Republic of Botswana

OFFICE OF THE PRESIDENT

PILOT NATIONAL
MULTIDIMENSIONAL
POVERTY INDEX
REPORT
2021

Nyeletso lehuma
PROSPERITY FOR ALL
POVERTY ERADICATION
SINCE 2011
LEAVING NO ONE BEHIND

STATISTICS BOTSWANA

UNDP

PILOT NATIONAL MULTIDIMENSIONAL POVERTY INDEX FOR BOTSWANA

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EXECUTIVE SUMMARRY

Botswana has been using the two uni-dimensional monetary poverty measures of extreme poverty ($1.90) and national Poverty Datum Line (PDL) to track progress in the fight against poverty. Monetary measures, however, do not capture the multiple and overlapping non-income deprivations experienced by the poor such as education, health, housing, sanitation and access to clean drinking water.

It is in this regard that in 2019, Government, in conjuction with Statistics Botswana, started the process of tracking the non-income deprivations through the use of the Multidimensional Poverty Index (MPI). Through the support of UNDP Botswana, the Oxford Poverty and Human Development Initiative (OPHI) was engaged to provide technical assistance on the development of both the Global and National MPI. The process involved all key stakeholders in the fight against poverty in the country such as the Office of the President through the Poverty Eradication Coordinating Unit, National Strategy Office, line Ministries, and the Botswana Institute for Development Policy Analysis (BIDPA).

As such, the country was included for the first time in the 2020 Global Multidimensional Poverty Index Report. The results showed that 17.2% of Batswana were multidimensional poor, with 3.5% living in severe multidimensional poverty.

Using the Global MPI as a guide, a Pilot National MPI for Botswana was developed, taking into consideration the poverty context in the country. Noting the inter-linkages between poverty, unemployment and inequality, an additional dimension of social inclusion was added to the Global dimensions with its indicators being unemployment and civil registration. Two other indicators of maternal care and access to health facility were added under the Health Dimension. Computer knowledge was also added as an indicator under the Education Dimension in order to align with the country's vision of transiting to a knowledge based economy.

The results of the Pilot National MPI reveal that 20.84% of the population are multidimensional poor, with average poverty intensity of 51.08%. Poverty incidence is higher in rural areas than in towns and cities. The results also show the indicator deprivation levels per district. Those in severe multidimensional poverty account for 3.9%, while the vulnerable ones are 15.94% of the population.

It is recommended that the results of the MPI be used to guide the planning system of the country going forward. This would result in not only designing more relevant and impactful interventions per location, but also assist in the allocation of resources to those areas with more pressing needs. The report also advocates for involvement of all stakeholders, both state and non-state actors, and the poor themselves in the development and implementation of policies and programmes geared towards addressing poverty in the country.

ACRONYMS AND ABBREVIATIONS

BIDPA Botswana Institute for Policy Development and Analysis MPI Multidimensional Poverty Index
NDP National Development Plan
NSO National Strategy Office
OP Office of the President
PEP Poverty Eradication Programme
PDL Poverty Datum Line
SDGs Sustainable Development Goals
UNDP United Nations Development Programme USD United States of America Dollar
WEE Women Economic Empowerment
YDF Youth Development Fund

GLOSSARY

Botswana Multi-Topic Household Survey (BMTHS): A survey that is carried out by Statistics Botswana every five years and provides a comprehensive set of household-level indicators for poverty and the labour market such as the poverty incidence, employment and unemployment levels.

National Poverty Datum Line (PDL): Poverty Datum Line (PDL) is based on the cost of a basket of goods and services assessed to be necessary to meet national basic needs of household members. This PDL is based on the basic requirements for food, clothing, personal items, household goods & services and shelter. Those falling below the line are considered poor.

Extreme Poverty (International Poverty Line): Purchasing power parity adjusted international poverty line equivalent to $1.90 per day. Those falling below the line are considered to be in extreme poverty.

Multidimensional Poverty Index (MPI): It is a poverty measure that reflects the multiple deprivations that poor people face in areas of education, health, living standards and others. It reflects both the share of people in poverty and the degree to which they are deprived. The MPI is calculated by multiplying the incidence of poverty (headcount ratio - H) by the Average percentage of deprivation experienced by the poor (Intensity - A) i.e. MPI = H*A. MPI ranges from zero (0) to one (1), with 0 indicating the absence of multidimensional poverty while 1 indicates complete presence of multidimensional poverty. In reality, countries range between 0 and 1, with all striving to be closer to 0.

Dimensions: A group of indicators that fall under one conceptual category. Indicators: variables used to measure the state of deprivations faced by the poor.

Weights: The value each dimension or indicator is assigned, depending on its perceived impact on the livelihood of the poor. Poverty Cut-Off: a threshold used to identify the multidimensionally poor (denoted by K in formulae).

Uncensored Headcount Ratio: The proportion of the population deprived in an indicator. Censored Headcount Ratio: The proportion of the population that is multidimensionally poor and deprived in an indicator.
Headcount or incidence: Percentage population of people in multidimensional poverty (denoted by H in formulae).

Intensity of poverty: Average percentage of deprivation experienced by the poor (denoted by A in formulae).

1.0 INTRODUCTION

Poverty has traditionally been measured in monetary terms, usually as income or consumption. This is done through the valuation of a basket of goods and services considered to be the minimum requirement to live a non-impoverished life and is referred to as the Poverty Datum Line (PDL). People who live below the poverty datum line, are considered to be poor as they do not have an income/consumption sufficient to cover the minimum requirement. The PDL is categorized into two: the international PDL (living below $1.90 a day) which is used to measure extreme poverty and is used to compare poverty levels across countries and; the national PDL which measures poverty as defined by a particular country and may in most cases not comparable across countries because of the uniqueness of each country.

Monetary measures, however, do not capture the multiple non-income deprivations that are experienced by the poor. These include lack of education, health, housing, sanitation, access to clean drinking water and personal security among others.

Therefore, in 2010, the Oxford Poverty and Human Development Initiative (OPHI) at the University of Oxford and the Human Development Report Office of the United Nations launched the global Multidimensional Poverty Index (MPI) to address

non-income deprivations. Specifically, the global MPI is used to track the deprivations that people experience in three equally weighted dimensions of Health, Education and Standard of living; and 10 indicators. The main focus being on the deprivation levels experienced by the poor, and to determine the intensity of poverty. Apart from shedding light on the number of people experiencing multidimensional poverty in a particular country, the MPI can also be disaggregated by district, region, age etc. to ensure that no one is left behind. The MPI is also used to track progress made in eradicating poverty in all its forms in line with Sustainable Development Goal 1 (SDG1).

The MPI has been adopted by many countries in developing their own national MPIs, tailored to their particular national contexts and priorities to complement income/consumption measures and to create a more comprehensive picture that reflects poverty in all its dimensions. The use of both monetary and non-monetary measures holistically reveal who is poor, the extent of their poverty and the range of different deprivations they experience.

Such tools guide the development of appropriate policies and programs that are targeted towards the poor; and allocation of resources to ensure that the hardest hit regions are given more attention.

It is worth noting that while the MPI is a fairly new concept, to a certain extent Botswana has been implementing some of the aspects of multidimensional poverty although it did not call it so, which places Botswana at an advantage in developing a country specific MPI.

The purpose of this report is therefore to present a pilot National MPI for Botswana to establish a baseline for multidimensional poverty monitoring in the country. This would allow for future tracking of progress in addressing multiple deprivations experienced by the poor.

The report entails the following: Background section which covers the history of poverty measures and poverty status both globally and in Botswana; The section on National MPI for Botswana to provide baseline information on the multidimensional poverty status in the country and compares the results with those of monetary measures; The last but one section draws conclusions from the previous sections and; the last section recommends actions that would enhance positive impact of poverty initiatives in the country.

2.0 BACKGROUND

2.1 Globally
Poverty eradication is a global challenge as indicated by it being the first goal of the 2030 Sustainable Development Goals (SDGs) which were adopted by the 2015 United Nations General Assembly. Progress on the global poverty levels is being tracked using both monetary and non-monetary measures.

2.1.1 Monetary Poverty
The 2016 World Bank report indicates that more than 766 million people or 10.7% of the world's population still live in extreme poverty, the majority of whom are children. Sub Saharan Africa accounts for more than half of the total number, while regions such as Latin America & the Caribbean and East Asia and the Pacific are making notable achievements in the fight against poverty. Europe and Central Asia have the lowest extreme poverty rate, at 2.2% (Table 2.1).

Table 2.1.1 Extreme Poverty By Region

	Poverty rate in region (%)	Number of poor (millions)
Global	10.7%	766
Sub-Saharan Africa	41.0%	388.7
South Asia	15.1%	256.2
East Asia and Pacific	3.5%	71
Latin America and the Caribbean	5.4%	33.6
Europe and Central Asia	2.2%	10.3

Source: World Bank Report, 2016

2.1.2 Multidimensional Poverty
As indicated earlier in the report, a number of countries have adopted the MPI as a complementary measure to monetary poverty measures. The MPI was developed by the Oxford Poverty and Human Development Initiative (OPHI) and uses the Alkire-Foster Method which assigns weights to different deprivation dimensions and their respective indicators and then uses a dual cut-off approach to identify poverty and its intensity among the poor.

The MPI is used to track deprivation levels experienced by the poor, and also to determine the intensity of poverty. Apart from shedding light on the number of people experiencing multidimensional poverty in a particular country, MPI can also be disaggregated by district, region, age etc. so as to ensure that no one is left behind.

Most governments use results derived from the MPI computations to develop appropriate policies and programs that are targeted towards the poor. The MPI also guides the allocation of resources to ensure that the hardest hit regions are given more attention.

The MPI is also used to track progress made in eradicating poverty in all its forms in line with Sustainable Development Goal 1 (SDG1).

There are two major categories of MPI that are currently used. These are the Global MPI, which uses standard variables and is used to compare the extent of multidimensional poverty across countries, and National MPI which uses country-specific deprivations and cannot be used to compare the extent of multidimensional poverty amongst countries.

The Global MPI looks closely at the multiple deprivations that poor people experience in the areas of education, health, and living standards. The MPI process identifies the dimensions of poverty as well as their respective indicators. Table 3.1 shows the equally weighted 3 dimensions (Health, Education & Standard of Living) of the Global MPI and the indicators for the respective dimensions. In total, there are 10 indicators and for a person to be considered multidimensionally poor, they must be deprived in at least a third (1/3) of the weighted indicators. That is all those with deprivation level of 33% or more are considered poor.

Table 3.1 Dimensions & indicators of the Global MPI (weights and cut-offs)

DIMENSIONS OF POVERTY	INDICATOR	DEPRIVED IF LIVING IN THE HOUSEHOLD WHERE...	WEIGHT
Health (1/3)	Nutrition	An adult under 70 years of age or a child is undernourished	1/6
	Child mortality	Any child under the age of 18 years has died in the five years preceding the survey.	1/6
Education (1/3)	Years of schooling	No household member aged 10 years or older has completed six years of schooling.	1/6
	School attendance	Any school-aged child is not attending school up to the age at which he/she would complete class 8.	1/6
Standard of Living (1/3)	Cooking fuel	The household cooks with dung, wood, charcoal or coal.	1/18
	Sanitation	The household's sanitation facility is not improved (according to SDG guidelines) or it is improved but shared with other households.	1/18
	Drinking water	The household does not have access to improved drinking water (according to SDG guidelines) or safe drinking water is at least a 30-minute walk from home, round trip.	1/18
	Electricity	The household has no electricity.	1/18
	Housing	Housing materials for at least one of roof, walls and floor are inadequate: the floor is of natural materials and/or the roof and/or walls are of natural or rudimentary materials.	1/18
	Assets	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike or refrigerator, and does not own a car or truck.	1/18

SOURCE: (Alkire, Kanagaratnam and Suppa, 2020) (Own presentation)

The Global MPI, published jointly with the United Nations Development Programme (UNDP) uses standard variables across all countries and is used to compare the extent of multidimensional poverty across countries. The 2020 Global MPI report covers 107 countries, 28 low income, 76 middle income and 3 high income. The MPI is disaggregated by age and geographic area to show poverty patterns within countries. It is also broken down by indicator to bring out the contributions of the deprivations to poverty and their role in increasing or decreasing it. Some major highlights of the report are:

• 22 percent (1.3 billion people in the data sets) from the 107 countries are multidimensional poor .

Half of the 1.3 billion multidimensional poor people are children under age 18. One in three children is poor compared to one in six adults.

- The countries with the fastest reduction in MPI value in absolute terms were Sierra Leone, Mauritania and Liberia, followed by Timor-Leste, Guinea and Rwanda. North Macedonia had the fastest relative poverty reduction, followed by China, Armenia, Kazakhstan, Indonesia, Turkmenistan and Mongolia. Each of these countries cut its original MPI value by at least 12 percent a year.

- In 14 countries in Sub-Saharan Africa, the number of multidimensional poor people increased, even though their MPI value decreased, because of population growth.

2.2 National

Although Botswana has long been using the two uni-dimensional monetary poverty measures of extreme poverty ($1.90) and national PDL, Government has long recognised the importance of non- monetary deprivations experienced by the poor. Hence implementation of various programmes geared towards addressing non-monetary deprivations. The programmes include, among others, the Food Basket for destitute persons, School Feeding Programme, Vulnerable Group Feeding Programme, Poverty Eradication Programme (PEP), Youth Development Fund (YDF) and Women Empowerment Programme (WEE). The programmes are meant to address the following deprivations of the poor as revealed in the Draft Poverty Eradication Policy of 2019:

- **Access to Food** - The poor do not have sufficient resources to afford minimum daily food requirements;

- **Shelter/Housing** - Poverty manifests itself as a lack of shelter. Poor people either have inadequate shelter, are overcrowded in their homes, or shelter does not exist at all;

- **Access to quality health** - Poor households generally have inadequate access to quality health services; hence the government provides the service almost freely to all;

- **Economic deprivation** - Poor people in both urban and rural areas are generally unemployed leading to inadequate and unreliable incomes, therefore, lack assets;

- **Sanitation** - The poor live under conditions of poor sanitation. Some do not have toilets at all, while some use pit latrines;

- **Access to safe drinking water and energy** - The poor generally have inadequate access to clean water and sustainable energy;

- **Large household size** - Poverty correlates positively with household size. On average, poor households have more family members than non-poor households, with an average of six members in a home;

- A**ccess to quality education** - The poor generally do not have access to quality education, thus leading to low qualification levels and skills, and further reducing their ability to be absorbed in any meaningful employment and;

- Subsistence agriculture - The poor are mostly found in rural areas, engaged in low productivity subsistence agriculture and informal sector activities.

Government has over the years implemented various initiatives meant to address these deprivations. These included agricultural programmes, given that most of the poor reside in rural areas (BMTHS, 2015/16), social protection as well as economic empowerment ones. However, there has been no measure that tracks the agglomerated impact of these programmes on the poor.

2.2.1 Monetary measure

Botswana has grown from being one of the poorest countries in Africa at independence in 1966 to being an upper middle-income over a period of three decades. Despite the economic success, poverty remains a challenge, with national monetary poverty at 16.3% in 2015/16, declining from 19.3% in 2009/10 and 30.6% in 2002/03 (Figure 2.1). Similarly, extreme poverty declined to 5.8%, from 6.4% and 23.4% over the same period (Statistics Botswana, 2018).

Poverty in the country has strong regional, rural-urban and gender dimensions. The poverty incidence in the rural areas was estimated at 24.2% in 2015/16, with the highest poverty level recorded in Kweneng West at 50.6%, followed by Ngwaketse West at 40.3% and Kgalagadi South at 39.5%. For urban villages, the poverty incidence was estimated at 13.4% while for the cities/ towns it was 9.4%.

With regard to gender, poverty levels are higher among female-headed households than the male- headed ones, at 55% and 45% respectively. In addition, larger households with more children have higher rates of poverty. The family structure is an important correlate of poverty, for example families with both parents have lower poverty rates than single-parent families (Poverty Eradication Programme administrative data, 2019).

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2.1 Monetary measure
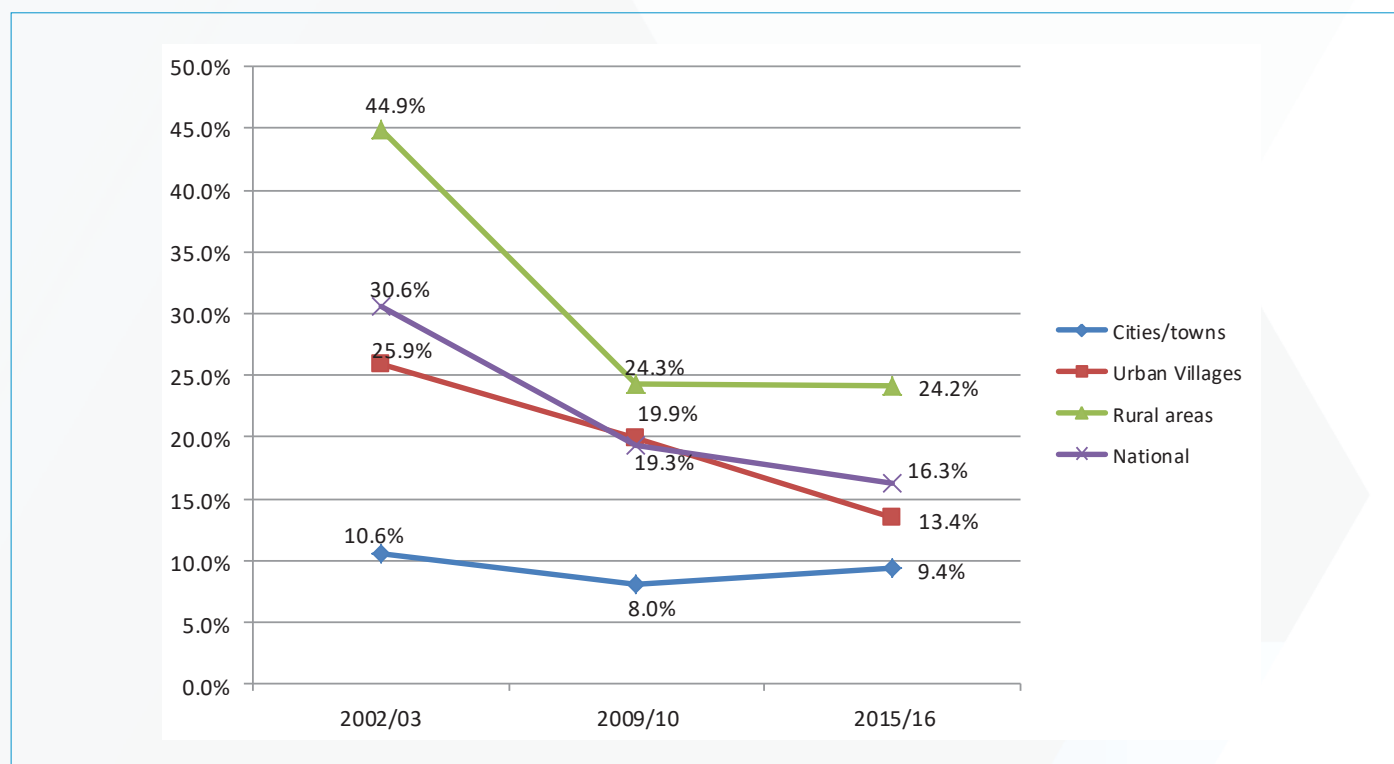
Source: Statistics Botswana, 2018 (own presentation)

2.2.2 Global Multidimensional Poverty Index (MPI)
Figure 2.2.2.1 shows results of Global MPI for Botswana. The figure depicts that 17.2% Batswana are multidimensional poor. Poverty is more concentrated in rural areas at 32.9% than in urban areas at 8.5%. Thus rural areas suffer most of the deprivations compared to urban areas, indicating the inadequacy of some of the basic infrastructure such as water reticulation and electricity in some rural areas. On the other hand, urban areas have a lower poverty rate, indicating the availability of most basic services in these areas.

Figure 2.2.2.1 – Global MPI
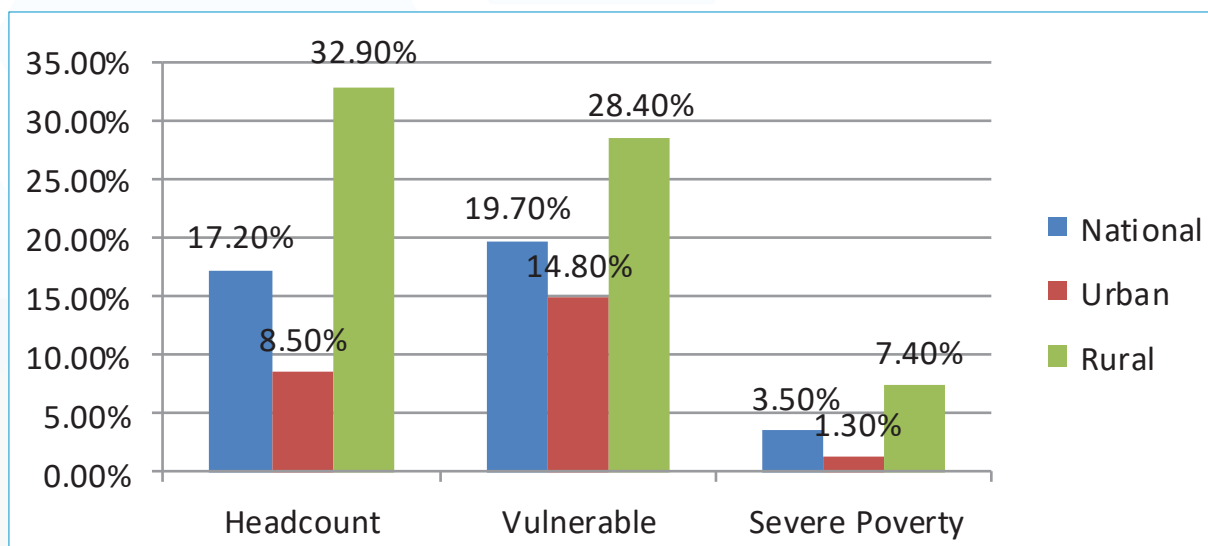
Source: (Alkire, Kanagaratnam and Suppa, 2020)

Under severe multidimensional poverty, that is those deprived in at least 50% of the indicators, only 3.5% of the population are affected nationally. Rural areas experienced higher incidence than the national level at 7.4% and severe poverty may be prevalent in remote rural areas where most basic services are either inaccessible or unavailable.

Another level is the vulnerable, that is the percentage of the population that are deprived in 20 to 33% of the indicators, and the same figure 2.2.2.1 shows that 19.70% are vulnerable nationally. These people also need attention so that they do not fall back into poverty when shocks such as drought occur. Rural areas have the highest percentage of vulnerable people, at 28.40%. This could be attributed to the fact that the livelihoods of most rural inhabitants are dependent on agriculture, which is susceptible to climate and weather changes.

Weighted Indicator Contribution to National MPI

Figure 2.2.2.2 depicts the percentage contribution of each weighted indicator to the global MPI. The highest contributor is Nutrition, at 28.29%. Nutrition, Electricity, Sanitation and Cooking fuel account for more than 63% of the National MPI indicating the need to focus more on these indicators.

Years of Schooling, School Attendance and Assets also contribute significantly to the global MPI for Botswana, thus indicating the low educational levels amongst the poor and lack of assets. This is in line with identified characteristics of the poor outlined in section 2.2.

Child mortality is the indicator with the lowest contribution to the global MPI (2%). However, the country should strive for a zero contribution as any child mortality is not acceptable.

In general, indicators that contribute more to the global MPI reveal areas that the country should focus on in the endeavor to eradicate poverty.

Figure 2.2.2.1 – Global MPI

Legend:
- School Attendance
- Years of Schooling
- Nutrition
- Child Mortality
- Electricity
- Water
- Sanitation
- Housing
- Assets
- Cooking Fuel
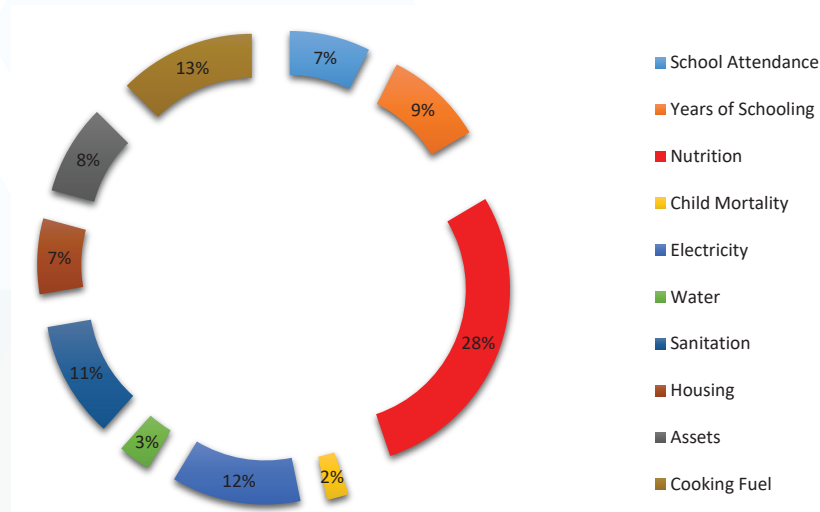
Source: (Alkire, Kanagaratnam and Suppa, 2020) (Own presentation)

Censored Headcount Ratios

This section analyses the censored headcount ratios, the percentage of the population that is multidimensional poor and deprived in each indicator in Botswana, according to the global MPI. Figure 2.2.2.3 shows the percentage of the population who are multidimensional poor and deprived in each of the 10 indicators. The censored headcount ratios range from 0.87% for Child Mortality to 16.38% for Cooking fuel. Other indicators with more than 10% deprivation level are Nutrition, Electricity, Sanitation and Assets. The indicators with high percentages (multidimensional poor and deprived) reflect areas of major concern for the poor and call for sustainable measures to address them. Any reduction to any of the censored headcount ratios will also lead to a reduction in the overall MPI for the country.

Figure 2.2.2.3 Censored Headcount Ratios
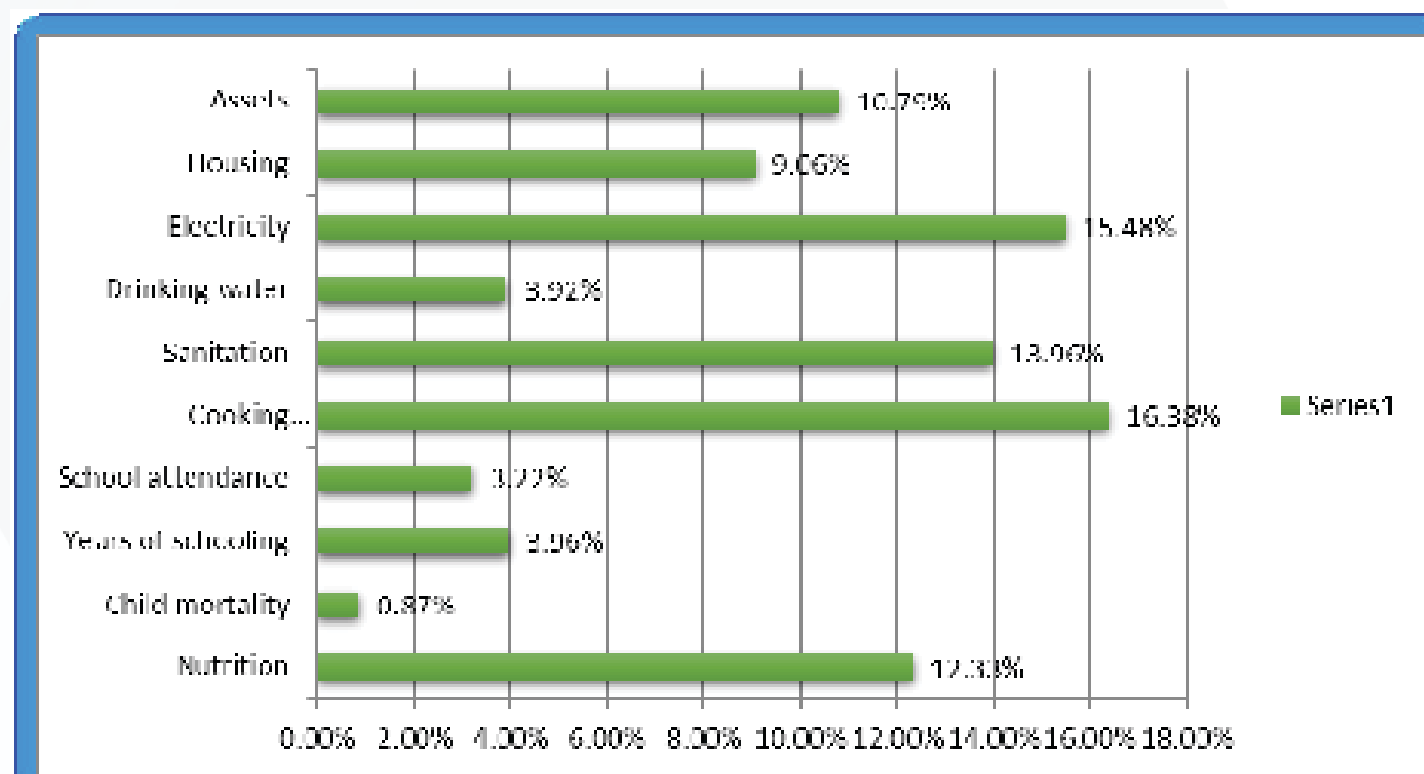
3.0 PILOT NATIONAL MPI FOR BOTSWANA

In an effort to start measuring the multiple deprivations experienced by the poor, Botswana has adopted the national MPI to help track progress in addressing the multiple deprivations. To start the process, Botswana Government with the support of UNDP received technical assistance from the Oxford Poverty and Human Development Initiative (OPHI) to compute the pilot national MPI. The process involved constituting a technical team of key stakeholders such as Office of the President (Poverty Eradication Coordination Unit), Statistics Botswana, Ministry of Local Government and Rural Development, Ministry of Basic Education, Ministry of Health and Wellness, National Strategy Office (NSO), Government Implementation Coordination Office (GICO) and the Botswana Institute for Development Policy Analysis (BIDPA). The team was trained and guided to draft the initial MPI for Botswana. This section of the report is the analysis of the proposed MPI for Botswana.

3.1 Data Set for the Pilot MPI for Botswana
The Pilot MPI for Botswana used data from the Botswana Multi Topic Household Survey (BMTHS) of 2015/16. The following are merits for using the dataset:

- It is the most recent multi-topic dataset and provides detailed household economic activity for Botswana.

- It has 16 modules covering household and individual levels. These include Education, Employment/Labour, Self-assessed Well-being, Health care, Services within the Village/Community and Housing Utilities etc.

- It Covers key indicators which are consistent with the characteristics of poverty in the country, among others, health status, nutrition, food security, participation/exclusion, personal security

- The Unit of identification for MPI is a household because it is assumed that all individuals in a households are deprived based on household's deprivation of the weighted indicators.

The following are some of the limitations of the dataset:

- The survey was carried out five years ago, therefore the results may not reflect the current poverty situation.
- As the survey was carried out before the country adopted the multidimensional poverty approach, the survey questionnaire was not designed to capture data for some possible/desired indicators.

3.2 Dimensions, Indicators, Weights & cut – off
Key to the use of MPI is the dimensions, indicators, weights and poverty cut-off. These were developed taking cognizance of the poverty dynamics in the country as outlined in the previous sections as well as the global MPI. As such, the proposed MPI for Botswana, as shown in Table 3.2, uses the three dimensions of the global MPI, with the addition of Social inclusion as a 4th dimension consisting of Employment and Civil Registration indicators. The indicators in each of the three Global MPI dimensions are also modified to suit Botswana context. All the four dimensions have been assigned equal weighting, except living standards which has a higher weight. This is based on the fact that it is the ultimate yardstick for determining poverty status. The total weights for indicators under each dimension add up to the weight of the respective dimension. Indicator cut-offs are also adjusted accordingly to reflect the poverty dynamics in the country.

Additionally, as the 2015/16 BMTHS dataset is used, the availability of suitable and robust data items in the data set also guided the inclusion of dimensions and indicators. Thus indicators such as Quality of education and Internet usage, though considered relevant, were not included because there were no relevant questions on data capturing tool for the survey. These indicators will be considered for inclusion in future surveys and used accordingly to guide future domestic MPI measures.

The cooking fuel indicator, though used in the global MPI, was not included because it was considered not a good indicator of one's poverty status in Botswana. This is because Batswana in rural areas may use dung, wood, charcoal or coal to cook out of choice not because they are deprived. For a detailed justification of the dimensions, indicators and cut-offs, see Appendix 1.

Table 3.2 – Dimensions and Indicators for Botswana Pilot MPI

DIMENSIONS OF POVERTY	INDICATOR	CUT OFFs	WEIGHT
EDUCATION (1/5)	School attendance	household is deprived if any of the children eligible for basic education (6-18) are not enrolled in school.	2/30
	School attainment	A household is considered deprived, if at-least one household member aged above 16yrs has less than 7 years of primary education.	2/30
	Computer usage	Deprived if no member of a household has used a computer in the last 12 months.	2/30
HEALTH (1/5)	Nutrition	Deprived if any child under 5 in the household is stunted, wasted, or underweight OR any child 5-17 has low BMI-by-age.	1/20
	Child Mortality	Deprived if any child has died in the family in the five-year period preceding the survey.	1/20
	Maternal care	Deprived if any woman 12-49 in the household who gave birth in the last 5 years did not have pre- or post-natal care or assisted delivery.	1/20
	Electricity	The household has no electricity.	1/20
	Access to Health Facility	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike or refrigerator, and does not own a car or truck.	1/20
SOCIAL INCLUSION (1/5)	Employment	Deprived if all household members in the labour force are unemployed.	3/20
	Civil Registration	Deprived if no one in the household has a birth certificate or national identity card.	1/20
LIVING STANDARDS (2/5)	Electricity	Deprived if household is not connected to the electrical grid.	1/30
	Water	Deprived if household gets drinking water from unclean source or it takes 30 minutes or more to collect water, round trip.	3/30
	Sanitation (Toilet facility)	Deprived if household has no toilet facilities, open pit latrine or other OR has a shared toilet.	1/30
	Housing	Deprived if household uses inadequate flooring or walls.	3/30
	Food Security	Deprived if the household reports experiencing any moderate or severe food insecurity.	3/30
	Assets	Deprived if a household does not own at least 3 of the following assets: 4 cattle, 12 small stock, 25 chickens, car, tractor, truck or donkey cart, a fridge and a phone	1/30

SOURCE: Author/Technical Team

3.3 Uncensored headcount ratios by Strata

This section analyses the uncensored headcount ratios, the percentage of population who are deprived in each indicator.

Figure 3.3 – Uncensored Headcount Ratios by STRATA
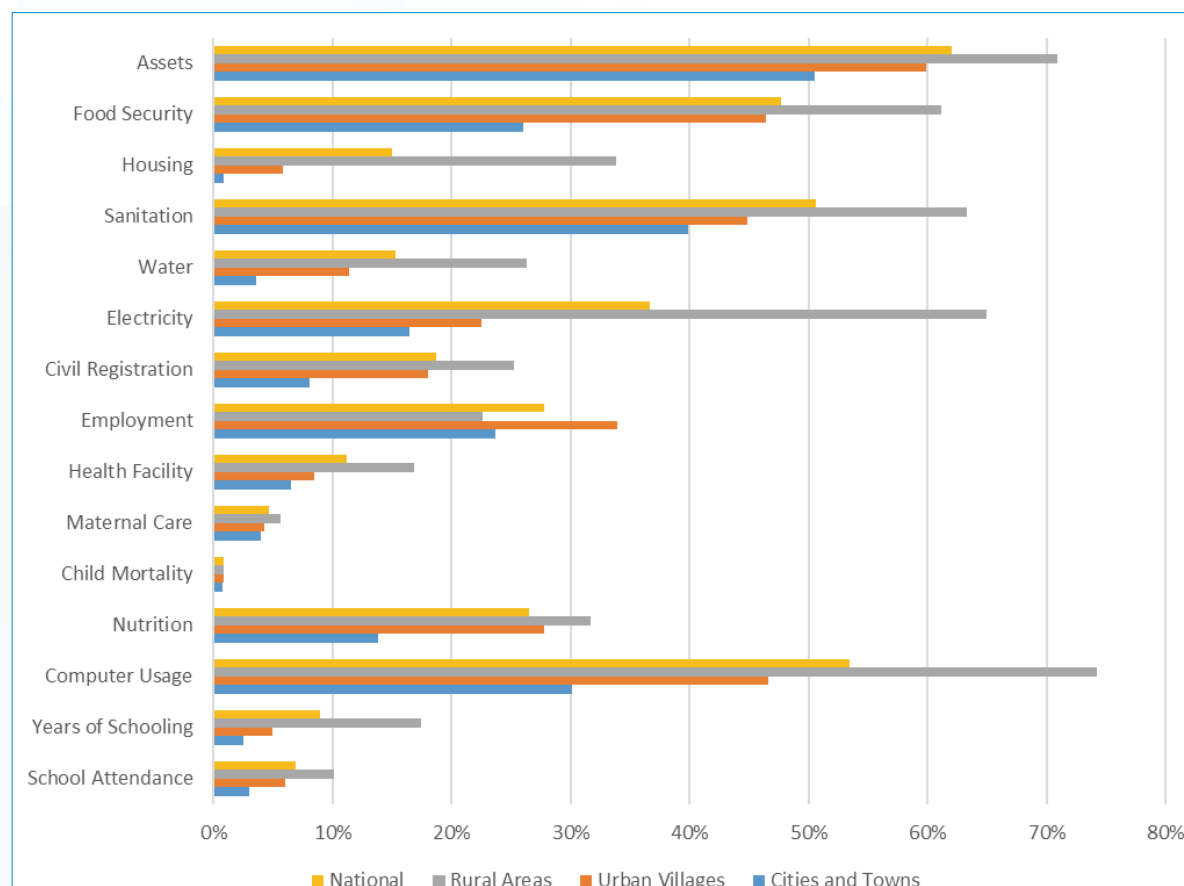
Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

Figure 3.3 shows that for most indicators, deprivations for rural areas are higher than those in urban villages and cities/towns except for employment where 22.6% are deprived in rural areas compared to 33.9% in urban areas and 23.7% in cities/towns. At national level a high percentage of the population are deprived in Computer use, Sanitation, Food Security and Assets with 53.4%, 50.6%, 47.7% and 62.0% respectively.

Due to the Government's policy of free and compulsory education for all school-going children, only a small proportion of the population is deprived in the School Attendance (6.9%) or Years of Schooling (9%)indicators. Hence, School Attendance have the lowest uncensored headcount ratios after Child
Mortality (0.9%) and Maternal care(4.7%). However, the high level of deprivation in Computer Use (53.4%) may be an indication that computer skills need to be harnessed. Assets is the highest of all the indicators with 62.0%

Overall, the chart reveals structural differences in urban and rural poverty which could imply different policy responses in different areas. The MPI could then be used in monitoring the effects of policies and programmes in respective areas.

3.4 Identification of the Poorz

The structure and nature of poverty in the country are key determinants of whether one is poor or not. The following are used to show the spectra of multidimensional poverty in the country:

• Cut-off of 40 %: Anybody whose overall deprivation level is 40% or more is considered multidimensional poor. This has been

equated to the weight of the Living standards dimension as is considered key in determining one's poverty status. The 40% is equivalent to being deprived in all indicators in either the living standards dimension or any two other dimensions

• 30 - 39%: A person is considered vulnerable to multidimensional poverty if they are deprived in 30 to 39% of the indicators.
• 60% or more: One is considered to be in severe multidimensional poverty if the overall deprivation level is 60% or more. This high poverty cut-off helps to prioritise interventions to those living in severe multidimensional poverty and thus, lacking very basic needs.

3.4.1 Poverty Incidence, Intensity, MPI for Cities, Towns & Rural Areas

This section presents an analysis of the Pilot national MPI as well as a breakdown by Cities/Towns, Urban Villages and Rural areas, as shown in Figure 3.4.1 and Table 3.4.1 Twenty point eight four percent (20.84%) of the population are multidimensionally poor, with a poverty intensity of 51.08%, meaning that, on average, poor people in Botswana experience just above fifty percent of the weighted sum of deprivations. However, only 3.9% of the population is in severe multidimensional poverty. Fifteen point nine four percent (15.94%) of the population, though not multidimensional poor, are vulnerable to poverty, therefore should also be assisted accordingly to build resilience to shocks such as drought.

Table 3.4.1 shows that multidimensionally poor people experience 11% of the total deprivations that would be experienced if all people were deprived in all indicators at the same time.

Figure 3.4.1 Multidimensional Poverty by Strata
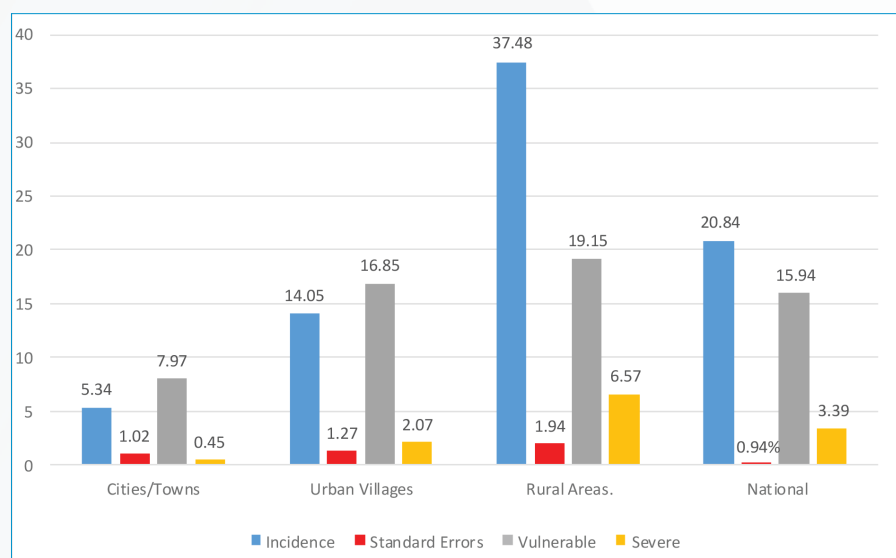
Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

Rural areas suffer higher poverty compared to cities and towns, and this could be an indication of the inadequacy of some of the basic infrastructure such as water reticulation and electricity in rural areas. In fact, rural areas are the only ones with a multidimensional poverty index that is higher than the national average.

On the other hand, cities and towns have lower poverty incidences, indicating the availability of most basic services in these areas.

Those who experience severe multidimensional deprivations are mostly found on the outskirts of urban villages as well as in remote rural areas where most basic services are not available. While urban villages have a fairly low percentage of poor people (14.05%), they have a relatively high percentage of vulnerable people (16.85%), higher than the national percentage.

Table 3.4.1 Multidimensional Poverty by Strata

| Strata	Incidence	Standard Errors	Intensity (%)	MPI	Vulnerable	Severe	Population Share
Cities/Towns	5.34%	1.02%	47.64	0.025	7.97%	0.45%	19.60%
Urban Villages	14.05%	1.27%	49.98	0.070	16.85%	2.07%	44.12%
Rural Areas.	37.48%	1.94%	51.85	0.194	19.15%	6.57%	36.28%
National	20.84%	0.94%	51.09	0.106	15.94%	3.39%	100%

Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

3.4.2 Censored headcount ratios

The below figure (3.4.2) shows Censored Headcount ratio which is the percentage of population that are poor and deprived in each indicator. The figure reflects that 19.1% of the population are both multidimensionally poor and deprived in Food Security followed by assets and computer use with 19.1%, 18.9% and 18.8% of the population respectively.

The indicators with least deprivations are child mortality, maternal care, and school attendance with 0.5%, 2.2% and 4.2% of the population poor and deprivedin these indicators respectively. The confidence intervals of the head count ratios are shown in Appendix

Figure 3.4.2 Censored headcount ratios
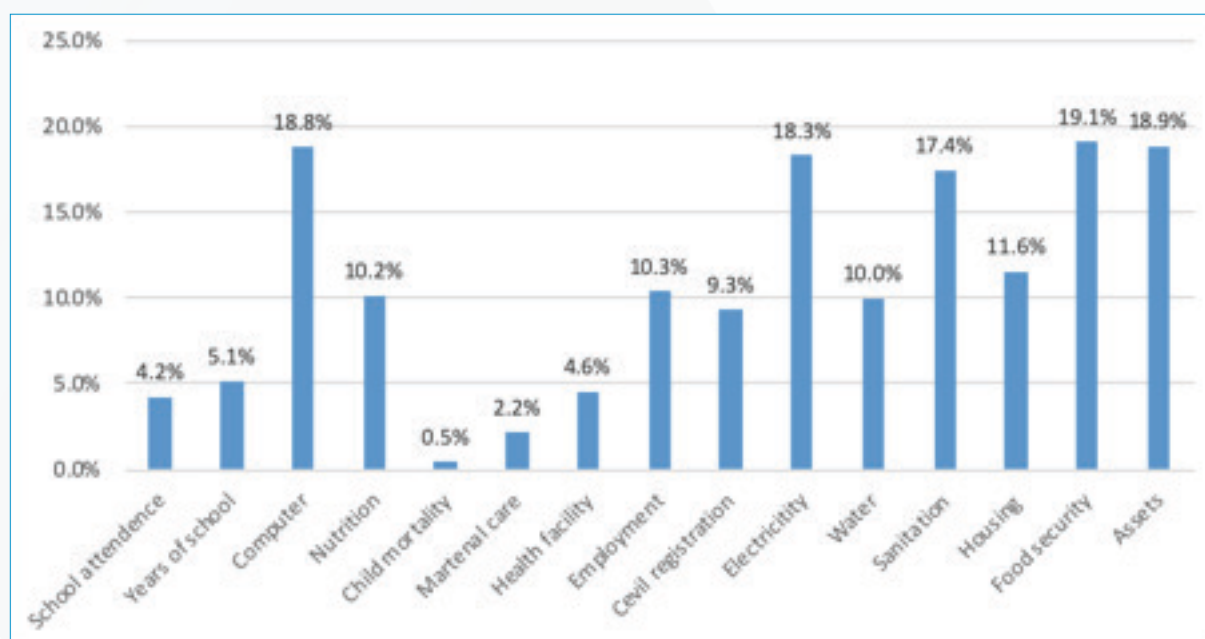
Source: Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

### 3.4.3 Percentage contribution of indicators to National MPIs
Figure 3.4.3.1 depicts the percentage contribution of each weighted indicator to the national MPI. Food Security, Employment, Computer Use, Housing and Water are the five biggest contributors, accounting for 64.6% of the National MPI (also reflecting the higher weights assigned to them). The remaining ten indicators contribute about 36% in total.

The breakdown of indicator contributions implies that food poverty is one of the issues affecting the multidimensional poor people in Botswana. Unemployment is also prevalent among the Multidimensional poor, resulting in them not having an income that would facilitate improvement on their overall living standards. As nutrition is recorded on a more regular basis for the under 5 only, its high contribution to MPI could be an indication that some of the under-5 government programmes may not be accessible to the poor or that there may be need for intensive monitoring of the programmes at household levels.

Civil registration in Botswana is a requirement for one to access government programmes; the national identity card (Omang) is used to identify household members so that they can benefit accordingly from government programmes. The contribution of civil registration to MPI could be an indication that some poor household members have not registered and therefore do not have access to some government programmes.

Although the contribution of school attendance and Years of Schooling are low, lack of computer use is apparent among the poor as indicated by a higher contribution to MPI.

Figure 3.4.3.1 - Percentage Contribution to national MPI
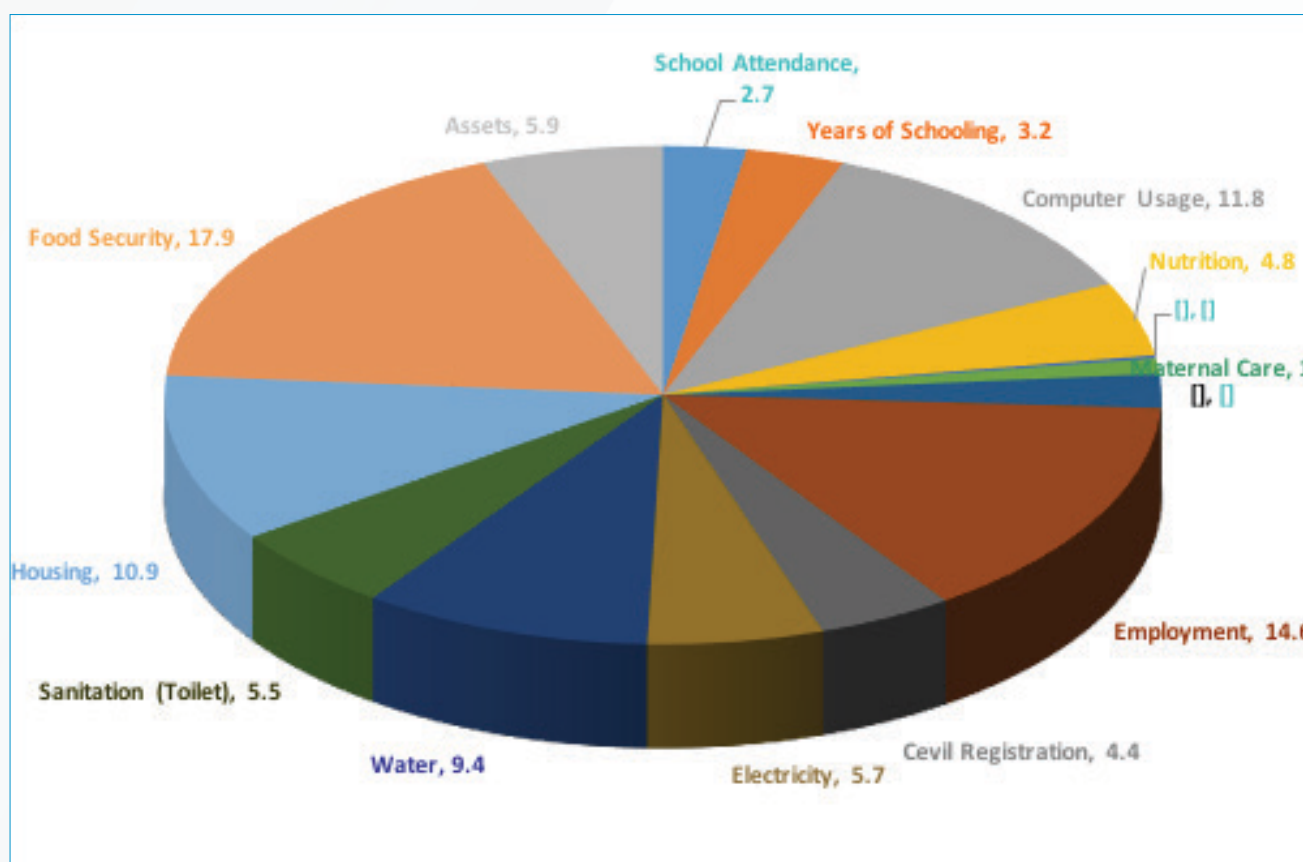
Source: Author, based on Statistics Botswana (BMTHS, 2015/16

Figure 3.4.3.2 shows that region wise the indicators that contribute the most to MPI are employment for both cities and towns and food security for rural areas. Food security and computer usage appear in the top three of the highest contributers to MPI in all the regions whereas employment appears to be the top contributer to MPI for both cities and towns and urban villages.

Figure 3.4.3.2 - Percentage Contribution to MPI by Strata
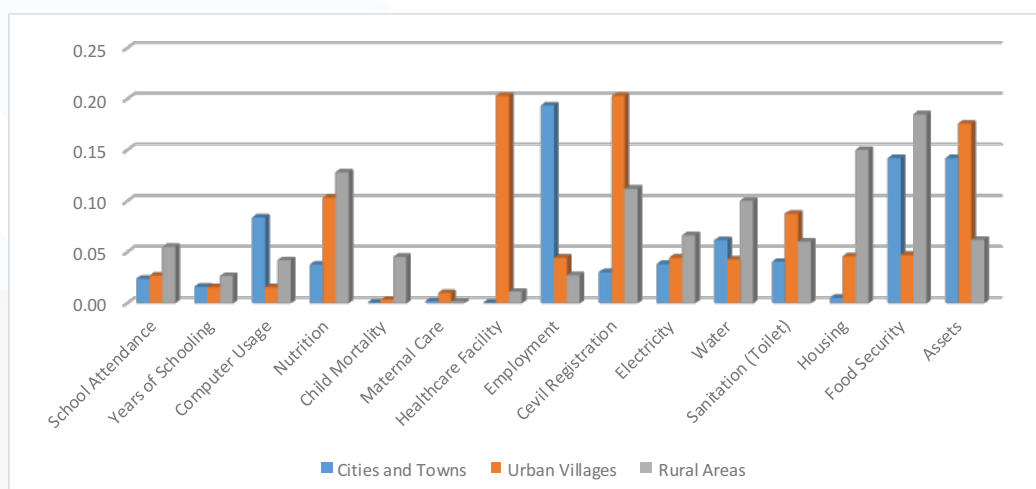
Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

In general, the contribution per indicator to the National MPI could also be revealing the poverty drivers in the country. The indicators that contribute more to the MPI show potential areas of focus in addressing the poverty scourge.

3.4.3 Districts Results (Poverty Incidence, Intensity, MPI)
This section analyses the multidimensional poverty disparities at district level. Table 3.4.3 shows Poverty incidence, Intensity, MPI and the percentage of people living in severe multidimensional poverty as well as those vulnerable to poverty at districts level.

The incidence of multidimensional poverty ranges from 0% (Sowa Town and Orapa) to 60.82% (Ngamiland West). Orapa and Sowa Town are secluded towns where most of the residents are employees of the respective mines. Furthermore, all the basic services such as electricity, health and education are easily accessible, hence the absence of multidimensional poverty. Kweneng West has the second highest incidence at 50.34%.

Jwaneng, Kweneng West, Central Boteti, Ngamiland West, Ngwaketse, Selibe Phikwe, Central Tutume, Central Serowe, Ghanzi, Kgalagadi North, and Ngwaketse West all have high poverty intensity. Apart from Selibe Phikwe, the rest of the areas have very remote settlements where there is limited access to some of the basic services. In Selibe Phikwe, locations such as Botshabelo contribute significantly to the high intensity of poverty in the town.

The analysis of severe multidimensional poverty shows that eight areas (Gaborone, Lobatse, Selibe Phikwe, Orapa, Jwaneng, Sowa, Barolong, and Chobe) have no severe multidimensional poverty. Only Ngamiland West and Kweneng West have more than 10% of their respective population living in severe multidimensional poverty. The remaining 14 districts have incidences of severity ranging from 0% to 8.29%.

Proportions of people vulnerable to poverty, shows that Kweneng West has the highest percentage at 27.95%. This could mainly be those in more remote areas.

In general, towns and cities have lower MPIs, closer to 0, compared to remote areas indicating that the deprivation levels are higher in remote areas than in towns.

Table 3.4.3: Multidimensional Poverty by District

District	H (%)	Standard Errors	A (%)	MPI	Vulnerable (%)	Severe (%)	Popultion Share	% Share of Poor
Gaborone	2.57	1.13%	44.14	0.011	9.31	0	10.26	0.26
Francis-town	9.16	4.48%	48.91	0.045	6.36	2.05	4.32	0.40
Lobatse	11.51	5.26%	45.72	0.053	15.09	0	1.11	0.13
Selibe Phikwe	9.03	1.67%	49.05	0.044	5.77	0	2.53	0.23
Orapa	0	0.00%	0	0	0.55	0	0.44	0.00
Jwaneng	3.97	2.15%	58.33	0.023	0.6	0	0.82	0.03
Sowa Town	0	0.00%	0	0	8.15	0	0.14	0.00
Ngwaketse	28.38	2.08%	51.96	0.147	23.7	5.89	6.04	1.71
Barolong	14.19	2.30%	47.96	0.068	19.68	0	2.74	0.39
Ngwaketse West	37.4	1.97%	50.65	0.189	19.73	0.98	0.69	0.26
South East	8.63	1.19%	49.49	0.043	11.56	0.6	4.21	0.36
Kweneng East	13.34	1.02%	49.76	0.066	16.58	1.2	14.18	1.89
Kweneng West	50.34	5.33%	55.89	0.281	27.95	12.26	2.74	1.38
Kgatleng	7.88	1.24%	49.14	0.039	11.59	0.64	4.72	0.37
Central Serowe	24.84	2.03%	51.2	0.127	18.65	3.02	9.03	2.24
Central Mahalapy	27.39	2.12%	49.89	0.137	19.59	3.23	6.84	1.87
Central Bobonong	20.77	3.06%	49.53	0.103	22.81	3.35	3.30	0.69
Central Boteti	37.63	2.78%	52.8	0.199	12.13	8.29	2.93	1.10
Central Tutume	34.01	2.33%	51.62	0.176	13.96	8.25	6.87	2.34
North East	14.99	2.33%	49.76	0.075	16.97	1.88	2.34	0.35
Ngamiland East	30.17	2.16%	50.03	0.151	20.82	5.36	5.05	1.52
Ngamiland West	60.82	2.36%	53.75	0.327	20.33	15.85	3.25	1.98
Chobe	5.21	1.15%	47.09	0.025	18.33	0	1.14	0.06
Ghanzi	35.23	4.93%	50.28	0.177	16.99	5.08	2.24	0.79
Kgalagadi South	30.56	3.00%	46.46	0.142	14.57	0.48	1.23	0.38
Kgalagadi North	13.26	3.60%	50.29	0.067	17.98	0.12	0.84	0.11
National	**20.84**	**0.50%**	**51.09**	**0.106**	**15.94**	**3.39**	**100.00**	**20.84**

Source: Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

3.5 Comparison of Monetary, Global MPI and Pilot National MPI

Figure 3.5.1 shows a comparison of monetary, 2020 global MPI and Pilot National MPI for Botswana, by district. For all districts, except Chobe, Gaborone, Jwaneng, Kgalagadi South, Orapa and Sowa Town, Francistown, Kweneng East, Kweneng West, Ngwaketse West, Kgatleng and Selibe Phikwe the incidence of multidimensional poverty (Global and Pilot) is higher than for the monetary one. Although this makes sense for mining towns such as Orapa, Sowa and Jwaneng as most residents there are employees of the mines and stay in institutional houses, it is not clear why it is the case for Kgalagadi South. Therefore, there may be the need for further investigation in Kgalagadi South so as to understand the poverty dynamics in the area.

> Although this makes sense for mining towns such as Orapa, Sowa and Jwaneng as most residents there are employees of the mines and stay in institutional houses, it is not clear why it is the case for Kgalagadi South. Therefore, there may be the need for further investigation in Kgalagadi South so as to understand the poverty dynamics in the area.

Figure 3.5.1 Monetary Poverty, Global MPI and Pilot National MPI
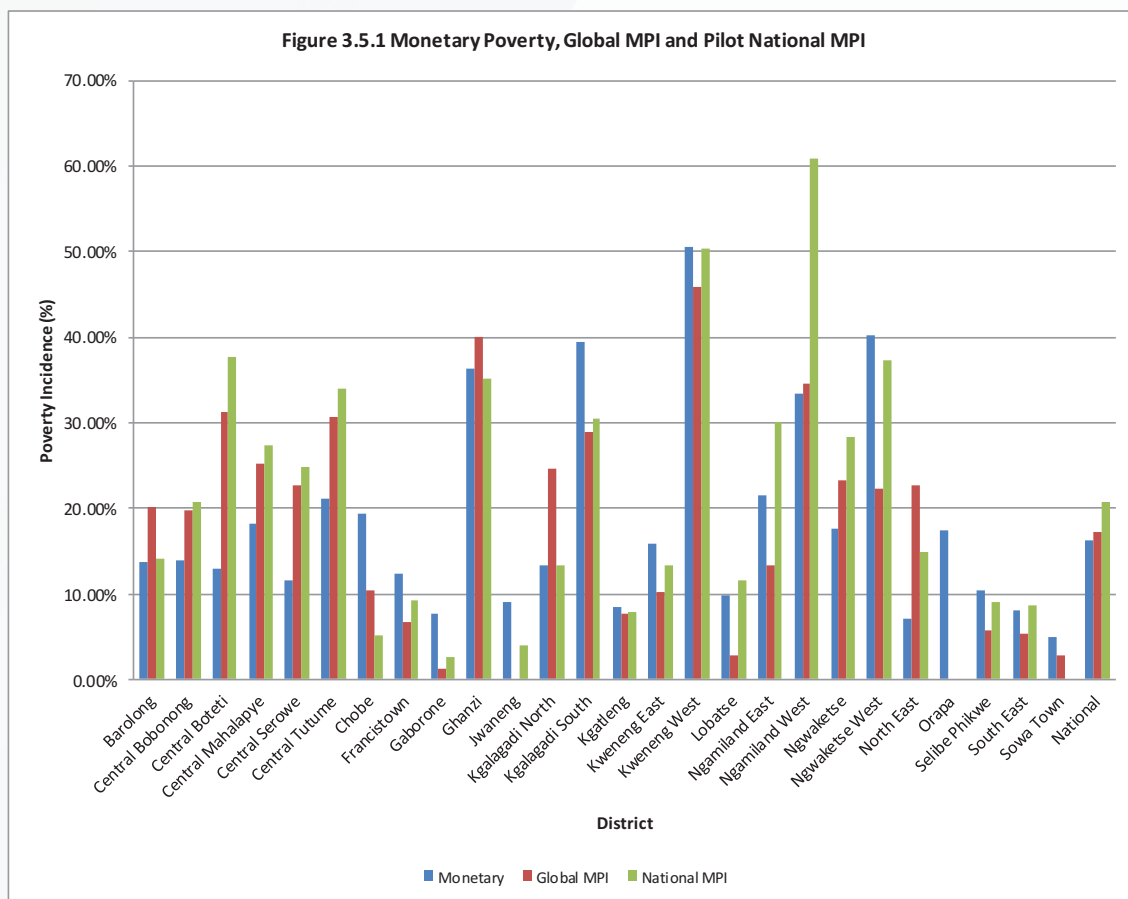
Source: Source: Author, based on Statistics Botswana (BMTHS, 2015/16) & Alkire, Kanagaratnam and Suppa, 2020

Overall, the pattern for both monetary and multidimensional poverty measures are the same, lower for cities/towns and higher for rural areas. However, the different measures reveal distinct poverty dynamics per area, thus would guide provision of appropriate interventions in respective areas.

Figure 3.5.2 is a Venn diagram that presents the overlaps/mismatches between monetary and Pilot National MPI poverty (e.g. whether people who are monetary poor are also MPI poor or are just MPI poor but not monetary poor). It shows that the percentage of people who are multidimensionally poor is larger than the percentage of people who are monetary poor. Thirteen point eighteen percent(13.18%) of the population are only MPI poor, whereas 8.64% are only monetary poor, it further shows that 7.66% of the population are both monetary and multidimensional poor.

shows that 7.66% of the population are both monetary and multidimensional poor.

Figure 3.5.2 Monetary vs Multidimensional Poverty
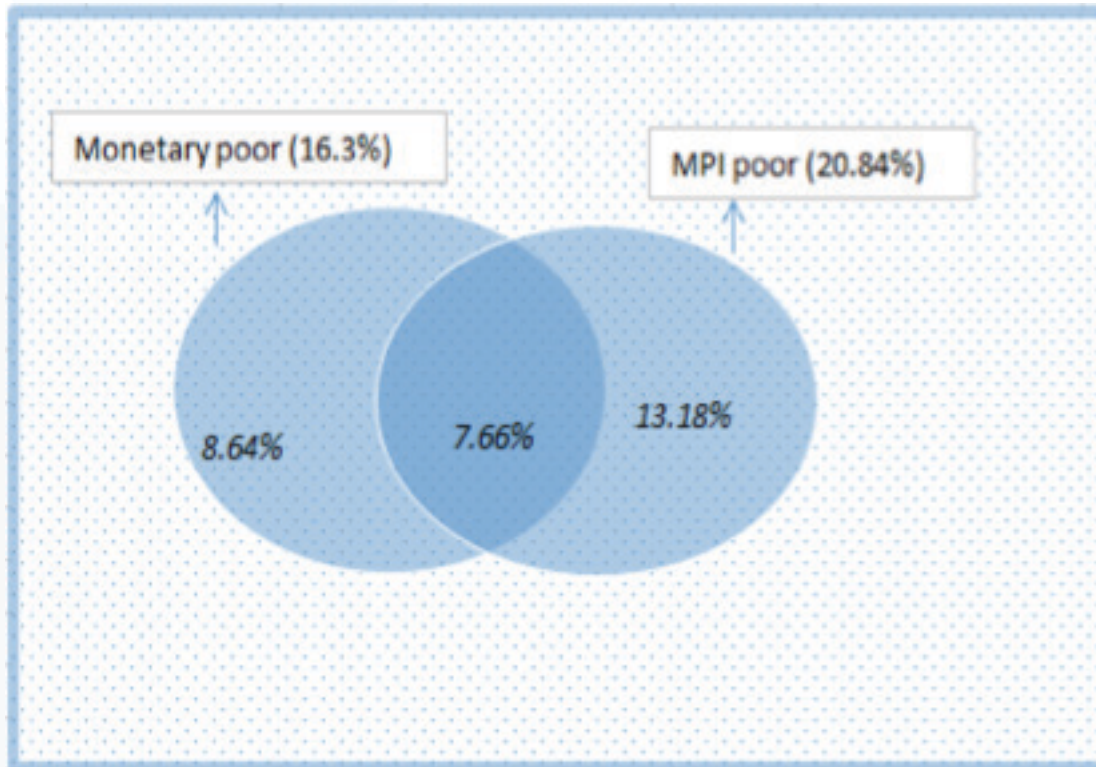
Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

4.0 CONCLUSION

i.   In conclusion, MPI computation shows that cities/towns have low poverty incidence with the lowest observed in Jwaneng, Gaborone, Sowa town and Orapa. The results are consistent with that of the monetary poverty.

ii. Rural areas have the highest levels of poverty. Ngamiland West, Kweneng West, Ghanzi and Ngwaketse West have the highest incidence of multidimensional poverty and also the highest intensity of deprivation. This is also consistent with the PDL results of the 2015/16 BMTHS on consumption poverty levels which also identified these areas as the hardest hit.

iii. The highest deprivations amongst the poor are in Computer Use, Assets and sanitation (Access to Toilet facility) particularly for those with a higher intensity of poverty. Therefore, addressing these deprivations would go a long way in eradicating multidimensional poverty in the country.

iv. MPI is very important as it provides more information on the deprivations that the poor experience, which could help in policy formulation; coordination; evaluation; and programme targeting.

v.   The headcount ratios can also be used to measure the country's progress on some of the non-monetary measures such as sanitation and access to safe drinking water.

vii. The measure of non-monetary poverty is new in Botswana; therefore some vital indicators such as the quality of education nd internet usage could not be included as they had not been adequately covered in the surveys. Therefore, it is expected that as various stakeholders start appreciating the value of the measure, future surveys as well as administrative data for programmes geared towards addressing poverty would encompass data on all aspects of poverty. It is expected that once available they would be incorporated into subsequent versions of the national MPI.

Overall, the results show that the monetary and multidimensional measures complement each other as the patterns of results are the same. What differs is mostly the incidence and also the fact that multidimensional poverty measures reveal the exact deprivations experienced by the poor as well as the poverty drivers. Therefore MPI would help guide the provision of more responsive and impactful interventions.

5.0 RECOMMENDATIONS

Based on the above conclusions, the following are proposed:

i.   While awaiting the finalization of the national MPI, it is recommended that the pilot national MPI, together with monetary measures, be used for planning and allocation of resources in the country. This could be piloted in areas with the highest incidence of poverty as well as those with high numbers of poor people.

ii. There is the need to address nutrition, food security, computer skills and access to sanitation amongst the poor. Addressing these deprivations will not only make an impact on the MPI but will also contribute to further reduction in health related aspects of poverty such as malnutrition and child mortality. Increasing agricultural production will also go a long way in addressing food insecurity amongst the poor.

iii. Review current programmes aimed at addressing multidimensional poverty in order to ensure that they are more impactful.

iv. After piloting, it is recommended that the final National MPI be adopted as an official statistic

v.   In order to be more useful for policy and programme development, there will be need for more regular collection and update of data to show how poverty has changed over time, especially with the potential impacts of Covid.

vii. Lastly, it is acknowledged that the effects of non-income dimensions of both poverty and inequality are less known in Botswana. Therefore, the participation of all stakeholders is needed for further country-based work on the nature, extent and determinants of various dimensions of inequality; and their effects on different dimensions of poverty to ensure that no one is left behind.

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APPENDICES

Appendix 1: Dimensions and Indicators Justification for the Pilot National MPI

DIMENSION	INDICATORS	SUSTAINABLE DEVELOPMENT GOALS
Education (1/5)	School Attendance	**SDG 4** QUALITY EDUCATION Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
	School Attainment	
	Computer knowledge	
Health (1/5)	Nutrition	S**DG 2** ZERO HUNGER End hunger, achieve food security and improved nutrition and promote sustainable agriculture. **SDG 3** GOOD HEALTH & WELL-BEING Ensure healthy lives and promote well-being for all at all ages
	Child Mortality	
	Maternal Care	
	Access/Distance to health services	
Social Inclusion (1/5)	Employment	**SDG 8** DECENT WORK AND ECONOMIC GROWTH Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all **SDG 8** 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (Target 16.9 - legal registration for all)
	Civil Registration	
LIVING STANDARDS (2/5)	Electricity	**SDG 7** AFFORDABLE AND CLEAN ENERGY Ensure access to affordable, reliable, sustainable and modern energy for all **SDG 6** CLEAN WATER & SANITATION Ensure availability and sustainable management of water and sanitation for all **SDG 11** SUSTAINABLE CITIES AND COMMUNITIES Make cities and human settlements inclusive, safe, resilient and sustainable **SDG 2** ZERO HUNGER End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
	Drinking Water	
	Sanitation (Toilet facility)	
	Housing	
	Assets	
	Food Security	

Source: Author/Technical Team

An additional dimension of Social Inclusion is added to the Global MPI ones, hence the total number of dimensions is four. Employment and civil registration are the two indicators for the dimension. Employment has been included as a deliberate move given the correlation between poverty and unemployment. With regard to the Health Dimension, additional indicators of maternal care and access to health facilities are included. The assets indicator under living standards dimension has been expanded to include livestock and land ownership.

In terms of the weighting, all the dimensions have equal weighting of 1/5, except Living standards which is weighted at 2/5. The higher weight is because living standards are considered key in determining whether one is poor or not. Additionally, living standards are part of basic human needs.

Justification (Dimensions Explained)

Education; the mandate of Botswana is to ensure that all girls and boys have access to free quality early childhood development, care and pre-primary education as well as equitable and quality primary and secondary education leading to relevant and effective learning outcome. It also encourages participation of youth and adults in formal and non-formal education. This is why school attainment and attendance as well as computer knowledge are considered as relevant indicators. Computer access/ usage, together with access to internet, is becoming increasingly important as a result of the Covid 19 pandemic as some people have had to work from home. Thus access to and knowledge of computers has gained in importance as more services are now being offered online.

Health; Though Child mortality is low, at less than 1%, it is still considered as one of the key health indicators as no life deserves to be lost. Therefore, the aim is to have 0% child mortality. SDG 2 seeks 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, as well as end all forms of malnutrition, that can lead to stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons. The aforementioned was brought into consideration when considering the cut-offs being; a household is deprived if any child under 5 in the household, is stunted, wasted, or underweight or any child 5-17 has a low BMI by age With regard to access to health facility indicator, the 5 km radius is consistent with Government policy which seeks to ensure that every Motswana is within a distance of 5km or less to the nearest health facility. Maternal care is also consistent with Government policy which advocates for delivery to be at a health facility.

Social Inclusion; employment was considered under this dimension because unemployment level is high in Botswana and therefore is one of the contributors to poverty as most of the poor are unemployed. Civil Registration is important as it improves access to programmes addressing poverty since it is the primary requirement, hence its inclusion as one of the indicators. The SDG 8 seeks to achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value. Employment is weighted higher because of the high correlation between employment and poverty as well as the fact that the unemployment rate in Botswana is considered unacceptable. The percentage of civil registration in Botswana is over 95%, hence it has a lower weight.

Living Standards; this is the ultimate barometer for improved livelihood and its facilitated by the other three dimensions of Education, Health and Social Inclusion. It was therefore included as it is through improvement in living standards that the country can achieve the aspirations of NDP 11 as well as Vision 2036. It is also in line with; SDG 7 that seeks to ensure universal access to affordable, reliable and modern energy services, proportion of population with access to electricity; SDG 6 seeks to achieve universal and equitable access to safe and affordable drinking water for all, and access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations and; SDG 11 seeks ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums. Cooking fuel was not included because majority of Batswana use firewood out of choice, particularly in rural areas, not that they are deprived. As livestock and land are key assets in Botswana, these have been included in the Assets indicator.

 • Food Security is moved from Health dimension to the Living standards one as lack of food or hunger is considered to immediately reflect one's poverty status and is also a basic human need. Therefore, one is deprived if the household reports experiencing any moderate or severe food insecurity

The weightings for the indicators are different because of the rankings assigned in terms of their importance in the livelihood of

the poor. As such Food Security, Access to clean drinking water and Shelter were ranked higher, thus were given higher weights than the rest of the indicators under the dimension.

Appendix 2: Uncensored Headcount Ratios Standard Errors

Indicator	Cities and Towns	Std. Err.	Urban Villages	Std. Err.	Rural Areas	Std. Err.	National
School Attendance	3%	0.6%	6.0%	0.8%	10.1%	1.1%	6.9%
Years of Schooling	2.5%	0.5%	5.0%	0.5%	17.4%	1.2%	9.0%
Computer Usage	30.1%	2.4%	46.6%	1.7%	74.2%	2.0%	53.4%
Nutrition	13.8%	1.3%	27.8%	1.4%	31.7%	1.6%	26.5%
Child Mortality	0.8%	0.3%	0.9%	0.3%	0.9%	0.3%	0.9%
Maternal Care	4.0%	0.7%	4.3%	0.7%	5.6%	0.8%	4.7%
Health Facility	6.5%	2.2%	8.5%	1.4%	16.9%	1.9%	11.2%
Employment	23.7%	1.7%	33.9%	1.6%	22.6%	1.4%	27.8%
Civil Registration	8.1%	1.1%	18.0%	1.2%	25.2%	1.7%	18.7%
Electricity	16.5%	1.8%	22.5%	1.4%	64.9%	2.2%	36.7%
Water	3.6%	0.7%	11.4%	1.4%	26.3%	1.8%	15.3%
Sanitation	39.9%	3.4%	44.8%	2.1%	63.3%	2.1%	50.6%
Housing	0.9%	0.3%	5.8%	1.1%	33.8%	2.0%	15.0%
Food Security	26.0%	2.3%	46.4%	1.8%	61.1%	1.7%	47.7%
Assets	50.5%	3.0%	59.9%	1.4%	70.9%	1.5%	62.0%

Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

Appendix 3: Censored Headcount Ratio Confidence Intervals

| INDICATOR	CENSORED HEADCOUNT RATIOS	95% CONFIDENCE INTERVALS	
School Attendance	4.2%	3.4%	5.2%
Years of Schooling	5.1%	4.4%	6.0%
Computer Usage	18.8%	17.1%	20.6%
Nutrition	10.2%	8.8%	11.7%
Child Mortality	0.5%	0.2%	0.9%
Maternal Care	2.2%	1.6%	2.9%
Health Facility	4.6%	3.7%	5.7%
Employment	10.3%	9.2%	11.7%
Civil Registration	9.3%	8.0%	10.9%
Electricity	18.3%	16.6%	20.1%
Water	10.0%	8.8%	11.4%
Sanitation	17.4%	15.8%	19.2%
Housing	11.6%	10.2%	13.1%
Food Security	19.1%	17.4%	20.9%
Assets	18.9%	17.2%	20.7%

Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

Appendix 4 - Robustness of the Results to Alternative Poverty Cut-offs

In designing the national MPI, It was also crucial to analyse the robustness of the measure to a range of specifications (e.g. change in indicators, deprivation cut-offs and weights). The analysis was conducted using two robustness tests, the more precise looked at the pairwise comparisons while the other focused on rank correlations. The basis of rank robustness analysis was to assess how the rankings of districts derived from two specifications of MPI, were maintained. This section presents robustness tests for different dimension weights and k- cut-offs.

Figure 6.4.1 depicts the value of head count for each district at different levels of the k cut-off. Visually, it gives an idea of how much criss-crossing there is between the lines, and the more crossing of the lines, the less robust. There is no clear ranking in terms of poverty between districts as reflected by the crossing lines, however, on average, the poverty rate in Orapa district, which is a mining area, is the lowest for every cut-off between 10% and 60% implying that, irrespective of the chosen poverty cut-off within this range, Orapa will always have lowest occurrence of multidimensional poverty in the country. The results further show that the reverse is true for Ngamiland West. At every cut-off between 10% and 50%, Ngamiland West district has the highest level of multidimensional poverty headcount, followed by Kweneng West. Other mining areas of Jwaneng and Sowa town, on average, also have the lowest multidimensional poverty headcount at poverty cut-off 10% and 50%. District MPI rates for different values of poverty k cut-off were also computed as shown in Figure 6.4.2 and also show a similar pattern.

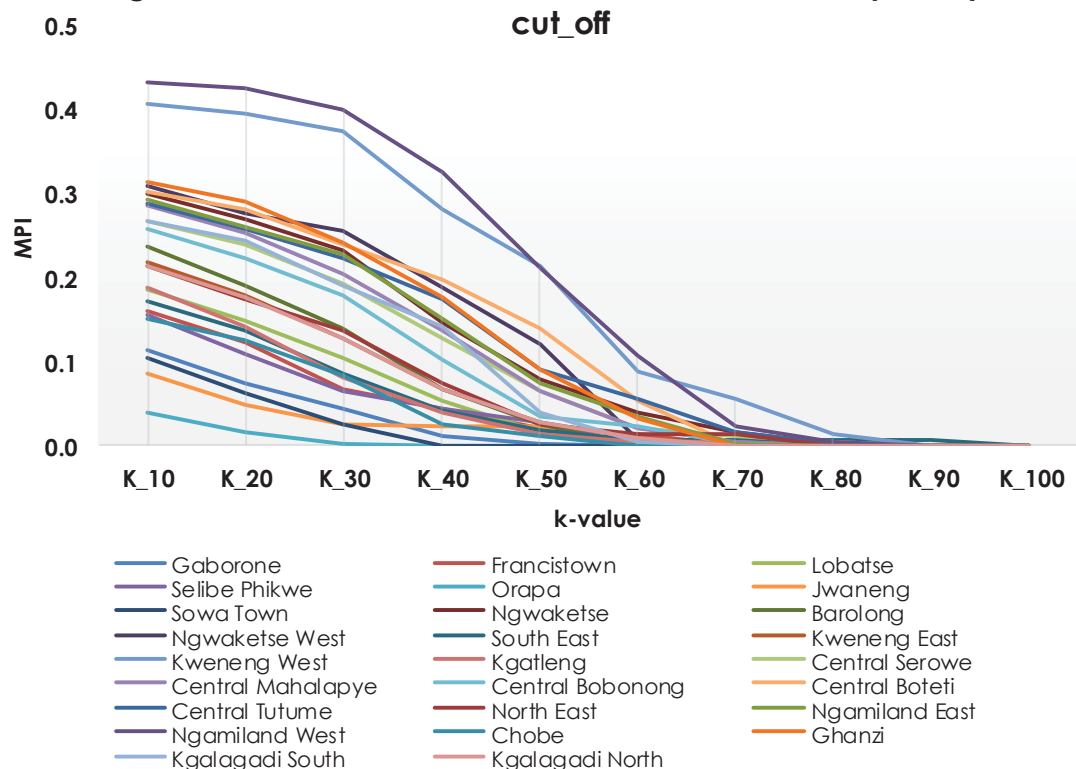**Source: Author's calculations based on data from BMTHS 2015–16**
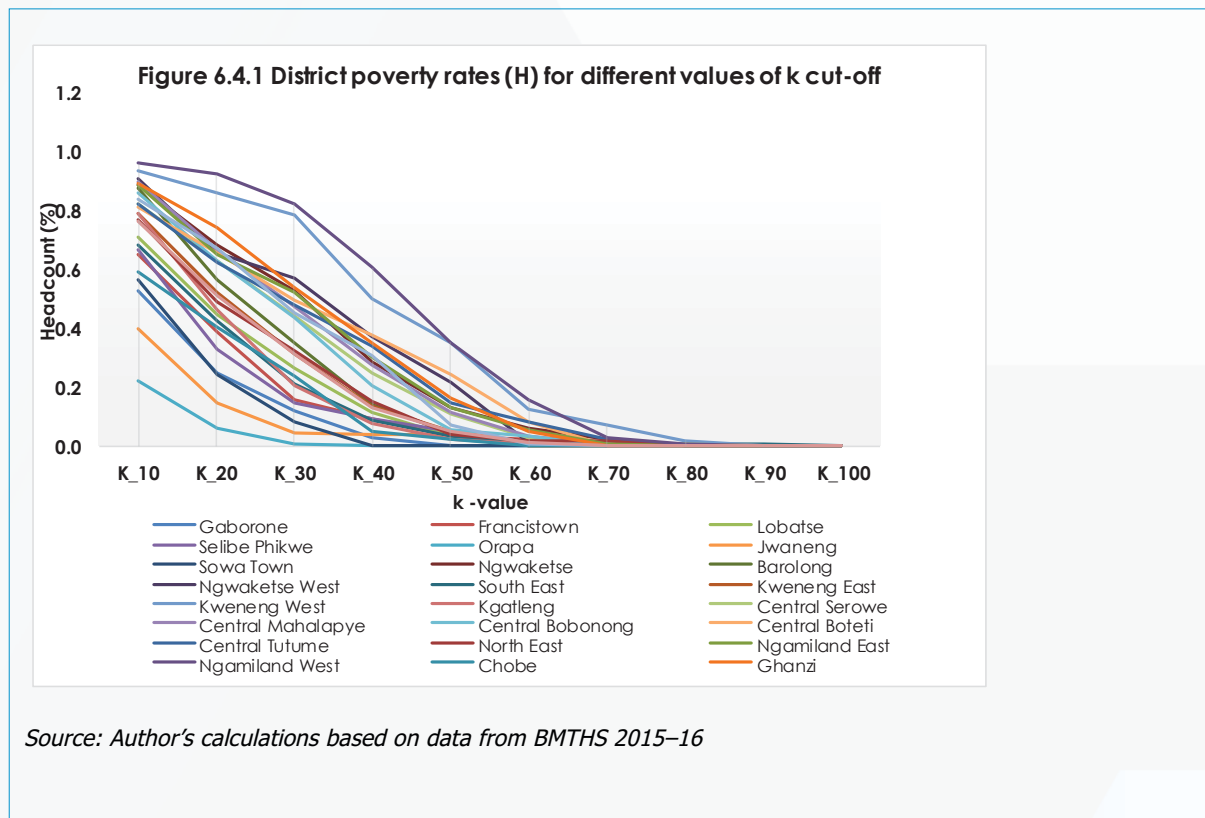
Source: Author's calculations based on data from BMTHS 2015–16

Source: Author's calculations based on data from BMTHS 2015–16

Figure 6.4.2: District MPI rates for different values of poverty k cut_off

Source: Author's calculations based on data from BMTHS 2015–16

Table 6.4.1 below presents different robustness tests that were applied to the national MPI, which includes four dimensions and 15 indicators. The Spearman and Kendall's rank correlation coefficient were computed between 26 districts rankings using the selected poverty cut-off, k=40% and ranking for alternative poverty cut-off of 10% and 50%. The results from the robustness analysis reveal that the Spearman coefficient is higher than 0.96 for alternative cut-offs between k=10% and k=50%. This means that the poverty ordering of districts between the selected poverty cut offs is preserved and to a large extent identical in both alternative specifications. Similarly, the results for Kendall Tau reveal that, at k=20% and 50%, the Kendall coefficient is above 0.85, implying that around 85 percent of the comparisons are concordant in each case to the national MPI findings with k = 40%. Usually, Spearman rho values tend to be higher than Kendall tau values.

Table 6.4.1: Correlation among district ranks for different poverty cut-offs. Botswana national MPI 2016

k=40%		
	Spearman	0.979***
k=10%	Kendall Tau-b	0.888***
	Spearman	0.976***
k=20%	Kendall Tau-b	0.881***
	Spearman	0.980***
k=30%	Kendall Tau-b	0.899***
	Spearman	0.961***
k=50	Kendall Tau-b	0.858***

Source: Author's calculations based on data from BMTHS 2015–16   *** = p-value < 0.01
The two correlation coefficient discussed above are important and useful methods to establish robustness, however, they do not

take into account that MPI estimates have statistical errors. Like any other sample survey, BMTHS 2015/16 survey was subjected to sampling error, therefore reliability of MPI estimates were analysed to determine the extent to which sample parameters assumed population parameters. Robustness of the MPI district rankings was assessed considering standard errors. In this case, the MPI values for districts were compared to each other within the baseline scenario which corresponds to the poverty cut-off k=40%. It was further assessed for example if on average, MPI value for one district is larger than the other ($MPI_A > MPI_B$) or vice-versa, and also determined the statistical significance of this comparison. The district ordering was taken at baseline and the robustness test was conducted with changes in poverty cut-off and weighting structure as follows: District MPI was estimated for alternative poverty cut-off k=30% and k=50% under the selected weighting scheme. The pairwise comparison is considered to be robust if the district ordering is significant at baseline and consistent in the alternative.

TABLE 6.4.2: THE PAIRWISE COMPARISON TEST

PAIRWISE COMPARISON TEST	OPTION 1	OPTION 2
Number of possible pairwise comparisons	325	325
Significant pairwise comparisons at baseline (CI overlap)	262	260
Robust pairwise comparisons	216	195
Ratio of robustness (all possible comparisons)	0.66	0.60
Ratio of robustness (only robust at baseline)	0.82	0.75

Source: Author's calculations based on data from BMTHS 2015–16

As shown in Table 6.4.2 option1, 216 out of 262 significant possible pairwise comparison are robust, that is, 82.4% remain unchanged under alternative cut-offs. For Option 2, a similar pairwise comparison to assess the relationship between the rank obtained under the selected baseline k=40% of the following MPI structure was also performed: 4 dimensions, 15 indicators, one dimension given 2/5 weight (living standards) while each of the remaining three dimensions given 1/5 weight (education, health, social inclusion), with alternative weighting structure. The alternative MPI scheme consists of 4 dimensions with social inclusion given more weight (2/5) as compared to the 1/5 weight in the initial structure. Option 2 shows that 195 out 260 (75.0%) significant pairwise comparisons are robust and that the district ordering at baseline remain stable to changes in the weighting scheme. Based on the ratio of robustness, option one is shown to be more stable than option two and thus confirms the reliability of the choice of option one as the main national MPI structure for Botswana.

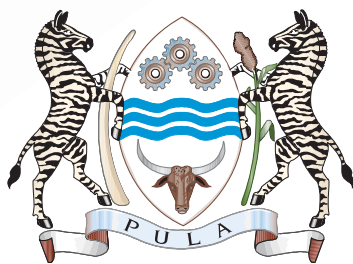## Appendix 5: Monetary, Global MPI and Pilot National MPI

District	Monetary	Global MPI	National MPI
Barolong	13.70%	20.20%	14.19%
Central Bobonong	13.90%	19.80%	20.77%
Central Boteti	12.90%	31.20%	37.63%
Central Mahalapye	18.20%	25.30%	27.39%
Central Serowe	11.60%	22.60%	24.84%
Central Tutume	21.20%	30.70%	34.01%
Chobe	19.30%	10.50%	5.21%
Francistown	12.40%	6.80%	9.16%
Gaborone	7.70%	1.30%	2.57%
Ghanzi	36.30%	40.00%	35.23%
Jwaneng	9.10%	0.00%	3.97%
Kgalagadi North	13.40%	24.60%	13.26%
Kgalagadi South	39.50%	28.90%	30.56%
Kgatleng	8.40%	7.60%	7.88%
Kweneng East	15.80%	10.30%	13.34%
Kweneng West	50.60%	45.90%	50.34%
Lobatse	9.80%	2.80%	11.51%
Ngamiland East	21.60%	13.30%	30.17%
Ngamiland West	33.40%	34.60%	60.82%
Ngwaketse	17.70%	23.30%	28.38%
Ngwaketse West	40.30%	22.30%	37.40%
North East	7.20%	22.60%	14.99%
Orapa	17.50%	0.00%	0%
Selibe Phikwe	10.40%	5.80%	9.03%
South East	8.10%	5.40%	8.63%
Sowa Town	5.00%	2.80%	0%
National	16.30%	17.20%	20.84%

Source: Author, based on Statistics Botswana (BMTHS, 2015/16)

Appendix 6: List of Technical Team Members

Name	Organisation
Nyendi Moloyi	Poverty Eradication Coordinating Unit - Office of the President
Wilmot Roberto Reeves	Unated Nations Development Programme
Johnson Tsoro Maiketso	Unated Nations Development Programme
Lillian Mookodi	Botswana Institute for Development Policy Analysis
Kutlwano Sebolaaphuti	Statistics Botswana
Kutlo N Oratile	Statistics Botswana
Batho Rendo	Statistics Botswana
Maipelo Busang	Statistics Botswana
Basadi Merapelo Moremi	Poverty Eradication Coordinating Unit - Office of the President
Doreen Phofuetsile	Poverty Eradication Coordinating Unit - Office of the President
Mmamiki P. Peloewetse	Statistics Botswana/ Ministry of Basiic Education
Olorato Moalosi	Office of District Commissioner – Molepolole Adminstration Authority
Lefetsakgang Metlhaleng	Office of Deputy District Commissioner - Sowa
Neo Ivy Matlho	Department of Community Development – Ministry of Local Government and Rural Development
Kutlo Motshegwa	Department of Community Development – Ministry of Local Government and Rural Development
Gomotsegang Khudu	Ministry of Basic Education
Lebone Makhale	National Strategy Office
Gabolete Gofetamang	Government Implementation Coordination Office
Dinah Tlotleng	Office of the District Commssioner – Francistown
Jacqualine Moeng	Office of the Deputy District Commssioner – Moshupa
Wame Segwagwa	Ministry of Health and Wellness
Tumelo Joseph	Ministry of Health and Wellness

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