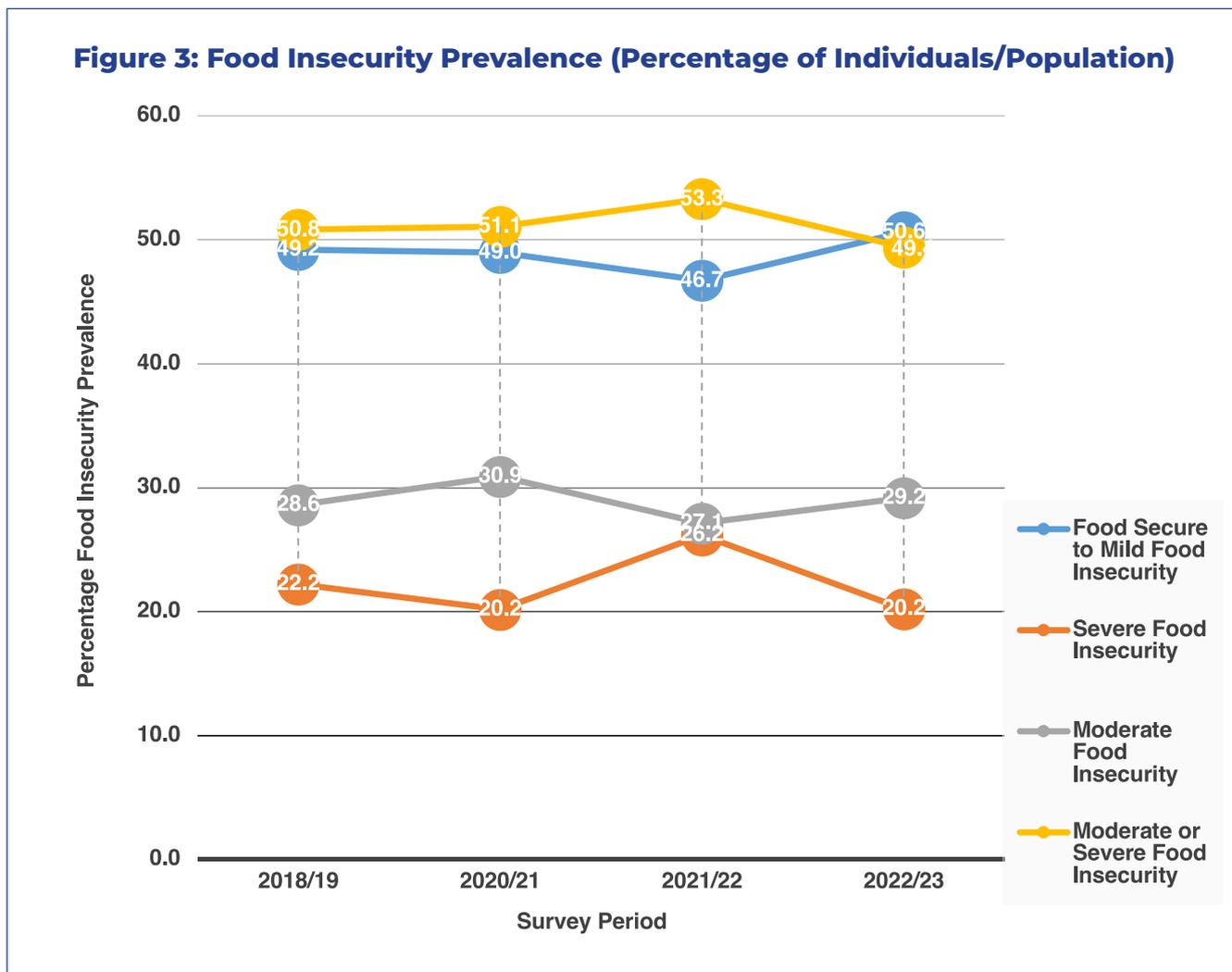


Table 1: Food Insecurity Prevalence by Strata between 2018/19 and 2022/23

Strata	2018/19				2020/21				2021/22				2022/23			
	Secure to Mild	Moderate	Severe	Moderate or Severe	Secure to Mild	Moderate	Severe	Moderate or Severe	Secure to Mild	Moderate	Severe	Moderate or Severe	Secure to Mild	Mode rate	Severe	Moderate or Severe
Cities and Town	68.3	19.8	11.9	31.7	68.1	20.8	11.2	31.9	65.1	17.3	17.6	34.9	66.3	21.2	12.5	33.8
Urban Villages	53.4	29.1	17.5	46.6	53.2	30.5	16.4	46.8	46.8	28.4	24.8	53.2	51.2	30.7	18.0	48.8
Rural Areas	34.5	32.4	33.1	65.5	34.3	34.3	31.3	65.7	35.7	30.9	33.5	64.4	40.2	31.4	28.4	59.9
National	49.2	28.6	22.2	50.8	48.9	30.9	20.2	51.1	46.7	27.1	26.2	53.3	50.6	29.2	20.2	49.4

Figure 3 further illustrates the trend in food insecurity prevalence over the years 2018/19, 2020/21, 2021/22, and 2022/23 through a linear diagram. The data revealed an inverse relationship between moderate or Severe food insecurity (SDG indicator 2.1.2) and food secure to mild food insecurity. Consistently, moderate or severe food insecurity decreases when food security increases and increases with a decrease in food insecurity.



CONCLUSION

Statistics Botswana is still adhering to its original intention to annually incorporate the FIES module in the quarterly survey. It is hoped that stakeholders will support the continued data collection and computation of the indicators to timeously track progress in the SDG Target 2.1: To end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round, By 2030.

FIES 2022/23

ANNEXURE 1: FIES Methodological Conceptualisation

The FIES Measure

Experience-based food security measurement is a comprehensive and context-specific approach that focuses on capturing the experiences of individuals regarding their perceived food security status. The method assesses food security at the household or individual level. Unlike the Food Insecurity Experience Scale, other food security measures rely on external indicators such as household income, food prices, and production levels and they do not capture the lived experiences of individuals who may have different needs and priorities when it comes to accessing and consuming food.

The FIES methodology measures access to food over a specific period, in this case 12 months. It is composed of eight questions (items), which cover different aspects of food insecurity. The respondents are asked about their experiences of food insecurity, such as uncertainty about food availability, insufficient quantity or quality of food, and skipping meals or going a Whole day without eating because of lack of resources. The FAO has designed and standardised the tool to be used in different countries and contexts and it has been tried and tested in several countries hence considered globally valid.

Key Concepts

The fundamental principle of experience-based food insecurity scales is that both the questions (items) and the people (individuals or households) being surveyed are measured on the same underlying continuum. Although the data in the FIES module is expressed using a binary format with responses given as either “yes” or “no”, food insecurity cannot be simply categorised as a “yes/no” proposition but rather, it manifests in varying degrees of intensity along a spectrum. This means that the questions used in the scale are designed to measure food insecurity experiences on a common scale or metric. This common metric allows for the calculation of a food insecurity score that can be used to classify individuals or households into categories of food insecurity, such as mild, moderate, or severe (figure 4). By positioning both the questions and respondents on the same underlying scale ensures that the questions are measuring the same construct and that responses are comparable. This is essential for generating accurate and reliable data on food security levels generating meaningful and actionable data on food insecurity.



The Rasch model is used to compute food insecurity levels. It works by estimating the probability of a person giving a particular response to a question based on their level of the underlying traits being measured. The model accounts for variations in the difficulty of the questions and the ability of the respondents, and uses the estimates to create a scale that represents the level of food insecurity experienced by each individual.

The severity of food insecurity is typically measured by the number of affirmative responses to these questions. There is a positive relationship between the severity of a respondent’s food insecurity status and the probability that they will respond affirmatively to a question related to food insecurity (see Box 1).

Box 1: The likelihood of the i -th respondent answering “Yes” to the j -th question in a sample can be modeled by the logistic function, where the probability of a positive response is given by:

$$Prob(X_{i,j} = \text{Yes}) = \frac{\exp(a_i - b_j)}{1 + \exp(a_i - b_j)}, \forall i, j,$$

where a_i and b_j represent, respectively, the position of the respondent and of the item on a one-dimensional scale of severity.

ANNEXURE 2: Survey Design

Coverage

The survey was designed to ensure the appropriate level of precision required for both national and subnational estimates to enhance policy decisions. Since this is a household survey, only private dwellings were covered and Institutional dwellings such as prisons, hospitals, army barracks and hotels were not covered. The coverage was at national level guided by census districts (district and sub-districts) that Statistics Botswana normally follows in the selection of survey units.

Survey Sampling

The design followed a two-stage sampling technique with probability proportional to size (PPS). The first stage involved sampling of primary sampling units (PSUs), Enumeration Areas (EAs) and sampling of households with systematic sampling in the second stage. The sampling procedure yielded a sample size of 312 EAs resulting in 3,744 households. These were selected with Probability Proportional to Size (PPS) method where Measure of size (MOS) is the number of households as enumerated from the 2022 Population & Housing Census.

Data Collection

The QMTS data was collected through an electronic questionnaire using the Computer Assisted Personal Interviews (CAPI) system and the FIES module is part of the modules which are included in the survey on a rotational basis. Both the 4 weeks and a 12-month reference (recall) period were used to collect data on food insecurity in Botswana and this statistical brief only reports the 12-month reference period. A 12-month reference (recall) period was used to account for potential seasonal differences in food insecurity across the year.

ANNEXURE 3: Statistical Validation

Model Reliability Measure

The survey data was analyzed using the Rasch model based on its suitability for generating a reliable measure of food insecurity. It quantifies the percentage of variation in the data that can be accounted for by the model. After testing adherence to the Rasch model’s assumptions for the FIES data, it was found that the data met the quality standards necessary for accurately estimating the prevalence of food insecurity in Botswana. In the case of an eight-item FIES scale, the Rasch reliability score of 70 percent or higher is deemed satisfactory. The Rasch reliability score for the 2023 Botswana FIES data was acceptable at 76 percent.

Estimated Severity Parameters

As shown in **Table 2** below the severity of items and respondents is determined by their estimated parameters on a scale which includes the mean severity level, and the standard error associated with each item. Item parameters are derived from the overall pattern of responses given by all respondents, rather than from the responses of individual respondents.

- An item that represents a less severe food insecurity experience will have a smaller parameter value assigned to it on the severity scale, while an item that represents a more severe food insecurity experience will have a larger parameter value assigned to it.

The concept of relative severity is expressed by noting that it is based on the recognition that respondents are “less likely to report more severe food insecurity experiences”. For example, **Table 2** below shows that item “Wholoday” has the highest severity, meaning that, of all items, it received the least number of “yes” responses.

Table 2: Estimated Severity Parameters for the FIES Items

ITEMS	Severity	S.E.	Infit	S.E.Infit	Outfit
Worried	-2.03	0.07	1.12	0.03	2.53
Healthy	-1.76	0.07	1.26	0.03	2.71
Few food	-1.36	0.06	0.87	0.03	1.21
Skipped	-0.28	0.06	0.89	0.03	0.95
Ate Less	-0.13	0.06	0.82	0.03	0.75
RunOut	0.79	0.07	0.95	0.04	0.99
Hungry	1.51	0.07	0.78	0.04	0.61
Whole Day	3.27	0.10	1.03	0.07	0.88

The results further indicate that all the items included in the analysis have acceptable infit statistics, ranging from 0.7 to 1.3. Infit statistics evaluates the quality of individual items on a severity scale, and values between 0.7 and 1.3 indicate that the items are performing well and contributing meaningfully to the overall assessment of food insecurity. The outfit statistics for all the items in the analysis are below 3, suggesting that items are accurately measuring the severity of food insecurity experiences and are appropriate for use in evaluating food insecurity. The standard errors also are relatively small which reflects a good sample size.

Table 3 shows the estimated severity parameters for each raw score. The raw score indicates the sum of “yes” responses given to the eight FIES questions. The raw score provides an indication of the level of food insecurity experienced by an individual or household. However, parameters of the respondents enable a more accurate assessment of the relative disparity in food insecurity across the scale, among respondents with different raw scores.

Table 3: Estimated Severity Parameters for each Raw Score

Raw.Score	Severity	Error	P1	P2
0	-3.58	1.51	0.00	0.00
1	-2.74	1.15	0.02	0.00
2	-1.71	0.93	0.07	0.00
3	-0.89	0.88	0.25	0.00
4	-0.13	0.88	0.58	0.00
5	0.68	0.92	0.86	0.00
6	1.63	1.03	0.97	0.06
7	2.93	1.29	0.99	0.40
8	4.58	1.51	1.00	0.81
Adjusted thresholds of food insecurity on the latent trait				
Moderate or Severe				-0.30
Severe				3.26

P₁ = probability to be moderately or severely food insecure

P₂ = probability to be severely food insecure

Probability of food insecurity

Table 3 reflects the probability of moderate or severe and severe food insecurity for each of the nine possible raw scores. The table shows that after adjustment of the global standard to the national metric for Botswana, thresholds for moderate or severe, and severe food insecurity are -0.30 and 3.26 respectively. If the probability of moderate or severe food insecurity is high for a particular raw score, it means that individuals or households with that raw score are more likely to experience food insecurity at moderate or severe levels. For example, given a raw score of 8 with a severity parameter of 4.58, with a moderate or severe threshold at -0.30 and severe threshold at 3.26, the probability that a household is severe or moderate food insecure or severe food insecure is 1 and 0.81 respectively. The probability that a household is in severe food insecurity at raw score 4, with severity parameter of -0.13 and threshold of 3.26, is 0.

Equating

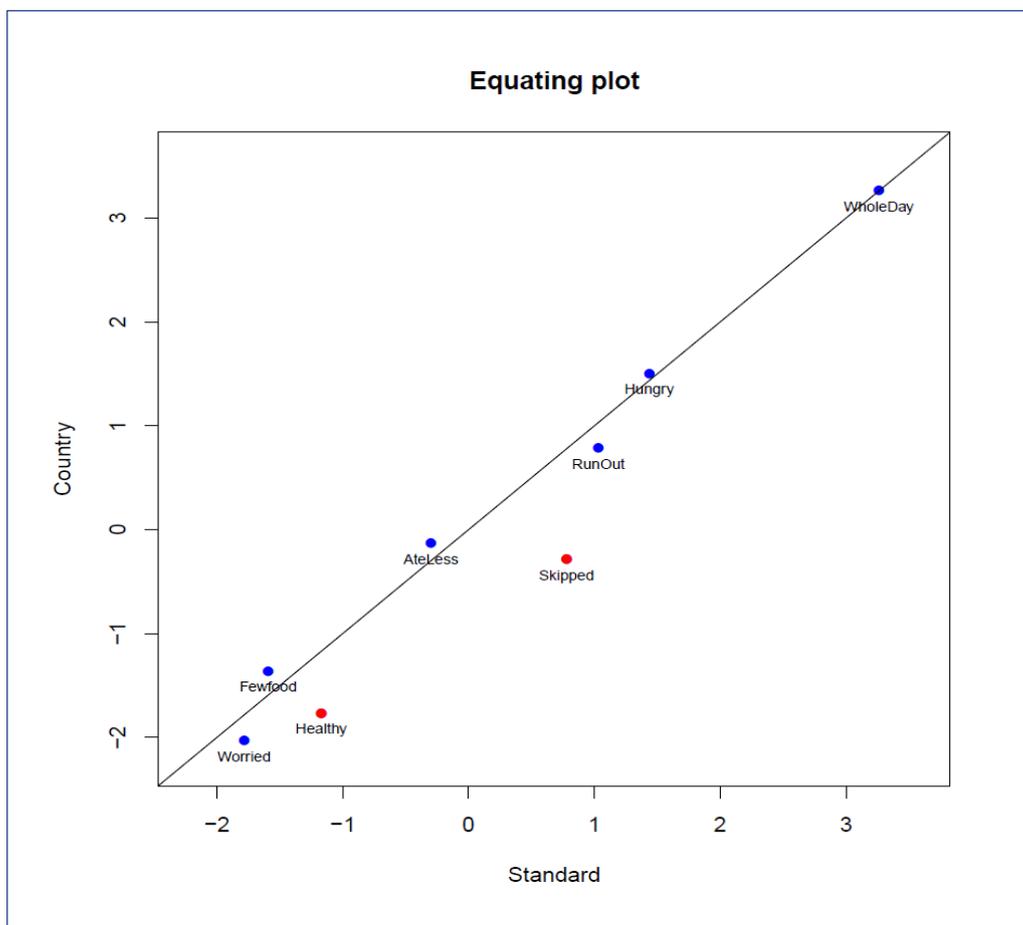
The data collected was analysed using the Rasch model, which allowed for the development of a consistent and reliable measure of food insecurity across different populations. To estimate the prevalence of food insecurity, the two FIES indicators, Prevalence of Moderate or Severe Food Insecurity and the Prevalence of Severe Food Insecurity were used and the standard threshold that permit the estimation of the two indicators are set at the severity of two items on the global reference scale. The equating procedure maps these standard thresholds to the national FIES scales, which is necessary because severity of food insecurity differs across countries and the standard thresholds may not be applicable in all contexts. The equating procedure ensures comparability of FIES scores obtained in different countries.

When comparing Botswana’s FIES data to a global scale, selecting which items to use for equating is a crucial decision as it affects the position of the threshold used to classify people into categories of food insecurity and the prevalence rates of food insecurity. **Figure 5** in this annex 3 shows the absolute differences in severity between the items on the global scale and Botswana scale. The table further reflects that items “HEALTHY” and “SKIPPED” are the most discrepant or unique in severity between the two scales with a correlation among common items at 97%. This may indicate that these items are less applicable or relevant in certain populations or contexts. Using a subset of items that are considered both relevant and comparable across various settings is essential to maintain the comparability of FIES scores across different contexts.

To attain the maximum number of items that result in the best alignment for equating, both “SKIPPED” and “HEALTHY” were omitted from the analysis to avoid redundancy in the scale, see **Figure 5** below.

Figure 5: FIES scale estimated in Botswana using the 2023 data, against the global standard, after adjustment

Figure 5: FIES scale estimated in Botswana using the 2023 data, against the global standard, after adjustment



The equating plot, absolute differences and correlation changes when omitting items “SKIPPED” and “HEALTHY” from analysis as in **Figure 5**. Correlation among common items changes from 97% to 99.4% which is much closer to 1. The remaining six items were found to be aligned with corresponding levels on the global reference scale as they have moved closer to the diagonal line.

References <http://www.fao.org/3/ca9318en/CA9318EN.pdf>



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