Original Research Article

Poverty Status among Irrigators and Homestead Gardeners in Eastern Cape Province of South Africa

Abstract

The is study analyzed the poverty status and determinants among farmers in Eastern Cape Province of South Africa. Primary data was were collected with the aid of well-structured questionnaire and a total of 267 respondents were chosen through a multistage random sampling technique. The data collected were analyzed using descriptive statics, Foster-Greer-Thorbecke (FGT) technique, logit regression model, and correlation matrix. The headcount index of the pooled data indicated that 49 percent of the respondents in the study area is were poor with poverty severity and poverty gap indices of 0.15 and 0.25 respectively. The depth of poverty was higher and severe in Tyhefu among the female homestead gardeners and farmers with less than 2ha of farmland. The result of logit regression revealed the years spent in school, household size, size of cultivated farmland, extension services, and being a member of an association have a significant influence on the likelihood of being poor. The study, therefore, recommends institutions in charge of credit facilities, education, and extension services are to be strengthened to give farmers sustainable well-being.

Keywords: Poverty indices, logit regression, correlation matrix

Introduction

The poverty rate in South Africa is unprecedented and so is the level of income inequality (Klasen, 1998; UNDP, 2007). According to SSA (2014), the estimated Gini coefficient for South Africa in 2011 stood at 0.69, showing a persistent decline in welfare. Such an outcome is consistent with the reality that, among the Medium Human Development countries in which South Africa is grouped by the UNDP, the HDI assessment for 2014 is 0.66 but, when the value was discounted for inequality in the distribution of the HDI dimension indices, the HDI fell to 0.428 (UNDP, 2015). The estimated youth unemployment rate in March 2011 as reported by MEC for Social Development in the Province was 41.4 percent above the national figure of 35 percent (Majodina, 2011). The adult unemployment rate was also estimated at 18.4 percent (Majodina, 2011).

Going by the natural events in current years, South Africa witnessed the most devastating drought in more than a century thus, cutting down farm jobs and increasing the cost of producing food (Vollgraaff *et al.*, 2016). The scientific community is confident such an occurrence is a consequence of climate change. Not clear? The magnitude of the predicted changes is unclear, but emerging facts agreed on the direction of changes and recognized that climate change will persist (Compass Resource Management, 2007). This occurrence has further compounded the rising food prices in addition to global situations to make the welfare situation worse in the urban and rural areas alike and as a result, incessant mass protests have become rampant. Without question, the recent fees must fall protests are linked to deteriorating welfare indices affecting the entire households of the protesting students.

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These unfavourable conditions according to Moyo (2010) are consequences of inefficient land reforms and controlled access to farming resources. In 2007, Obi reported that restricted access to the area of land South Africa black farmers could access hindered their ability to actively compete in the agricultural market. This situation has spurred major political and economic discourse sought after the distribution of assets and other forms of wealth. The Freedom Charter of the ANC and the struggle of the black population revolved around land and how race should not determine the size of landholding (Seeking and Nattrass, 2005). In line with these fundamental, government since the inception of democratic rule in 1994 has undertaken several actions, including comprehensive land reform. Alongside the land redistribution programme are complementary programmes for economic empowerment through credit assistance, subsidization of farm infrastructure development, and other forms of support included under various schemes such as Comprehensive Agricultural Support Programme (CASP), Micro Agricultural Financial Institutional Scheme of South Africa (MAFISA), to mention a few (OECD, 2011).

The growing level of poverty especially among the rural farming households despite the different reforms affirms a missing link that probably arose from insufficient information to build a pragmatic approach to mitigate poverty. Therefore, an informed decision is relevant to gain a better understanding of the poverty dimensions among different farmers and their respective capacities to chart appropriate programmes to alleviate poverty.

The policies adopted to expedite actions on farmers' skill acquisition and thereafter welfare improvements rely on what is known and how they relate theoretically, and the position government has taken is probably informed by what they know. The government would probably have done more by adopting a much more different approach, hence the need for the study. The primary attention of this study is on irrigators (farmers who apply water to cultivate their farms year-round to boost production) and homestead gardeners.

Methodology

Sampling Procedure

A multistage stratified sampling technique was used to select a total of 267 farmers cultivating maize and cabbage under the small-scale irrigation scheme and homestead gardening in the Eastern Cape Province of South Africa. The first stage was the purposive selection of Qamata and Tyhefu irrigation schemes as the Primary Sampling Units. These two schemes were selected based on their attributes (e.g. functional status and accessibility) from a sample frame of irrigation schemes (Qamata, Bilatye, Ncora, Keiskam Ahoek, Tsitsa Basin, Ntshon Gweni, Ntshon Gweni, Pendu, and Tyhefu) established across the Eastern Cape Province of South Africa. The second stage involved the listing of the maize and cabbage farming households and the sample frame from each of the area (Qamata and Tyhefu) stratified into irrigators and homestead gardeners following the principle of Probability Proportional to size (PPS). In Qamata, irrigators and homestead gardeners represent 69 percent and 31 percent of the sample frame while they take 64 percent and 36 percent in Tyhefu respectively. Considering the predetermined proportions, sample sizes of households within each stratum were obtained through simple random technique and the household heads were then administered the questionnaire.

Data

Primary data was used for this study and relevant information collected using structured questionnaires. Such information includes farmer's socio-economic characteristics such as age,

household size, number of years spent in school, marital status, frequency of extension contacts, membership of an association, farm size, income, information on inputs, output, and marketing. The questionnaire was pretested on a sample of farmers in Melani village. Though the questionnaire was written in English, it was administered in Xhosa local language for easy understanding and feedback.

Method of Data Analysis

The Foster-Greer-Thorbecke was adopted to assess the dimension of poverty in the study area. Equally, factors influencing the poverty level of irrigators, homestead gardeners as well as the pooled data was assessed using a logit regression model to understand the relationship between poverty and some selected socioeconomic characteristics. Furthermore, a correlation matrix was equally estimated for irrigators, homestead gardeners as well as the pooled data to affirm the determinants of poverty among respondents in the Eastern Cape Province of South Africa.

FGT Assessment of Poverty

The poverty model proposed by Foster-Greer-Thorbecke (FGT) (1984) was used to determine the poverty status of the household head in the study area. The model is presented as follows

$$P_{\alpha} = \frac{1}{n}\sum_{i=1}^{q}\left[\left(\frac{g}{Z}\right)^{\alpha} I(Y_i < Z)\right] \quad \text{.....(1)}$$

Where P_{α} = Poverty parameter, α = Degree of poverty aversion, n = Total number households, q = Number of poor households, $g = Z - Y_i$ = Per capita income deficit (Rand), Z = Poverty line, and $I(Y_i < Z) = \begin{cases} 1 \text{ if } Y_i < Z \\ 0 \text{ if } Y_i > Z \end{cases}$ = Indicator function.

According to Sanusi *et al.* (2013), if $\alpha = 0$, P_{α} = Poverty incidence (Headcount), it represents the proportion of households below the poverty line. If $\alpha = 1$, P_{α} = Poverty gap (Poverty depth), it represents the proportion of the poverty line required for a poor household to become non-poor; and if $\alpha = 2$, P_{α} = Poverty severity (Squared poverty gap), it represents the extent of severity of a poor household. The closer it is from 1, the harder it is for the household to become non-poor.

Estimation of the Poverty Line

Expenditure and income data are critical indicators when evaluating human well-being (Woolard and Leibbrandt, 1999). Ravallion (1992) and Meyer and Sullivan (2003) observed many developing countries prefer to adopt expenditure data rather than income data as an indicator of well-being because they are of the view that many households cut back on their actual income. However, Covarrubias *et al.* (2009) argued that income data carefully collected allow an in-depth assessment of inequality as well as income designs. In line with the foregoing, and for this study, the income of household heads was chosen and collected to assess the well-being of respondents because it emerged to be more reliable and easier to collect.

Therefore, the mean per capita income of household heads was computed by dividing the aggregate per capita income of household heads by the number of household heads surveyed to get the mean per capita income of household heads. The mean per capita income was computed for irrigators, homestead gardeners as well as for the pooled data. Furthermore, in line with FGT (1984) approach, two-third of the mean per capita income of the household heads were taken and fixed as a poverty line. This was done for irrigators, homestead gardeners, and the pooled data. Any household head whose two-third mean per capita income value fell below the fixed values in any of the categories is considered poor.

In order to identify the determinants of poverty status of farm household sampled for this study, a logit regression model was estimated. Logit regression has been defined as the amount of change in the value of one variable associated with a unit change in the value of another and this helps to determine the effect of changes in the explanatory variables on the dependent variable. The logit model is used whenever the dependent variable is binary (also called dummy), taking values 0 or 1. Logit regression is a non-linear regression model that forces the output (predicted values) to be either 0 or 1. Logit model estimates the probability of your dependent variable to be 1 (Y=1), probability event happening or otherwise.

Following Adekoya (2014), the logistic (logit) probability function is specified as:

$$P_i = \frac{1}{1+e^{-z_i}} = f(Z_i) \quad \text{.....(2)}$$

where: P_i = Probability a household *i* (i=1, 2, …n) will be poor, and Index Z_i = Random variable predicting the probability of a household being poor or non-poor. The probability P_i in equation 2 is further transformed to give equation 3.

$$P_i = \frac{e^{z_i}}{1+e^{z_i}} \quad \text{.....(3)}$$

Hence, the ith observation of a household is stated as:

$$Z_i = \frac{\ln P_i}{1-P_i} = \beta_0 + \sum \beta_0 X \quad \text{.....(4)}$$

Therefore, $\ln(P/1-P) = 1$ if the household is poor while $\ln(P/1-P) = 0$ if otherwise i.e. non-poor. Drawing from the foregoing, the estimated empirical model is stated as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_{41} X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon \quad \text{.....(5)}$$

where: Y = Poverty status of household, X_1 = Age of the respondents, X_2 = Years spent in schooling, X_3 = Household size of respondents, X_4 = Size of farmland cultivated, X_5 = Extension services, X_6 = Association membership, ε_i = error term, β_0 = Constant, and β_i = Coefficients of regression.

Furthermore, a correlation matrix was estimated to affirm the determinants of the poverty level of the respondents and the functional form is stated as follow:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + e_i \quad \text{.....(6)}$$

where: Dependent variable Y = Per capita income, X_1 = Gender of the respondents, X_2 = Household size of the respondents, X_3 = Age of the respondents, X_4 = Size of farmland cultivated, X_5 = Year spent in schooling, X_6 = Marital status of the respondents, e_i = error term, α = Constant, and β_i = Coefficients of regression.

Results and Discussion

Outcome and Determinants of Poverty

This section presenteds the outcome of poverty analysis. In addition, the determinants of poverty among farmers were also presented. The summary of the descriptive statistics of the respondents in the study is presented in Table 1.

Table 1: Variables in the model across irrigation schemes (pooled dataset)

Variables	Unit	Pooled (267)	Qamata (182)	Tyhefu (86)	Diff. test
Age[a]	Years	61 (12.60)	62 (12.56)	58 (12.26)	-2.65***
Education[a]	Years	5 (4.48)	6 (4.67)	5 (3.98)	-1.94*
Household size[a]	Number	5 (2.43)	4 (2.13)	5 (2.94)	2.15**
Farm cultivated[a]	Hectares	1.07 (0.97)	1 (1.11)	1 (0.52)	-1.95*
Gender[b]	Dummy	176 (66)	134 (76)	42 (24)	-4.01***
Marital Status	Dummy	195 (73)	132 (68)	63 (32)	0.13
Association[b]	Dummy	163 (61)	147 (90)	16 (10)	-9.73***
Extension[b]	Dummy	164 (61)	128 (78)	36 (22)	-4.46***
Irrigators[b]	Dummy	181 (68)	126 (70)	55 (30)	-0.86
Per-capita income[a]	Rand	2300.36 (2085.6)	2613.13 (2260.4)	1638.47 (1459.4)	-3.65***

Source: Field survey, 2015

Note: *Values in brackets are standard deviation and percentage for continuous and discrete variables, respectively. And, a and b represent continuous and discrete variables respectively while T-test and Z-test were used as difference test for continuous and discrete variables, respectively.*

The mean age of respondents in Qamata and Tyhefu was 62 years and 58 years with the standard deviation of 12.56 and 12.56, respectively. In the pooled data, the mean age was 61 years with a standard deviation of 12.60. The standard deviation value showeds that the majority of the age value in this sample are clustering within 12.60 around the mean. This revealeds that respondents were somewhat old in the pooled data but significantly older in Qamata relative to Tyhefu. The finding was contrary to several studies on maize and vegetable production, such as those of Fakayode *et al.* (2004); Onojah *et al.* (2013); Onuk *et al.* (2010) and Tchale and Sauer (2007) who found out that average maize farmers were middle-aged. The reason for the dominance of older respondents may might have been be associated with the migration of the youth to urban areas in search of wage jobs for better security.

Male gender representation in Qamata and Tyhefu was 76 percent and 24 percent, respectively. In the pooled data, male representation was 66 percent. This result shows a farming system that is male-dominated. Having more men may have a direct influence on the resource control pattern as it is believed that male farmers get preferential treatment over the female.

In Qamata, 68 percent of the respondents were married while 32 percent were married in Tyhefu. The pooled data revealed that 73 percent of the respondents in the study area were married. This result suggesteds that majority of the respondents are likely to enjoy on-farm assistance from their spouse, all things being equal.

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Moreover, 90 percent of respondents in Qamata and 10 percent of the respondents in Tyhefu were are members of one association or the other. In the pooled data, it was observed that 61 percent of the respondents belonged to one association or the other. The number of years respondents spent in school in Qamata and Tyhefu was 6 years and 5 years with the standard deviation of 4.67 and 3.9, respectively. The pooled data revealed 5 years as the number of years respondents spent in school with a standard deviation of 4.48. The standard deviation value shows that the majority of the educated respondents in this sample have their educational status clustering within 4.48 years around the mean. Although the dispersion of the level of education of the respondents around their mean value was high, it can be said that farmers had, on average, a primary level of education in both the pooled data. This implieds that an average respondent in the study area had a primary level education which can enable reading, writing, interpreting instructions relating to the use of machinery and farm inputs, and take advantage of extension services. This statement may be considered valid in line with Koshy in Bembridge (2000) who reported 4 years of education as a standard level of education and that otherwise, is unlikely to have acquired any functional literacy.

The average household size of respondents in Qamata and Tyhefu was 4 and 5 members with a deviation of about 2 and 3 members, respectively. The pooled data showed an average household size of 5 members with a standard deviation of 2. The standard deviation value shows that the majority of the household size in this sample have their house size clustering within 2 around the mean. This implies that the household size of the farmers going by the pooled data and across the irrigation schemes was small compared to studies of Fakayode *et al.* (2004), Ohajianya *et al.* (2010) and Ahmed *et al.* (2013).

The average farm size cultivated in Qamata and Tyhefu is 1 ha with a standard deviation of 1.11 and 0.52, respectively. The average size of farm cultivated going by the pooled data was 1.07 ha with a standard deviation of 0.97. The standard deviation value shows that the majority of the cultivated farm size in the sample have their size clustering within 0.97 hec around the mean. This means that the respondents in the study area are smallholder farmers. This result implies that respondents may not be able to scale-up production quantity that can unshackle them from poverty.

It was also discovered that 70 percent and 30 percent of the farmers grow their crops under the irrigation scheme in Qamata and Tyhefu, respectively. Also, 68 percent of the farmers in the pooled data practiced more of an irrigated system of farming. The implication of this result is that majority of the respondents in the study area have access to plots under the irrigation scheme programme which allows them to cultivate crops all year round and subsequently avail them large quantity and profit to break them away from poverty.

Assessing the Poverty Level of The Respondents

The result in Table 2 presents the poverty profile analysis of respondents in the study area using a poverty line of R1537.41.

Table 2: Poverty profile analysis of respondents

Variables	Headcount (P_0)	Poverty gap (P_1)	Poverty Severity (P_2)
Pooled	0.49 (0.03)	0.25 (0.02)	0.15 (0.02)
T-value	15.81***	12.67***	10.12***
Gender			
Male	0.45 (0.04)	0.2 (0.02)	0.11 (0.02)

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Female	0.56 (0.05)	0.34 (0.04)	0.24 (0.03)
Difference	-0.12 (0.06)	-0.14 (0.04)	-0.13 (0.03)
T-value	-1.82*	-3.20***	-3.83***
Irrigation Scheme			
Qamata	0.39 (0.04)	0.16 (0.02)	0.08 (0.01)
Tyhefu	0.65 (0.05)	0.4 (0.04)	0.28 (0.03)
Difference	-0.26 (0.06)	-0.24 (0.04)	-0.2 (0.04)
T-value	-4.11***	-5.61***	-5.53***
Irrigator and Homestead gardener			
Irrigators	0.45 (0.04)	0.22 (0.02)	0.14 (0.02)
Homestead	0.56 (0.05)	0.3 (0.03)	0.18 (0.03)
Difference	-0.12 (0.07)	-0.08 (0.04)	-0.04 (0.03)
T-value	-1.76*	-1.86*	-1.26
Land classes			
<2 ha	0.55 (0.04)	0.3 (0.03)	0.2 (0.02)
>=2 ha	0.38 (0.05)	0.15 (0.02)	0.07 (0.02)
Difference	-0.17 (0.06)	0.16 (0.04)	-0.13 (0.03)
T-value	-0.04	4.35***	-4.93***

****P<0.01 * P<0.1. Values in brackets are standard errors.*
Poverty line = 2/3 (Per capita income) =1537.41*

The headcount (poverty incidence) index of the pooled data was 0.49, which implies that 49 percent of the respondents in the study area were poor. The poverty gap index was 0.25, which implies that farmers in the study area would need about R614.96 to be librated of poverty. Poverty severity index was 0.15; it could be interpreted as the depth of poverty after accounting for inequality among the poor. The finding is close to the study of Baiyegunhi and Fraser (2014) who found that 44 percent of smallholder farmers were poor in the Eastern Cape Province.

The gender headcount analysis of male and female respondents in the study area was 0.45 and 0.56 respectively. Moreover, the headcount differential of -0.12 was significant at 10 percent level of probability between the male and female respondents. This shows that poverty was prevalent among female farmers in the study area. The poverty gap among the male and female farmers was 0.2 and 0.34 with a significant difference of 0.14. The finding implies that the average poor female respondent was poorer than the average poor male farmer in the study area. In other words, female and male respondents would need on the average, R522.72 and R307.48 respectively to be out of poverty.

The poverty severity among the male and female respondents was 0.11 and 0.24; this implies that the depth of poverty was higher among the female farmers than their male counterparts even after accounting for the inequality among the poor.

The headcount from the area/location of the scheme was 0.39 and 0.16 for Qamata and Tyefu respectively. The headcount differential of 0.26 was significant at 1 percent level of probability. This result indicates that poverty was more prevalent in Tyhefu than in Qamata.

The poverty gap in Qamata and Tyhefu was 0.16 and 0.4 respectively; this implies that the depth of poverty was higher in Tyhefu than in Qamata. In other words, respondents in Qamata and Tyhefu would need an average of R246 and R614.96 respectively to be unshackled from the chain of poverty. The poverty severity index in Qamata and Tyhefu index was 0.08 and 0.28

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respectively. This index informs that the depth of poverty was higher in Tyhefu than in Qamata after accounting for inequality among the poor.

The result of the analysis across irrigation/non-irrigation scheme members shows that the poverty incidence among the irrigators and homestead farmers was 0.45 and 0.56 respectively. This outcome reveals that poverty was prevalent among the homestead gardeners if the significant difference in their headcount is anything to go by. The poverty gap among the irrigators and homestead gardeners was 0.22 and 0.3 respectively. This is an indication that the depth of poverty among the homestead gardeners was higher than the irrigators. In other words, irrigators and homestead gardeners would need on the average, R338.23 and R461.22 respectively to mitigate the effect of poverty. The poverty severity was 0.14 and 0.18 among the irrigators and the homestead gardeners; this implies that the depth of poverty was still higher among the homestead gardeners than the irrigators even after accounting for inequality.

The result of the analysis across land classes shows that the headcount among farmers with less than 2ha and more than 2ha was 0.55 and 0.38 respectively. These values suggest that farmers with less than 2 ha of land were poorer than those with more than 2ha of land. The poverty gap was 0.3 and 0.15, and this means that the depth of poverty was higher among the farmers with less than 2ha than respondents with more than 2ha of farmland. Precisely, farmers with less than 2ha of land would need an average of R461.22 to reduce the effect of poverty while those with more than 2ha of land would need R230.612 to do the same.

Determination of factors influencing Poverty Level (correlates) of respondents (irrigators)

The result of the analysis on factors influencing poverty status among irrigators is presented in Table 3.

Table 3: Logit Regression Analysis Estimates (Irrigators).

	Coefficient	Standard Error	Z	P>[z]
Constant	-.172	1.488	-0.12	0.908
Age	.015	.021	0.75	0.454
Years spent in schooling	-.134	.059	-2.28	0.023**
Household Size	-.673	.142	-4.73	0.000**
Cultivated Farm Size	1.331	.257	5.18	0.000**
Extension services	1.296	.448	2.89	0.004**
Member of association	1.748	.547	3.20	0.001**
Wald $Chi^2(6)$ =	48.49			
Prob>Chi^2 =	0.000			
Pseudo R^2 =	0.363			
Likelihood ratio =	-77.600			

Source: Field survey, 2015

**5% probability level.

The likelihood ratio value of 77.600 indicates that some of the coefficients of the explanatory variables are statistically different from zero. The chi-square value also shows that the model performed well. Education, household size, farm size, extension services, and membership of an association of the respondents have a significant influence on the log likelihood of being poor. Only age appears to be insignificant to the log likelihood of being poor going by the z-statistics.

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While education and the household size of the respondents reduce the log likelihood of being poor, size of cultivated farmland, extension services, and membership of association increases the log likelihood of being poor among irrigation farmers. Also, the findings revealed that an increase in years of formal education reduced the likelihood of being poor. Equally, when the household size of irrigator increases by one person, the log likelihood of being poor reduces, and this could be explained from the fact that there will be more supply of family labor to assist in getting the farm work done.

The likelihood of being poor linked to increased farm size suggests the lack of financial capacity to cultivate more land. Equally, the fact that extension services increase the likelihood of being poor suggests a gap between the disseminated know-how and the requisite knowledge that irrigators need to break away from the vicious cycle of poverty. The likelihood of being poor which increases with the membership of an association suggests an uncoordinated activity that lacks the foundation to unshackle its member from poverty.

Results of correlation matrix among the irrigators

The result of the correlation matrix conducted on the data obtained from irrigators is presented in Table 4.

Table 4: Correlation Matrix Analysis (Irrigators)

	Per-capita income	Gender	Household Size	Age	Farm Size	Years of schooling	Marital Status
Per-capita income	1.0000						
Gender	0.2177	1.0000					
Household Size	-0.5015	-0.0782	1.0000				
Age	0.2615	0.0455	-0.1407	1.0000			
Farm Size	0.1771	0.1228	0.2509	-0.2227	1.0000		
Years of schooling	-0.0813	0.0556	0.1501	-0.5736	0.3795	1.0000	
Marital Status	0.1633	0.2991	-0.0653	-0.0097	0.1281	-0.0472	1.0000

Source: Field survey, 2015

It is evident from Table 4 that gender of household heads, age of household head of irrigation farmers, size of the cultivated irrigation farm, and marital status of the irrigation farmers has a positive relationship with the per capita household income. On the contrary, the number of years spent in school and the household size of irrigation farmers have a negative relationship with the per capita income of the irrigation farmers.

Since the outcome of the analysis conducted to show a positive relationship between per capita income and gender, it therefore, suggests that male irrigation farmers have the tendency and capacity to generate more per capita income than their female counterparts. This might be linked to the cultural values that give male gender more privilege over the female in terms of resource control.

Age also showed a positive relationship with per capita income. The positive relationship suggests that older irrigation farmers have a wealth of experience enough to align their resources in a way that increases their per capita income.

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Moreover, it was observed that as the size of cultivated irrigation farm increases so is the tendency to increase the per capita income of the irrigation farmers. Equally, the positive link between marital status and per capita income suggests the possibility of household head and their spouse combining efforts to generate more income.

The household size and years spent in the school of irrigation farmers have a negative relationship with per capita income. This means that as the household size of irrigation farmer increases, there is a high tendency that their per capita income would decrease. The fact than an increase in household size possibly reduces the per capita income of irrigation farmers suggests that household heads are burdened the with responsibility of a large family. This could explain why farmers may not reinvest in farming activities and will possibly reduce their per capita income.

Also, as the irrigation farmers spent more years to acquire education, results show a reduction in their per capita income considering the negative sign. This suggests that as irrigation farmers have additional qualifications, chances are high that they abandon farming activities for a more formal job thereby reducing per capita income from farm source.

Determination of factors influencing Poverty Level (correlates) among the homestead gardeners

The result of the analysis of the factors influencing the poverty status of homestead gardeners is presented in Table 5.

Table 5: Determination of factors influencing Poverty Level (correlates) among Homestead farmers

	Coefficient	Stand. Error	Z	P>[z]
Constant	1.403	1.854	0.76	0.449
Age	.020	.023	0.85	0.393
Years spent in schooling	-.039	.068	-0.57	0.570
Household Size	-.522	.123	-4.23	0.000**
Cultivated Farm Size	.304	.455	0.67	0.503
Extension services	.639	.512	1.25	0.212
Member of association	.093	.504	0.18	0.854
Wald $Chi^2(6)$	= 18.77			
Prob>Chi^2	= 0.0046			
Pseudo R^2	= 0.1944			
Likelihood ratio	= -46.896			

Source: Field survey, 2015

It could be deduced from the results as presented that the coefficient of the explanatory variables is statistically different from zero with the likelihood ratio value of 46.896. The value of the chi-square revealed that the estimation from the model gave a good outcome. Furthermore, Table 5 shows that age, years spent in schooling, size of the cultivated farmland, extension services, and being a member of an association have no significant influence on the likelihood of being poor among homestead gardeners. Although the number of years spent in schooling is not significant to the likelihood of homestead gardener being poor, it however, reduces the likelihood of homestead gardeners being poor. Equally, age, cultivated farm size, extension services, and

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being a member of an association is not significant to the likelihood of homestead gardeners being poor; they are however positively related to the likelihood of being poor. It follows that an increase in any of these variables will increase the likelihood of homestead gardeners being poor.

Household size of homestead gardeners was observed to have a significant influence on the likelihood of being poor but negatively related to the likelihood of being poor. This means that an increase in the household size of homestead gardeners could allow using family labour on homestead garden and would eventually help save the funds that would have been spent on hiring labour hence, reducing the likelihood of homestead gardeners being poor.

Results of correlation matrix among homestead gardeners

The result of the correlation matrix analysis conducted on the data collected from the homestead gardeners is presented in Table 6.

Table 6: Correlation matrix for Homestead farmers

	Per-capita income	Gender	Household size	Age	Farm size	Years of schooling	Marital status
Per capita income	1.0000						
Gender	0.0417	1.0000					
Household size	-0.4752	-0.0024	1.0000				
Age	0.1113	0.0215	0.0950	1.0000			
Farm size	0.0673	0.0293	0.1313	0.1816	1.0000		
Years of schooling	-0.1864	-0.0762	-0.1412	-0.5194	-0.2578	1.0000	
Marital status	-0.0420	0.5313	0.0656	-0.0568	-0.0612	-0.0575	1.0000

Source: Field survey, 2015

The analysis was conducted to affirm the factors influencing the poverty status of homestead gardeners. Gender, age, and farm size are positively related to per capita income of homestead gardeners. Similarly, household size, years spent in schooling, and marital status is negatively related to per capita income of homestead gardeners.

It follows that male household head who are homestead gardeners have a higher tendency to increase their per capita income. This result suggests that male gender is more agile and possibly have more resource to cultivate their homestead gardens which perhaps increased their per capita income.

Similarly, the age of homestead gardeners which have a positive relationship with per capita income suggests that older homestead gardeners have wealth of experience to handle events that take away more income from their farming activity.

Furthermore, farm size had a positive relationship with per capita income of homestead gardeners, an outcome which suggests that if more area of land is put under cultivation then per capita income of homestead gardener will likely increase.

As for the household size tending to reduce the per capita income of homestead gardeners, it suggests that homestead gardeners are saddled with more responsibility that prevented them from reinvestment into getting more income from their homestead gardens.

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Equally, years spent in school having a negative relationship with per capita income of homestead gardeners suggest no relationship between the skills acquired and the practice of homestead gardening. This may cause homestead gardeners to abandon homestead gardening as they are better qualified to take up formal jobs that possibly take all their time and possibility prefer to buy from shops food they hitherto cultivated in their gardens.

Marital status showed a negative relationship with per capita income which means married respondents reduces the per capita income generated from homestead garden.

Determination of factors influencing Poverty Level (correlates) using the pooled data

The irrigators and homestead gardeners' pooled data were considered. The result as presented in Table 7 revealed that the number of years spent in school, household size, area of land cultivated, extension services, and being a member of the association have a significant influence on the log likelihood of farmers being poor in the study area.

Table 7: Correlates of Poverty (Pooled)

	Coefficient	Standard Error	Z	P>[z]
Constant	2.169186	1.127407	1.92	0.054
Age	-.0037796	.0152133	-0.25	0.804
Years spent in schooling	-.167759	.0471363	-3.56	0.000***
Household Size	-.5250414	.0760485	-6.90	0.000***
Cultivated Farm Size	.8410316	.2430561	3.46	0.001***
Extension services	.6448872	.3337285	1.93	0.053***
Member of association	1.186706	.3548196	3.34	0.001***
Wald $Chi^2(6)$ =	70.61			
Prob>Chi^2 =	0.0000			
Pseudo R^2 =	0.2743			
Likelihood ratio =	-129.5303			

Source: Field survey, 2015

Also, only the age of the respondents was insignificant in determining the log likelihood of being poor. The years spent in school is negatively related to the log likelihood of being poor. It follows that an increase in the number of years spent in school reduces the log likelihood of farmers being poor. The outcome of this analysis agrees with the results from irrigators. This result implies that education equips farmers with the requisite skill to make informed decision and judgments that reduces their log likelihood of being poor. Although the results from the homestead gardener showed a similar sign (negative) with the coefficient obtained from irrigators and pooled data, it is however not significant.

Equally, the coefficient of household size and years spent in schooling shows that they are significant and negatively related to the log likelihood of farmers being poor. It means an increase in the size of the household reduces the log likelihood of farmers being poor. This result tallies with the one obtained from the analysis conducted on irrigators' and homestead gardeners. This suggests the possible use of family labour on their respective farms which helps cut the cost that would have been used to pay off hired labour.

The size of farmland cultivated with respect to pooled data was significant and positively related to the log likelihood of being poor. The likelihood of being poor with respect to cultivated farmland under irrigation agrees with the result from the pooled data. This implies that an

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increase in the size of the cultivated farmland increases the log likelihood of being poor. This suggests the possibility of lack of resources to cultivate additional hectares of land and due to the inability to cultivate, the land farmers have become poorer. Under the homestead gardening, the coefficient sign was also positive but insignificant to the log likelihood of being poor.

Moreover, an increase in the frequency of extension officer's visit considering the pooled data showed a positive and significant relationship with the likelihood of being poor. The foregoing result is in line with the result obtained from irrigators' data. This result suggests that the extension services offered by the extension staff are not in line with the need for farmers to reduce the likelihood of being poor. Unlike the result from the pooled and irrigator data, extension services are insignificant to the likelihood of being poor considering the homestead gardeners.

The relationship between the likelihood of being poor and being a member of an association is significant and positive. The same relationship considering the irrigators did not show a contrary result. This implies that being a member of an association increases the farmer's likelihood of being poor. This result suggests that the association is not at the frontier of pushing its members away from poverty. The relationship between the likelihood of being poor and membership of the association was insignificant considering homestead gardeners.

Though age was observed to be insignificant to the likelihood of being poor considering the pooled data, however, it has a negative relationship with the likelihood of being poor. This outcome revealed that old respondents have a wealth of experience that could be passed on to younger ones to help them reduce the likelihood of being poor. Also, age was also insignificant in the models for irrigator and homestead gardening respectively.

Results of correlation matrix using pooled data

The outcome of the correlation matrix conducted using the pooled data is presented in Table 8. The table shows that gender, age, farm size, years spent in schooling, and the marital status of respondents are positively linked to the per capita income. However, the per capita income of respondents was observed to be negatively related to the size of household and years spent in schooling.

Table 8: Correlation matrix of the pooled data

	Per-capita income	Gender	Household size	Age	Farm size	Years of schooling	Marital status
Per-capita income	1.0000						
Gender	0.1626	1.0000					
Household size	-0.4960	-0.0486	1.0000				
Age	0.2156	0.0378	-0.0575	1.0000			
Farm size	0.1627	0.0910	0.1945	-0.1018	1.0000		
Years of schooling	-0.1113	0.0179	0.0596	-0.5561	0.2030	1.0000	
Marital status	0.1152	0.3744	-0.0403	-0.0445	-0.0313	-0.0282	1.0000

Source: Field survey, 2015

The positive relationship between per capita income and gender of the household head in the study area revealed that the male respondents are likely to earn more per capita income than their

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female counterpart. This results tallies with the outcome from irrigators, homestead gardeners and the report of Olawuyi and Raufu (2012). This suggests that male gender is more agile and possibly have more control over resources to cultivate their farm than the female counterpart.

Age of respondents was also observed to be positively related to per capita income, and this result was the same across all the classes of data examined. This link suggests that older farmers deployed their experience to salvage situations which invariably allow them to increase their per capita income.

Equally, an increase in the size of farmland was linked to an increase in per capita income of the respondents. This result corroborates with the outcome from the analysis conducted on data of irrigators and homestead gardeners. This suggests that respondents with access to more land can increase the quantity of crops cultivated which thereafter increases their profit and income.

Marriage was observed to increase the per capita income of household head considering the pooled data. More per capita income arising from marital status (married) of irrigators agrees with the result from the pooled data. This outcome suggests that household head that is married perhaps get assistance from their spouse which enabled them to increase the household per capita income. The result from the analysis conducted using homestead gardening data revealed that marriage reduces the per capita income of the household head.

On the other hand, household size had a negative relationship with per capita income of respondents in respect of the pooled data. Results from the analysis conducted on irrigators and homestead gardeners agree with the pooled data. The implication of this is that an increase in household size reduces the per capita income of household head. This might not be unconnected with the responsibilities to meet as the number of persons in the household increases. It may reduce the amount of money reinvested into farming activities which also reduces the income that comes from farming.

The years spent in school was found to reduce per capita income of household head using the pooled data. This result was the same for both irrigators and homestead gardeners. It could be that the knowledge acquired while in school is not related to how to sustainably manage agriculture. This may be the reason why respondents opt for a more formal job since they will see agriculture as a venture that consumes time, and energy with little financial gain

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Summary and Recommendations

The demographic characteristics reveal that respondents are old with at least primary school education; and household size of 5 persons. The mean cultivated farm size is 1.07ha. Male gender was dominant, having majority married, and belonging to one association or the other. Majority of the sampled farmers irrigated their farmland, and; have access to extension services.

The poverty indices (Headcount, Poverty gap, Poverty Severity) assessed revealed that poverty is more pronounced among female respondents than male; among homestead gardeners than irrigator; among farmers in Tyhefu than in Qamata; and among farmers who have less than 2 ha of farmland than those with more than 2ha.

Drawing conclusions from the estimated logit regression using pooled data, years spent in school, household size, size of cultivated farmland, extension services, and being a member of an association have a significant influence on the likelihood of being poor. Only the age of the respondents was not significant.

Similarly, the correlation matrix revealed that gender, age, farm size, years spent in schooling, and marital status of respondents are positively linked to the per capita income while a negative relationship was observed between per capita income and household size, and years spent in school.

Therefore, governments effort should be properly aligned to ameliorate poverty among resource-poor farmers by easing the rigor associated with assessing credit facility and instituting proper monitoring among the different organs of government saddled with such responsibilities. By so doing, many abandoned farmlands will be put to effective use.

Education should be prioritized while also incorporating agriculture in school curriculum to spur interest and productivity in agriculture. Activities of different association to which respondents belong should be geared towards helping each member tackle the challenges confronting them. Extension service providers should adopt a participatory approach to disseminate innovative technologies that meet the farmers' needs.

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