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Farmers', Farm Characteristics' and Use of Public Agricultural Extension Support across Time in Selected Municipalities of Limpopo Province, South Africa

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ABSTRACT The paper compares data on subsistence grain producers' socio-economic, farm characteristics, and their use of public extension support for farm management across time and in various municipalities of Limpopo province, South Africa. A cross-sectional survey design was used to collect the data in eight selected local municipalities by means of multi-stage sampling. Data were analysed by means of descriptive statistics. Findings across time periods (2014 and 2017) and aggregated for all the different local municipalities investigated were similar regarding respondents' socio-economic and farm characteristics as well as use of public extension support for farm management. These evidence-based findings augur well for the development of uniform and appropriate strategies for the local municipalities to improve public extension support so that producers can receive more extension farm visits and, therefore, more farm management information. Such support will help producers to improve their farming operations and invariably, their productivity and household food security.

INTRODUCTION

Studies on data continue to receive a lot of attention in various fields, for example, in education (Provost and Fawcett 2013), in inter-organizational collaboration (Moore and Lammert 2017). There is evidence of significant improvements in decision making in data-driven organizations compared those that rely less on data (Stobierski 2019). The use of data in the field of agriculture for agricultural production, for example, is becoming increasingly important in view of the devastating impacts of climate change, dwindling available land for agricultural activities arising from increasing human population and industrialization. Carletto et al. (2013) indicted that despite the important role of the smallholder sector in the economies of countries in sub-Saharan Africa, only two countries out of 44 rated by the FAO had high standards in data collection. Farmers' socio-economic, cultural and farm characteristics influence their use of agricultural innovations (Milkias and Abdulahi 2018) and for this reason such data needs to be readily available to those who have to make decisions on how to improve the adoption of innovations. The importance of collecting data about the farm, producers and other aspects of farming is acknowledged (Statistics South Africa 2016). This stems from the fact that data is critical for informed policy development, improved planning, decision making and service delivery (He et al. 2012; Statistics South Africa 2013). In recent years, the generation of data on smallholder and subsistence farming in South Africa has received attention as shown in the compilation of the Agricultural Households' report (Statistics South Africa 2013). The data collected, however, is cross-sectional in most cases as in research conducted for academic purposes (for example, Nkosi 2017; Abdul-Hanan and Abdul-Rahaman 2016). Some of the data may, however, be periodically collected as in General Household Surveys and Income and Expenditure Surveys by government departments (Statistics South Africa 2013). In other cases, it may be longitudinal data collected from the same sam-

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ple of respondents over a period of time (van der Heijden and Cramer 2017). The analysis of any data is, however, informed by the purpose of the data collected; it is for this reason that most of the data collected lack comparative analysis across time for different locations where the data was collected. This represents a gap in knowledge. Such knowledge is, however, needed to provide extension field-level extension practitioners, policymakers and other extension and advisory service providers with evidence-based information on subsistence dryland grain farmers across time in different localities for effective and efficient service delivery decision making.

The purpose of this paper is to generate data to compare smallholder grain farmers' socio-economic and farm information as well as their use of public agricultural extension support for farm management across time and in various municipalities of Limpopo province of South Africa. The comparison was achieved from data collected from two rounds of a cross-sectional surveys in 2014 and 2017, on subsistence, dryland, grain producers in three district municipalities of Limpopo Province. Similarity of data on the producers' variables investigated in this study in the various municipalities and in the two time periods, should provide a compelling reason for extension service providers to come up with uniform strategies to meet the producers' farm management needs.

Research Questions

The study purpose was achieved by addressing the following research questions:

1. How do farmers' socio-economic and farm characteristics/ differ across time and in various municipalities?
2. How does farmers' use of public extension support for farm management differ across time and in various municipalities?

METHODOLOGY

The study areas are indicated in Figure 1. Both Fetakgomo and Makhuduthamaga local municipalities are in Sekhukhune district municipality which is located between latitude -24° 49' 59.99" S and longitude 29° 49' 59.99" E (Sekhukhune District Municipality 2019). The dominant plant species in the two areas is natural grassland which is used as fodder for livestock; in some areas, subsistence crop production, especially, sorghum, also feature well in the agricultural production (Department of Rural Development and Land Reform 2016). The study areas receive rainfall (500mm – 600mm per annum) in the summer months (September to May); summer and winter temperature range between 28^0C-18^0C and 20^0C-7^0C respectively (Department of Rural Development and Land Reform 2016). Water is a serious constraint to agricultural production in the two survey areas.

The Capricorn district municipality is located between latitude -23° 52' 59.99" S and longitude 29° 25' 59.99" E (Capricorn District Municipality 2019). Most of the rainfall (380-550mm per annum) in Blouberg local municipality of Capricorn district is experienced during the summer months. This is a hot area and in the rainy season, there is a lot of water loss due to evapotranspiration. The vegetation ranges from subtropical savannah to alpine. Drought occurs quite often in this area with a negative effect on the local economy (Blouberg Local Municipality 2018). Rainfall in Aganang local municipality, also in the Capricorn district municipality, similarly occurs in summer with very dry winters. Precipitation generally occurring as short, heavy, thunder showers. The mean annual precipitation ranges from 454mm to 500mm per annum and the vegetation is characterised by different types of bushveld (Aganang Local Municipality 2013).

Generally, the Mopani district municipality is located between longitude, 29 52´E to 31 52´E and latitude, 23 0´S to 24 38´S (Mopani District Municipality 2014). It is semi-arid and receives a mean rainfall of 611 mm in the summer months while the temperatures range between 21-25 ^{o}C, producing a climate conducive for agricultural and forestry activities (Mopani District Municipality 2018). The topography is characterised by high mountain ranges producing low lying areas and, thus, generally, the study area experiences high rainfall and floods (Mopani District Municipality 2018).

This present paper makes use of data from 'Rounds 1 and 2' of the study titled, 'Climate variability and subsistence crop farmers' food

security in Limpopo Province of South Africa: the role of public extension'. The aim of the main study in different time periods and locations of the province was to generate data for comparison on the *status quo* situation on subsistence dryland, grain farmers.

In Round 1 of the study in 2014, two districts municipalities, Capricorn and Sekhukhune of the five district municipalities of Limpopo Province, were purposively chosen for the study because each had a local municipality that was either prone to drought (Blouberg) or had undergone a government food security programme, Fetsa Tlala (Makhuduthamaga). The other two local municipalities in the Capricorn and Sekhukhune districts included in the study were Aganang and Fetakgomo respectively. These local municipalities were selected by simple random processes; Aganang from five local municipalities and Fetakgomo from four. Five villages were then selected per local municipality by a simple random procedure. Thus in each of the four local municipalities and the five villages selected, 10 grain farmers were again selected by a simple random process from a list of farmers per village. A total of 200 grain farmers, therefore, in farming households were selected for interviews. However, the final number interviewed for the study was 194 due to logistical challenges.

Round 2 was the 2017 study in Mopani district municipality. A census approach was used (Afful and Ayisi 2020) in which all project members in 12 randomly selected villages in the following four local municipalities of the Mopani district municipality (Giyani: 2 villages; Tzaneen: 3 villages; Phalaborwa: 3 villages and Maruleng: 4 villages) were included in the study. A total of 322 respondents were interviewed in these four local municipalities.

In both the 2014 and 2017 surveys, a cross-sectional survey design was used and data were collected in eight local municipalities from adult household members engaged in dryland grain production by means personal interview schedules.

The data extracted from the main study for this paper centred on respondents' use of public extension and their socio-economic and farm characteristics. The data were analysed using the IBM Statistical software, SPSS. Data organisation was by means of tables and the analysis techniques used include percentages, means, and median.

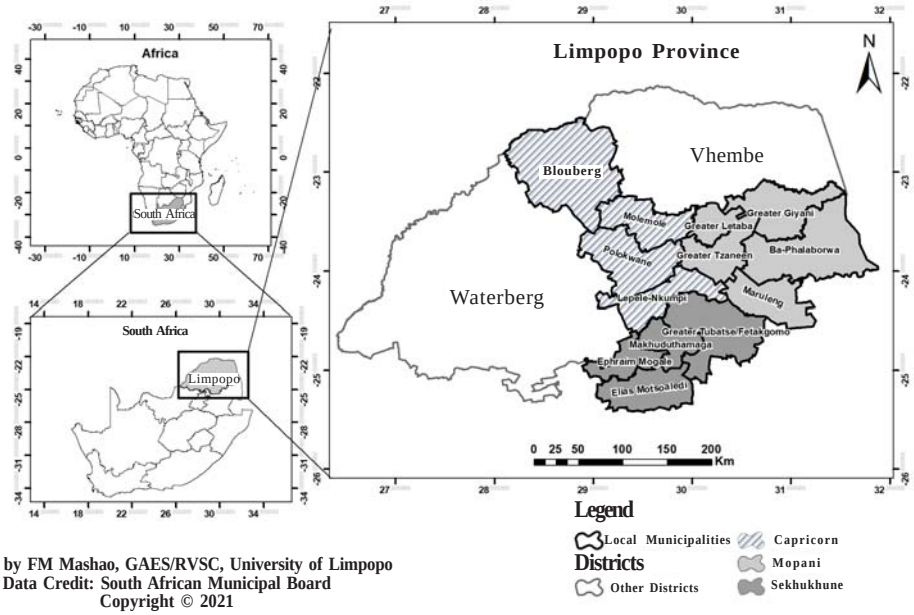

Fig. 1. Map of study areas

RESULTS

Respondents' Demographic and Farm Information

The findings on sex and participation in dryland grain production indicate that there were two to three times more women than men engaged in dryland grain production in each local municipality in each time period (Table 1).

Table 1: Sex of respondents according to district and local municipality

District municipality	*2017*		
	Local municipality	*Sex*	
		Male	*Female*
Mopani	Maruleng (n= 91)	19.8	80.2
	Tzaneen (n= 66)	24.2	75.8
	Giyani (n= 52)	42.3	57.7
	Phalaborwa (n=113)	22.1	77.9
Total	N= 322	27.1	72.9
	2014		
Capricorn	Blouberg (n= 50)	28.0	72.0
	Aganang (n= 43)	34.9	65.1
Sekhukhune	Fetakgomo (n= 55)	35.3	63.6
	Makuduthamaga (n= 46)	21.7	78.3
Total	N=194	29.9	69.8

The respondents' age distribution reveals that 44 and 50 percent of respondents aggregated for all municipalities involved in dryland grain production were in the age bracket of 54-69 years in the two time periods, 2014 and 2017, respectively (Table 2). This study's finding was also consistent with regard to the percentage (6%) of respondents in the age bracket, 22-37 years, involved in farming in all municipalities in the two time periods of the investigation. Again, the percentages of respondents in the age bracket, 86 years or more, aggregated for all municipalities, in the time periods, 2014 and 2017, were almost the same: two and three percent, respectively.

The age bracket for the youth in South Africa has been variously defined, 18-35 by Mathivha (2012), 15-34 years according to Statistics South Africa (2016). By these definitions, it is clear that very few youths (6%) in the researchers' surveys in the age bracket, 22-37, were involved in farming in all eight local municipalities; this finding was consistent in the two periods of the study (Table 2).

Table 2: Crop type produced, size of cropping land, years of schooling and age in all municipalities and study period

Age (years) of respondents in all municipalities	*2014*	*2017*
	Respondents (%) n=194	*Respondents (%) n= 322*
22-37	06	06
38-53	33	17
54-69	44	50
70-85	15	24
86 or more	02	03
Size of cropping land (Ha) in all municipalities	*Respondents (%) n= 194*	*Respondents (%) n=322*
Less than 0.5	31.72	5.90
0.5-1.99	59.68	52.17
2-2.99	6.5	18.63
3-3.99	1.6	7.45
4 or more	0.5	15.84
Type of crop planted in all municipalities	*Respondents (%) n=194*	*Respondents (%) n=322*
Maize	98.14	69.63
Sorghum	1.84	27.75
Other (vegetables, beans)	-	2.62
Years of schooling	*Respondents (%) n= 194*	*Respondents (%) n=322*
0	20	32
1-6	24	37
7 and more	56	31

2017: (N=322): Median age= 62.5; skewness = -.526; Standard error= .136
2014: (N=194): Median age age=56.5; skewness= .177; Standard error=.175
2017: (N= 322) Median number of years of schooling = 4.00; Skewness- .792
2014: (N= 194) Median number of years of schooling = 7.00; Skewness = -.154

The size of the cropping lands (ha) cultivated by most respondents (60 and 52%) aggregated for all municipalities in the two survey periods (2014 and 2017) respectively, was between 0.5 to less than two hectares (Table 2).

With regard to the type of grain crop cultivated by the respondents, the findings reveal

that the respondents in all municipalities surveyed in both time periods did not differ. Most of them, 98 and 70 percent in the 2014 and 2017 surveys, respectively, planted maize (Table 2).

The finding on respondents' years of formal schooling (Table 2) in the 2014 survey indicates that 20 percent of all farmers in all the local municipalities surveyed had no formal education at all and this was not too different from the result in the 2017 survey which yielded a figure of 32 percent.

More farmers (56%) in the researchers' 2014 study had seven or more years of schooling compared to only 31 percent in the 2017 study.

The Use of Public Extension

The researchers defined the term 'public extension' in this study based on the number of farm visits respondents received for farm management information and skills development from the public extension agent in the year before the study. The data aggregated for all respondents, both maize and sorghum producers, in Table 3 show that most respondents (63%) in the 2014 survey and (73%) in the 2017 survey did not receive extension visits from the public extension service. Data in the 2017 study aggregated for all municipalities reveal that only 11 percent of maize producers did not receive extension visits compared to 75 percent sorghum producers (Table 5). For most maize farmers (66%) and the few sorghum farmers (25%) who received visits in the researchers' study, it was between one to three. Three municipalities did not produce sorghum, apparently due to climatic reasons.

Table 3: Respondents' use of public extension service and number of extension visits received

Use of public extension	*2014 (n= 194)*	*2017 (n=322)*
Yes	37%	27%
No	63%	73%
Number of Extension Visits/Year (n= 72)		*(n= 87)*
1-3	72%	63%
4-6	21 %	29%
7 and above	7%	8%

In the 2014 study, data aggregated for all municipalities showed that most maize producers (70%) and all sorghum producers (100%) received between one to three visits (Table 6). Sorghum was not produced in Aganang municipality because of climatic reasons. The findings further indicate that there were no significant differences in the number of extension visits among maize farmers (p=.537) and also among sorghum producers (p=.439).

Respondents' use of public agricultural extension service in terms of the number of farm visits received according to the type of grain crop produced is presented in Table 4. Maize farmers compared with sorghum producers in all municipalities in both time periods, 2014 and 2017 on average, received more extension visits per annum; they received three and two visits in 2014 and 2017, respectively. Generally, the number of visits received by maize and sorghum pro-

Table 4: Number of extension visits received by according to crop type

	2017						
Crop type received (n= 313)	*Number of extension visits*						
	Min	*Max*	*Mean*	*Std. Dev.*	*Median*	*Skewness*	*N*
Maize	0	9	-	-	2	2.112	76
Sorghum	0	1	-	-	0.00	2.000	4
	2014						
Crop type	*Number of extension visits received (n=194)*						
	Min	*Max*	*Mean*	*Std. Dev.*	*Median*	*Skewness*	*N*
Maize	1	12	-	-	3	2.017	46
Sorghum	1	2	1.5	.548	-	.000	6

ducers was not significantly different in all municipalities in the two time periods investigated (Tables 5 and 6).

DISCUSSION

Respondents' Demographic and Farm Information

Research question one posed in the introduction section of this study is discussed here to show how the findings answer this question.

Sex

The aggregate findings on sex and participation in dryland grain production in this study mean that in all the eight local municipalities investigated and in both time periods, 2014 and 2017, more women than men engaged in dryland grain farming. Maponya's (2012) study in Capricorn and Sekhukhune district municipalities of South Africa, which included four of the local municipalities (Blouberg, Aganang, Makhuduthamaga and Fetakgomo) in the 2014 study indicated that more women than men participated in agricultural production. This finding supports the researchers' result in the study areas and in the two time periods investigated. This finding has implications for extension management in terms of the farm management support provided by public extension service to women dryland grain producers. Some of the important management issues that come to mind include how to effectively work with women grain producers and the type of support to be provided. For example, mass media is known to reach many people at a time with a low cost per person reached (Coldevin 2003; Ani et al. 2015 citing Muhammad 2005); its use will mean finding out when women farmers are free from family chores to listen to agricultural news on radio or television. Agricultural extension communication channels through which farmers receive extension information have been shown to be different for male and female farmers (Okwu and Daudu 2011). Meeting times for extension activities, for example, need to accommodate women farmers to ensure their full participation. These issues have to be taken into account when planning extension programmes

Table 5: Cross tabulation between local municipalities and number of extension visits received (2017) (N= 80)

				Municipality				*Total*
				Maruleng	*Tzaneen*	*Giyani*	*Phalaborwa*	
Maize	Visit	0	No.	6	0	2	0	8
			%	17.1%	0.0%	15.4%	0.0%	10.5%
		1-3	No.	21	7	7	15	50
			%	60.0%	77.8%	53.8%	78.9%	65.8%
		4 or more	No.	8	2	4	4	18
			%	22.9%	22.2%	30.8%	21.1%	23.7%
	Total	No.		35	9	13	19	76
		%		100.0%	100.0%	100.0%	100.0%	
Sorghum	Visit	0	No.				3	3
			%				75.0%	75.0%
		1-3	No.				1	1
			%				25.0%	25.0%
	Total	No.				4	4	
		%				100.0%	100.0%	
Total	Visit	0	No.	6	0	2	3	11
			%	17.1%	0.0%	15.4%	13.0%	13.8%
		1-3	No.	21	7	7	16	51
			%	60.0%	77.8%	53.8%	69.6%	63.7%
		4 or more	No.	8	2	4	4	18
			%	22.9%	22.2%	30.8%	17.4%	22.5%
	Total	No.		35	9	13	23	80
		%		100.0%	100.0%	100.0%	100.0%	100.0%

Maize: χ^2 = .875 p = .350 df = 1 Sorghum: χ^2 = .000 p = .988 df = 1

Table 6: Cross tabulation between local municipalities and number of extension visits received (2014) (N= 52)

				Municipality				*Total*
				Blouberg	*Aganang*	*Fetakgomo*	*Makhudu-thamaga*	
Maize	Visit	0	No.	6	0	2	0	8
Maize	Visit	1-3	No.	8	11	1	12	32
			%	61.5	73.3	50.0	75.0	69.6
		4 or more	No.	5	4	1	4	14
			%	38.5	26.7	50.0	25.0	30.4
	Total	Count		13	15	2	16	46
		%		100.0	100.0	100.0	100.0	100.0
Sorghum	Visit	1-3	No.	1		4	1	6
			%	100.0		100.0	100.0	100.0
	Total	No.		1		4	1	6
		%		100.0		100.0	100.0	100.0
Total	Visit	1-3	No.	9	11	5	13	38
			%	64.3	73.3	83.3	76.5	73.1
		4 or more	No.	5	4	1	4	14
			%	35.7	26.7	16.7	23.5	26.9
	Total	No.		14	15	6	17	52
		%		100.0	100.0	100.0	100.0	100.0

Maize: χ^2 = .381 p = .537 df = 1 Sorghum: χ^2 = .598 p = .439 df = 1

if women grain farmers are to be reached with farm management information with the potential to improve their production.

Age

Most respondents (44 and 50 %) in the 2014 and 2017 studies, respectively, aggregated for all municipalities, involved in dryland grain farming were in the most dominant age group (54-69). This shows that on the whole, there were no major differences in all the municipalities investigated in the two time periods regarding the most dominant age group involved in dryland grain farming. A study by Maponya and Mpandeli (2012) in Sekhukhune and Capricorn districts of Limpopo province, corroborates the findings of this present study; they found that of the farmers they surveyed, most respondents, 26 percent and 41percent in the two districts respectively, were in the age brackets 50-64 and 65 or more. The median ages indicated in this study, (56.5 years (2014) and 62.5 years (2017) show that the farming population surveyed in all municipalities in the two time periods is ageing. This is against the backdrop of the national average of the farming population in South Africa which is estimated to be 62 years compared to 55 years in the USA (Sihlobo 2015).

In view of the different age groupings used in different studies, a study by the Statistics South Africa (2016) that had an age grouping, 20-39 which was close to the researchers' 2014 and 2017 age grouping, 22-37, was used for a comparative analysis. The 6 percent figure of youth involved in farming in the study areas in the two time periods investigated, compares well with the 9 percent for the total number of respondents for the whole South Africa in the age bracket, 20-39 engaged in farming (Statistics South Africa 2016).

The findings in this study show that with regard to age, especially, the youth, there were no differences in all the municipalities studied in the two time periods regarding their involvement in farming; most youths were not participating in farming. This finding resonates with the point that there is very little or no youth participation in farming despite the high unemployment rate affecting this group in South Africa (Statistics South Africa 2016). The literature attests to this reality (Leavy and Smith 2010; Swarts and Ali-

ber 2013). Many reasons have been put forward to explain this situation, including the lack of land ownership, limited or lack of access to resources, gender inequalities and focused support for young farmers (Eissler and Brennan 2015; Mathivha 2012; Swarts and Aliber 2013). It also seems that the lack of, or minimal participation by the youth in farming, revolves around the scale of production. This is because it has also been indicated that in Uganda, even though most youths are engaged in some sort of agricultural activity (Butler and Kebba 2014), for the most part, however, youth do not see the attractiveness of agriculture, especially, subsistence farming, as a primary income-generating activity but rather as a second source of income generation (Butler and Kebba 2014). This ageing farming population and the small number of young people in farming, might explain why a sizeable number of the producers have no formal schooling.

Size of Cropping Fields

The idea of a small farm is not defined in the same way amongst researchers worldwide. The size of the land is commonly referred to in the description of small farms but because land differs in its characteristics and environmental attributes, no one particular way of measurement is able to explain subsistence producers' resource limitations. For example, the Department of Agriculture Forestry and Fisheries (DAFF) (2014), provides different categories of subsistence farmers in South Africa in which subsistence class 2 farmers are described among others, as having access to 0.5 ha or more of land. The FAO, however, broadly set the upper limit of a small farm size below two hectares (Lowder et al. 2016). This reveals that respondents in the researchers' 2014 and 2017 studies were typical subsistence farmers according to the DAFF (2014) classification of subsistence farmers. This finding compares well with the description of small farming in Vhembe district of Limpopo province, South Africa as characterized by small farm sizes of approximately 1.5 ha (Chauke et al. 2013). Further beyond South Africa, Graham (2012) indicated that in the Caribbean small farm sizes ranged from 0.15 hectare of land to under 2.0 hectares; the researchers' finding on this issue thus finds support in the literature. The implication of the finding is how should the public extension provider work with this type of farmers and what kind of farm management assistance should be provided for them considering their production needs and goals and the evidence on the relationship between farm size and adoption of farming innovations? (Milkias and Abdulahi 2018).

Type of Grain Crop Cultivated

This study's finding on the type of grain planted by farmers in the areas investigated in the two different time periods is corroborated by statement by the DAFF (2017) that in South Africa, maize, ranks on top of all grains for livestock feeding and the staple food for most people. Furthermore, the DAFF statement indicates that maize production in the non-commercial sector which is made up of smallholder and subsistence farmers, approximates 6 percent of the total national production (DAFF 2017). Chauke et al. (2013) also stated that farming under smallholder system in the Vhembe district municipality of Limpopo province, for example, is characterized by maize as the dominant cereal grain.

Years of Formal Schooling

The number of years of formal schooling was investigated based on the assumed positive influence of education, knowledge on adoption. It is thus expected that the more educated farmers will adopt agricultural innovations sooner than non-educated farmers (Abebe et al. 2013). One can safely say that with regard to years of formal schooling, in the main, there were no major differences among the farmers investigated in the different local municipalities in the two time periods of the study who did not have formal schooling. A good number of respondents, therefore, have literacy challenges which could affect their performance as agricultural producers. On the whole, the finding in the 2014 survey of 20 percent of farmers with no formal education at all, was not too different from the Community Survey of South Africa (Statistics South Africa 2016) in which 13 percent of the South African population surveyed had no formal education. The Department of Higher Education in

South Africa defines a functional literate person as one who has completed grade 7 schooling and is able to read and write with comprehension (Auditor-General of South Africa 2014). More farmers (56%) in the 2014 study had seven or more years of schooling and could, therefore, be considered literate compared to only 31 percent in the 2017 study. These findings augur well for farmers' potential to accept and use farming information in view of the positive influence of education on the adoption of innovations as recorded in literature (Knowler and Bradshaw 2007).

Use of Public Extension

The second research question posed in the introduction section of this study is discussed here to show how the findings answer this question.

The common findings in the literature regarding few or no public extension farm visits to subsistence and smallholder farmers (Akpalu 2013; Shabangu 2015) corroborate the researchers' findings in the study areas on maize and sorghum farmers in the study areas and in the two time periods investigated (Tables 5 and 6). This study's finding thus, has implications for extension management because of the positive relationship between farm output and the number of extension visits small farmers receive (Betz 2009). The literature seems to lack studies that use bivariate analysis on crop type or enterprise type and extension visits in view of the paucity of information found in the literature search. Afful and Mafsikaneng (2018), however, found that maize and vegetable farmers in the government Comprehensive Agricultural Support Programme in Gauteng province, South Africa, mentioned that extension officers visited their farms at least once a month, which was more visits in a cropping season. The literature shows that subsistence maize farmers in the Free Start province in South Africa, desire to receive three visits per month (Afful 2012) and two per month in Kenya (Gautam 2000). This desired frequency of visits shows that the number of visits received by the respondents in the researchers' two study periods is far below what they want. The type of farming enterprise as well as resource availability, including personnel, which appears to be the main factor, seem to influence the number of visits public extension officers make to farming projects in South Africa (Jacob 2003).

CONCLUSION

The aggregate findings regarding the variables investigated for all local municipalities in the study are consistent for the two study periods. Respondents have similar social-economic and farm characteristics. Two to three times more women than men participate in the cultivation of the dominant crop, maize on small plots of land, which are mostly, less than two hectares. Such farmers can thus be referred to as subsistence producers according to the Department of Agriculture categorization. The farming population studied is ageing while very few youths participate in maize production on the scale engaged in by the older producers. Most respondents do not receive extension farm visits; the few who do, do not generally, receive more than three per annum. Most maize producers generally receive more farm visits that sorghum farmers.

The results outlined in this paper relate to the wider conversation in the literature regarding more female compared to male participation in farming. The findings are also consistent with the broader discussion in the extant literature about the small farm sizes of most subsistence farmers, ageing population of most subsistence producers, substantial low literacy level of subsistence farmers as well as poor public extension visits received. Of particular concern is the minimal involvement of youth in farming.

A limitation of the study which further study could look into, is the lack analysis to prove statistically significant differences for most variables between municipalities and different study periods. This notwithstanding, the big picture, which is really the thrust of the paper, emerges from the data regarding differences between variable attributes such as male and female participation in grain production and also the similarities among most variables of findings in different study periods and local municipalities which should help inform policy.

RECOMMENDATIONS

In view of the similarities amongst the respondents in the factors investigated in this

study, the results in this paper should help public extension managers and policymakers to put in place uniform and appropriate strategies to improve public extension support to subsistence grain producers, especially, female producers. The following specific recommendations are made based on this study's findings:

1. Effort should be made to ensure more farm visits and that extension program activities consider the needs of women for their maximum participation so that they will benefit from receiving more farm management information. This improved extension support would invariably, help improve the productivity and household food security of subsistence farmers.
2. There is need to examine the type of strategies, including the type of extension communication channels to use to reach such ageing farmers, if they are going to be effective. Furthermore, the narrative about lack of interest of youth in farming should, therefore, look into the whole agricultural value chain and where youths are particularly interested to participate in. This will require government to provide the necessary enabling environment to attract the youth to participate. Such an approach will invariably help to improve the literacy level in the farming population because more youths with better literacy levels will enter the sector.
3. The fact that maize is the major crop produced subsistence farmers requires that the latest maize production technologies are provided to this group of farmers to improve their production to ensure that they achieve household food security, which is generally, their production goal, and also, be able to market surpluses for income, generation

The farmers' socio-economic variables examined in the two study periods relate to the broader issue of factors that affect the adoption of farming innovations as well as the management of agricultural extension programs. In view of the fact subsistence agricultural production is prevalent in most developing countries, the findings and recommendations on these socio-economic variables as well as the number of extension visits received, should also speak to the situations in other countries so that the recommendations provided here should provide guidelines for public extension service providers in those other situations.

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