Land ownership and usage for agriculture: Empirical evidence from South African Living Conditions Survey

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Abstract: Land is an indispensable resource in agricultural production. In South Africa, land's economic, political and cultural worth often surpass its production value. Both the proponents and opponents of the ongoing debate on land expropriation without compensation in South Africa have expressed concerns on its implications for land usage for food and agricultural production by land reform beneficiaries. The aim of this study is to determine household land ownership and usage for agricultural production in South Africa. The study adopted a nationally representative secondary data collected by Statistics South Africa. Descriptive statistics and bivariate probit regression model were implemented to analyze drivers of land ownership and usage for agricultural production. The descriptive statistics results showing the distribution of land ownership and usage across the country indicate the highest land ownership in Eastern Cape (9.66%), KwaZulu Natal (5.29%), Limpopo (4.51%) and land usage in Eastern Cape (8.61%), KwaZulu Natal (4.80%), Limpopo (3.89%). The bivariate probit model shows that age of the household, household participation in home garden, income and engagement in own production explains land ownership and utilization among other variables. It was observed that older household heads are more likely to own land, whereas they

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PUBLIC INTEREST STATEMENT
In South Africa, there is an ongoing debate on land expropriation without compensation. Both the proponents and opponents of this debate canvased for the usage of land for productive activities like agriculture after expropriation. This study determines factors explaining household land ownership and usage for agricultural production in South Africa. The study implemented descriptive statistics and bivariate probit regression using a secondary data collected by Statistics South Africa. Findings revealed land ownership of 9.66% in Eastern Cape, 5.29% in KwaZulu Natal, 4.51% in Limpopo and land usage in Eastern Cape 8.61%, KwaZulu Natal 4.80%, Limpopo 3.89%. The bivariate probit model shows that age of the household, household participation in home garden, income and engagement in own production explains land ownership and utilization among other variables. It was recommended that South Africa land reform policy should be reviewed to target young South Africans with regular income, practicing home garden and engaging in own production.
are less likely to use it. Counterintuitively, wealthier household has lesser probability to own land. Based on these findings, it was recommended that South Africa land reform policy should be reviewed to address pervasive land ownership inequality in the country by targeting young South Africans with regular income, practicing home garden and engaging in own production.

Subjects: Land Reclamation Pedology; Consumer Psychology; Economic Psychology; Landscape

Keywords: agricultural activities; bivariate probit; land access; land utilization; South Africa

1. Introduction

Land access is fundamentally crucial to efficient agricultural production, food security and poverty alleviation in Sub-Saharan Africa where rural households have limited access to productive land. The vital role of land in the production of food is linked to the social, political and economic life of most African countries, where agriculture, natural resources and other related land-based activities are critical to livelihoods, food security, incomes and employment. Empirical research conducted in many developing areas has demonstrated that relatively egalitarian land distribution patterns often foster higher rates of economic growth than highly concentrated ones (Berg, 2011; Deininger, Savastano, & Xia, 2017). This is often due to the widespread agricultural growth that mostly brings about second-round expenditures in support of locally produced non-tradable goods and services in rural areas and towns (Jayne, Ballard, Gear, & Weber, 2009). The multiplier effects brought about by this growth are usually less when the source of agricultural growth is confined within relatively few hands. This is particularly true of land, which is a limited agricultural resource. Therefore, the growth rate is likely to influence the distribution of land in the agricultural sector, particularly among the rural households.

In South Africa, the long history of colonization, racial domination and land dispossession have culminated in the vast expanse of the country’s agricultural land being owned by the minority white. In 1994, South Africa had approximately 82 million hectares of white-owned agricultural land (Adams, 2000). The democratic government promised to redistribute 30% of this land, or 24.5 million hectares, to the previously disadvantaged South Africans who are predominantly black residents of the former homelands by 2014 (Binswanger-mkhize, 2014). By the end of 2009, when the last formal statistics were released, the government had managed to acquire 6.7 million hectares representing 26% of the 24.5 million hectares of land targeted (Binswanger-mkhize, 2014). Subsequently, after 2009, an additional 1.25 million hectares of land were further redistributed, making a total of 7.95 million hectares by 2012 (Kirsten, 2012 cited in Binswanger-mkhize, 2014)

Following the 54th national conference of African National Congress (ANC) on 20 December 2017, the ruling party resolved to amend the Constitution to make provision for land expropriation with no compensation. The land expropriation without compensation advocates such as the Economic Freedom Fighters (EFF), Black First Land First (BFLF) and their allies within ANC believes that no compensation should be payable to landowners from whom land would be expropriated, since according to them the land was taken by the ancestors of the current white landowners (Crosby, 2017). The resolution emphasized that the land expropriation without compensation should be pursued with due consideration to food security, ownership of agricultural land and the effective performance of the South African economy. The proponents of this land reform policy cited weaknesses in South Africa’s current willing-buyer, willing-seller principle that has delayed the land reform process.

Moreover, cases of unused agricultural land have been reported in some provinces, thereby raising more concerns on the dare consequences of transferring land that was commercially productive to individuals or communities without the capacity to put it to productive use thus leaving it in an idle. Some of these cases have been reported in Limpopo and Northern Cape where 46% and 52% of
potential arable land were reported to be lying fallow (NDA, 2008). In addition, the past 10 years have witnessed departure from farming, as land-use practices have shifted from agricultural production altogether to non-agricultural land-use practices like game farms, golf courses, housing and holiday estates (Hall, 2009). Despite the decline in farming land-use activities, land-based livelihood activities still exist in rural areas of South Africa where other employment prospects are limited. In fact, land-based livelihoods make a much more valuable contribution to rural livelihoods than the conventional wisdom dictates (Andrew, Ainslie, & Shackleton, 2003).

Furthermore, failures of the land reform policy in facilitating access to agricultural land have been implicated by some individuals as reasons for not participating in commercial agriculture space. Although it has been over 20 years since land reform program was implemented in South Africa, yet, the number of land beneficiaries and land area transferred to rural dwellers remains dismally low, even though rural unemployment has reduced drastically over the past decade (World Bank, 2014). Cousins and Aliber (2013) opine that only 40% of agrarian reform projects support active beneficiaries. Similarly, Lyne (2014) found that government-assisted land purchases have only benefited some 460,000 rural households from 1994 to 2014, whereas Cousins (2016) further maintained that around 8–9% of farmland have been transferred through restitution and redistribution and that many settled restitution claims have not been fully implemented. Moreover, the vast majority of the 69,000 urban restitution claims have been settled through cash compensation (Hall, 2011), thereby making actual land unavailable for productive use.

Several factors have been blamed for lack of access to land and for not putting land to productive use in South Africa. In some parts of Eastern Cape and KwaZulu-Natal, large areas of previously cultivated land are said to be abandoned (Andrew et al., 2003). Under-farming also appears to be evident in the more disturbed communal areas of other provinces in South Africa. For instance, a historical trend study of land use in the Transkei indicates that the process of abandoning arable land began in the first half of the twentieth century but increased rapidly in the 1960s and 70s (Andrew et al., 2003). However, Giannecchini (2001), cited in Andrew et al. (2003), opined that in Limpopo and Mpumalanga, the total area of cultivated land appears to have expanded over time, but the size of household plots seems to have declined. What is, however, unclear is that we are not sure of whether intensification is occurring in the northern provinces of the country. A wide variety of reasons for the under-use of arable land has been identified in the cases mentioned above. These include a shortage of labour due to the absence of male labour, constraints on female labour linked to domestic responsibilities and urbanization processes.

Furthermore, Aliber et al. (2006) investigated the extent and nature of land demand in Limpopo, Eastern Cape and Free State. Although the outcome of the study findings cannot be generalized to the entire country, they, however, indicate the magnitude of land demand: 48% of black people in the three provinces want land and one-third want access for food production. Twenty-nine percent of the land demand is from the farm dwellers, whereas 37% are demanded from communal areas. Forty-five percent of those wanting land want 1 hectare or less, while a quarter will be contented with 1 to 5 hectares, and 48% of the land demand is from 18 to 34 years old. Moreover, land utilization in South Africa has become worrisome in view of the declining interest of youth in farming, particularly in the rural areas. Statistics show that, although 70% of rural households carry out some form of farming activity, only 2.7% of them were said to be relying on it as a source of income (Edition et al., 2000). According to Aliber et al. (2006), over three million households were involved in farming in 2011 and by 2013; this number has dropped to 2.6 million.

In view of the fact that there is limited empirical evidence connecting land ownership with agricultural land usage in South Africa, this study aims to analyze the factors that determine household land ownership and utilization of land for food and/or agricultural production in South Africa. This study is worth undertaking because land constitutes an important factor of production with no alternative or substitute. For rural households, land is more than assets or input in the production process, but it has both historical and cultural values also. In addition, if the factors influencing land access and utilization...
are known, our understanding of how to make land reform policy work will be enhanced. This study seeks to fill this gap (i.e. identify factors determining land ownership/access and usage for agricultural production) and add to the existing literature on land reform policy. Finally, there is the need to understand the correlates of land access and utilization in order to enhance the proper design of land reform programs and facilitate successful implementation of many pressing land policies in South Africa.

2. Methodology

2.1. Data and sampling procedure
This study used South African Living Conditions Survey 2014/2015 data collected by Statistics South Africa. Details of the sampling procedures had been explained by Statistics South Africa (StatSA 2015). The data were collected using a well-designed survey questionnaire. Trained enumerators administered the questionnaires. In all, 30,818 dwelling units were sampled across the country during the survey. A total of 32,906 households were identified by the survey (StatSA 2015). From these, there was a sample realization of 27,527 (83.65%) households, with the remaining 5,379 (16.35%) households being classified as out-of-scope due to a number of reasons, such as listing error and vacant/unoccupied dwelling. Sampled households participated in the survey for a period of four weeks, and the survey was conducted over a period of one year between 13 October 2014 and 25 October 2015. However, for this study, 23,380 households across nine South African provinces with complete information on land access, utilization and other relevant variables were included in the analysis.

2.2. Conceptual model: The bivariate probit
Several efforts have been made to empirically model the influence of socio-economic variables on land access and tenure security. In many instances, the use of probit or logit model is applied (Africa, 2013; Alawode, 2013; Verburg, de Nijs, van Eck, Visser, & de Jong, 2004; Verburg, Ritsema van Eck, de Nijs, Dijst, & Schot, 2004). In these models, land access and utilization by farmers are assumed to be based on decisions to maximize utility. The land access and utilization are defined as “f” and “p”, respectively, where f, p = 1 for access and utilization, and f, p = 0 for no access and no utilization. The underlying utility function, which ranks the preference of the ith household, is assumed to be a function of household head-specific attributes, “X” (e.g. age, sex, household size, etc.), and a disturbance error term having a zero mean:

\[ U_{i1}(X) = \beta_1 X_i + \epsilon_{1i} \] for access and utilization, \[ U_{i0}(X) = \beta_0 X_i + \epsilon_{0i} \] for non-access and non-utilization.

Since the utility is assumed to be random, the household will select the alternative “access and utilized” if and only if \( U_{i1} > U_{i0} \). Thus, for the household “i”, the probability of access and utilization is presented as follows:

\[ \psi(1) = \psi(U_{i1} > U_{i0}) \]
\[ \psi(1) = \psi(\beta_1 X_i + \epsilon_{1i} > \beta_0 X_i + \epsilon_{0i}) \]
\[ \psi(1) = \psi(\epsilon_{1i} > \epsilon_{0i} - \beta_1 X_i + \beta_0 X_i) \]
\[ \psi(1) = \psi(\epsilon_1 < \beta X_i) \]
\[ \psi(1) = \phi(\beta X_i) \]

where \( \psi \) is the cumulative distribution function \( \epsilon \). The functional form for \( \phi \) will depend on the assumption made about \( \epsilon \). A probit model arises from assuming the normal distribution for \( \epsilon \). Hence, for a household “i”, the probability of access to land and subsequent usage for agricultural production, respectively, is given by:

\[ \phi_f(\beta X_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \exp\left(-\frac{t^2}{2}\right) dt \]
Although the two equations above can be estimated independently using two separate probit models, however, this is inefficient since it will ignore the correlation between the disturbance $\varepsilon_f$ and $\varepsilon_p$ of the underlying stochastic utility functions associated with land access and land usage, respectively (Haab, 1997).

In this study, the bivariate regression model was employed to take care of the correlation between the two error terms. The bivariate probit is based on the joint distribution of two normally distributed variables and is specified as (Haab 1997),

$$f(f, p) = \frac{1}{2\pi \sigma_f \sigma_p \sqrt{1 - \rho^2}} e^{-\left(\frac{(f - \mu_f)^2 + (p - \mu_p)^2 - 2\rho(f - \mu_f)(p - \mu_p)}{2(1 - \rho^2)}\right)}$$

$$\varepsilon_f = \frac{e - \mu_f}{\sigma_f}$$

$$\varepsilon_p = \frac{e - \mu_p}{\sigma_p}$$

where $\rho$ is the correlation between $e$ and $p$. The covariance is $\sigma_{fp} = \rho \sigma_f \sigma_p$. $\mu_f, \mu_p, \sigma_f$ and $\sigma_p$ are the means and standard deviations of the marginal distributions of $f$ and $p$, respectively. The distribution of $f$ and $p$ is independent if and only if $\rho = 0$. The most appropriate technique for estimating bivariate probit is the full information maximum likelihood. This technique requires iterative algorithm. In this study, the model was estimated using STATA SE version 15.

### 2.3. Empirical model

The empirical specification of land access and land utilization is employed to investigate household’s access and utilization of land in South Africa. A bivariate probit model is developed to examine the relationship between socio-economic characteristics and land access and utilization. Access to land and utilization of land among households are linked to some socio-demographic variables based on empirical literature on land use. For instance, limited success of smallholder-based efforts to improve agricultural productivity in Sub-Saharan Africa and apparent export competitiveness of “mega-farms” in Latin America or Eastern Europe during 2007/8 global food crisis has led many observers to suggest acquisition of land by large operators as a pathway out of poverty and development (Collier & Venables, 2012). Moreover, Besley and Ghatak (2009) affirmed the importance of secure land tenure for sustainable land management, productivity-enhancing investment, and operation of land markets that transfer land to its best and most productive use, and eventually access to credit markets by using land as collateral. Despite the fact that this has given rise to an array of interventions to formalize land rights in all of the world’s regions, Africa remains in several ways an outlier. Several socio-economic-, agricultural-, health- and financial-related factors can influence households’ access to and utilization of land for food production or agricultural purposes. Studies have shown that socioeconomic variables, such as age, gender, level of education and family labour, affect participation in land market in Nicaragua (Deininger et al., 2017; Jayne et al., 2009).

The descriptive statistics of the independent variables included in the empirical model are presented in Table 1. The dependent variable is whether or not the household has access to or owns land and/or if the land is used for agricultural production activities or not. For land access, this variable is given by $Q211OWNLAND$, but later recoded as dummy with name OWNLAND. The second dependent variable is given as $Q212LANDUSED$, but was recoded as dummy from the initial 1 and 2 codes to 1 and 0 with variable name LANDUSED. Hence, the two dependent variables take the value of 1 if household owns or has access to land or utilizing the land for agricultural production and 0 otherwise. The household-specific socio-economic explanatory and their description are presented in Table 1.
3. Results and discussions

3.1. Socio-economic profiles of the households

Table 2 presents the socio-economic characteristics of the respondents that participated in the study across South Africa’s nine provinces. It shows that male heads 55% of the households, whereas female heads 45%. Gender distribution of household heads mirror the overall distribution apart from the two urban provinces (Western Cape and Gauteng) with 64% households headed by male and Limpopo Province having very low male-headed households of 46%. The average age of household heads in the study was 49 years. Households heads in the Eastern Cape had the highest average age of 52 years, while Free State and Gauteng had the youngest household heads with an average age of 47 years. The age distribution shows that 45% and 41% are within the age bracket of 50 years and above and 31 to 50, respectively. Only 14% of the household heads are 30 years and below. This result is similar to the finding of Oyekale (2015) on Factors Explaining Households’ Cash Payment for Solid Waste Disposal and Recycling Behavior in South Africa using GHS 2012 data where Eastern Cape reported the highest average age of 48.94 years and Free State reported the lowest average age of 45.57 years.

Furthermore, the results indicate that an average of 3.8 persons constitute household size in South Africa. Kwa-Zulu Natal and Limpopo Province have a household size of at least four persons, whereas other provinces have a household size of at least three persons. The provinces with high household size are also the ones with a high population of rural areas where livelihood is agricultural base.
Table 2. Descriptive statistics of household heads’ selected socioeconomic characteristics

| Variables          | WC  | EC  | NC  | FS  | KZN | NW  | GP  | MP  | LP  | ALL |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
|                    | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   | Freq. | %   |
| Gender             |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
| Male               | 1,728 | 64.26 | 1,459 | 49.09 | 775  | 56.65 | 1,231 | 56.65 | 1,881 | 51.03 | 1,117 | 55.57 | 2,096 | 64.61 | 1,305 | 55.2 | 1,327 | 46.04 | 12,919 | 55.26 |
| Female             | 961  | 35.74 | 1,513 | 50.91 | 585  | 43.35 | 942  | 43.35 | 1,805 | 48.97 | 893  | 44.43 | 1,148 | 35.39 | 1,059 | 44.8 | 1,555 | 53.96 | 10,461 | 44.74 |
| Total              | 2,689 | 100  | 2,972 | 100  | 1,360 | 100  | 2,173 | 100  | 3,686 | 100  | 2,010 | 100  | 3,244 | 100  | 2,364 | 100  | 2,882 | 100  | 23,380 | 100  |
| Age (years)        |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
| ≤30                | 276  | 10.26 | 306  | 10.3 | 186  | 13.68 | 336  | 15.46 | 537  | 14.57 | 252  | 12.54 | 470  | 14.49 | 383  | 16.2 | 419  | 14.54 | 3,165  | 13.54 |
| 31-50              | 1,233 | 45.85 | 1,053 | 35.43 | 567  | 41.69 | 945  | 43.49 | 1,492 | 40.48 | 794  | 39.5 | 1,534 | 47.29 | 929  | 39.3 | 1,028 | 35.67 | 9,575   | 40.95 |
| >50                | 1,180 | 43.88 | 1,613 | 54.27 | 607  | 44.63 | 892  | 41.05 | 1,657 | 44.95 | 964  | 47.96 | 1,240 | 38.22 | 1,052 | 44.5 | 1,435 | 49.79 | 10,640  | 45.51 |
| Total              | 2,689 | 100  | 2,972 | 100  | 1,360 | 100  | 2,173 | 100  | 3,686 | 100  | 2,010 | 100  | 3,244 | 100  | 2,364 | 100  | 2,882 | 100  | 23,380 | 100  |
| Mean               | 49   |      | 52   |      | 49   |      | 47   |      | 48   |      | 50   |      | 47   |      | 49   |      | 51   |      | 49   |      |
| Household size     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
| 01-May             | 2,243 | 83.41 | 2,296 | 77.25 | 1,074 | 78.97 | 1,870 | 86.06 | 2,685 | 72.84 | 1,607 | 79.95 | 2,751 | 84.8 | 1,803 | 76.27 | 2,166 | 75.16 | 18,495 | 79.11 |
| 06-Oct             | 416  | 15.47 | 615  | 20.69 | 262  | 19.26 | 288  | 13.25 | 894  | 24.25 | 375  | 18.66 | 465  | 14.33 | 520  | 22   | 652  | 22.62 | 4,487   | 19.19 |
| >10                | 30   | 1.12  | 61   | 2.05  | 24   | 1.76  | 15   | 0.69  | 107  | 2.97  | 28   | 1.39  | 28   | 0.86  | 41   | 1.73 | 64   | 2.22  | 398     | 1.7   |
| Total              | 2,689 | 100  | 2,972 | 100  | 1,360 | 100  | 2,173 | 100  | 3,686 | 100  | 2,010 | 100  | 3,244 | 100  | 2,364 | 100  | 2,882 | 100  | 23,380 | 100  |
| Mean               | 3.7  |      | 3.9  |      | 3.8  |      | 3.4  |      | 4.2  |      | 3.7  |      | 3.5  |      | 3.9  |      | 4    |      | 3.8   |      |
| Monthly income     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |      |     |
| ≤R 1,000           | 128  | 4.76  | 219  | 7.37  | 83   | 6.1   | 174  | 8.01  | 1,330 | 36.08 | 361  | 17.96 | 470  | 14.49 | 275  | 11.63 | 364  | 12.63 | 3,404  | 14.56 |
| R 1,001-5,000      | 986  | 36.67 | 1,753 | 58.98 | 660  | 48.53 | 1,100 | 50.62 | 1,775 | 48.16 | 1,069 | 53.18 | 1,360 | 41.92 | 1,259 | 53.26 | 1,792 | 62.18 | 11,754 | 50.27 |
| R 5,001-10,000     | 793  | 29.49 | 526  | 17.7  | 331  | 24.34 | 467  | 21.49 | 361  | 9.79  | 338  | 16.82 | 672  | 20.72 | 475  | 20.09 | 383  | 13.29 | 4,346  | 18.59 |
| 10,000             |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

(Continued)
| Variables | WC | EC | FS | KZN | NW | GP | MP | LP | ALL |
|-----------|----|----|----|-----|----|----|----|----|-----|
|           | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| R 1,000-  | 468  | 17.49 | 296  | 9.96 | 186  | 13.68 | 273  | 12.56 | 162  | 4.40 | 159  | 7.91 | 448  | 13.81 | 217  | 9.18 | 212  | 7.36 | 2,421 | 10.36 |
| >R 20,000 | 314  | 11.68 | 178  | 5.99 | 100  | 7.35 | 159  | 7.32 | 58   | 1.57 | 83   | 4.13 | 294  | 9.06 | 138  | 5.84 | 131  | 4.55 | 1,455 | 6.22  |
| Total     | 2,689 | 100 | 2,972 | 100 | 1,360 | 100 | 2,173 | 100 | 3,686 | 100 | 2,010 | 100 | 3,244 | 100 | 2,882 | 100 | 2,364 | 100 | 2,882 | 100 | 23,380 | 100 |

WC: Western Cape; EC: Eastern Cape; NC: Northern Cape; FS: Free State; KZN: KwaZulu Natal; NW: North West; GP: Gauteng Province; MP: Mpumalanga Province; LP: Limpopo Province.
Hence, large household may be a source of labour for agricultural activities in these areas. However, some provinces with agricultural potential such as Northern Cape, North West and Free State also share similar household size distribution with West Cape and Gauteng which are predominantly urban. This result is almost 50% of 6.1 household size reported in Binswanger-Mkhize's (2014) study on the impact evaluation of land reform program on beneficiaries in South Africa.

On average, households reported a net household monthly income of R 7,949. As expected, Western Cape, which is predominantly urban with the highest standard of living compared to the rest of the country, recorded the highest net household monthly income of R 11,362. The least net household monthly income of R 2,010 was recorded by North West Province. This result is much higher than the mean monthly income of R 6,064.52 and highest monthly household income of R 8,003.05 and R 7,809.82 from Gauteng and Western Cape, respectively. Concerning land access across the nine provinces of South Africa, Table 3 depicts the uneven distribution of land access and ownership. Most of the households that responded yes to this question were predominantly from the Eastern Cape (9.66%), KwaZulu Natal (5.29%) and Limpopo (4.51%) provinces. Very negligible percentage of the households from Western Cape (0.11%), Northern Cape (0.88%) and Gauteng (0.80%) were affirmative and were asked if they own land or have access to land for productive use.

With regards to the utilization of land for food or agricultural production, a very negligible percentage of the households that own or have access to land use it for food or agricultural production. Of the 750 households that responded “yes” to the question on land ownership or access, only 38 households representing 0.16% of the entire population engaged their land in food or agricultural production, while 644 representing 2.75% do not use their land for either food production or agricultural activities. The remaining 97.08% are the households that responded “no” to question on land ownership and access. Across the nine provinces, land utilization looks similar to the overall scenario in South Africa; 0.61%, 0.24% and 0.14% of households utilized their land for agricultural production in Eastern Cape, KwaZulu Natal, Free State and Limpopo, respectively. Since very few households indicated access to land in Western Cape, none of these few utilized their land for agriculture.

3.3. Reasons why land is not utilized for agricultural production in South Africa
To gain an understanding of why the majority of households with access to land did not engage in food production and/or agricultural activities, we analyzed the follow-up questions on why those with land are not using them. Several reasons were cited why land is not being put into productive use, and the results are presented in Table 4. The six main reasons why households with access to land do not put them into productive use include non-availability of funds, lack of agricultural expertise, paucity of human resources, lack of farming or agricultural equipment, water scarcity and the land is too far away. The majority (i.e. 60%) of the households cited lack of funds as the main reason for not engaging their land in agricultural activities. This is understandable considering the level of poverty in the country. The second most cited reason for not utilizing land is lack of water. About 42% of the
## Table 3. Distribution of land access and land utilization for agricultural activities among households in South Africa Provinces

|                   | WC       | EC       | NC       | FS       | KZN      | NW       | GP       | MP       | LP       | ALL      |
|-------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
|                   | Freq.    | %        | Freq.    | %        | Freq.    | %        | Freq.    | %        | Freq.    | %        |
| Land Ownership    |          |          |          |          |          |          |          |          |          |          |
| Yes               | 3        | 0.11     | 287      | 9.66     | 12       | 0.88     | 37       | 1.70     | 195      | 5.29     | 34       | 1.69     | 26       | 0.80     | 26       | 1.10     | 130      | 4.51     | 750      | 3.21     |
| No                | 2,686    | 99.89    | 2,685    | 90.34    | 1,348    | 99.12    | 2,136    | 98.30    | 3,491    | 94.71    | 1,976    | 98.31    | 3,218    | 99.20    | 2,338    | 98.90    | 2,752    | 95.49    | 22,630   | 96.79    |
| Total             | 2,689    | 100.00   | 2,972    | 100.00   | 1,360    | 100.00   | 2,173    | 100.00   | 3,686    | 100.00   | 2,010    | 100.00   | 3,244    | 100.00   | 2,364    | 100.00   | 2,882    | 100.00   | 23,380   | 100.00   |
| Land Utilization  |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |
| Yes               | 0        | 0        | 0        | 0        | 18       | 0.61     | 0        | 0        | 1        | 0.05     | 1        | 0.03     | 2        | 0.08     | 4        | 0.14     | 38       | 0.16     |          |          |
| No                | 0        | 0        | 256      | 8.61     | 11       | 0.81     | 29       | 1.33     | 177      | 4.80     | 26       | 1.29     | 13       | 0.60     | 20       | 0.85     | 112      | 3.89     | 644      | 2.75     |
| N/A               | 0        | 0        | 2,698    | 90.78    | 1,349    | 99.19    | 2,141    | 98.53    | 3,500    | 94.95    | 1,983    | 99.57    | 3,230    | 99.07    | 2,342    | 99.07    | 2,766    | 95.98    | 22,698   | 97.08    |
| Total             | 2,689    | 100.00   | 2,972    | 100.00   | 1,360    | 100.00   | 2,173    | 100.00   | 3,686    | 100.00   | 2,010    | 100.00   | 3,244    | 100.00   | 2,364    | 100.00   | 2,882    | 100.00   | 23,380   | 100.00   |

Source: Author’s computations from South Africa’s Living Conditions Survey (LCS) 2014/2015 (Statistics South Africa (StatSA), 2015).

WC: Western Cape; EC: Eastern Cape; NC: Northern Cape; FS: Free State; KZN: KwaZulu Natal; NW: North West; GP: Gauteng Province; MP: Mpumalanga Province; LP: Limpopo Province.
### Table 4. Distribution of reasons for not utilizing land among rural households in South African Provinces

|                     | WC | EC | NC | FS | KZN | NW | GP | MP | LP | All |
|---------------------|----|----|----|----|-----|----|----|----|----|-----|
|                     | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| **Lack of Funds**   |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |
| Yes                 | 0   | 0  | 164 | 65 | 7    | 64 | 17  | 61 | 89   | 51 | 14   | 54 | 10   | 77  | 12  | 63  | 71  | 63  | 384 | 60 |
| No                  | 0   | 0  | 89  | 35 | 4    | 36 | 11  | 39 | 84   | 49 | 12   | 46 | 3    | 23  | 7   | 37  | 41  | 37  | 251 | 40 |
| Total               | 0   | 0  | 253 | 100| 11   | 100| 28  | 100| 173  | 100| 26   | 100| 13   | 100 | 19  | 100 | 112 | 100| 635 | 100 |
| **No Expertise**    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |
| Yes                 | 0   | 0  | 55  | 22 | 1    | 9  | 5   | 18 | 20   | 12 | 0    | 0  | 2    | 15  | 6   | 32  | 6   | 5   | 95  | 18 |
| No                  | 0   | 0  | 192 | 78 | 10   | 91 | 23  | 82 | 152  | 88 | 26   | 100| 11   | 8   | 13  | 68  | 105 | 95  | 532 | 85 |
| Total               | 0   | 0  | 247 | 100| 11   | 100| 28  | 100| 172  | 100| 26   | 100| 13   | 100 | 19  | 100 | 111 | 100| 627 | 100 |
| **No Human Resources** |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |
| Yes                 | 0   | 0  | 86  | 34 | 5    | 45 | 6   | 21 | 39   | 23 | 6    | 23 | 3    | 23  | 7   | 39  | 11  | 0.1 | 163 | 26 |
| No                  | 0   | 0  | 164 | 66 | 6    | 55 | 22  | 79 | 133  | 77 | 20   | 77 | 10   | 77  | 11  | 61  | 99  | 0.9 | 465 | 74 |
| Total               | 0   | 0  | 250 | 100| 11   | 100| 28  | 100| 172  | 100| 26   | 100| 13   | 100 | 19  | 100 | 110 | 100| 628 | 100 |
| **No Equipment**    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |
| Yes                 | 0   | 0  | 127 | 52 | 5    | 83 | 7   | 25 | 61   | 36 | 8    | 31 | 5    | 38  | 8   | 42  | 26  | 23  | 247 | 40 |
| No                  | 0   | 0  | 119 | 48 | 6    | 55 | 21  | 75 | 110  | 64 | 18   | 69 | 8    | 62  | 11  | 58  | 85  | 77  | 378 | 60 |
| Total               | 0   | 0  | 246 | 100| 11   | 100| 28  | 100| 171  | 100| 26   | 100| 13   | 100 | 19  | 100 | 111 | 100| 625 | 100 |
| **No Water**        |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |
| Yes                 | 0   | 0  | 41  | 17 | 3    | 27 | 9   | 32 | 76   | 44 | 12   | 46 | 2    | 15  | 11  | 58  | 31  | 28  | 185 | 42 |
| No                  | 0   | 0  | 207 | 83 | 8    | 73 | 19  | 68 | 96   | 56 | 14   | 54 | 11   | 85  | 8   | 42  | 79  | 72  | 442 | 70 |
| Total               | 0   | 0  | 248 | 100| 11   | 100| 28  | 100| 176  | 100| 26   | 100| 13   | 100 | 19  | 100 | 110 | 100| 627 | 100 |
| **Far Away**        |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |     |    |
| Yes                 | 0   | 0  | 8   | 3  | 1    | 9  | 0   | 0  | 11   | 6  | 5    | 19 | 3    | 23  | 1   | 5   | 17  | 15  | 46  | 7  |
| No                  | 0   | 0  | 239 | 97 | 10   | 91 | 28  | 100| 160  | 94 | 21   | 81 | 10   | 77  | 18  | 95  | 94  | 85  | 580 | 93 |
| Total               | 0   | 0  | 247 | 100| 11   | 100| 28  | 100| 171  | 100| 26   | 100| 13   | 100 | 19  | 100 | 111 | 100| 626 | 100 |

Source: Author’s computations from South Africa’s Living Conditions Survey (LCS) 2014/2015 (Statistics South Africa (StatSA), 2015).

WC: Western Cape; EC: Eastern Cape; NC: Northern Cape; FS: Free State; KZN: KwaZulu Natal; NW: North West; GP: Gauteng Province; MP: Mpumalanga Province; LP: Limpopo Province.
household cited no water as the main reason for not using their land for agriculture. South Africa has been experiencing severe drought lately, and it peaked in 2015/2016 agricultural production season.

About 40% of the respondents implicated lack of farming equipment as the main reason for not engaging their land in agriculture. This reason clearly suggests that most of the participants of the study are smallholders and emerging farmers with limited access to farm implements. Only 26% mentioned no human resources as the main reason for not using their land in productive resources. This finding aligns with our initial result on the distribution of the household size across the provinces, which suggest that most, the households’ average number of persons living within them, may support family labour if required for agricultural activities. When asked if lack of agricultural expertise constitutes impediment for land use in agricultural production, 18% of households responded in affirmative. Although this does not constitute majority of the respondent, but it also implies the need for agricultural skill development among farming households in the country. In terms of proximity of land to households as likely constraints to land utilization, 7% of the households responded “yes”. This suggests that most of the households that own land do not live far away from where their land is located.

3.4. Factors explaining land access and land utilization for agricultural production

The results of the bivariate probit model adopted for the study are presented in Table 5. In the modelling, the first stage entailed a test of multicollinearity among the independent variables initially identified for the analysis. During this stage, some variables did not pass the collinearity test and they were dropped. The choice of whether to include a variable in the model or not was taken after due consideration is given to the tolerance level. The tolerance of all variables that were included in the final model is indicated in the last column of Table 5, and the average variance inflation factor (VIF) for the model was 1.95. This translates to an overall tolerance of approximately 51.28%, which is a good indication that multicollinearity poses no problem to our model.

Estimates derived from the bivariate probit model fit the data accurately, looking at the statistical significance of the Wald Chi-Square statistics ($p < 0.01$). The computed correlation coefficient between the two error terms of land ownership and land used equations was 0.0000. Similarly, the likelihood ratio test of rho equals to zero rejects the null hypothesis that there is no correlation ($p < 0.01$). This means that the two error terms of land ownership and land utilization models are indeed correlated, and estimating each model independently using the conventional Probit model would yield a biased estimate. The results in addition confirm that the omitted variables that would have influenced land access, if included, would have led to an increase in the probability of utilization of land for agricultural activities in the second model.

Among the 16 variables included in the model, 10 were statistically significant at various levels in both models. The household head age parameters ($Ageofhead$) are statistically significant ($p < 0.01$) in both land ownership and land access models. Whereas the coefficient of age parameters is positive for the land ownership model, implying that if other variables included in the model are held constant, the older the household head, the higher the probability of owning or having access to land, but the coefficient of the age of household head is negative in the land utilization model. These two signs align with our a priori expectations since land ownership is positively correlated with age and farmers’ ability to till the ground tend to decline as they grow old (Hall, 2009a, 2009b). This finding corroborates World Bank’s (2014, p. 70–71) report, which revealed a sharp decline from 37.9% to 26% of adult working age employed in agricultural or self-employed in rural areas of South Africa.

Similarly, parameters of participation in garden ($GARDEN$) are statistically significant ($p < 0.01$) in the two models. The coefficient of the parameters of household involvement in garden is negative (-0.0285) in the first model and positive (0.0282) in the second model. This implies that if other variables are held constant, households that are practicing home garden are less likely to have access to land than those that are not, but household participation in garden increases the likelihood of utilizing land for agricultural production. This result agrees with Middleton's (1997) study on
Table 5. Bivariate probit regression results of land access and usage in South Africa

| Variables              | Land access |            |            | Land utilization |            |            |            | Tolerance |
|------------------------|-------------|------------|------------|-----------------|------------|------------|------------|-----------|
|                        | Coefficient | SE         | Prob.      | Coefficient     | SE         | Prob.      |            |           |
| GENDER                 | 0.0169      | 0.0355     | 0.634      | -0.0242         | 0.0364     | 0.506      | 0.9409     |
| Ageofhead              | 0.0057      | 0.0011     | 0.000      | -0.0053         | 0.0011     | 0.000      | 0.8767     |
| hhsize                 | -0.0062     | 0.0067     | 0.357      | 0.0068          | 0.0071     | 0.336      | 0.9078     |
| INVOLVED               | -0.0028     | 0.0281     | 0.919      | 0.0295          | 0.0337     | 0.381      | 0.3670     |
| GARDEN                 | -0.0285     | 0.0077     | 0.000      | 0.0282          | 0.0077     | 0.000      | 0.9422     |
| Q229NETINCOME          | -0.0000067  | 0.0000023  | 0.005      | 0.0000008       | 0.000002   | 0.001      | 0.9581     |
| OWNPROD                | -0.0982     | 0.0501     | 0.050      | 0.0907          | 0.0519     | 0.081      | 0.6087     |
| HEALTH                 | -0.0253     | 0.0262     | 0.335      | 0.0267          | 0.0273     | 0.328      | 0.4153     |
| LIVESTOCK              | -0.0026     | 0.0063     | 0.673      | -0.0068         | 0.0069     | 0.324      | 0.4946     |
| BLACK AFRICAN          | 0.4360      | 0.0721     | 0.000      | -0.4730         | 0.0771     | 0.000      | 0.8188     |
| Eastern Cape           | -0.0627     | 0.0052     | 0.000      | 0.0625          | 0.0054     | 0.000      | 0.4484     |
| Northern Cape          | 0.0481      | 0.0114     | 0.000      | -0.0456         | 0.0115     | 0.000      | 0.2421     |
| KwaZulu Natal          | -0.0238     | 0.0053     | 0.000      | 0.0234          | 0.0055     | 0.000      | 0.5304     |
| North West             | 0.0396      | 0.0079     | 0.000      | -0.0455         | 0.0085     | 0.000      | 0.3655     |
| Mpuumalanga            | 0.0597      | 0.0083     | 0.000      | -0.0650         | 0.0090     | 0.000      | 0.3906     |
| Limpopo                | -0.0088     | 0.0057     | 0.122      | 0.0054          | 0.0060     | 0.365      | 0.4484     |
| Constant               | -2.7915     | 0.1248     | 0.000      | 3.0265          | 0.1363     | 0.000      | 0.000      |

Likelihood ratio test of rho = 0; \( \chi^2(1) = 4635.79 \), Prob. > \( \chi^2 = 0.0000 \)
Number of obs. = 23,380; Wald \( \chi^2(32) = 731.56 \), Prob. > \( \chi^2 = 0.0000 \); Log likelihood = -2144.4052
Mean VIF 1.96
Source: Author’s computations from South Africa’s Living Conditions Survey (LCS) 2014/2015 (Statistics South Africa (StatSA), 2015).
women’s rights and needs in Thornhill and Merino Walk, where women demanded small garden or small fields on which to grow vegetables and not large grazing areas. Hence, it is intuitively reasonable to expect that households that are currently utilizing small plot or space in their home as garden will want to make use of their land for agricultural purpose if access is granted.

The net monthly income (Q229NETINCOME) of household in South African Rand was statistically significant with negative coefficient for the first model and statistically significant with positive coefficient for the second model. This means that provided all other variables remain equal, increase in net household income will reduce the probability of ownership of land, whereas increase in net household income will increase the probability of utilizing land for agricultural activities. While the positive effect of net household income on land utilization in the second model was anticipated a priori since increase net household income may translate to more disposable income that household may invest in agricultural investment, the negative effects of net household monthly income on land ownership seems to be counterintuitive. Households with more income should have the financial wherewithal to acquire land for productive purposes. Reflecting on this result in the context of Aliber et al. (2006), who show that 13.9% of those wanting land also expect to use it as a source of income, may therefore imply that households with large net household income are not really particular about land ownership like their poor counterparts who want it as asset or collateral.

The parameters of whether households engage in own product production (OWNPROD) or not is statistically significant at (p < 0.05) in the first model and at (p < 0.1) in the second model. The variable also shares similar coefficient signs with household income parameters. The coefficient (-0.0982) of the variable in the first model indicates negative or inverse relationships between engagement in own product production and land ownership. This implies that the households that are engaging in own product production are less likely to own land even though they are likely to need more land space for their production. However, households engaging in own product production have a higher probability of utilizing their land for agricultural production provided all other variables are held constant.

Furthermore, the parameter of racial variable (BLACK AFRICAN) in the two models shows statistical significance (p < 0.01) and with positive and negative signs in first and second models, respectively. These parameters indicate that if other variables are held constant, households belonging to black African population group have a higher probability of owning land and lower probability of utilizing it. This finding corroborates the result of Aliber et al. (2006), which reported 48% demand for land among black people in Limpopo, Eastern Cape and Free State. In this study, 29% of the demand is from farm dwellers, 37% from communal areas and 34% from urban areas. Forty-five percent of those wanting land want 1 ha or less, while a quarter would be satisfied with 1 to 5 ha, and 48% of the demand is from 18 to 34 year olds. Their study shows clearly that an enormous demand exists for land in the three provinces —mostly for small areas.

Five of the six provincial variables show statistical significance (p < 0.01) and with mixed signs in both models for land ownership and utilization. This implies that assuming all other variables are constant, households in Northern Cape (0.0481), North West (0.0396) and Mpumalanga (0.0597) would have higher probabilities of owning land compared with those in Western Cape, Gauteng and Free State, whereas households in Eastern Cape (-0.0627) and KwaZulu Natal (-0.0238) have lower probabilities of owning land compared with those in Western Cape, Gauteng and Free State. Conversely, households in Eastern Cape (0.0625) and KwaZulu Natal (0.0234) would have higher probabilities of utilizing their land for agricultural production compared with those in Western Cape, Gauteng and Free State while households in Northern Cape (-0.0456), North West (-0.0455), Mpumalanga (-0.0650) would have less probabilities of utilizing land for agricultural production compared with those in Western Cape, Gauteng and Free State.
4. Conclusion

In South Africa, access to land is currently generating political and economic debate due to the outcome of the African National Congress December 2017 elective conference where proposition was made on land expropriation without compensation which may have an implication on national food security. In this study, we empirically investigated factors explaining household access and utilization of land for agricultural production using the recently released South African Living Conditions Survey data. Results from this study indicate that of all the 23,380 that participated in the study, only 750 representing 3.21% have access to or own land. This is dismally low. In terms of access to land across provinces, findings from the study identify differences in land access and ownership across South Africa Provinces with households from Eastern Cape and KwaZulu Natal reporting higher access to land, whereas least access was reported among the households interviewed in Western Cape and Northern Cape. Although this finding appears counterintuitive in view of the apartheid history of the country, it is, however, obvious from the finding that substantial discrepancies exist in land access and ownership across the country, which makes the implementation of South African policy on land reform both urgent and needful.

Among the 750 households with access to land, 38 households representing 0.16% utilized their land for food or agricultural production and 644 households (2.75%) were not using their land for food or agricultural production. Follow-up questions on why households were not using their land show six main reasons why households with access to land do not utilize it. Sixty percent cited lack of funds, and 42% cited no water as the main reason for not using their land for agriculture. About 40% implicated lack of farming equipment as the main reason for not engaging their land in agriculture, whereas 26% mentioned no human resources as their reason for not using their land. When asked if lack of agricultural expertise constitutes impediment for land use in agricultural production, 18% of households responded in affirmative. In terms of proximity of land to households as likely constraints to land utilization, 7% of the households responded affirmatively.

Access to and utilization of land is hypothesized to be influenced by some variables identified from the empirical literature. In this study, households’ wealth does not necessarily guarantee access to land or ownership of land, but positive relationships exist between household wealth and land utilization for food and agricultural production among households with access to land. Therefore, it is not only sufficient that government land reform policy facilitates households’ access to land but issue of poverty, which inhibit household utilization of land should be addressed so as to empower them to engage their land productively. The result from household age reveals that older household head has more access but utilization tend to decline with age. It is therefore important that access should be facilitated among younger household heads, who are hitherto without access since they have the wherewithal to utilize the land.

Participation in home garden and own production is a good indication of tendency to productively utilize land if access is granted. Findings from this study revealed that households that engaged in home garden and own production are less likely to have access to land, even though they are more likely to engage their land productively. It is therefore pertinent that land reform policy in South Africa targets households with these traits and prioritizes them as beneficiaries. Even though gender is not significant in our model, for land reform policy to be inclusive, it should be gender-sensitive, while targeting youths and young head of households. They should also provide basic education on the need for effective land utilization, particularly among black South Africans.

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