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ABSTRACT

Botswana has an extensive social protection system aimed at improving the welfare of poor and vulnerable groups. We evaluate the targeting effectiveness of 15 social transfer programs using targeting performance indicators and Benefit Incidence Analysis (BIA), and the 2015/16 Botswana Multi-Topic Household Survey data. Results on targeting performance indicators reveal that, except for one, programs have low coverage (high under-coverage) and low targeting effectiveness of the poor; hence, high leakages to the non-poor. BIA results indicate that most social assistance and asset transfer programs, and a public works program are progressive and pro-poor. However, while programs aimed at building human capital through financing tertiary education are also progressive, they are not pro-poor, suggesting inequality in access to higher education. Since education is one of the pathways out of poverty, this may contribute to intergenerational transmission of poverty. Further, means-tested programs do not necessarily target the poor better than programs employing categorical and self-selected targeting mechanisms. This may partly be because eligibility criteria may not be strictly enforced during selection of beneficiaries for major means-tested programs, such as the Destitute Persons Program. Therefore, reforms are required to improve the targeting effectiveness of the programs and to minimize leakages to the non-poor.

Keywords: Benefit Incidence Analysis, Targeting Effectiveness, Social Transfers, Poverty

JEL Classification: D63, I32, I38

1. INTRODUCTION

Botswana has been one of the world's fastest growing economies since gaining independence in 1966 (UNDP 2009; World Bank 2019). The impressive record was mainly attributed to diamond exports, prudent macroeconomic management and good governance (Maipose 2008). Despite the impressive economic growth performance, the country has faced three interlinked socio-economic challenges of unemployment, poverty and income inequality (World Bank 2015; Lekobane and Seleka 2017).[1] These challenges are due to the dependence of the economy on the capital-intensive activity of mining and the poor performance of labor-intensive activities – for example, agriculture and manufacturing - as well as the slow pace of overall economic diversification. These socio-economic realities have led to the recognition that, while it is necessary, economic growth is not a sufficient condition for sustained poverty reduction (MFDP 2003). In turn, social protection has become one of the key strategies for poverty reduction and for achieving broader national goals of social justice, inclusive growth and human and social development (MFDP 1991; MFDP 2003; Vision 2036 Presidential Task Team 2016). Various social protection (henceforth, social transfer) programs have been launched to channel support to segments of the population that have been (or are likely to be) bypassed by the benefits of economic growth.

Botswana's social protection system has evolved and matured over time in response to emerging socio-economic conditions and challenges. At independence, social transfer instruments included feeding programs for primary school children and permanent destitute persons, as well as food-for-work programs (Fako and Molamu 1995; BIDPA 2003, 2013; World Bank 2015). During the 1970s and 1980s, new social transfer programs were launched to channel support to marginalized remote area dwellers and individuals living in destitution (BIDPA 2003; MLG 2002). The 1990s saw the emergence of social transfer instruments aimed at channeling support to poor and vulnerable groups (the elderly, orphans and AIDS patients). In the 2000s, the social protection system was further expanded by introducing new programs for promoting economic empowerment, enterprise development and employment creation, particularly among the youth.

Three broad social transfer mechanisms have traditionally been employed worldwide to target support to poor and vulnerable groups: (1) means-tested targeting, (2) categorical targeting and (3) self-selection targeting (Legovini 1999; Lavallee et al. 2010; Sabates-Wheeler, et al. 2015).[2] Means-tested targeting involves the use of income or asset ownership thresholds in setting program eligibility criteria. Categorical targeting uses geographic or demographic distribution of poverty (age, geographic location or vulnerability) as criteria for selecting beneficiaries. Self-selection targeting involves voluntary enrolment of beneficiaries in a program. Usually, program benefits are set so low (in either monetary value or quality) that only those individuals with low opportunity cost of time or higher valuation of the goods being provided are attracted to voluntarily enroll.

Two issues have featured prominently in the development literature concerning the delivery of transfers to beneficiaries. The first concerns the effectiveness of programs in targeting the poor (Coady, Grosh and Hoddinott 2004; Sumarto, Suryahadi and Widyanti 2002; Deveraux, et al. 2017). The second relates to whether means-tested programs perform better than programs employing other targeting mechanisms in targeting the poor, particularly those employing universal targeting (Hanna and Olken 2018). This paper tackles these issues using the 2015/16 Botswana Multi-Topic Household Survey (BMTHS) data set.

To address the first issue, we evaluate the targeting effectiveness of 15 social transfer programs using targeting performance indicators and Benefit Incidence Analysis (BIA). Targeting performance indicators are "concerned with measuring both *inclusion errors* [or *leakages*] (giving transfers to those who are not poor) and *exclusion errors* [or *under–coverage*] (failing to deliver the transfer to poor individuals who slip through the cracks in the targeting protocol)" (Hanna and Olken 2018; p 202). Hence, the corresponding indicators are concerned with the effectiveness of social transfer programs in reaching and targeting the poor. They provide estimates of the proportion of poor households covered or under-covered by the programs as well as the proportions of the poor among program participants. BIA is concerned with "how effectively governments are able to target their limited resources towards meeting the needs of the poor" (Pearson 2002; p.4), and may be used to assess whether programs are pro-poor or not, and progressive or regressive (World Bank and BIDPA 2013). Therefore, in this study, BIA is used to assess the distribution of program transfers across the household consumption distribution, and to assess whether programs are pro-poor or not pro-poor, and progress or regressive.

To address the second issue, we compared the targeting performance indicators and BIA results across programs employing different targeting methods (means-tested, categorical testing and self-selected targeting). Here emphasis is on comparing means-tested programs with categorical and self-selected programs. We are able to implement these comparisons because, five programs employ means-tested targeting, one uses self-selected targeting and the remaining nine employ categorical targeting. However, despite having adopted these broad classifications, it is noteworthy that a few programs use combinations of means-tested targeting and health criteria to determine eligibility. The programs evaluated in this paper are those covered in the 2015/16 BMTHS, and form a greater part of Botswana's social protection system (World Bank and BIDPA 2013).

By evaluating the effectiveness of individual programs in targeting the poor, the paper provides useful information for informing future reforms relating to program design and implementation, with the view to maximizing program welfare effects.

Similarly, a comparative assessment of the effectiveness of alternative targeting mechanisms is intended to provide information on future program reforms. The paper adds to the growing and developing literature on the effectiveness of social transfer programs in targeting the poor, as well as that concerning whether means-tested programs are more effective in targeting the poor than programs employing other targeting mechanisms, such as universal targeting. It also adds to previous studies that have investigated program targeting effectiveness in Botswana (Seleka, et al. 2007; BIDPA and World Bank 2013; Seleka and Lekobane 2018). It extends previous work in Botswana by expanding the scope in terms of the number of social transfer programs covered and by conducting a comparative assessment of means-tested versus categorical and self-selected programs.

The rest of the paper is structured as follows. Section 2 provides a brief overview of the 15 programs considered in the study, and the targeting mechanisms employed. In section 3, we present the methodology employed to evaluate the targeting performance of the various social transfer programs, followed by a discussion of the data used in the evaluation in section 4. The results are then presented in section 5 and conclusions provided in section 6.

2. PROGRAM DESCRIPTION AND TARGETING MECHANISMS

Social safety nets (henceforth, social transfer programs) in Botswana may be traced back to the country's independence in 1966, although the origins of some programs predate independence (Fako & Molamu 1995; BIDPA 2013; World Bank 2015). The programs deliver various kinds of benefits to poor and vulnerable groups. Most programs deliver in-kind food and cash transfers to eligible individuals. However, others provide asset transfers and economic incentives to promote the productive capacity of resource poor individuals/households. The programs employ means-tested, categorical and self-selected targeting mechanisms to reach beneficiaries. Means-tested targeting is normally applied on those programs that target the poorest of the poor while categorical targeting is applied where the objective is to support vulnerable groups, based on criteria such as age, health status, disability and, to a lesser extent, geographic location. However, a few programs use combinations of means-tested and other criteria such as health status and vulnerability.

This section provides an overview of the 15 social transfer programs and the targeting mechanisms they employ. These programs have been extensively discussed elsewhere (Seleka, et al. 2007; World Bank and BIDPA 2013; World Bank 2015; Seleka and Lekobane 2017; Seleka and Lekobane 2018), and hence, the overview here is not exhaustive. In what follows, we classify programs according to the main targeting mechanism employed to facilitate discussions. Given their extensive use herein, program acronyms are listed in Table 1 to provide a quick reference guide.

Table 1: List of acronyms for social transfer programs in Botswana

Acronym	Full program name
Means–tested targeting	
DPP	Destitute Persons Program
NSP	Needy Student Package
CHBC	Community Home-Based Care
LIMID	Livestock Management and Infrastructure Development
PEP	Poverty Eradication Program
Categorical targeting	
VGFP	Vulnerable Group Feeding Program
SFP	School Feeding Program
OCP	Orphan Care Program
OAP	Old Age Pension
WVP	World War II Veterans Program
RADP	Remote Area Development Program
YDF	Youth Development Fund
SA	Student Allowances
SCH	Scholarships
Self–selection	
IPWP	Ipelegeng Public Works Program

2.1 MEANS-TESTED PROGRAMS

Five programs employ means-tested targeting. These are the Destitute Persons Program (DPP), Needy Student Package (NSP), Community Home-Based Care (CHBC) Program. Livestock Management and Infrastructure Development (LIMID) Program and Poverty Eradication Program (PEP) (Table 1). The Destitute Persons Program, which is the major means-tested program, is aimed at providing welfare support to permanent and temporary destitute persons. To be eligible for assistance under the Destitute Persons Program, an individual with (without) dependents should earn monthly income not exceeding P150 pula (P120 pula) and should own no more than four (4) cattle (MLG 2002). The program also covers individuals who are unable to engage in economic activity due to old age or disability, and children under the age of 18 living under difficult circumstances. Each registered destitute person is eligible for a predetermined food basket supplying about 1750 calories per day, and to a monthly cash benefit of P250. Moreover, dependent children of destitute persons under the age of 18

are eligible for food baskets equivalent to those prescribed for the Orphan Care Program (to be discussed). Annexed to the Destitute Persons Program is the Needy Student Package (NSP), which provides support to children of destitute persons attending school and other needy students registered in schools, who come from dysfunctional families.

The Community Home-Based Care Program was initially targeted at terminally ill AIDS patients (MoH 1996; MLG 2005). However, the program scope was later modified to also cater for patients suffering from chronic illnesses such as diabetes, hypertension and heart diseases. Eligibility to the program is based on the Destitute Persons Program criteria, but it is also subject to referral by a government medical doctor. Thus, the program combines means-testing with health criteria as targeting mechanisms. Beneficiaries to the program receive a prescribed CHBC monthly food basket or special food baskets prescribed by a government dietician.

The LIMID Program, which is intended to promote food security and eliminate destitution, is also means-tested based on the Destitute Persons Program criteria. Its poverty alleviation component provides grants not exceeding P12,000 for investment in sheep and goats, guinea fowls or Tswana Chicken production (for the purchase of the breeding stock) (MADFS 2018). Similarly, the Poverty Eradication Program, which is intended to promote productive investment and to eradicate absolute poverty, is somewhat based on the Destitute Persons Program eligibility criteria, but its income threshold for eligibility (of P366/month) is higher than that for the Destitute Persons Program. The program targets able-bodied individuals registered in the Destitute Persons Program, potential destitute persons, people living with disability and Ipelegeng Public Works Program (IPWP) beneficiaries. The program provides grants of up to P15,000 for investment in any of the 45 prescribed enterprises. However, individuals are allowed to propose enterprises that are outside the prescribed list, as long as they demonstrate economic viability.

2.2. CATEGORICALLY TARGETED PROGRAMS

Nine programs apply categorical targeting to reach potential beneficiaries. They include: School Feeding Program (SFP) (both primary and secondary), Vulnerable Group Feeding Program (VGFP), Orphan Care Program (OCP), Old Age Pension (OAP), World War II Veterans Program (WVP), Remote Area Development Program (RADP), Youth Development Fund (YDF), and Scholarships and Sponsorships.[3] The School Feeding Program, which predates Botswana's independence, targets all children attending public primary and secondary schools. The program first employs the categorical targeting mechanism, followed by universal targeting of the intended groups. It provides meals to children so as to reduce hunger and malnutrition and to enhance cognition and learning. Meals provided in primary schools are intended to cater for a third of each child's daily caloric requirement. In secondary schools, the program provides one meal per day to non-boarders and three meals per day to boarders.

The Vulnerable Group Feeding Program, which may also be traced back to Botswana's independence, is intended to improve health and nutrition status among under five children, medically selected pregnant and lactating mothers, and Tuberculosis (TB) and leprosy patients (Regional Hunger and Vulnerability Programme [RHVP] 2011). Hence, it employs categorical targeting based on age and health status, with all the under five children being universally targeted. The program provides prescribed monthly food baskets to eligible vulnerable groups at health facilities and, hence, the condition is that the respective beneficiaries should attend public health facilities.

The Orphan Care Program is aimed at providing protection and care to orphans under the age of 18 (Seleka, et al. 2007). Thus, the program employs categorical targeting based on age and vulnerability. Its packages include monthly food baskets, clothing, school uniform and psychosocial support to registered orphans. The broad aim is to ensure that orphaned children stay in school and are provided for nutritionally and psychosocially.

The Old Age Pension is a social pension scheme providing welfare support to citizens aged 65 and above (RHVP 2011). Thus, the program employs categorical targeting based on age, with universal targeting of eligible citizens. Under this program in 2018, each elderly person receives a cash income of P530/month. The World War II Veterans Program is aimed at providing welfare support to World War II veterans (RHVP, 2011). In cases where the veteran is deceased, cash assistance is provided to a surviving spouse or children under the age of 21. The program currently provides a cash allowance of P550/month.

Sponsorships and scholarships are meant to improve human capabilities in education. Sponsorships are provided to students studying in national tertiary institutions, while scholarships are provided for studies abroad (World Bank 2015). All students meeting minimum passing standards and admitted at national tertiary institutions are eligible for sponsorships. But scholarships to study abroad are normally awarded for specialized courses not offered in local institutions. Hence, the program employs categorical targeting combined with secondary school grades to identify eligible beneficiaries. Beneficiaries receive grants and loans, with repayment of the loan component expected to commence soon after the recipient becomes employed. Scholarships and sponsorships normally cover tuition, books, equipment, medical fees, insurance and student allowance.

The Remote Area Development Program was launched in 1978 to replace the Basarwa Development Program, which had been launched in 1975 to integrate Basarwa (an ethnic minority) into Botswana's development process (BIDPA 2003). The program's objective is to improve the livelihoods of marginalized remote area communities through acceleration of economic development, poverty reduction, and promotion of sustainable livelihoods. The program employs geographic targeting to identify communities. Eligible communities should have a population not exceeding 250 people or 50 households, and should be located 15 kilometers or more from an officially recognized settlement (Republic of Botswana

2010). While the emphasis of the Remote Area Development Program is on community projects, one of its key functions is to facilitate access to other social transfer programs at individual level in the respective communities, using eligibility criteria for the respective programs. Traditionally, any individual who is a Mosarwa by origin is also eligible.

The Youth Development Fund is intended to provide funding to out-of-school, unemployed or underemployed youth aged 18-35 to start productive enterprises (MYESCD 2017). Thus, the program employs categorical targeting based on age. It provides funding of up to P100,000 to individuals or P450,000 to youth cooperatives (groups) as start-up capital. Half of the money is provided as a grant, while the remaining half is an interest free loan payable over a prescribed period.

2.3 SELF-TARGETED PROGRAMS

Only one program, the Ipelegeng Public Works Program (IPWP), employs self-selected targeting to reach potential beneficiaries. The program is intended to provide temporary employment and income support to unemployed, underemployed and vulnerable citizens aged 18 or above (RoB 2010). Participation in the program is rotational, with each beneficiary allowed to work for a continuous period not exceeding six months, for six hours per day, five days a week. Each participant receives a wage of P567/month, while each supervisor (also a participant) receives P651/month. In addition, both the participant and the supervisor receive a meal allowance of P8.00/day.

3. METHODOLOGY

This section describes in detail the methods used to assess the targeting effectiveness of social transfer programs in Botswana. First, we present targeting performance indicators used in measuring the proportion of poor households participating and not participating in programs and the proportion of the poor and non-poor among program participants. These indicators will inform us about program performance in helping poor households address the welfare situations they faced. Second, we present a discussion of how consumption expenditure was equivalized before undertaking distributional analysis of transfers across the household consumption distribution (consumption quintiles and deciles). Lastly, we discuss how BIA was implemented as part of distributional analysis.

3.1 MEASURING TARGETING PERFORMANCE (INCLUSION AND EXCLUSION ERRORS)

We employ the methods that focus on estimating program *inclusion errors* (or *leakages*) and *exclusion errors* (or *under-coverage*), commonly used in studies that evaluate the targeting effectiveness of social programs (Sumarto, Suryahadi and Widyanti 2002; Coady, Grosh and Hoddinott 2004; Devereux, et al. 2017; Lavallee, et al. 2010; Leite, Stoeffler and Kryeziu 2015), to assess the targeting effectiveness of 15 social transfer

programs in Botswana. The approach entails sub-dividing Botswana's households as illustrated in Table 2. For each social transfer program, households are first divided into participants (E) and non-participants (F). Then, participants and non-participants are further sub-divided into the target (G) and the non-target (H) groups. This leads to four sub-groups: A, B, C and D. Program participants (E) include the target (A) and the non-target (B) group; E=A+B. Similarly, program non-participants (F) include the target (C) and the non-target (D) group; F=C+D. From the second column, the target group (G) includes participants (A) and non-participants (C); G=A+C. And finally, the non-target group (H) also includes participants (B) and non-participants (D); H=B+D. Finally, I (=A+B+C+D) represents total households.

Table 2: Measuring targeting effectiveness of social transfer programs

Participation in program	Population (I)		Total
	Target	Non-target	
Participants	Successful targeting (A)	Inclusion error (leakage) (B)	(E) = (A) + (B)
Non-participants	Exclusion error (under-coverage) (C)	Successful exclusion (D)	(F) = (C) + (D)
Total	(G) = (A) + (C)	(H) = (B) + (D)	(I) = (A) + (B) + (C) + (D)

Source: Sumarto, Suryahadi and Widyanti (2002); Coady, Grosh and Hoddinott (2004); Dutrey (2007);

Since the program's target population is G (=A+C) and the program instead covers population E (=A+B), households A, D, B and C, respectively, represent *successful targeting*, *successful exclusion*, *inclusion error* (or *leakage*) and *exclusion error* (or *under-coverage*). These may be represented by the following four related program performance indicators:

$$TER = ST/P = A/E \tag{1}$$

$$LR = L/P = B/E = 1 - TER \tag{2}$$

$$CR = ST/T = A/G \tag{3}$$

$$UR = U/T = C/G = 1 - CR \tag{4}$$

where TER, LR, CR and UR, respectively, represent the Targeting Effectiveness Ratio, Leakage Ratio, Coverage Ratio and Under-coverage Ratio, P denotes participants, T is the target population, ST represents successful targeting, L represents leakage (or inclusion error) and U is under-coverage (or exclusion error).

A TER of unity would suggest perfect targeting (that is, all program participants belong to the target population and that there are zero inclusion errors or leakages). A ratio of less than unity would imply that some of the program participants are in the non-target population - there are leakages to the non-target population. Conversely, an LR of unity would imply that all the participants are in the non-target population and that the program is not reaching any of the target population, while an estimate of zero would imply that all the participants are in the target population -- there is no leakage to the non-target population.

A CR of unity would suggest that the entire target population is covered by the program - there is no exclusion error or under-coverage. An estimate of less than unity would reflect that some of the target population is not covered by the program. Therefore, an estimate that approaches unity would reflect better program performance than a lower estimate. Conversely, a UR of unity would suggest that no one in the target population is reached by the program, and an estimate that approaches zero would reflect better performance than a higher estimate.

We used three methods to identify poor (eligible) and non-poor (ineligible) households. The first method was based on predefined national poverty datum lines (PDLs) provided as part of the data set used in the study. Households whose consumption expenditures were less than their PDLs were classified as poor and those having the opposite situation as non-poor. From the data, we first identified poor and non-poor beneficiaries and non-beneficiaries for each program and computed program effectiveness ratios.

The second method was based on the concept of relative poverty and used per capita consumption quintiles to separate poor from non-poor beneficiary and non-beneficiary households (Sumarto, Suryahadi and Widyanti 2002). Households belonging to the lowest consumption quintile were classified as poor and those belonging to the remaining four upper consumption quintiles as non-poor. Before deriving consumption quintiles, we first equivalized household consumption expenditure to account for variations in individual needs based on age and geographic location. The method used to equivalize consumption is described in the next sub-section.

The final method employed the criteria for the Destitute Persons Program to decompose program participants and non-participants into eligible and non-eligible. Households that met the Destitute Persons Program eligibility criteria were classified as the target population and those that did not were the non-target population. A household was classified as eligible for the Destitute Persons Program if it owned four (4) or less livestock units and earned a monthly cash income of less than P150 (P120) with (without) dependents. For each household, livestock units were derived as LU=$1*C+0.25G+0.25S$, where C, G and S, respectively, represent the number of cattle, goats and sheep owned by the household.

3.2 EQUIVALIZING HOUSEHOLD CONSUMPTION

The consumption quintile method (discussed in the previous sub-section) and the BIA were based on equivalized consumption expenditure, which was used to group households into deciles or quintiles. This sub-section therefore describes the method used to equivalize household consumption expenditure to account for household composition and geographic location. Since the household is the unit of analysis, welfare assessments should be based on per capita household consumption expenditure (y) rather than total household consumption expenditure (Y). In computing y, it would not be accurate to simply divide total household consumption expenditure by household size because PDLs for Botswana vary depending on household composition (based on gender and age) and geographical location. The best approach would be to adjust household consumption expenditure to *adult equivalent* before undertaking distributional analysis, to derive *equivalized household consumption expenditure*. However, this concept has not been adopted in Botswana and hence the corresponding equivalent weights do not exist. We therefore *proxied* equivalent weights from the 2015/16 food poverty datum line (FPDLs).[4] To derive such weights, we normalized the food PDL for each individual by the food PDL for an adult male residing in the city of Francistown, the most expensive location in 2015/16.

The weight assigned to household member j of age group g and gender n ($n=m$, f), residing in geographical location k, was expressed as:

$$w^j_{gnk} = FPDL^j_{gnk} \Big/ FPDL^j_{Am\mathcal{F}} \tag{5}$$

where the numerator represents the food PDL for the respective individual and the denominator is the food PDL for an adult (A) male (m) residing in Francistown ($\mathcal{F}$). The weight for an adult male residing in Francistown is therefore equal to unity, while the weights for other individuals are less than unity. The equivalized per capita consumption expenditure for household h (Ey^h) was then expressed as:

$$Ey^h = Y^h \Big/ \sum_j w^{jh} \tag{6}$$

where Y^h represents total consumption expenditure for household h and w^{jh} is the weight assigned to individual j residing in household h. Next, total equivalized household consumption expenditure was derived as::

$$EY^h = Ey^h N^h \tag{7}$$

where N^h denotes household size.

3.3 BENEFIT INCIDENCE ANALYSIS

Benefit incidence analysis was carried out using program concentration curves, the Lorenz curve of consumption expenditure and concentration indices. We first equivalized social transfers as:

$$Em_i^h = m_i^h N^h \big/ \sum_j w^{jh} \tag{8}$$

where Em_i^h represents equivalized transfers made to household h through program i, m_i^h denotes actual transfers received, and other variables are as previously defined. The share of program transfers Sm_i^d and the share of household consumption expenditure SY^d for households found in each consumption decile d were, respectively, derived as:

$$Sm_i^d = \sum_h Em_i^{hd} \big/ \sum_h Em_i^h \tag{9}$$

$$SY^d = \sum_h EY^{hd} \big/ \sum_h EY^h \tag{10}$$

where the numerator and denominator of equation 9, respectively, represent total program i transfers received by households in decile d ($d=1, 2, …, 10$) and total program i transfers received by all households. Similarly, the numerator and denominator of equation 10, respectively, represent total consumption expenditure for households in decile d and total consumption expenditure for all households. At each reference decile $\tilde{d}$, the cumulative share of transfers $CSm_i^{\tilde{d}}$ and cumulative share of consumption expenditure $CSY^{\tilde{d}}$ were, respectively, derived as:

$$CSm_i^{\tilde{d}} = \sum_{d=1}^{\tilde{d}} Sm_i^d \tag{11}$$

$$CSY^{\tilde{d}} = \sum_{d=1}^{\tilde{d}} SY^d \tag{12}$$

A plot of cumulative population shares (arranged by per capita consumption expenditure) on the *x-axis* and cumulative shares of transfers on the *y-axis* yields the concentration curve. Similarly, a plot of cumulative population share against cumulative household expenditure share is the Lorenz curve of consumption. The two curves may be used with the 45-degree (45^0) line, or line of equality, to determine if transfers are pro-poor or not, and progressive or regressive.

If the concentration curve lies on the 45^0 line, the transfer program equally benefits all households across the consumption distribution; as households in each decile receive equal shares of program transfers. A concentration curve lying above the 45^0 line would suggest that the program is pro-poor – it benefits the poor more than the non-poor (World Bank and BIDPA 2013). If the concentration curve lies above (below) the Lorenz curve, the program is progressive (regressive) because it performs better (worse) than the distribution of consumption. If the concentration curve lies between the Lorenz

curve and the 45^0 line, the program is progressive, but not pro-poor. Finally, if the concentration curve lies below the Lorenz curve, the program is regressive and not pro-poor (the worst-case scenario).

To advance the analysis further, we expressed the concentration index for program i, defined as twice the area between the concentration curve and the line of equality, as:

$$C_i = \sum_{t=1}^{T-1}(p_{it}L_{it-1} - p_{it+1}L_{it}) \tag{13}$$

where p_t (t=1,…T) represents cumulative shares of the population arranged by consumption expenditure and L_t ($=CSm_i^{\tilde{a}}$) is the corresponding cumulative shares of transfers (O'Donnell, et al., 2008). The range of C_i is $-1 \leq C_i \leq +1$. If there is perfect equality in the distribution of social transfers, $C_i=0$. If the concentration curve falls above (below) the line of equality, $C_i<0$ $(C_i>0)$ and the transfer program is pro-poor (not pro-poor). The Gini Index *(GI)* of consumption was also computed using equation 13, but now with *L* representing cumulative shares of consumption expenditure. The range of *GI* is $0 \leq GI \leq 1$, where *GI=0 (GI=1)* implies perfect equality (inequality) in the distribution of consumption across the population distribution. If $C_i=GI$, the transfer program distributes income in the same manner as the distribution of consumption. If $C_i<GI$ $(C_i>GI)$, the transfer program is progressive (regressive) because it distributes income better (worse) than the distribution of consumption.

4. DATA

The study uses the 2015/16 Botswana Multi-Topic Household Survey (BMTHS) data, collected by Statistics Botswana (SB). The data set contains information from 24,720 individuals from 7,060 households surveyed in 2015/16. Applying expansion factors, the survey translates to an estimated 589,909 households and a national population of 2,073,675 individuals (SB, 2018), which is comparable to the 2016 projected national population of 2,219,736 (SB 2015). The BMTHS data is a nationally representative cross-sectional data set containing socio-economic information on a variety of modules. The topical modules are designed to gather specific in-depth information on (but not limited to) demographic characteristics, household expenditure and consumption, labour force, health, education, sources of income and social protection, self-assessed well-being and food insecurity, services within villages/community, housing, utilities, durable goods and livestock ownership, and anthropometric measurements for children under 18 years (SB 2018).

The study relied heavily on the topical module 8 capturing information on sources of income, social protection and other government assistance. The social protection programs captured include the Orphan Care Program, Destitute Persons Program, Vulnerable Group Feeding Program, School Feeding Program, Needy Student Package, Community Home-Based Care Program, Remote Area Development Program, LIMID Program and Poverty Eradication Program. Aid packages include World War II Veterans Program,

Old Age Pension, Student Allowances, Scholarships and Youth Development Fund. Information on Ipelegeng PWP was extracted from topical module 4 on employment, covering income received from the program by household members. Information from these modules was merged into the main household data to facilitate analysis. Households with missing program transfer values were categorised as non-recipients.

The data on the food PDLs, used as part of the 2015/16 BMTHS, were obtained from Statistics Botswana in spreadsheet format. These data, which are reported in Table 3, contained food PDLs for seven geographical areas and 11 individual groups based on gender and age, which translates to 77 food PDL estimates. Evidently, the highest food PDL estimate was for an adult male aged 20-64 residing in Francistown, which was used to normalize the food PDLs into 77 individual weights. The resulting weights, also reported in Table 3, were applied as described in the methodology section to derive equivalized household consumption and transfers.

Table 3: Food Poverty lines and food PDL-based adult male equivalent weights for Botswana, 2015/16

Household member category	Gaborone	Francistown	Other Towns	Rural SE	Rural NE	Rural NW	Rural SW
	Food poverty datum line (Pula)						
Adult male (20-64 yrs)	284.45	**301.69**	**293.74**	**248.79**	**259.73**	**264.00**	**300.31**
Adult female (20-64 yrs)	254.38	269.45	263.48	223.68	231.59	235.14	264.86
Male 65+ yrs	226.70	239.79	235.10	198.91	205.30	208.78	236.97
Female 65+ Yrs	214.43	226.41	221.50	188.80	195.00	198.90	224.60
Male (15-19 yrs)	262.30	278.10	271.51	229.99	238.14	241.25	272.80
Female (15-19 yrs)	257.79	273.15	267.27	227.05	234.73	238.60	268.43
Kids (10-14 yrs)	252.29	268.52	256.27	221.86	228.71	231.77	258.71
Kids (7-9 yrs)	233.71	248.43	237.82	205.64	212.47	213.42	241.52
Kids (4-6 yrs)	224.59	239.52	227.29	204.12	207.49	212.09	230.16
Kids (1-3 yrs)	192.50	206.21	194.61	175.62	178.81	182.60	194.93
Kids < 1 yr	97.67	100.50	93.70	83.24	83.81	86.58	108.42
	Adult male equivalent weights						
Adult male (20-64 yrs)	0.94	1.00	0.97	0.82	0.86	0.88	1.00
Adult female (20-64 yrs)	0.84	0.89	0.87	0.74	0.77	0.78	0.88
Male 65+ yrs	0.75	0.79	0.78	0.66	0.68	0.69	0.79
Female 65+ Yrs	0.71	0.75	0.73	0.63	0.65	0.66	0.74
Male (15-19 yrs)	0.87	0.92	0.90	0.76	0.79	0.80	0.90
Female (15-19 yrs)	0.85	0.91	0.89	0.75	0.78	0.79	0.89
Kids (10-14 yrs)	0.84	0.89	0.85	0.74	0.76	0.77	0.86
Kids (7-9 yrs)	0.77	0.82	0.79	0.68	0.70	0.71	0.80
Kids (4-6 yrs)	0.74	0.79	0.75	0.68	0.69	0.70	0.76
Kids (1-3 yrs)	0.64	0.68	0.65	0.58	0.59	0.61	0.65
Kids < 1 yr	0.32	0.33	0.31	0.28	0.28	0.29	0.36

Source: Statistics Botswana/Author Computed

5. RESULTS AND DISCUSSIONS

5.1 PROGRAM COVERAGE AND UNDER-COVERAGE *(EXCLUSION ERRORS)*

Table 4 decomposes households based on the methodology described in section 3.1, using the 2015/16 BMTHS data set. The information presented in Table 4 was used to compute program performance ratios described in section 3.1. Table 5 presents the resulting performance ratios for each of the three methods used to sub-divide households into sub-groups (national PDL, consumption quintile and the Destitute Persons Program). Generally, results indicate underperformance across performance indicators for the national PDL method than for the consumption quintile and the Destitute Persons Program methods. This is because the PDL method has fewer households classified as poor (eligible) than the consumption quintile and the Destitute Persons Program methods (see Table 4). Given that Botswana uses PDLs in poverty analysis, our discussions of performance measures will focus on the PDL-based estimates.

Coverage ratios for the PDL method are also depicted in Figure 1. Except for the School Feeding Program, which covered 66.6% of poor households, all social transfer programs are associated with low coverage or high under-coverage of the poor. For example, the second and third best performers, the Old Age Pension and Ipelegeng PWP, respectively, covered only 21.7% and 11.3% and excluded the remaining 78.3% and 88.7% of poor households. The remaining programs recorded coverage ratios of under 3% and under-coverage tarios of over 97%. For example, the major means-tested program, the Destitute Persons Program, covered only 2.8% of poor households and excluded the remaining 97.2%. Even when using its eligibility criteria, the Destitute Persons Program only covered 5.7% of eligible households and excluded the remaining 94.3% (see Table 5). Similar results were obtained for the Needy Student Package, which is an annex of the Destitute Persons Program.

There appears to be a positive association between program enrolment and coverage. For example, the School Feeding Program, Old Age Pension and Ipelegeng PWP have the highest enrolment and coverage ratios, whereas the Remote Area Development Program, Community Home-Based Care Program, Vulnerable Group Feeding Program, Youth Development Fund and World War II Veterans Program have the lowest enrolment and coverage ratios. Thus, programs with higher enrolment have a higher likelihood to cover the poor than those with lower enrolment. This suggests that the poor are covered more-or-less as "*collateral benefit*", since enrolment seems to be the key determining factor of the extent of covering them. However, the results may be partly influenced by the fact that children and the elderly are more likely to be poor and programs targeting these groups (Old Age Pension and School Feeding Program) have a better chance of reaching the poor than those targeting other groups. Moreover, the unemployed poor are more likely to accept low wages offered through a self-targeted Ipelegeng PWP. Means-

Table 4: Decomposition of households into poor, non-poor program participants and non-participants, 2015/16

| Program	Participants	National PDL method				Consumption quintile method				Destitute persons program method			
		PP (**A**)	NPP (**B**)	UC (**C**)	SE (**D**)	PP (**A**)	NPP (**B**)	UC (**C**)	SE (**D**)	EP (**A**)	NEP (**B**)	UC (**C**)	SE (**D**)
Means-tested targeting													
DPP	19,552	1,494	18,058	51,581	518,776	5,998	13,554	106,705	462,707	6,742	12,810	110,988	459,369
NSP	14,709	1,520	13,189	51,555	523,644	6,066	8,643	106,637	467,618	6,569	8,140	111,160	464,039
CHBC	1,080	88	992	52,987	535,841	169	911	112,535	475,350	169	911	117,560	471,268
LIMID	6,582	820	5,762	52,255	531,071	1,833	4,749	110,871	471,511	2,109	4,474	115,621	467,706
PEP	7,605	1,425	6,180	51,650	530,653	3,060	4,545	109,643	471,715	3,249	4,357	114,480	467,823
Categorical targeting													
VGFP	901	188	713	52,887	536,121	283	617	112,420	475,644	283	617	117,446	471,562
SFP	248,466	35,335	213,131	17,740	323,703	76,800	171,666	35,904	304,595	82,061	166,405	35,669	305,774
OCP	14,475	670	13,805	52,405	523,029	2,598	11,877	110,106	464,384	2,654	11,821	115,075	460,359
WVP	1,460	368	1,092	52,707	535,741	553	907	112,151	475,353	553	907	117,177	471,272
OAP	84,742	11,525	73,217	41,550	463,617	28,326	56,333	84,378	419,928	31,088	53,654	86,641	418,526
RADP	1,156	0	1,156	53,075	535,678	93	1,063	112,611	475,198	93	1,063	117,637	471,116
YDF	1,266	176	1,090	52,899	535,743	275	992	112,429	475,269	275	992	117,454	471,188
SA	23,292	881	22,411	52,195	514,423	1,594	21,698	111,110	454,563	1,622	21,670	116,108	450,510
SCH	12,330	544	11,786	52,531	525,047	996	11,334	111,707	464,927	1,061	11,269	116,668	460,910
Self-selected targeting													
IPWP	36,199	6,020	30,179	47,055	506,655	15,002	21,197	97,702	455,064	15,516	20,683	102,213	451,496

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Note: PP=Poor participants (successful targeting); NPP= non-poor participants (leakage); UC= under-coverage (exclusion error); SE = successful exclusion

EP: Eligible participants, NEP: Ineligible participants. The enrolment estimate for VGFP appears to be erroneous and hence the results should be interpreted with care. Since the program universally covers all under five children attending public health facilities, it is inconceivable that only 901 households participated in the program during the survey year.

tested programs do necessarily not perform better than programs employing categorical or self-selected targeting in covering the poor. For example, the best performing means-tested programs, the Needy Student Packege, Destitute Persons Program and Poverty Eradication Program, rank fourth, fifth and sixth, and are surpassed by two categorical programs (School Feeding Program and Old Age Pension) and a self-targeted program (Ipelegeng PWP).

Figure 1: PDL-based program coverage and under-coverage of the poor, 2015/16
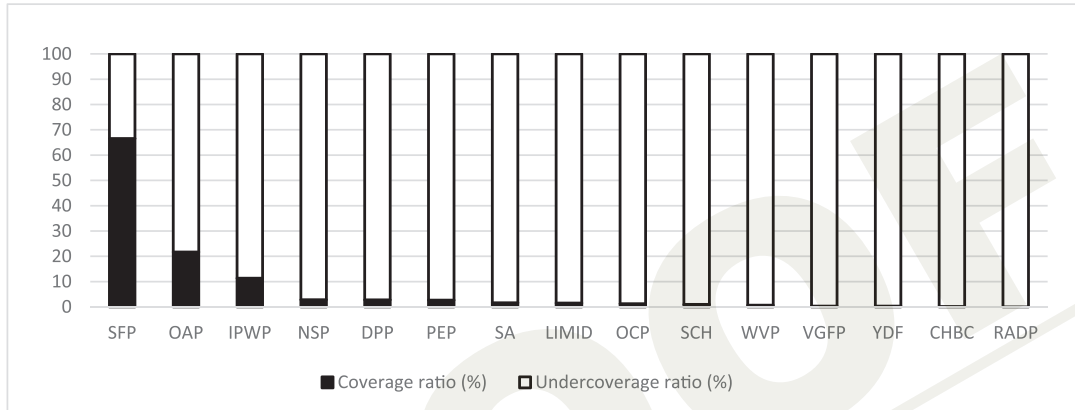
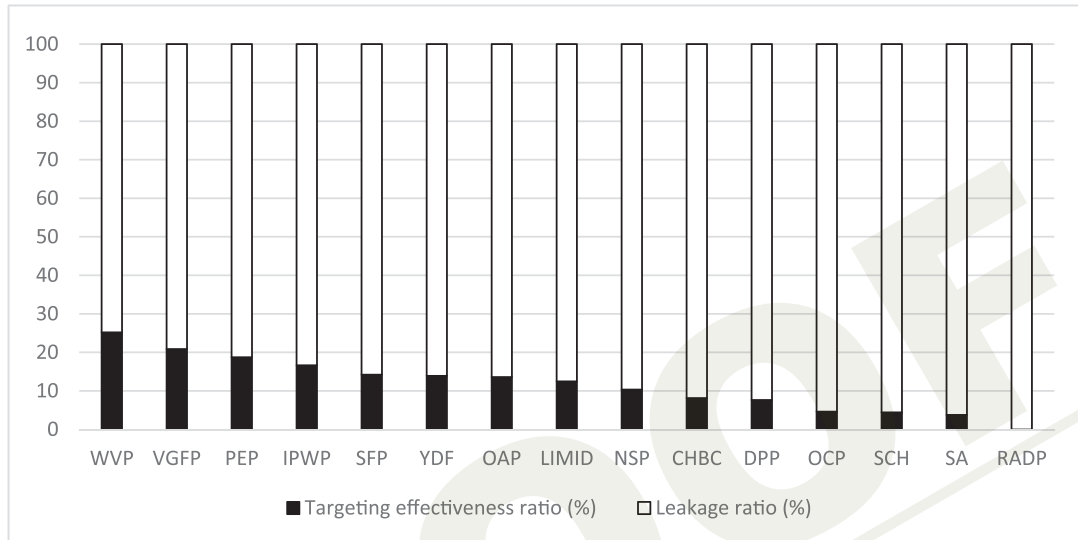Source: Computed by the author from the Botswana multi-topic household survey 2015/16

5.2   PROGRAM TARGETING AND LEAKAGES *(INCLUSION ERRORS)*

Turning to program targeting effectiveness and leakage, it is apparent that all programs have low targeting effectiveness ratios and high leakage ratios (Table 5 and Figure 2). Therefore, all the programs target non-poor households more than the poor - they have high leakage to the non-poor. For example, based on the PDL method, 25.2% of participants to the best performer, the World War II Veterans Program, were poor, and the remaining 74.8% were non-poor. The worst performer, the Remote Area Development Program, recorded a targeting effectiveness ratio of zero and a leakage ratio of 100%, suggesting that all participants to the program were non-poor.[5]

The best two performers (World War II Veterans Program and Vulnerable Group Feeding Program) and the worst performer (Remote Area Development Program), in terms of targeting the poor, employ categorical targeting. Broadly, means-tested programs do not necessarily perform better than those employing alternative targeting mechanisms, except that, at position three, the Poverty Eradication Program ranks reasonably well. With targeting effectiveness ratios (leakage ratios) of 7.6% (92.4%) and 10.3% (89.7%), and being ranked ninth and eleventh, respectively, in terms of targeting the poor, the major means-tested programs, the Destitute Persons Program and Needy Student Package,

have underperformed; given that they are the major poverty focused instruments. The two programs are outperformed by a self-targeted instrument, Ipelegeng PWP, which is at position four.

Figure 2: PDL-based program targeting effectiveness and leakage, 2015/16

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Improvements in targeting effectiveness are broadly attained when considering the consumption quintile and the Destitute Persons Program methods (Table 5; Figure 3), although the results still indicate lower targeting effectiveness ratios than leakage ratios. For example, with a targeting effectiveness ratio of 41.4% and a leakage ratio of 58.6%, a self-targeted program, Ipelegeng PWP, is the best performer under the consumption quintile method. Further, 30.7% and 41.2% of the Destitute Persons Program and Needy Student Package participants, respectively, were poor, and the remaining 69.3% and 58.8% were non-poor when employing the quintile method. Program rankings also changed when the method for defining poor and non-poor changed. The ranking for the Needy Student Package and the Destitute Persons Program improved to second and eighth positions, respectively (Figure 3). Evidently, the Destitute Persons Program was consistently outperformed by categorical/universal programs (School Feeding Program and Old Age Pension) and a self-targeted program (Ipelegeng PWP) in targeting the poor (Table, 5; Figures 2 and 3).

To extend the analysis further, Table 6 reports the distribution of program beneficiaries across consumption expenditure quintiles. As seen, the shares of program participants in the bottom quintile (Q1) are equivalent to the targeting effectiveness ratios reported in Table 5 for the quintile method, whereas the sums of the shares of the remaining four

**Table 5: Program coverage and targeting indicators (percentage).**

Social Transfer Program	National PDL method				Consumption quintile method				DPP method			
	TER	LR	CR	UR	TER	LR	CR	UR	TER	LR	CR	UR
Means-tested targeting												
DPP	7.64	92.36	2.81	97.19	30.68	69.32	5.32	94.68	34.48	65.52	5.73	94.27
NSP	10.33	89.67	2.86	97.14	41.24	58.76	5.38	94.62	44.66	55.34	5.58	94.42
CHBC	8.15	91.85	0.17	99.83	15.65	84.35	0.15	99.85	15.65	84.35	0.14	99.86
LIMID	12.46	87.54	1.54	98.46	27.85	72.15	1.63	98.37	32.04	67.96	1.79	98.21
PEP	18.74	81.26	2.68	97.32	40.24	59.76	2.72	97.28	42.72	57.28	2.76	97.24
Categorical targeting												
VGFP	20.87	79.13	0.35	99.65	31.44	68.56	0.25	99.75	31.44	68.56	0.24	99.76
SFP	14.22	85.78	66.58	33.42	30.91	69.09	68.14	31.86	33.03	66.97	69.70	30.30
OCP	4.63	95.37	1.26	98.74	17.95	82.05	2.31	97.69	18.34	81.66	2.25	97.75
OAP	13.60	86.40	21.71	78.29	33.46	66.54	25.13	74.87	36.69	63.31	26.41	73.59
WVP	25.21	74.79	0.69	99.31	37.88	62.12	0.49	99.51	37.88	62.12	0.47	99.53
RADP	0.00	100.00	0.00	100.00	8.04	91.96	0.08	99.92	8.04	91.96	0.08	99.92
YDF	13.90	86.10	0.33	99.67	21.70	78.30	0.24	99.76	21.70	78.30	0.23	99.77
SA	3.78	96.22	1.66	98.34	6.84	93.16	1.41	98.59	6.96	93.04	1.38	98.62
SCH	4.41	95.59	1.02	98.98	8.08	91.92	0.88	99.12	8.61	91.39	0.90	99.10
Self-selected targeting												
IPWP	16.63	83.37	11.34	88.66	41.44	58.56	13.31	86.69	42.86	57.14	13.18	86.82

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

upper consumption quintiles are equivalent to the corresponding *leakage ratios*. If the estimates decline progressively from Q1 to Q5, it would suggest that the program may be pro-poor; because the number of beneficiaries declines consistently with increases in household expenditure.

Figure 3: Consumption quintile-based program targeting effectiveness and leakage, 2015/16
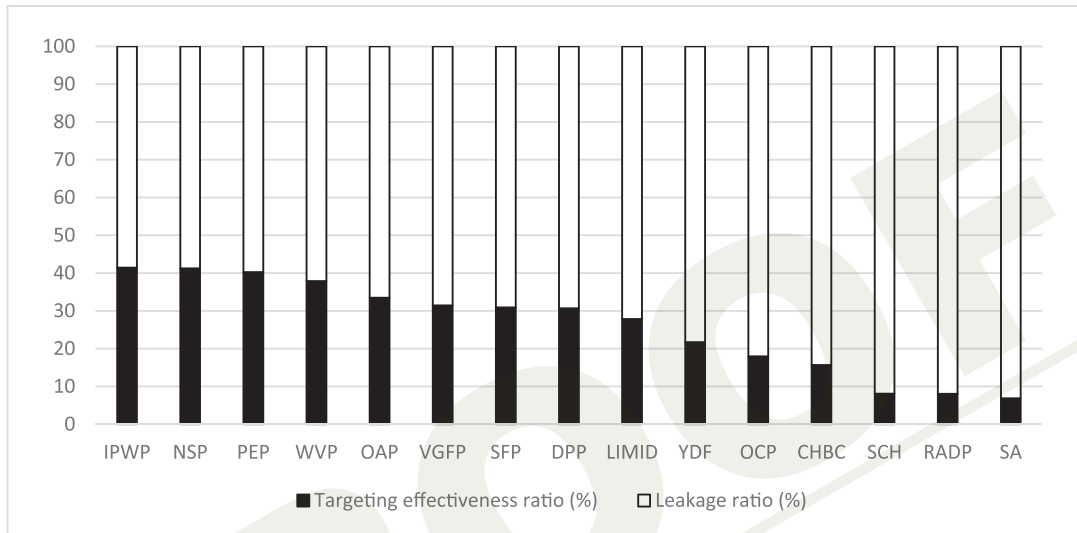
Source: Computed by the author from the Botswana multi-topic household survey 2015/16

From Table 6, it is apparent that five programs exhibited consistent inverse relationships between per capita consumption and the number of beneficiaries, implying that they are likely to be pro-poor. These include two means-tested programs (Needy Student Package and Poverty Eradication Program), two categorical/universal programs (School Feeding Program and Old Age Pension) and one self-targeted program (Ipelegeng PWP). Two other means-tested programs (Destitute Persons Program and LIMID Program) exhibited similar trends, except that they had slightly more beneficiaries recorded in Q2 than Q1. Similarly, the Vulnerable Group Feeding Program exhibited an inverse relationship between consumption and the number of participants, except for the slightly higher proportions of beneficiaries recorded in Q4 than Q3. A similar trend is observed for the Orphan Care Program, which recorded higher proportions of participants in Q2 and Q3 than in Q1. The World War II Veterans Program is a special case because it shows consistent reduction in the shares of beneficiaries from Q1 to Q4 and a substantial jump in Q5, with the highest share of beneficiaries found in Q1, followed by Q5. Thus, subject to further analysis, it could be concluded that at least 10 of the 15 programs may be pro-poor, in that most of the participants to these programs are found in lower consumption quintiles.

Table 6: Distribution of program beneficiary households across consumption expenditure distribution

Program by targeting method	Number (percent distribution) of beneficiary households by quintile					
	Q1	Q2	Q3	Q4	Q5	Total
Means-tested targeting						
DPP	5,998	6,530	4,208	2,267	549	19,552
	(30.7)	(33.4)	(21.5)	(11.6)	(2.8)	(100)
NSP	6,066	4,977	2,740	792	134	14,709
	(41.2)	(33.8)	(18.6)	(5.4)	(0.9)	(100)
CHBC	169	272	448	87	104	1,080
	(15.6)	(25.2)	(41.5)	(8.1)	(9.6)	(100)
LIMID	1,833	2,069	1,104	954	622	6,582
	(27.8)	(31.4)	(16.8)	(14.5)	(9.5)	(100)
PEP	3,060	2,119	1,402	695	329	7,605
	(40.2)	(27.9)	(18.4)	(9.1)	(4.3)	(100)
Categorical targeting						
VGFP	283	247	143	158	70	901
	(31.4)	(27.4)	(15.9)	(17.5)	(7.8)	(100)
SFP	76,800	61,106	44,256	36,232	30,072	248,466
	(30.9)	(24.6)	(17.8)	(14.6)	(12.1)	(100)
OCP	2,598	4,915	4,619	1,157	1,185	14,474
	(17.9)	(34.0)	(31.9)	(8.0)	(8.2)	(100)
OAP	28,326	21,136	18,916	11,260	5,021	84,659
	(33.5)	(25.0)	(22.3)	(13.3)	(5.9)	(100)
WVP	553	301	191	59	356	1,460
	(37.9)	(20.6)	(13.1)	(4.0)	(24.4)	(100)
RADP	93	369	276	145	273	1,156
	(8.0)	(31.9)	(23.9)	(12.5)	(23.6)	(100)
YDF	275	201	301	333	157	1,267
	(21.7)	(15.9)	(23.8)	(26.3)	(12.4)	(100)
SA	1,594	2,981	5,486	6,664	6,566	23,291
	(6.8)	(12.8)	(23.6)	(28.6)	(28.2)	(100)
SCH	996	1,573	2,344	3,340	4,077	12,330
	(8.1)	(12.8)	(19.0)	(27.1)	(33.1)	(100)
Self-selected targeting						
IPWP	15,002	11,683	5,803	2,944	767	36,199
	(41.4)	(32.3)	(16.0)	(8.1)	(2.1)	(100)

Source: Computed by the author from the Botswana multi-topic household survey 2015/16.

Note. Equivalized per capita quintiles are defined as follows. Q1: Ey≤479.20; Q2: 479.20<Ey≤ 824.40; Q3: 824.40<Ey≤1380.76; Q4: 1380.76<Ey≤2602.34; Ey>2602.34. Figures in parentheses are percentage shares of beneficiaries.

The remaining five programs cannot be said to be pro-poor. Three of these programs, one means-tested (Community Home-Based Care Program) and two categorically targeted (Remote Area Development Program and Youth Development Fund), do not show discernible relationships between per capita consumption and the number of beneficiaries. The remaining two programs, Student Allowances and Scholarships, which employ categorical targeting (and secondary school pass grades), generally exhibit positive relationships between per capita consumption and the number of program beneficiaries – hence they target the non-poor more than the poor. Since scholarships and student allowances are provided universally to qualifying students at tertiary institutions, these results imply that children from poorer households have lower rates of progression to tertiary education than those from higher income households. Since education has been found to enhance welfare in Botswana (Lekobane and Seleka 2017), this may contribute to intergenerational transmission of poverty from parents to their children.

5.3 BENEFIT INCIDENCE ANALYSIS

This section presents the results for the benefit incidence analysis, which is concerned with the distribution of transfers across the consumption distribution. Table 7 presents estimates of the concentration curves for the 15 social transfer programs, together with estimates for the Lorenz curve of consumption expenditure. The concentration curves for the respective programs and the Lorenz curve are further depicted in Figures 4a-4e. Figures 4a-4c indicate that eight programs were pro-poor, including four means-tested programs (Destitute Persons Program, Needy Student Package, LIMID Program and Poverty Eradication Program), three categorical/universal programs (World War II Veterans Program, School Feeding Program and Old Age Pension) and one self-targeted program (Ipelegeng PWP). A point to note, however, is that the concentration curves for the Destitute Persons Program and Needy Student Package fall slightly below the 45^0 line at the bottom decile. Figure 4a shows that the Needy Student Package may be more pro-poor than the Destitute Persons Program, except for the ambiguity at the bottom consumption decile.

**Table 7: Welfare indicators and concentration curves of social transfer programs**

Group	Mean household income	Mean income ratio	CCS	NoH	CSH	Program cumulative transfer shares														
						DPP	NSP	CHBC	LIMID	PEP	VGFP	SFP	OCP	OAP	WVP	RADP	YDF	SA	SCH	IPWP
Bottom	1,624.46	1.00	0.03	56842	0.10	0.10	0.09	0.00	0.11	0.22	0.03	0.21	0.04	0.16	0.34	0.00	0.18	0.02	0.01	0.20
2	2,207.24	1.36	0.07	55862	0.19	0.31	0.37	0.10	0.23	0.39	0.12	0.38	0.12	0.31	0.50	0.01	0.24	0.05	0.02	0.43
3	2,493.06	1.53	0.11	57731	0.29	0.50	0.58	0.11	0.38	0.54	0.56	0.54	0.29	0.45	0.58	0.37	0.37	0.08	0.03	0.64
4	2,643.60	1.63	0.16	57953	0.39	0.64	0.69	0.26	0.48	0.67	0.59	0.65	0.44	0.55	0.67	0.44	0.37	0.16	0.09	0.75
5	2,819.23	1.74	0.21	57109	0.48	0.78	0.79	0.49	0.65	0.72	0.73	0.72	0.69	0.67	0.67	0.66	0.47	0.32	0.11	0.83
6	3,543.23	2.18	0.28	58886	0.58	0.85	0.91	0.87	0.74	0.86	0.73	0.80	0.83	0.78	0.87	0.68	0.57	0.42	0.75	0.89
7	4,206.17	2.59	0.36	59305	0.69	0.92	0.98	0.87	0.87	0.92	0.98	0.87	0.91	0.86	0.90	0.78	0.61	0.49	0.79	0.92
8	5,123.74	3.15	0.46	61230	0.79	0.97	0.99	0.94	0.91	0.96	0.98	0.91	0.94	0.92	0.90	0.78	0.84	0.74	0.85	0.98
9	7,810.99	4.81	0.61	62224	0.90	1.00	0.99	0.94	0.96	0.98	0.98	0.96	1.00	0.97	1.00	0.92	0.92	0.87	0.88	0.99
Top	20,130.03	12.39	1.00	61822	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total	5,392.71			588965																

Source: Computed by the author from the Botswana multi-topic household survey 2015/16.

Notes: Mean income ratio is the ratio of decile its mean consumption expenditure to the mean for the bottom decile. CCS: Cumulative consumption share. NoH: Number of households. CSH: Cumulative Share of Households. Equivalized per capita deciles for the 10 groups are as follows:

Ey≤334.41; 334.42≤Ey≤ 479.20; 479.21≤Ey≤ 635.43; 635.44≤Ey≤ 824.40; 824.41≤Ey≤ 1061.86; 1061.87≤Ey≤1380.76; 1380.77≤Ey≤ 1853.89; 1853.90≤Ey≤ 2602.34; 2602.35≤Ey≤ 4178.74; and Ey≥4178.75.

Figure 4a: Concentration curves for destitute person program and needy student package, 2015/16
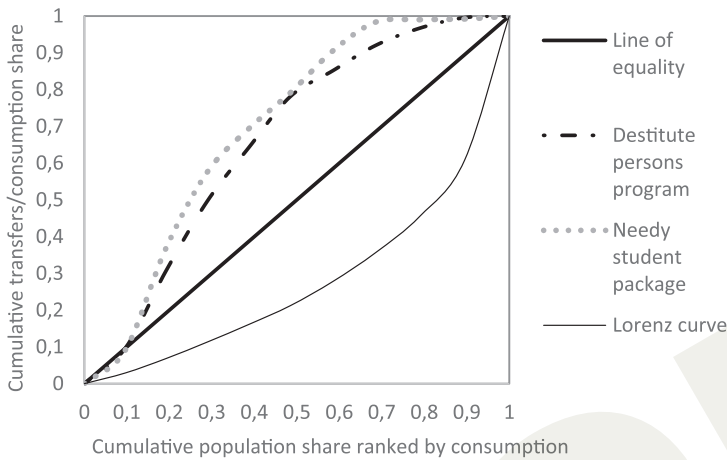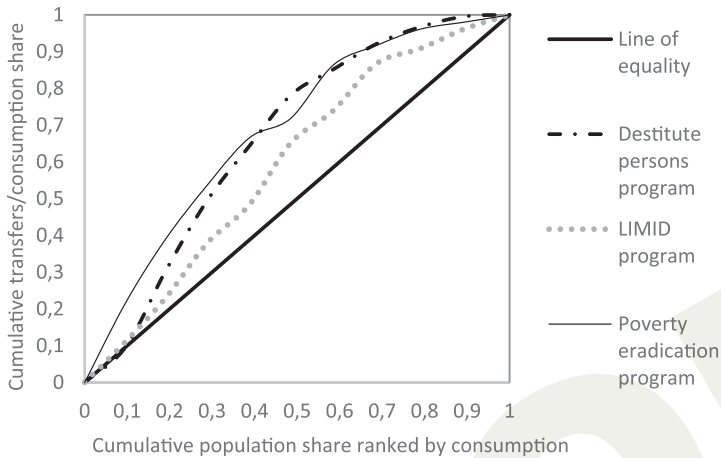

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Figure 4b: Concentration curves for destitute persons program, world war II veterans program and old age pension, 2015/16
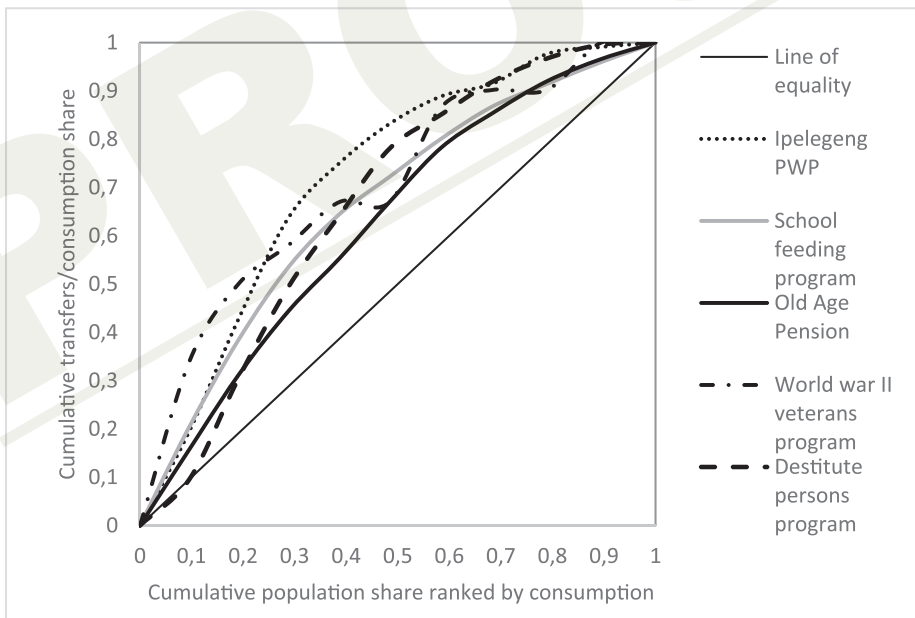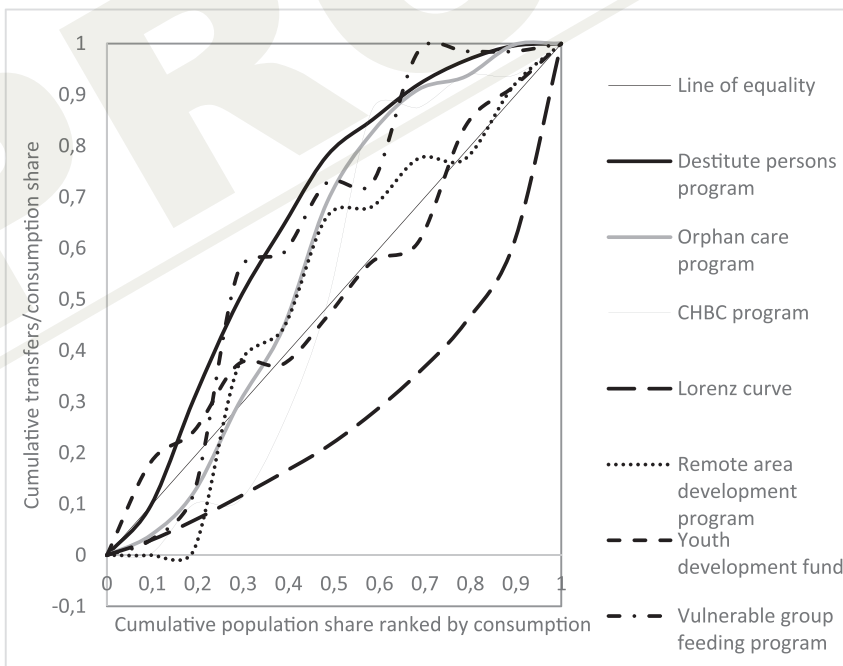

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Figure 4c: Concentration curves for destitute persons program, poverty eradication program and livestock management and infrastructure development program, 2015/16
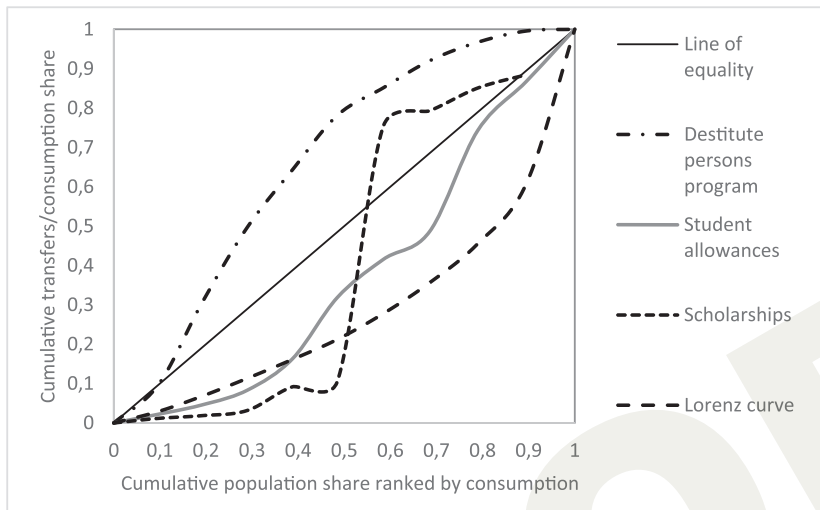

Source: Computed by the author from the Botswana Multi-topic Household Survey 2015/16

Figure 4d: Concentration curves for destitute persons, orphan care, community home-based care and remote area development programs, and youth development fund, 2015/16

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Figure 4e: Concentration curves for destitute persons programme, student allowances and scholarships, 2015/16

Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Figure 4b compares the World War II Veterans Program, Old Age Pension, School Feeding Program and Ipelegeng PWP with the Destitute Persons Program. Clearly, the Old Age Pension, World War II Veterans Program, School Feeding Program, and Ipelegeng PWP outperformed the Destitute Persons Program up to the bottom 20%, 40%, 40% and 80% of the population distribution (respectively), after which either the reverse prevailed or indiscernible differences were observed. It is also apparent from Figure 4c, that the Destitute Persons Program generally outperformed the LIMID Program, except at the bottom 10% of the population distribution. Lastly, the Poverty Eradication Program outperformed the Destitute Persons Program at the bottom 40% of the population distribution, after which no discernible differences could be established. Broadly, it cannot be concluded whether the Destitute Persons Program is more pro-poor than the seven programs depicted in Figs 4a-4c.

The remaining seven programs indicate mixed results in terms of being pro-poor or not, and progressive or regressive. The Youth Development Fund performed well up to the bottom 30% of the population distribution, after which its concentration curve fell below the line of equality (Figure 4d). Similarly, the concentration curves for the Vulnerable Group Feeding Program, Orphan Care Program, Community Home-Based Care Program and Remote Area Development Program fell below (above) the line of equality at lower (higher) consumption levels. Moreover, the concentration curves for the Remote Area Development and Community Home-Based Care Programs fell below the Lorenz curve at lower consumption levels. Finally, Scholarships and Student

Allowances were the worst performers (Figure 4e) and were not pro-poor. This is particularly obvious for Scholarships because its concentration curve consistently fell below the line of equality.

Table 8 reports estimates of the concentration indices for the 15 programs, and these are further depicted, together with the Gini Index in Figure 5. As seen, 13 programs registered negative estimates and therefore appear to be pro-poor, and with positive concentration indices, two programs are not pro-poor. When combining the results from the distribution of beneficiaries across the consumption distribution, concentration curves and concentration indices, we draw the following conclusions. First, nine programs (Ipelegeng PWP, World War II Veterans Program, Needy Student Package, Poverty Eradication Program, Destitute Persons Program, School Feeding Program, Vulnerable Group Feeding Program, Old Age Pension and LIMID Program) are pro-poor and progressive. Second, while they have negative concentration indices, four programs (Orphan Care Program, Remote Area Development Program, Community Home-Based Care Program and Youth Development Fund) are not necessarily pro-poor because they exhibit concentration curves that fall both below and above the line of equality; but they are progressive. Third, with positive concentration indices, two programs (Student Allowances and Scholarships) are not pro-poor, but are progressive in that their concentration indices are smaller than the Gini coefficient of consumption. Fourth, means-tested programs do not necessarily outperform programs employing other targeting mechanisms. For example, while the major means-tested programs (Needy Student Package and Destitute Persons Program) rank third and fifth, respectively, based on the concentration indices, they are surpassed by Ipelegeng PWP and the World War II Veterans Program. The Poverty Eradication Program, which is also means-tested, ranked fourth, and is also surpassed by the World War II Veterans Program and Ipelegeng PWP. The LIMID Program, also means-tested, ranked ninth based on concentration indices, and is surpassed by many programs, both categorical and self-targeted.

Table 8: Concentration indices for social transfer programs

Group	DPP	NSP	CHBC	LIMID	PEP	VGFP	SFP	OCP	OAP	WVP	RADP	YDF	ST	SCH	IPWP	Gini Index
1	0.012	0.019	0.010	0.002	-0.003	0.007	-0.002	0.004	0.001	-0.016	0.001	-0.010	0.000	0.000	0.004	0.001
2	0.007	-0.001	-0.008	0.005	-0.011	0.068	-0.009	0.021	-0.006	-0.035	0.074	0.004	0.004	0.000	-0.001	0.002
3	-0.005	-0.021	0.033	-0.009	-0.016	-0.043	-0.021	0.015	-0.011	-0.035	-0.016	-0.036	0.018	0.017	-0.031	0.003
4	-0.008	-0.028	0.076	0.015	-0.047	0.001	-0.033	0.054	-0.007	-0.065	0.031	0.003	0.038	-0.006	-0.041	0.004
5	-0.044	-0.026	0.123	-0.021	-0.005	-0.074	-0.034	-0.001	-0.014	0.025	-0.058	0.006	0.017	0.290	-0.056	0.011
6	-0.045	-0.044	-0.089	-0.004	-0.058	0.066	-0.041	-0.037	-0.038	-0.063	-0.012	-0.035	0.000	-0.044	-0.074	0.018
7	-0.061	-0.095	-0.044	-0.055	-0.068	-0.102	-0.059	-0.074	-0.040	-0.094	-0.083	0.079	0.135	-0.040	-0.054	0.031
8	-0.079	-0.105	-0.100	-0.057	-0.086	-0.104	-0.061	-0.052	-0.058	-0.016	0.018	-0.025	0.015	-0.057	-0.092	0.073
9	-0.105	-0.095	-0.055	-0.065	-0.085	-0.085	-0.065	-0.105	-0.075	-0.105	-0.035	-0.015	0.025	0.015	-0.096	0.287
Total	-0.328	-0.395	-0.055	-0.190	-0.379	-0.266	-0.325	-0.175	-0.247	-0.403	-0.081	-0.028	0.253	0.175	-0.441	0.429

Sources: Computed by the author from the Botswana multi-topic household survey 2015/16.

Figure 5: Concentration indices for social transfer programs in Botswana. 2015/2016
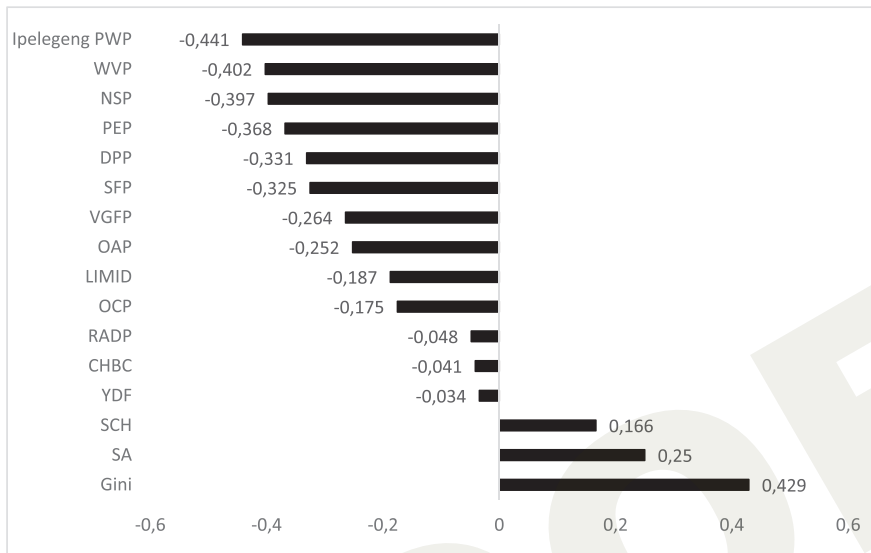
Source: Computed by the author from the Botswana multi-topic household survey 2015/16

Note: The Gini is lower than the Statistics Botswana estimate of 0.522 since the current estimate used the household, rather than an individual, as a unit of analysis.

6. CONCLUSIONS AND POLICY IMPLICATIONS

The foregoing analysis has indicated that social transfer programs in Botswana are associated with low coverage (and high under-coverage) of poor households, except for the School Feeding Program, which covers about two-thirds of poor households. Therefore, this limits their effectiveness in terms of poverty reduction; as they leave many poor households uncovered. There appears to be no association between the rate of coverage and the targeting mechanism employed, since the low coverage rates are widespread across programs employing means-tested, categorical and self-selected targeting. Instead, a positive association is seen between the coverage rate and enrolment, implying that coverage of the poor is more-or-less a *collateral benefit*.

When using the national PDL method to decompose households into poor and non-poor program participants and non-participants, all programs perform poorly in targeting the poor. While targeting effectiveness is improved when employing the consumption quintile-based and DPP-based methods, the resulting targeting effectiveness ratios are still exceeded by leakage ratios for all programs. This signifies underperformance, particularly for means-tested programs, which are expected to perform better at targeting the poor. It is also observed that, based on performance ratios, and contrary to

expectation, means-tested programs do not necessarily outperform programs employing other targeting mechanisms.

Benefit Incidence Analysis indicates that most programs are pro-poor. Pro-poor programs include seven social assistance programs delivering cash and in-kind food transfers to beneficiaries (Ipelegeng PWP, World War II Veterans Program, Needy Student Package, Destitute Persons Program, School Feeding Program, Vulnerable Group Feeding Program and Old Age Pension) and two asset transfer (investment) programs (Poverty Eradication Program and LIMID Program). Inconsistent results (across measures) were obtained for four programs (Orphan Care Program, Remote Area Development Program, Community Home-Based Care Program and Youth Development Fund), which, though progressive, are not definitively pro-poor. Programs meant to promote investment in human capital development (Student Allowances and Scholarships) were found to be progressive, but not pro-poor, implying that children from poor families have lower chances of advancing to tertiary education level; a situation which may contribute to intergenerational transmission of poverty from parents to their children as education is an important factor in poverty reduction.

While it is commendable that most means-tested programs are pro-poor, it is disconcerting to learn that they do not necessarily outperform programs employing categorical and self-selected targeting mechanisms. This could suggest that identification and selection methods are not robust enough to pick the poorest of the poor or that eligibility criteria are not strictly adhered to during selection. Improved identification and selection methods and adherence to eligibility criteria, particularly for the major means-tested programs (Destitute Persons Program and Needy Student Package), would improve both coverage and targeting effectiveness of these programs. A better understanding of these issues would require further (field-based) study.

Another concern is that eligibility criteria for the Destitute Persons Program, which are applied for several other means-tested programs, have remained unchanged since the inception of the program in 1980. Yet PDLs have changed over time due to the changing social and economic conditions. This brings additional doubt as to whether such eligibility criteria are in practice strictly enforced, about four decades since their adoption, during the identification and selection processes. Therefore, in addition to devising robust identification and selection methods, and enforcing strict adherence to eligibility criteria, means-testing criteria should be revisited to factor-in the changed economic and social environments.

NOTES.

1. Overall unemployment was recorded at 17.7% in 2015/16, while unemployment among the youth aged 15-35 was registered at 25.2% during the same period (SB 2018). While income poverty progressively declined from 59% in 1985/86 to 16.3% in 2015/16 (BIDPA 1997; SB 2018), it has been found that, based on the $1/day poverty-line, Botswana is outperformed by comparator upper middle income economies of Brazil, Costa Rica, Malaysia, Mexico, Turkey, Uruguay and Venezuela (Uriksen 2012). It has also been revealed that Botswana has the third highest inequality in the world, after South Africa and Seychelles (World Bank 2015).

2. Alternative classification schemes have also been proposed. For example, Deveraux et al. (2017) identified six targeting mechanisms: (1) means-testing, (2) proxy means-testing, (3) categorical-targeting, (4) geographic targeting, (5) community-based targeting, and (6) self-selection targeting. We can combine means-testing and proxy means-testing into a single category of means-testing or poverty targeting (Legovini, 1999), and categorical targeting, geographic targeting and community-based targeting into a single category of categorical targeting (Lavallee, et al., 2010), which yields the three broader categories adopted in this paper.

3. The BMTHS data set has two categories of transfers related to scholarships and sponsorships: (1) Scholarships and (2) Student Allowance. It is unclear as to why this distinction was made because student allowances should apply for both Scholarship (offered for studies outside Botswana) and Sponsorships (offered for studies in Botswana). To ensure consistency with Statistics Botswana, the two categories were analysed separately.

4. Poverty Datum Lines (PDLs) in Botswana are constructed based on gender and age of household members and geographical location. Due to the variations in the age categories across categories of goods used in constructing PDLs, we used the food PDL, which accounts for the largest weight in total PDL. The food PDL identified seven geographical areas (Gaborone, Francistown, other towns, Rural Southeast, Rural Southwest, Rural Northeast and Rural Northwest) and 11 household member categories (adults male aged 20-64 years, adult female aged 20-64 years, male aged 65 and above, female aged 65 and above, male aged 15 to 19 years, female aged 15-19 years, children aged 10-14 years, children aged 7-9 years, children aged 4-6 years, children aged 1-3 years and children aged less than one year).

5. It is however noteworthy that these results for the RADP were unexpected given that the program targets remote areas dwellers, who are likely to be poorer than individuals residing elsewhere in the country. Therefore, the results need to be interpreted with care.

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