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Participatory Agricultural Extension Methods and Their Perceived Benefits Among Smallholder Farmers in Nkomazi, South Africa

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ABSTRACT

Participatory agricultural extension approaches are increasingly promoted as a means of enhancing smallholder farmers' knowledge, decision-making capacity, and food security, both globally and across Africa. This study examined the socio-economic characteristics of smallholder farmers and assessed the types, usefulness, and perceived benefits of participatory extension methods in Nkomazi, South Africa. A quantitative survey was conducted among 39 smallholder farmers in Nkomazi area. Descriptive statistics were used to analyze farmers' socio-economic characteristics, household conditions, and experiences with extension services. The results indicate that most participants were older farmers, with low levels of formal education and relatively large household sizes. Local operatives were identified as the primary providers of extension services, with farm visits and group discussions being the most used extension methods. Most farmers perceived extension services as useful and reported benefits such as improved farming practices, better decision making, increased yields, and enhanced food security. The article concludes with a recommendation that farmers should adopt participatory extension approaches to strengthen rural livelihoods and household food security.

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Introduction

Smallholder farmers play a critical role in household food production and in sustaining rural livelihoods in South Africa. However, they often face challenges such as low productivity, limited access to information, and many constraints, such as a lack of economic resources (Khan and Ali, 2023). Agricultural extension services are intended to support farmers by providing knowledge, skills, and technical advice to improve farming practices and food security (Adamsone-Fiskovica and Grivins, 2022). In recent years, participatory agricultural extension methods have gained increasing attention, as they are considered more effective than conventional top-down approaches (Wijeratne and De Silva, 2024). These methods actively involve farmers in learning, decision-making, and problem-solving. Approaches such as group discussions, demonstration plots, on-farm visits, and farmer-to-farmer learning create opportunities for shared knowledge and practical learning. Participatory approaches are particularly important in rural areas, where farmers have varying levels of education and face resource constraints.

Despite the promotion of participatory extension, there is still a need to understand how farmers experience these services and what benefits they perceive. Furthermore, socio-economic characteristics such as age, education, income, and household size may also influence how farmers engage with extension programs and apply what they learn. Therefore, the objective of this study was to examine the socio-economic characteristics of smallholder farmers and to assess the types, usefulness, and perceived benefits of participatory extension methods in Nkomazi municipality, South Africa.

Materials and Methods

Description of Study Area

The study was conducted in Nkomazi, a predominantly rural area located in Mpumalanga Province, South Africa. The area is characterized by smallholder farming systems, with households largely dependent on crop and livestock production for both consumption and income generation. Farmers in Nkomazi face several challenges, including limited access to productive resources, high unemployment, and varying levels of education. These constraints underscore the importance of effective agricultural extension support in enhancing farming practices and improving household food security.

Study Approach and Sampling Technique

A quantitative research approach was employed in this study. Data were collected using a structured survey administered to 39 of the 43 smallholder farmers participating in agricultural extension programs in Nkomazi. The sample size was determined using Yamane's Formula with 5% margin of error. The questionnaire captured information on socio-economic characteristics, household size, types of participatory

extension services received, and perceived usefulness and benefits of these services. Participation in the study was voluntary, and respondents provided informed consent before taking part in the survey.

Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 30.0, in accordance with the study objectives. Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to analyze the data (Haden, 2019). The results are presented in tabular form and discussed in relation to existing literature on participatory extension and smallholder farming.

Results and Discussion

Socio-Economic Characteristics of Smallholder Farmers

Age Distribution

The age distribution indicates that the majority of the farmers were older adults. Farmers aged 55 years and above made-up 41% of the sample, followed by those in the 45 to 54 age group, who accounted for 28.2%. Younger farmers were underrepresented, with only 12.8% under 35 years. This distribution suggests low youth participation in farming and agricultural extension activities. Similar trends have been observed in previous studies, which indicate that young people often view agriculture as less attractive due to limited economic opportunities and alternative career interests (Geza et al., 2021).

Gender

The results indicate that most farmers were male (66.7%), while females accounted for 33.3% of the sample. This suggests that men are more involved in the agricultural extension programs in Nkomazi. The observed gender imbalance may reflect gender differences in access to productive resources, land, and agricultural support services, which often favor male farmers in rural areas (Witinok-Huber et al., 2021).

Education Level

Education levels among farmers were generally low. Nearly half of the farmers (48.7%) reported having no formal education, while only 23.1% had attained tertiary education. This finding highlights the importance of adopting extension methods that are practical, visual, and easy to understand, particularly for farmers with limited literacy levels.

Employment Status

Regarding employment status, 41% of farmers were retired, which aligns with the sample's older age structure. Employed farmers accounted for 26%, while self-employed farmers and unemployed farmers

represented 23% and 10% of the sample, respectively. These figures reflect limited formal employment opportunities in rural areas and demonstrate the role of farming in supporting livelihoods for both economically active and retired individuals.

Table 1. Socio-economic Characteristics of Smallholder Farmers

Characteristics	Category	Frequency	percentages (%)
Age	Under 25 years	2	5.1
	25-34 years	3	7.7
	35-44 years	7	17.9
	45-54 years	11	28.2
	55 years and above	16	41.0
Gender	Male	26	66.7
	Female	13	33.3
Level of education	No formal education	19	48.7
	Primary	5	12.8
	Secondary	6	15.4
	Tertiary	9	23.1
Employment status	Unemployed	4	10.3
	Self-employed	9	23.1
	Employed	10	25.6
	Retired	16	41.0
Monthly household income	Below R1000	7	17.9
	R1001-R3000	8	20.5
	R3001-R5000	6	15.4
	Above R5000	18	46.2
Years in farming	Less than 1 year	5	12.8
	1-3 years	9	23.1
	4-6 years	12	30.8
	More than 6 years	13	33.3

Household Income

Household income levels varied among farmers. About 46.2% reported monthly incomes above R5000, while others reported lower incomes. This variation indicates differences in financial capacity among households, which should be considered when recommending farming practices that may require investment in inputs or equipment.

Farming Experience

Most farmers had considerable farming experience, with 64% reporting that they had been farming for over 4 years. This suggests that experienced farmers form the core group participating in extension programs. However, the presence of newer farmers also presents opportunities for peer learning and knowledge exchange within farming communities.

Household Size

Household size among the farmers ranged from 2 to 13 members, with an average of 7.77 members per household. These relatively large household sizes increase food demand and may compromise household food security. In such contexts, extension programs that improve productivity, efficiency, and resource management are especially important for supporting household wellbeing.

Table 2. Number of Household members

Descriptive statistics					
Characteristic	N	Minimum	Maximum	Mean	Std. Deviation
Household members	39	2	13	7.77	2.805

Participatory Extension Services

Service Providers

The results indicate that local operatives were the primary providers of extension services (48.7%), followed by government services (33.3%) and non-governmental organizations (17.9%). This highlights the important role of local actors in delivering agricultural support to smallholder farmers. Local service providers are often more accessible and better attuned to community needs, thereby improving trust and communication between farmers and extension personnel. Similar findings have been reported in other developing country contexts, where decentralized and community-based extension systems have proven effective in reaching smallholder farmers (Tilumanywa, 2021). Local institutions and farmer organizations are frequently better positioned to deliver context-specific advice and to maintain regular interaction with farmers than more centralized structures (Kusnandar et al., 2023). The complementary roles of government and non-governmental organizations further suggest a pluralistic extension system, which is increasingly recognized as important for improving coverage and service quality (Saha et al., 2025).

Extension Methods

Regarding extension methods, on-farm visits (30.8%) and group discussions (28.2%) were the most common approaches used. Demonstration plots (17.9%) and farmer-to-farmer training (15.4%) were also applied, while farmer field schools were less common (7.7%). These findings show a preference for practical, interactive, and farmer-centered methods.

Participatory approaches such as farm visits and group learning are widely promoted because they allow farmers to learn by doing, share experiences, and adapt technologies to local conditions (Adamsone-Fiskovica and Grivins, 2022). Demonstration plots provide visual evidence of improved practices and have been shown to enhance adoption by allowing farmers to observe results directly (Maredia et al., 2022). Farmer-to-farmer learning is also recognized as a cost-effective and socially embedded method of knowledge transfer, especially in rural communities where trust and peer influence are strong (Ochieng et al., 2022). Although farmer field schools were less common in this study, they are globally recognized as a structured participatory method that improves farmer knowledge, experimentation, and problem-solving skills (Singh et al., 2022). The lower use of this approach may reflect resource and time requirements associated with its implementation.

Perceived Usefulness of Extension Services

Most farmers viewed the extension services positively. More than half of the respondents (53.8%) rated the services as very useful, while 33.3% considered them somewhat useful. Only a small proportion perceived them as not useful or were unsure. This indicates that participatory extension approaches are generally well received by farmers. Positive perceptions of extension services are often associated with higher levels of engagement and adoption of recommended practices (Maake and Antwi, 2022). When farmers perceive extension as relevant and responsive to their needs, they are more likely to apply the knowledge gained. Participatory approaches, which involve farmers in identifying problems and solutions, tend to increase satisfaction and ownership compared to top-down advisory models (Prajapati et al., 2025).

Benefits of Participatory Extension

Farmers reported a range of benefits from participatory extension services. The most frequently mentioned benefit was improved farming practices (25.6%). Other reported benefits included better decision making (17.9%), increased yields (15.4%), improved food security (15.4%), and reduced input costs (10.3%). These findings demonstrate that participatory extension contributes not only to production improvements but also to household wellbeing.

Improved farming practices and decision-making are common outcomes of participatory learning processes, as farmers gain practical knowledge and confidence to experiment with new techniques (Haryanto et al., 2021). Increases in yield and reductions in input costs have also been linked to farmer participation in extension programmes that emphasise local problem solving and efficient resource use (Mapiye et al., 2021).

Table 3. Participatory extension services

Characteristics	Category	Frequency	Percentages (%)
Service providers	Government	13	33.3
	NGO	7	17.9
	Local operative	19	48.7
Type of extension methods	Farmer field schools	3	7.7
	Demonstration plots	7	17.9
	Group discussions	11	28.2
	On-farm visits	12	30.8
	Farmer-to-farmer training	6	15.4
Rate of usefulness	Very useful	21	53.8
	Somewhat useful	13	33.3
	Not useful	3	7.7
	Not sure	2	5.1
Benefits of participatory extension services	Improved farming practices	10	25.6
	Increased yields	6	15.4
	Reduced input costs	4	10.3
	Better decision-making	7	17.9
	Enhanced food security	6	15.4
	Other benefits	6	15.4

Conclusion

The study showed that participatory extension methods play an important role in supporting smallholder farmers in Nkomazi. Farmers who participated in these programs were mainly older adults with low levels of formal education and large households, which highlights the need for simple, practical, and inclusive extension approaches. Local service providers and methods, such as on-farm visits and group discussions, were central to extension delivery. Farmers generally perceived these services as useful and reported benefits, including improved farming practices, better decision-making, higher yields, and improved food

security. These findings suggest that strengthening participatory extension approaches can improve livelihoods and household food security among smallholder farmers. It is recommended that extension advisors and farmers in Nkomazi adopt participatory extension approaches when implementing extension programs, thereby ensuring program ownership and strengthening food security. Furthermore, they should continue to use interactive methods and ensure that services are accessible to farmers with varying levels of education and income.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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