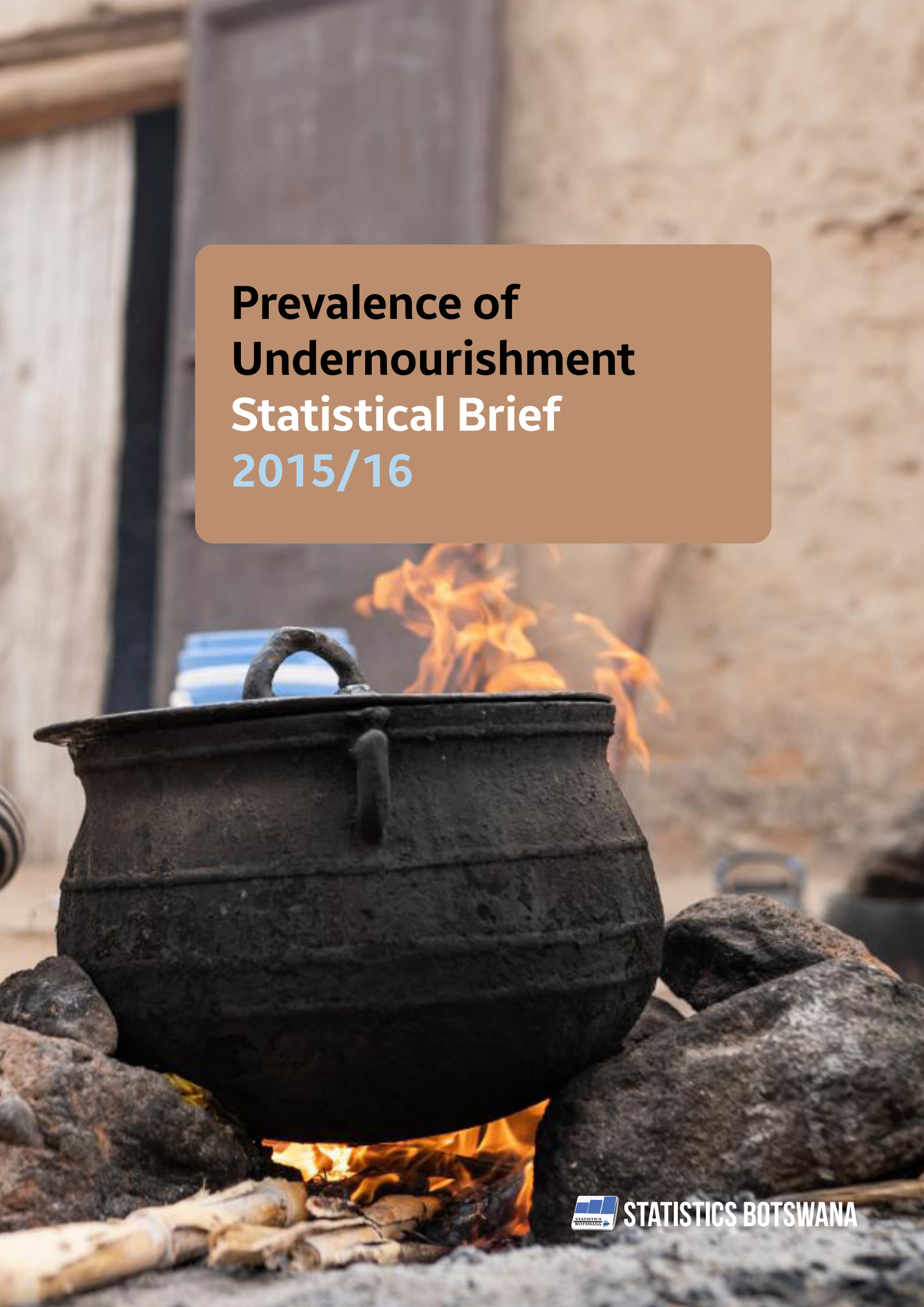

Prevalence of Undernourishment Statistical Brief 2015/16

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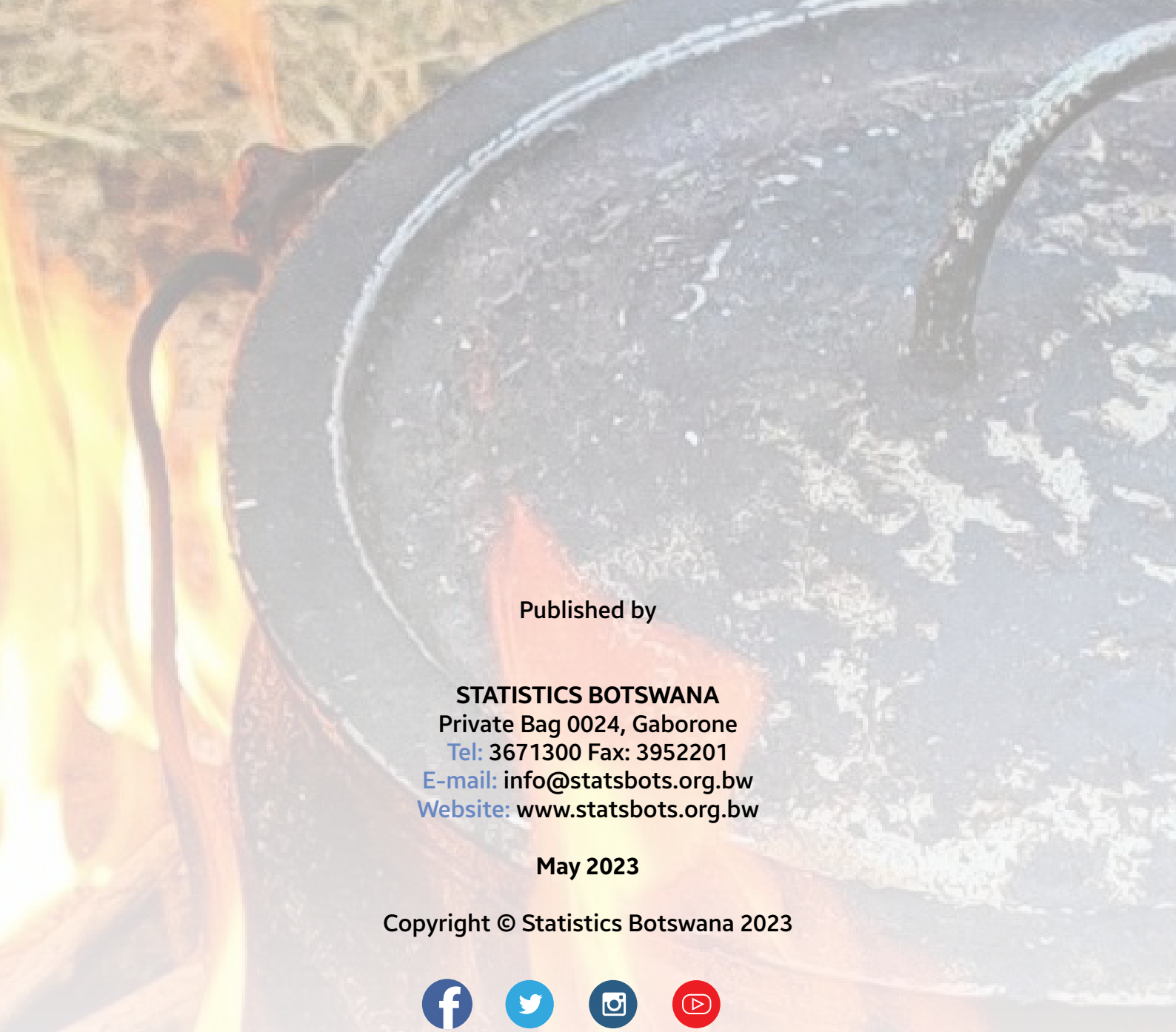

Published by

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May 2023

Prevalence of Undernourishment

Statistical Brief 2015/16

This is Statistics Botswana's first statistical brief on the prevalence of undernourishment (PoU). The primary goal is to establish a baseline for the PoU using the 2015/16 Botswana Multi Topic Household Survey (BMTHS) data.

PREFACE

This is Statistics Botswana's first statistical brief on the prevalence of undernourishment (PoU). The primary goal is to establish a baseline for the PoU using the 2015/16 Botswana Multi Topic Household Survey (BMTHS) data. The outline also discusses how prevalent undernourishment compares to other metrics such as the minimum dietary energy requirements, poverty indices, and prevalence of food insecurity using the Food Insecurity Experience Scale (FIES).

According to the findings, 32.0 percent of the population nationwide is undernourished, meaning that there is 32.0 percent probability that upon random selection of an individual at national level, that person will be consuming food that is below their dietary energy requirement.

At the strata level, rural areas have the largest frequency of deprived people at 45.0 percent, followed by urban villages at 30.0 percent and cities and towns at 11.0 percent. The pattern is consistent with poverty incidence where poverty is higher in rural areas at 24.2 percent, followed by 13.3 percent at urban villages and 9.4 percent in cities and towns.

I would like to express my gratitude to the United Nations' Food and Agricultural Organization (FAO) for providing training to Statistics Botswana staff on data analysis methods and the creation of the "Prevalence of Undernourishment" Statistical Brief. My gratitude also goes to the survey respondents.

Dr. Burton Mguni
Statistician General
May 2023

1.0 Introduction

In 2015/16 Statistics Botswana conducted the Botswana Multi-Topic Household Survey (BMTHS). The survey was conducted from November 2015 to October 2016 with the primary objective of providing a comprehensive set of indicators for poverty and labour market.

The BMTHS had modules on Household Consumption and Expenditure; Education, Health, Access to amenities, Economic Activity, Household Enterprises among others. A comprehensive household paper questionnaire was used to conduct interviews and a 14-day diary was used to collect data on household food consumption, as well as food and non-food purchases.

The dairy was kept by households to record food consumption and expenditure, acquisition by main source (purchased, own produce, in-kind, etc.). The recorded values were quantity and price of food items. Consumption excluded food not consumed by household members during the 14-day diary period. The diary method was supplemented by further interviews of households on consumption and expenditure to ensure items consumed or purchased on daily basis were not missed.

The quantities consumed were used to determine household per capita consumption (average dietary energy consumption (kilocalories/person/day)). The minimum dietary energy requirement, which is the amount of energy needed for an individual to maintain a healthy and active life was computed based on age, gender, body size, physical activity level, and other factors.

This brief provides the baseline of the Prevalence of Undernourishment (PoU) obtained from the 2015/16 BMTHS data. The indicator 2.1.1 prevalence of undernourishment (PoU), falls under Target 2.1 (By 2030, 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) of SDG 2 Zero Hunger.

Prevalence of undernourishment is therefore measured by the proportion of the population whose food intake falls below the minimum dietary energy requirements. It is defined as the probability that selecting one individual at random from the population, that person is found to be consuming, on a regular basis, an amount of food that provides less than his or her own dietary energy requirements. Measuring the PoU is important because it provides a snapshot of the extent of food insecurity in a population (in terms of food consumption).

It is important to note that both prevalence of undernourishment and undernutrition are related to food security, but refer to different aspects of the problem. Undernourishment is a measure of caloric intake rather than overall nutrient adequacy and Undernutrition is a more comprehensive concept that encompasses not only insufficient energy intake but also inadequate intake of other nutrients. Undernutrition can as such lead to stunted growth, wasting, micronutrient deficiencies, and other health problems.

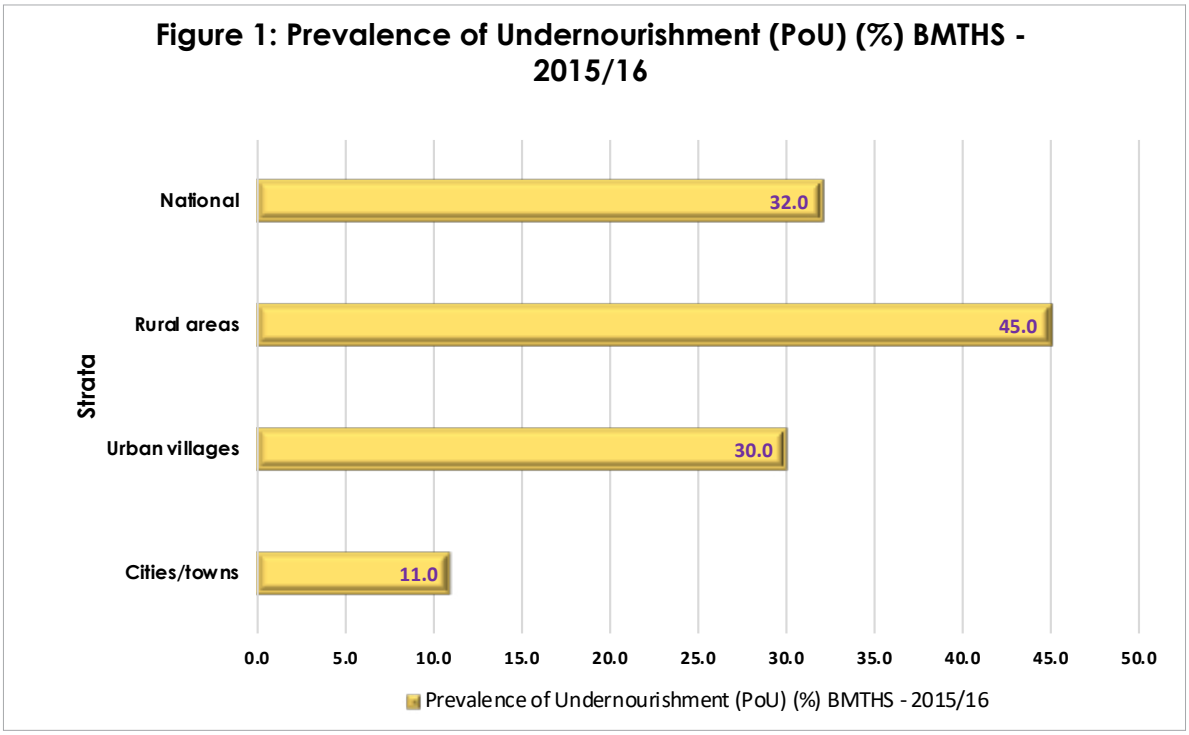
2.0 Results

2.1 Prevalence of Undernourishment (PoU), by Strata.

The results as indicated in figure 1, show that at national level, 32.0 percent of the population is undernourished. That is, the probability of randomly selecting an individual who is consuming, on a regular basis, an amount of food that provides less than their dietary energy requirements is 32.0 percent. When we examine the data at the strata level, we observe that the prevalence of deprived individuals is highest in rural areas at 45.0 percent, followed by urban villages with 30.0 percent, and lastly, cities and towns with 11.0 percent.

The high prevalence rates in rural areas may be attributed to the habitual consumption patterns of people living in that stratum. Specifically, the data shows that there is a high probability of selecting individuals in rural areas who consume less dietary energy than what is required for their daily living, which contributes to higher levels of deprivation. This may indicate that lack of access to food, poor infrastructure, and limited economic opportunities are contributing factors to undernourishment in rural areas.

Figure 1: Prevalence of Undernourishment (PoU) (%) BMTHS - 2015/16



2.2 Comparing Average Dietary Energy Intake, Minimum Dietary Energy Requirement (MDER) and Prevalence of Undernourishment (POU) by Strata

The results in Table 1 show that at national level, the average amount of dietary energy consumed per person per day in Botswana is 2202 kilocalories. The results also shows that the minimum amount of energy that an individual needs to consume in order to maintain a healthy body weight and carry out daily activities, i.e. the minimum dietary energy requirement (MDER) is 1788 kcal per day. The calculation of the MDER was based on age, sex, and physical activity level.

While the average energy consumption in the population is above the minimum requirement nationally and across strata, there is still a significant proportion of the population that are not consuming enough food to meet their daily energy needs. This is reflected by the prevalence of undernourishment (PoU) of 32.0 percent at national level.

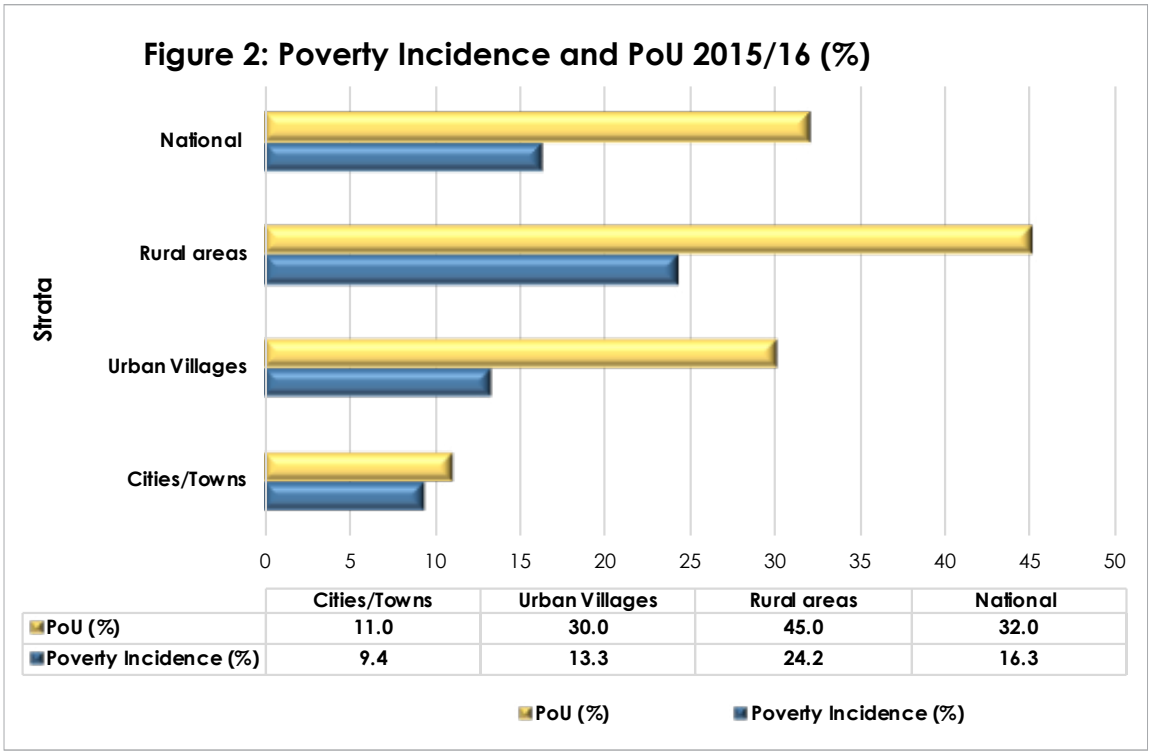
Across strata, Rural Areas recorded the highest PoU of 45.0 percent, followed by Urban Villages at 30.0 percent and Cities and Towns with 11.0 percent.

Table 1: Average Dietary Energy intake and MDER by strata

Strata	MEAN (Kcal/person/day)	Minimum Dietary Energy Requirement (MDER)	Prevalence of Undernourishment (PoU)
National	2,202	1,788	32.0%
Cities/Towns	2,668	1,859	11.0%
Urban Villages	2,192	1,793	30.0%
Rural areas	1,941	1,745	45.0%

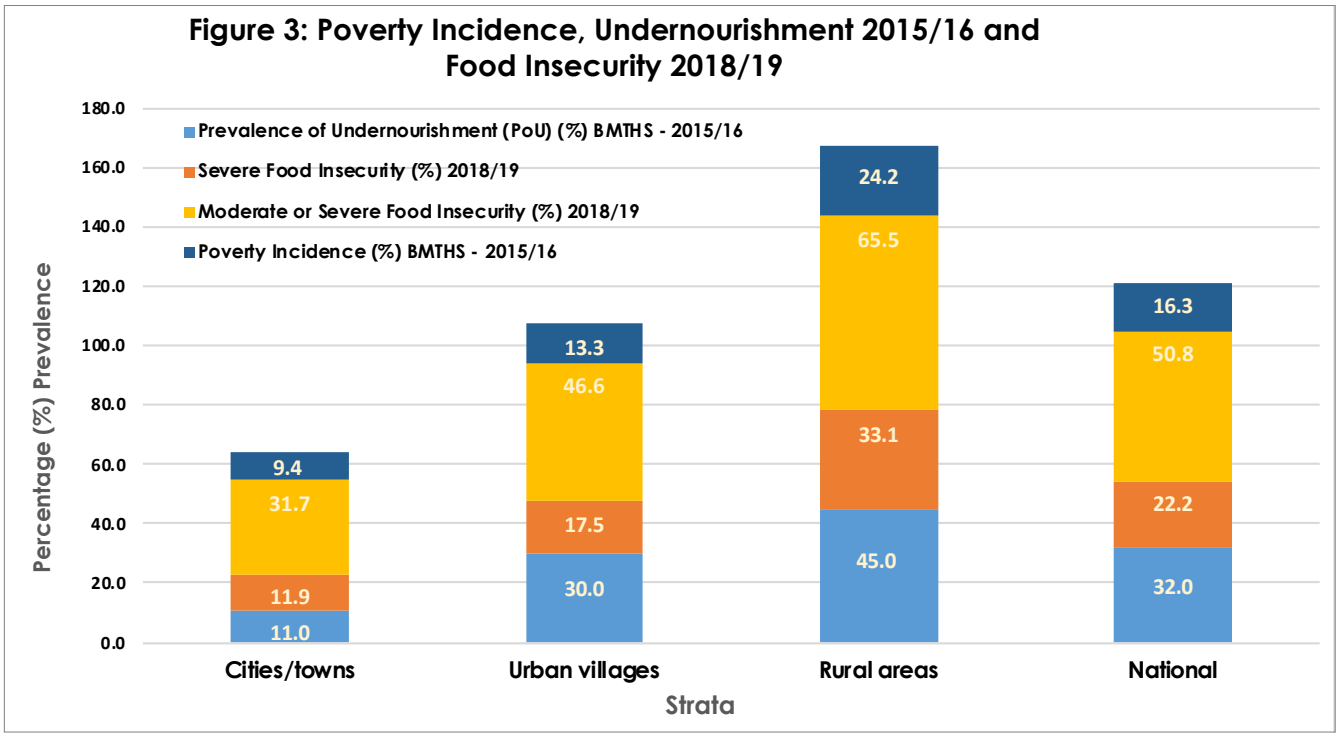
2.3 Poverty Incidence compared to Prevalence of Undernourishment

Poor people are generally characterised by lack of sufficient basic needs such as food and the PoU indicates the magnitude of food insecurity in the population. As a result, it is expected that areas with high poverty rates would also exhibit high levels of undernourishment. Figure 2 supports this hypothesis by demonstrating that in rural areas, where poverty rates are the highest at 24.2 percent, and the highest rates of undernourishment are observed at 45.0 percent.



2.4 Poverty Incidence, Prevalence of Undernourishment (PoU) 2015/16 and Food Insecurity 2018/19

Following the 2015/16 BMTHS Survey which was designed to be a launching pad for the Quarterly Multi-Topic Survey (QMTS); Statistics Botswana commenced a series of QMTS surveys in 2019 which had several modules including the Food Insecurity Experience Scale (FIES). Figure 3 is an extension of Figure 2 that includes food insecurity indicators from the QMTS. An intriguing trend is apparent for all three indicators, with rural areas exhibiting the highest prevalence, followed by urban villages, and finally cities and towns for both the Poverty Incidence, Undernourishment in 2015/16 and Moderate or Severe Food Insecurity for the 12 months of 2018/19. (see figure 3 for more details)



It should be noted that the PoU estimates the sufficiency of dietary energy intake within a population, while the FIES gauges the proportion of the population experiencing difficulties in obtaining food at varying levels of severity, such as moderate and severe. The lack of access to food can result in insufficient dietary energy intake within a population while on the other side the population may lack a variety of desired nutritional food items and opt for cheaper food to meet dietary energy requirements.

3.0 Conclusion

Information on prevalence of undernourishment as reflected in the results section, could be used to inform targeted interventions and policies aimed at reducing undernourishment and improving food security within specific areas in Botswana. This information assist in developing targeted programs that provide food assistance to individuals in rural areas or low-income households.

Annexure: Methodology and Computation

The calculation of undernourishment prevalence involves determining the distribution of population across different age and gender groups. The minimum dietary energy requirement is estimated based on the gender distribution, rather than using arbitrary calorie averages such as the 2100 kcal. This is because applying a uniform standard to all countries would not account for variations in age and gender structures, which may introduce a significant margin of error in computing the prevalence of undernourishment. Failure to take into account the variations in food intake and energy requirements across different population groups can result in an inaccurate estimation of undernourishment prevalence, which may have serious implications for policy and intervention efforts aimed at addressing this issue.

In order to estimate the prevalence of undernourishment, the PoU method utilises a log-normal distribution function that takes into account both the probability distribution of the population and the degree of food access, as measured by the Coefficient of Variation. By incorporating these factors, the PoU gives the probability that a randomly selected individual in Botswana would be undernourished. Unlike the head count approach, the PoU utilises a probabilistic distribution framework that provides information on the mean, standard deviation, and skewness, allowing for the estimation of the population of undernourished individuals. The estimate of the proportion of the population below the minimum level of dietary energy consumption, is defined within a probability distribution framework as shown below;

$$P(U) = P(x < r_L)) = \int_{x<r_L} f\ (x)dx = F_x(r_L)$$

$P(U)$ is the proportion of undernourished in total population

(X) refers to the dietary energy consumption

r_L is a cut-off point reflecting the minimum energy requirement

$f\ (x)$ is the density function of dietary energy consumption

F_x is the cumulative distribution function

Requirements for calculating POU

1. To calculate the PoU, four parameters were used, which include:
2. The Dietary Energy Consumption (DEC) (kcal/capita/day) obtained from food diaries (BMTHS 2015-16) for each individual.
3. The minimum dietary energy requirement (threshold).
4. The coefficient of variation in food access (CV) based on income as a direct proxy. Household income is used to create income deciles, and the coefficient of variation is calculated to measure inequality in food access based on household income. In Botswana, total household expenditure is used as a proxy for income due to underreporting (of income) and the assumption that if households can spend it, they must have it.
5. Age and gender classifications for individuals.

Calculating the minimum dietary energy requirement

The Botswana population was categorised into various age and gender groups using the BMTHS 2015-16 Survey data. The Body Mass Index (BMI) was assigned to each of these groups based on their median heights and pre-existing ranges for the body mass index. The height information was obtained from the Botswana Demographic Survey 2017. Many values were already established, including weight for attained height in kilograms, weight gain per age in grams per day, physical activity level (PAL) for ages 18 and above, energy per gram of weight gained in kilocalories, standard equations for countries with under five mortality rates below 10 per thousand live births to calculate the lower limit of energy requirement in kilocalories per capita per day for each age-gender group, population ratio, and minimum dietary energy requirement.

To determine the weighted mean for males across different age gender groups, the population ratio was first calculated. The number of individual males that belonged to the same age gender class was divided by the total population of the males to find the frequency of males that belong to that age gender class i.e. the population ratio. The population ratio was then multiplied by the lower limit of energy requirement to come up with the contribution of that age gender class to the national male minimum dietary energy of the hypothetical average male in Botswana.

The same process was applied on the female population with an additional coefficient or factor. The additional factor takes into account the energy required by women who are pregnant or lactating in any given nation at a particular time. An extra amount of calories is added to factor in the energy needed for breastfeeding, which is computed using the crude birth ratio (BR) in the country. The higher the birth ratio, the more significant the additional energy assigned. The total minimum dietary energy requirement (MDER) per capita per day is calculated by adding the total female MDER (including the extra energy required during pregnancy and lactation) and the total male MDER (kcal/capita/day). The Crude Birth ratio (CBR) for the year 2016 was 0.0153, under 5 mortality rate for 2016 was 9.4 and pregnancy and lactating allowance = 210 kcal.

Calculating Dietary energy consumption

The food file was utilised to calculate dietary energy consumption. It comprised various food items that were consumed by the household(s) along with their corresponding quantities and associated monetary values. Moreover, it included details regarding the source of acquisition. Additionally, the food file had standardised quantities of food items with grams as a standard unit of measure.

If the average dietary energy supply falls below the average dietary energy requirement, then the population is considered to be undernourished.

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