

# The Effectiveness of Backyard Gardening Initiative in Poverty Eradication: The Case of Beneficiaries in Ramotswa Village, Botswana

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## Abstract

This study evaluated the effectiveness of the backyard garden initiative in poverty eradication in Ramotswa village, Botswana. The specific objectives of the study were to (1) describe the demographic characteristics of the beneficiaries of backyard gardening initiative (2) estimate gross margins and profits generated in backyard gardens, and (3) measure poverty incidence among backyard garden beneficiaries. Forty (40) beneficiaries of the backyard gardening initiative were interviewed on one-on-one basis using a structured questionnaire. The findings of the study indicated that 32.5% of the beneficiaries did not go to school while 40% had attained primary education. Majority of beneficiaries were elderly women aged 50 years and above. It was found that only one-third of the backyard gardens recorded positive gross margins. None of the backyard gardens made profit. This result implied that the backyard gardens were not able to generate enough revenue to cover their operational and fixed costs of production. Based on the poverty datum line (PDL) criterion (BWP878.87 per month; equivalent to US\$80.26 per month), 48% of the beneficiaries of the backyard garden initiative in Ramotswa were not poor. These beneficiaries were not eligible for enrolment in this poverty eradication initiative. However, the backyard garden initiative reduced incidence of poverty among beneficiaries from 52 to 15% in the Ramotswa agricultural extension area. This was a success rate of about 71 percent. Policy implications derived from the findings of this study are that eligibility criteria for enrolment into poverty eradication programmes such as backyard gardening initiative need to be made leakage-proof to ensure that only the target group (poor people) receive the support. The backyard gardening initiative has potential to reduce poverty among its beneficiaries provided the projects are well-managed. The project operators need to be empowered through training and mentorship. It is essential that the beneficiaries receive adequate and timely agricultural extension services.

**Keywords:** poverty, backyard, gardening, programme effectiveness, gross margin, Botswana

## 1. Introduction

### 1.1 Overview of Botswana's Economy

Botswana has a population of 2,098,018 (Statistics Botswana, 2012). The country was classified as one of the ten poorest countries at the time of independence in 1966. Currently, Botswana is classified as a middle income country (World Bank 2011). The country experienced a somewhat rapid transformation from an economic structure heavily dependent upon agriculture to a mineral resource (mainly diamonds) dominated economy. The agricultural sector currently contributes around two percent of GDP as opposed to 40 percent of GDP at independence. On average, mining has contributed 40 percent to total GDP since the discovery of diamonds (Malema, 2012). Despite the grossly reduced contribution of agriculture to total GDP, a majority of Botswana, an estimated 69 per cent of the population live in the rural areas and earn their livelihood from agriculture. However, the incidence of poverty is highest in rural Botswana (Statistics Botswana, 2013; MoA 2014).

### 1.2 Poverty Incidence and Reduction Strategy in Botswana

Many countries have included poverty alleviation as an essential component of their sustainable growth and development programmes. For these countries, progress on poverty reduction has become a major measure of success of their development policy (Foster et al. 2013; Usman 2015). Botswana is no exception. The 2003 *National Strategy for Poverty Reduction* (NSPR) and the *Poverty Eradication Guidelines* 2014 are the key policy documents guiding intervention regarding poverty in Botswana. The main aim of the strategy was to provide people with opportunities to have a sustainable livelihood through the creation of permanent productive jobs or facilitating self-employment. The strategy sought to enhance access to social investment by the poor, with a view to promoting their capabilities to work and earn an income (Republic of Botswana, 2003; 2014).

National statistics on poverty in Botswana show a continual tendency for the incidence of poverty to decline. Reports indicate that poverty incidence declined from 59 to 47 percent in the period 1985-1994. It further fell to

30.6 percent in 2003 and 19.3 percent in 2010. (CSO 2008; Statistics Botswana 2013). These figures imply that Botswana was able to reduce national incidence of poverty by more than half within a period of less than two decades. Though this is a commendable achievement for a developing country, the current incidence of poverty in Botswana is still unacceptably high given the country's vision 2016 objective of zero poverty (which is now also a 2030 United Nations Sustainable Development Goal No.1). The incidence of poverty varies with region and gender of head of household. Some regions have high levels of poverty than others. Studies have also shown that poverty is more profound among female-headed than male-headed households in Botswana (Statistics Botswana 2013).

### 1.3 Backyard Gardening Initiative

The government of Botswana came up with an initiative of backyard gardening in 2010 under the National Strategy for Poverty Reduction (2003). Small scale horticulture development was to be pursued as one of the several programmes meant to achieve sustainable livelihoods for beneficiaries. The aims of the backyard garden initiative are to eradicate poverty, promote food security at household level and small scale entrepreneurship and income generation among its beneficiaries. The initiative comprises of backyard fruit and vegetable production. Beneficiaries are provided with start-up fixed and working capital (ranging between P11, 626 – P15,509) as a grant and are expected to produce fruits and vegetables in a sustainable manner for home consumption and sale (Republic of Botswana, 2014). The overall objective of this study was to evaluate the effectiveness of backyard gardening initiative on poverty eradication in the Ramotswa agricultural extension area. The specific objectives of the study were to describe the demographic characteristics of the beneficiaries of backyard gardening initiative in Ramotswa agricultural extension area, (2) estimate average monthly gross margin and profits of backyard gardens, and (3) measure the poverty headcount ratio among backyard garden beneficiaries in the study area.

### 1.4 Experience with Backyard Gardening

In countries such as Nigeria, Burkina Faso and Ghana, backyard gardens were able to produce food throughout the year and help to feed the community (New Agriculturist 2013). The backyard garden initiatives were also designed to provide people with disabilities and their families with vegetables and fruits to eat and sell throughout the year. They also provided beneficiaries with fodder for livestock and firewood. Through such small horticultural projects, people with disabilities were also able to contribute to inclusive training initiatives that help change mindset or attitudes by emphasizing their contribution to the social and economic life of their community. Furthermore, Talukder et al. (2009) emphasised that homestead production of fruits and vegetables provides the households with direct access to important nutrients that may not be readily available or within their economic reach. Therefore, backyard gardening would be a good means to improve household food security. It has been shown to be a source of additional income because households can sell a portion of the garden's produce. The additional income is generally utilised to purchase supplementary food items, which increases the diversification of the family's diet. However, the study noted that constraints such as the need for regular supply of quality seeds and other inputs, poor soils fertility, inadequate fencing and poor irrigation are some of the challenges facing backyard gardening (Talukder et al., 2009).

In Botswana, backyard garden projects continued to be established nationwide. However, these fruit and vegetable projects experienced slow uptake owing to frequent water shortage in certain areas as well as lack of commitment by beneficiaries who abandon the gardens during the ploughing season (BIDPA 2013). Assessment by IMF (2012) showed that the programmes have not had a major contribution towards poverty, as they were creating a culture of dependency on government handouts. This is because most of these programmes were not well targeted and were therefore subject to abuse and fraudulent use by those who were not meant to benefit from such programmes. However, BIDPA (2007) highlighted that both income and capability poverty in Botswana have been on the decrease even though not at a satisfactory rate that could make the country achieve the Vision 2016 goal of zero poverty.

### 1.5 Determination of Economic Viability of an Agricultural Enterprise

Whole farm gross margin or gross margin per unit area may be used as a measure of financial efficiency of a given crop activity. It takes into account the outputs and variable costs of the enterprise and produces a figure which can be compared with similar or alternative enterprises (Marumo et. al. 2012). Xaba and Masuku (2013) used gross margin per hectare as a proxy for profitability in their analysis of factors affecting productivity and profitability of vegetable production in Swaziland.

### 1.6 Concept and Measurement of Poverty

There are two main concepts of poverty, the “*income approach*” and the “*capability approach*.” The income approach views poverty as income (or consumption) deprivation. It identifies the poor on the basis of monetary income or consumption. It measures the degree of lowness of income or consumption in the society. Poverty, may also be viewed in terms of capability deprivation. This view encompasses not only material deprivation (measured by income or consumption) but also other forms of deprivations in life. For example, it also identifies the poor on the basis of deprivations such as lack of education, unemployment, ill health, vulnerability, powerlessness, social exclusion, and so on (UNDP-IPC and BIDPA, 2005). There are three most common indices used to measure poverty, which are usually referred to as the Foster-Greer-Thorbecke (FGT) class of poverty measures (Forster et al. 1984). The general expressions of such poverty indices is as shown below:

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left( \frac{Z - y_i}{Z} \right)^{\alpha} ; \alpha \geq 0$$

where

- $P_{\alpha}$  = average poverty in the given population.
- $n$  = total number of households in the population;
- $q$  = number of households below the poverty datum line;
- $Z$  = the poverty datum line (PDL);
- $y_i$  = total consumption expenditure of the  $i$ th household.

The  $\alpha$  accounts for the sensitivity of the index to inequality among the poor (intensity of poverty). So,  $\alpha = 0$  generates the Poverty Head Count Index (PHCI);  $\alpha = 1$  generates the Poverty Gap Index (PGI) and  $\alpha = 2$  generates the Severity of Poverty or Squared Poverty Gap Index (SPGI).

## 2. Research Methodology

The study was a cross-sectional survey research targeting all 40 beneficiaries of backyard gardening initiative in Ramotswa. A structured questionnaire was designed based on the review of related literature and objectives of the study. The questionnaire comprised of questions on demographic characteristics of the beneficiaries of backyard gardening initiative, attitude towards and participation in the poverty eradication programme, awareness of types of projects undertaken through poverty eradication programme, costs of production and returns, extent to which backyard gardening has met its stated objectives, problems / constraints encountered in the implementation of the backyard gardening initiative and possible areas of improvement of the backyard gardening initiatives. A one-on-one interview was conducted with all the 40 beneficiaries of backyard gardening in Ramotswa using the structured questionnaire. Content validity of the question was established through expert opinion from the Department of Agricultural Economics, Education and Extension at Botswana University of Agriculture and Natural Resources. The reliability of the questionnaire was established through a pilot test in Tlokweng village. The split-half method was used to determine reliability coefficient of the questionnaire. A reliability coefficient of 0.70 or greater indicated that the questionnaire was suitable for use. For this study a reliability coefficient of 0.87 was used.

Descriptive statistics were used to analyze the socio-economic characteristics of backyard garden beneficiaries in Ramotswa. A total gross margin analysis was conducted based on farm records, recall by beneficiary and researchers’ observations of each backyard garden to measure its financial efficiency. Enterprise Gross Margin was obtained as a difference between the enterprise’s gross income and total variable costs. This study employed the Foster-Greer-Thorbecke (FGT) class of poverty measures (Forster et al. 1984) to determine the incidence of poverty amongst backyard garden beneficiary households in the study area. Average monthly gross margin for each beneficiary was compared with current national poverty datum line (which was estimated at P878.87 per month; equivalent to US\$80.26 per month) in Botswana to determine its poverty status. A beneficiary whose average monthly gross margin was equal or less than the specified datum line was considered poor while those beneficiaries whose average monthly gross margin was greater than the specified datum line were considered nonpoor. The poverty headcount index was computed as

$$P_{\alpha} = \frac{1}{n} \sum_{i=1}^q \left( \frac{Z - y_i}{Z} \right)^{\alpha} ; \alpha = 0$$

where

- $P_r$  = poverty incidence among beneficiaries of the backyard gardening initiative in Ramotswa
- $n$  = total number of beneficiaries of the backyard gardening initiative in Ramotswa;
- $q$  = number of beneficiaries below the poverty datum line;
- $Z$  = the poverty datum line (PDL);
- $Y_i$  = average monthly gross margin of the  $i$ th beneficiary.

### 3. Results and Discussion

#### 3.1 Demographic characteristics of respondents

Table 1 shows that almost half of the beneficiaries were large size households. Literature has shown that such households are associated with poverty (Lanjouw and Ravallion, 2012); Gang (2004) and Mwabu et al. (2000) used regression analysis and identified size of household as one of the key determinants of poverty. It is argued that the absence of well-developed social security systems and low savings in developing countries (especially those in Africa) tends to increase fertility rates, particularly among the poor, in order for the parents to have some economic support from children when parents reach old age. This is one of the rationales for parents to increase the number of children so that they will have high probability of getting support when they are old. Also, as Schultz (1981) had indicated, high infant mortality rates among the poor tends to provoke excess replacement births or births to insure against high infant and child mortality, which will increase household size.

The findings of the Ramotswa study were that almost three quarters of the beneficiaries had primary or no formal education at all. This is in line with Plamer-Jones and Sen (2003) and Anyanwu (2012) who found out that rural households whose main earning member does not have formal education or has attended only up to primary school are more likely to be poor than households whose earning members have attended secondary school and beyond. Low levels of education are a challenge to beneficiaries because they have difficulties understanding recommended management practices to improve productivity and profitability of their backyard garden enterprises.

#### 3.2 Performance of the Backyard Garden Initiative

Table 2 Proportion of Beneficiaries by Grown Crop Grown in Ramotswa

Crop grown	Number of beneficiaries that grew the crop	Relative Frequency (%)
Maize	19	47.5
Tomato	13	32.5
Spinach	12	30.0
Green pepper	7	17.5
Rape	5	12.5
Cabbage	4	10.0
Onion	2	5.0

Source: Compiled by authors from survey data

Table 2 presents the proportion of backyard garden beneficiaries by type of crop grown in Ramotswa. Results showed that beneficiaries produced different kinds of vegetable crops namely; swiss chard (spinach), rape, green mealies, tomatoes, cabbage, green pepper and onions. Maize, followed by tomatoes and spinach were the main crops grown in the backyard gardens. The main crop was green mealies because the gardeners believed it was the most inexpensive and did not require plenty of water and intensive management like most vegetable crops.

Table 3 presents crops grown, total and average output from backyard gardens in Ramotswa. Results indicated that crop yields obtained from the gardens were generally very low. The average yield figures can be regarded as "conservative" yield which is obtained from a relatively poor crop. This level of yield is frequently not economical to produce unless particularly high product prices are realised. The gardeners attributed such low yields to shortage or lack of irrigation water. In some incidences, Water Utilities Corporation had disconnected the irrigation water supply due to high water bills which went unsettled for long periods of time. The gardeners also attributed crop failure due to poor soil conditions and high pests and disease infestation in the gardens. However, we believe attainment of such low crop yields may be largely attributed to the prominently low levels of education and lack of necessary skills to grow and manage horticultural crops efficiently. Nonetheless, better yields were obtained in the case of maize. Rouanet (1987) has reported that maize is a major traditional food

cereal for people in Botswana. It is not surprising that better yields were obtained from maize by beneficiaries since they have relatively more experience growing maize as staple crop.

### 3.3 Costs and Returns from Backyard Gardens

Table 4 shows estimated annual sales revenue of backyard gardens by type of crop grown in Ramotswa. The findings were that maize was the most income-generating crop in the backyard gardens, followed by spinach and tomato. Rape and onion were the least in terms of generated annual sales revenue. Table 5 depicts the estimated annual costs of production of the backyard gardens in Ramotswa. The main variable costs of production incurred in the backyard gardens were cost of seed and seedlings, fertilizer, pesticide, water, telephone and transport. The highest variable cost item was water which accounted for, on average, 71 percent of total variable costs of production in the backyard gardens. Other significant variable costs of production were fertilizer, transport and telephone expenses. The estimated annual fixed costs of production amounted to P2,000, which was a depreciation of durable assets and an imputed constant cost of operator's labour used in the backyard gardens.

### 3.4 Annual Gross Margins and Profits of Backyard Gardens

Table 6 presents annual sales revenue, variable and fixed costs of production, computed gross margins and profits for each backyard garden in Ramotswa. Results showed that only thirteen (13) of the forty (40) backyard gardens recorded positive gross margins. This meant that only about 33% of the projects were able to cover their variable costs of production. The remaining 27 projects (about 67%) failed to cover their annual operating costs. When annual fixed costs of production were taken into account, all the backyard gardens recorded negative profits. This result indicated that all the backyard gardens in Ramotswa were unprofitable and financially unsustainable.

### 3.5 Share of Backyard Garden Income in Total Income of Beneficiaries

Table 7 presents average monthly income of beneficiary by source. Results showed that beneficiaries had multiple sources of income other than backyard gardening including pastoral agriculture, non-farm businesses, off-farm employment, family remittances, and old age pension. Off-farm employment, family remittances, and old-age pension were the main three non-backyard garden income sources in that order. Results showed that the contribution of backyard garden income to total monthly income of the beneficiaries was far less than half, estimated at 31 percent on average. Given Botswana's poverty datum line of BWP 878.87 (Statistics Botswana, 2013), which is about US\$80.26 per month, none of the backyard gardeners in Ramotswa generated monthly income at or above that poverty line from horticultural produce. This result implied that if the beneficiaries in the sample were to rely only on backyard gardening as their source of income, they are most likely not going to graduate out of poverty.

### 3.6 Poverty Headcount Analysis

Table 8 Impact of Backyard Garden Intervention on Poverty Status of Beneficiaries

Variable	Number of Beneficiaries	Relative Frequency (%)
<b>Before BYG Intervention:</b>		
Beneficiaries above PDL before backyard garden intervention	19	48
Beneficiaries below PDL before backyard garden intervention	21	52
<b>After BYG Intervention:</b>		
Beneficiaries above PDL after backyard garden intervention	34	85
Beneficiaries below PDL after backyard garden intervention	6	15

Table 8 presents poverty headcount indices among beneficiaries in Ramotswa village before and after the government-funded backyard garden intervention. Based on Botswana's poverty datum line (PDL) of P878.87, only 52% of the beneficiaries were actually poor prior to their enrolment in the backyard garden programme. The remaining 48% of the beneficiaries already had monthly incomes above the PDL before enrolling in this poverty reduction intervention. These beneficiaries were, by this measure, not eligible for enrolment in this poverty reduction programme. Results showed that the backyard garden initiative reduced poverty incidence among its

beneficiaries from 52% when they enrolled in the programme to 15% at the time of this study. This decline in incidence of poverty among beneficiaries translated to a programme's success rate of 71 percent in Ramotswa village.

#### 4. Conclusion and Policy Implications

This study was undertaken to determine the effectiveness of the government-funded backyard garden initiative towards poverty eradication in Ramotswa agricultural extension area, Botswana. The study used survey data from forty (40) beneficiaries of the backyard gardening initiative who were interviewed on one-on-one basis using a structured questionnaire. Results from this study indicated that the majority of the beneficiaries of the backyard gardening initiative were females, with low educational attainment, aged 51 years old and above and had families with seven or more persons. Only one-third of the backyard gardens had positive gross margins (though very small). This means that majority of the projects were not able to generate enough revenue to cover (at least) their variable costs of production. However, none of the backyard gardens in this study made profit. Total revenue obtained from the backyard gardens per year was not able to cover their annual operational and fixed costs of production. This result implied that the backyard gardens were financially not self-sustaining. The continued operation of the projects was being subsidized from beneficiaries' alternative sources of income.

Based on the PDL criterion, almost half of the beneficiaries of the backyard garden initiative were not poor. These beneficiaries were not eligible for enrolment in this poverty eradication initiative. However, the backyard garden initiative reduced incidence of poverty among beneficiaries from 52 to 15% in the Ramotswa agricultural extension area. This was a success rate of about 71 percent. Policy implications derived from the findings of this study are that eligibility criteria for enrolment into poverty eradication programmes such as backyard gardening initiative need to be made leakage-proof to ensure that only the targeted group (poor people) receive the support. The backyard gardening initiative has potential to reduce poverty among its beneficiaries provided the projects are well-managed. The project operators need to be empowered through training and mentorship. Majority of the beneficiaries lacked business management skills and crop husbandry knowledge and skills to enable them operate sustainable horticultural projects. Provision of extension advisory services to these beneficiaries was inadequate and uncoordinated. It is essential that the beneficiaries receive coordinated, adequate and timely agricultural extension services.

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## Appendices

### Appendix 1

Table 1 Demographic Characteristics of Beneficiaries: Backyard Gardening Initiative s

Characteristic	Frequency	%
<i>Gender:</i>		
Female	32	80
Male	8	20
<i>Age:</i>		
21-30	2	5
31-40	2	5
41-50	3	7.5
51-60	8	40
61-70	17	42.5
More than 70	8	20
<i>Marital Status:</i>		
Single	15	37.5
Married	8	20
Divorced	5	12.5
Co-habiting	8	20
Widowed	4	10
<i>Household Size of Beneficiaries:</i>		
1 person	3	7.5
2 persons	6	15
3 persons	2	5
4 persons	3	7.5
5 persons	3	7.5
6 persons	4	10
7 persons and above	19	47.5
<i>Highest Education Attained:</i>		
None	13	32.5
Primary	16	40
Secondary (Junior)	6	15
Secondary (Senior)	5	12.5

*Source: Compiled by authors from survey data*



## Appendix 2

Table 3 Crops grown, Total and Average Output from Backyard Gardens in Ramotswa

Garden	Yield (Kilogrammes, KG)							Total	Average
	Spinach	Rape	Maize	Tomato	Cabbage	Pepper	Onion		
1	-	20	50	-	-	-	-	70	10
2	15	-	-	6	-	-	-	21	3
3	-	-	40	-	-	-	-	40	5
4	-	20	-	50	-	-	-	70	14
5	-	-	60	-	-	-	-	60	9
6	-	-	50	-	-	-	-	50	7
7	-	-	70	-	-	-	-	70	10
8	96	-	-	-	-	-	-	100	14
9	-	-	45	-	-	-	-	50	6
10	42	-	-	20	-	5	-	70	9
11	-	-	70	-	-	-	-	70	10
12	-	-	50	-	-	-	-	50	7
13	-	-	-	-	-	-	-	-	-
14	-	-	-	152	-	-	-	152	22
15	15	-	-	50	-	-	-	200	29
16	-	-	70	0	-	-	-	70	10
17	143	-	-	25	-	25	-	190	28
18	10	-	-	0	20	35	-	70	9
19	50	-	-	20	-	-	-	70	10
20	20	13	-	25	-	-	-	60	8

Table 3 Continued.

Garden	Yield (Kilogrammes, KG)							Total	Average
	Spinach	Rape	Maize	Tomato	Cabbage	Pepper	Onion		
21	-	-	-	-	60	15	-	80	10
22	-	-	-	-	25	5	25	60	9
23	-	-	-	30	15	-	55	100	14
24	30	-	-	25	-	-	-	60	9
25	-	30	-	-	-	-	-	30	4
26	-	-	50	-	-	-	-	50	7
27	-	-	50	-	-	-	-	50	7
28	-	-	70	-	-	-	-	70	10
29	20	30	-	-	-	-	-	50	7
30	-	-	-	-	-	-	-	-	-
31	-	-	20	-	-	-	-	20	3
32	-	-	50	-	-	-	-	50	7
33	-	-	-	25	-	25	-	50	7
34	-	-	50	-	-	-	-	50	7
35	-	-	60	-	-	-	-	60	9
36	-	-	60	-	-	-	-	60	9
37	-	-	55	-	-	-	-	60	8
38	-	-	-	15	-	20	25	50	9
39	25	-	-	20	-	-	-	50	9
40	15	-	50	-	-	-	-	70	9
Total	620	110	1020	460	120	130	110	2550	370
Average	20	3	30	10	3	3	3	60	10

Source: Compiled by authors from survey data

### Appendix 3

Table 4 Estimated Annual Sales Revenue of Backyard Gardens in Ramotswa

Garden	Sales Revenue by Crop Grown by Beneficiary (BWP)							Total Revenue (BWP)
	Spinach	Rape	Maize	Tomato	Cabbage	Greenpepper	Onion	
1	-	115	600	-	-	-	-	715
2	75	-	-	120	-	-	-	195
3	-	-	435	-	-	-	-	435
4	-	60	-	145	-	-	-	205
5	-	-	650	-	-	-	-	650
6	-	-	545	-	-	-	-	545
7	-	-	760	-	-	-	-	760
8	365	-	-	-	-	-	-	365
9	-	-	490	-	-	-	-	490
10	195	-	-	40	-	75	-	310
11	-	-	760	-	-	-	-	760
12	-	-	540	-	-	-	-	540
14	-	-	-	330	-	-	-	330
15	575	-	-	100	-	-	-	675
16	-	-	600	-	-	-	-	600
17	550	-	-	50	-	50	-	650
18	180	-	-	-	30	70	-	280
19	555	-	-	160	-	-	-	715
20	205	55	-	50	-	-	-	310
21	-	-	-	-	225	30	-	255
22	-	-	-	-	280	100	25	405
23	-	-	-	60	175	-	55	290
24	30	-	-	60	-	-	-	90
25	0	130	0	0	-	-	-	130
26	-	-	380	-	-	-	-	380
27	-	-	505	-	-	-	-	505
28	-	-	760	-	-	-	-	760
29	55	15	-	-	-	-	-	70
31	-	-	220	-	-	-	-	220
32	-	-	540	-	-	-	-	540
33	-	-	-	60	-	50	-	110
34	-	-	540	-	-	-	-	540
35	-	-	640	-	-	-	-	640

Garden	Sales Revenue by Crop Grown by Beneficiary (BWP)							Total Revenue (BWP)
	Spinach	Rape	Maize	Tomato	Cabbage	Greenpepper	Onion	
36	-	-	650	-	-	-	-	650
37	-	-	595	-	-	-	-	595
38	-	-	-	170	-	40	40	250
39	110	-	-	40	-	-	-	150
40	60	-	540	-	-	-	-	600

#### Appendix 4

Table 5 Recorded Costs of Production of Beneficiary Backyard Gardens at Ramotswa

Garden	Variable Costs						Fixed Costs
	Seeds/Seedling	Fertilizer	Pesticide	Water	Telephone	Transport	Labour & Depreciation
1	50	-	-	990	37.5	-	2,000
2	60	50	20	500	-	-	2,000
3	10	-	-	150	-	-	2,000
4	150	-	-	3,300	100	35	2,000
5	-	-	-	500	-	35	2,000
6	-	60	-	560	-	60	2,000
7	-	100	-	450	-	70	2,000
8	100	-	-	2,450	-	35	2,000
9	10	-	-	450	100	35	2,000
10	-	150	-	3,600	300	66	2,000
11	10	-	-	-	300	52.5	2,000
12	10	-	-	-	150	42	2,000
14	-	60	-	350	-	-	2,000
15	20	-	100	400	100	150	2,000
16	-	-	-	-	300	37.5	2,000
17	-	150	100	750	75	49	2,000
18	25	100	75	990	-	150	2,000
19	15	70	-	700	100	200	2,000
20	60	-	100	700	200	150	2,000
21	75	50	50	750	-	-	2,000
22	100	-	-	1,000	50	100	2,000
23	100	150	-	750	-	-	2,000
24	55	100	-	450	-	-	2,000
25	40	50	-	900	100	200	2,000
26	10	-	-	200	200	150	2,000
27	10	500	-	300	-	-	2,000
28	10	-	-	350	-	-	2,000
29	70	-	120	600	-	-	2,000
31	10	-	-	300	-	-	2,000
32	10	50	-	300	-	-	2,000
33	50	100	60	500	-	-	2,000
34	10	-	-	250	-	17.5	2,000
35	10	-	-	200	30	-	2,000
36	10	-	-	300	-	17.5	2,000

Table 5 Continued.

Garden	Variable Costs						Fixed Costs
	Seeds/Seedling	Fertilizer	Pesticide	Water	Telephone	Transport	Labour & Depreciation
37	10	-	-	250	-	17.5	2,000
38	75	-	120	600	-	-	2,000
39	40	100	-	500	-	17.5	2,000
40	30	500	-	300	-	-	2,000

Source: Compiled by authors from survey data

### Appendix 5

Table 6 Estimated Annual Gross Margins and Profits (Botswana Pula) for Backyard Gardens

Backyard Garden	Sales Revenue (BWP)	Variable Costs (BWP)	Gross Margin (BWP)	Fixed Costs (BWP)	Profit (BWP)
1	715	1,078	-363	2,000	-2,363
2	195	630	-435	2,000	-2,435
3	435	160	275	2,000	-1,725
4	205	3,585	-3,380	2,000	-5,380
5	650	535	115	2,000	-1,885
6	545	680	-135	2,000	-2,135
7	760	620	140	2,000	-1,860
8	365	2,585	-2,220	2,000	-4,220
9	490	595	-105	2,000	-2,105
10	310	4,116	-3,806	2,000	-5,806
11	760	363	397	2,000	-1,603
12	540	202	338	2,000	-1,662
14	330	410	-80	2,000	-2,080
15	675	770	-95	2,000	-2,095
16	600	338	262	2,000	-1,738
17	650	1,124	-474	2,000	-2,474
18	280	1,340	-1,060	2,000	-3,060
19	715	1,085	-370	2,000	-2,370
20	310	1,210	-900	2,000	-2,900
21	255	925	-670	2,000	-2,670
22	405	1,250	-845	2,000	-2,845
23	290	1,000	-710	2,000	-2,710

Table 6 Continued.

Backyard Garden	Sales Revenue (BWP)	Variable Costs (BWP)	Gross Margin (BWP)	Fixed Costs (BWP)	Profit (BWP)
24	90	605	-515	2,000	-2,515
25	130	1,290	-1.160	2,000	-3,160
26	380	560	-180	2,000	-2,180
27	505	810	-305	2,000	-2,305
28	760	360	400	2,000	-1,600
29	70	790	-720	2,000	-2,720
31	220	310	-90	2,000	-2,090
32	540	360	180	2,000	-1,820
33	110	710	-600	2,000	-2,600
34	540	278	262	2,000	-1,738
35	640	240	400	2,000	-1,600
36	650	328	322	2,000	-1,678
37	595	278	317	2,000	-1,683
38	250	795	-545	2,000	-2,545
39	150	658	-508	2,000	-2,508
40	600	830	-230	2,000	-2,230
Total	16,715	33,803	-17,088	80,000	-97,088
Average	418	845	-427	2.000	-2,427

*Source: Compiled by authors from survey data*

**Appendix 6**

Table 7 Proportion of Backyard Garden Income to Total Income of Beneficiaries

Average Monthly Income of Beneficiary by Source (BWP)								Proportion of Garden Revenue to Total Income (%)
Ben.	Backyard Garden Income (BWP)	Pastoral Agric. Income (BWP)	Non-Agric. Business Income (BWP)	Off-Farm Employment Income (BWP)	Family Remittance Income (BWP)	Old Age Pension (BWP)	Total Income (BWP)	
1	715	-	-	-	700	250	1,665	42.9
2	195	-	-	800	-	-	995	19.6
3	435	-	-	300	500	-	1,235	35.2
4	205	-	-	-	1,000	-	1,205	17.0
5	650	350	-	-	1,200	-	2,200	29.5
6	545	250	-	700	-	-	1,495	36.5
7	760	50	-	-	800	250	1,860	40.9
8	365	100	-	500	-	250	1,215	30.0
9	490	200	-	-	-	250	940	52.1
10	310	400	-	-	-	250	960	32.3
11	760	-	-	-	700	250	1,710	44.4
12	540	-	-	500	-	250	1,290	41.9
13	5	-	500	-	-	250	755	0.7
14	330	-	800	-	-	-	1,130	29.2
15	675	300	-	1,000	-	-	1,975	34.2
16	600	-	-	300	500	250	1,650	36.4
17	650	200	-	-	500	-	1,350	48.1
18	280	-	-	1,000	-	-	1,280	21.9
19	715	250	-	1,000	-	-	1,965	36.4
20	310	200	500	-	-	-	1,010	30.7
21	255	-	-	700	400	-	1,355	18.8
22	405	-	-	300	1,000	-	1,705	23.8
23	290	-	-	500	-	-	790	36.7
24	90	30	-	500	950	-	1,570	5.7
25	130	-	-	-	-	250	380	34.2
26	380	-	-	700	-	-	1,080	35.2
27	505	-	-	600	-	-	1,105	45.7
28	760	-	-	700	-	-	1,460	52.1
29	70	-	-	1,000	-	-	1,070	6.5
30	0	-	-	-	200	250	450	0.0
31	220	-	-	500	-	250	970	22.7

Table 7 Continued.

Average Monthly Income of Beneficiary by Source (BWP)								
Ben.	Backyard Garden Income (BWP)	Pastoral Agric. Income (BWP)	Non- Agric. Business Income (BWP)	Off-Farm Employment Income (BWP)	Family Remittance Income (BWP)	Old Age Pension (BWP)	Total Income (BWP)	Proportion of Garden Revenue to Total Income (%)
32	540	-	-	500	-	-	1,040	51.9
33	110	-	-	-	450	250	810	13.6
34	540	450	-	500	-	-	1,490	36.2
35	640	-	-	1,200	-	-	1,840	34.8
36	650	-	-	1,000	-	-	1,650	39.4
37	595	-	-	700	350	250	1,895	31.4
38	250	200	-	-	400	-	850	29.4
39	150	-	400	-	600	-	1,150	13.0
40	600	-	-	450	-	250	1,300	46.2
Total	16,715	2,980	2,200	15,950	10,250	3,750	51,845	

*Source: Compiled by authors from survey data*