Research article

Determinants of smallholder farm income under the Recapitalization and Development Programme: A case study from Gauteng Province, South Africa

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A B S T R A C T

Post-settlement support plays a crucial role in ensuring the sustainable development of small-scale farmers. Since 2010, South Africa has implemented the Recapitalization and Development Programme (RECAP) to support land reform beneficiaries. This paper assesses the factors influencing farm income among RECAP beneficiaries in Gauteng province, with the aim of informing strategies to enhance their earnings. Data was collected from a randomly selected sample of 100 farms using a semi-structured questionnaire. A Heckman Selection Model was applied for empirical analysis. The results indicate that only labour availability and land operated significantly influenced farmers' ability to generate income. Meanwhile, farmers' age, access to extension services, market access, and enterprise mix were key determinants of income levels. Notably, none of the RECAP-related variables showed a significant relationship with either the ability to earn income or the level of income achieved. These findings highlight that financial support alone is insufficient to meet the agricultural development goals of land reform. Effective support must also address critical factors such as labour availability, extension service quality, market access, and broader capacity challenges. The study recommends strengthening the mentorship programme, improving capacity on land reform farms, providing in-service training for extension officers, supporting young farmers, and facilitating access to high-value markets.

1. Introduction

Post-settlement support is widely recognized as a key strategy for promoting land and agrarian transformation in low- and middle-income countries. In South Africa, it has been identified as a crucial component in enhancing the success of the land reform programme [1,2]. Land reform aims to address historical injustices resulting from colonial land dispossession. The majority of land reform beneficiaries are disadvantaged Black South Africans who, without adequate support, may struggle to utilize the land productively [3]. Studies indicate that a significant proportion of land reform projects remain underutilized. For instance, Aliber et al. [4] found that 46 % of land reform projects in Limpopo Province were idle, while Kirsten and Machete [5] reported that in North West Province, 27 % of projects were non-operational, and 24 % had no agricultural production. As a result, post-settlement support has been recommended as a critical measure to address financial constraints and improve the productivity and sustainability of transferred farms. However, it is

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essential to assess whether such interventions are effectively supporting emerging farmers and improving the livelihoods of intended beneficiaries.

To enhance the productivity of land reform beneficiaries, the South African government introduced the Recapitalization and Development Programme (RECAP) in 2010. This initiative aimed to strengthen the capacity of land reform farmers, enabling them to maximize land use and leverage opportunities in the agricultural sector [6]. RECAP beneficiaries included both individual farmers and cooperatives. The programme provided two forms of support: recapitalization funding—where the government covered part of the costs while strategic partners or commercial farmers contributed the rest [7]—and development funding, which required applicants to present high-case business plans aligning with their developmental goals [1]. Between 2010 and 2014, approximately R3.318 billion was allocated to 1459 farms, benefiting around 28,000 individuals [2]. Given this substantial investment, it is necessary to assess whether the programme has yielded meaningful outcomes.

Although RECAP has recorded some success stories [6], there are concerns that these achievements do not justify the level of investment, suggesting limited value for money. Many stakeholders agree that the programme has largely underperformed, particularly in fostering employment and improving market access [6,8]. The inefficiencies of the Department of Rural Development and Land Reform (DRDLR) have also been cited as a contributing factor [8,9]. However, the programme's impact may vary by sector. Ellenson and Madhanpall [1] found that some funded farms in the sugar industry experienced growth in employment and output, highlighting the importance of evaluating RECAP's effectiveness within specific agricultural sectors.

Several studies have assessed the success of land reform in South Africa ([8–10]; [41]), with a common conclusion that post-settlement support is essential for beneficiaries to succeed. A decade after its inception, there is much to learn from RECAP's progress in achieving its intended goals. Evaluating the programme at different levels is crucial for the future of agricultural transformation and the success of land reform efforts. Research has also shown that RECAP's performance varies across provinces, potentially due to differences in project evaluation methods, mentor recruitment, and monitoring processes [1,2].

Gauteng, however, has received limited empirical attention regarding RECAP's impact, likely because it is primarily an urbanized province with minimal agricultural activity. It has the smallest proportion of farms (5.7 %) and agricultural land (0.8 %) in the country [11]. Consequently, Gauteng also had the fewest hectares funded under RECAP (1.4 %) and the lowest number of beneficiaries [2]. Given these unique characteristics, it is important to assess RECAP's contribution to agricultural development within the province.

This study aims to examine the factors influencing the farm income of RECAP beneficiaries, focusing specifically on individual land reform farmers in Gauteng. By doing so, it contributes to the broader literature on the effectiveness of post-settlement support programmes in agriculture. The primary objective is to determine whether RECAP-related factors significantly impact farmers' income levels, providing insights for policymakers seeking to enhance support strategies for smallholder farmers under the land reform initiative. While the determinants of farm income have been extensively studied, few studies in South Africa have explored the link between income generation and post-settlement support programmes such as RECAP [12,13]. This research seeks to address that gap, making a valuable contribution to the field.

2. Post-settlement support and agrarian transformation

Post-settlement support is a fundamental aspect of agrarian transformation in Africa. Research indicates that land reform programmes in countries such as Australia, Brazil, the Philippines, and Zimbabwe have faced significant challenges due to insufficient post-acquisition support [14]. Similarly, one of the key reasons for the underperformance of South Africa's land reform programme is the inadequate and poor-quality post-settlement support [2,9,15,16]. Essential complementary support—such as training, mentorship, farm inputs and equipment, access to credit, irrigation infrastructure, crop subsidies, technological advancements, and processing facilities—is crucial for the success of land redistribution. However, there has been a disconnect between the legal framework for land acquisition and resettlement and the funding mechanisms necessary for beneficiaries to effectively utilize the land [7]. This gap has hindered resettled farmers from competing in capitalist markets dominated by large-scale commercial producers. Cousins [7] argues that government support in South Africa should prioritize "accumulation from below," meaning targeted assistance for Black farmers to enhance their productivity and market participation.

Maladministration and corruption have also undermined support for land reform beneficiaries, as seen in the Philippines [17]. This issue is not unique to the Philippines but has been a recurring challenge in many countries undergoing agrarian transformation in the Global South. Additionally, reluctance by some governments to grant full land ownership to the Black majority has further hindered progress, as seen in South Africa [18]. Without adequate support, resettled land often reverts to wealthy individuals, perpetuating rural poverty [16]. In the absence of policies restricting the sale of redistributed land, some beneficiaries may find it more beneficial to sell their land rather than struggle to develop it. Even when such restrictions exist, beneficiaries may be forced into exploitative partnerships with wealthy investors, limiting their control over the land and its outputs.

Policy consistency is also critical for the success of land reform and agrarian transformation. However, South Africa has experienced frequent policy shifts since 1994, which have negatively impacted the effectiveness of land reform initiatives [19]. Given the complexity of land reform, the coordination of various stakeholders—each playing a vital role—is essential to its success. Xaba [15] emphasizes that effective stakeholder collaboration and sufficient institutional capacity are necessary for land reform initiatives to achieve their intended outcomes.

3. Research methodology

3.1. Description of the study area

The survey was conducted in the Tshwane, Sedibeng, and West Rand districts of Gauteng province, South Africa (Fig. 1). Gauteng is the smallest province in the country, covering an area of 18,178 km^2, which accounts for just 1.4 % of South Africa's total land area [20]. It is bordered by the Northwest, Limpopo, Free State, and Mpumalanga provinces. Despite its small size, Gauteng is the most densely populated province, home to 24.1 % of the country's total population. It remains the economic hub of both South Africa and the broader subcontinent, contributing approximately 34.8 % of the national GDP [20]. The province's economy is primarily driven by mining, manufacturing, banking and financial services, innovation, and trade [42].

Although agriculture plays a relatively minor role in Gauteng's economy, it remains an essential livelihood activity for many residents. The province has implemented over 115 land reform projects covering more than 19,000 ha. By 2015, Gauteng had invested approximately R203 million in RECAP [2]. The predominant farming system in the province is mixed farming, with activities including crop cultivation, animal husbandry, forestry, logging, and fishing ([41]).

3.2. Sampling and data collection

The study was conducted in May 2020 and utilized a semi-structured questionnaire to collect data from 100 land reform beneficiaries who had also received support through RECAP. These farmers were supported as individuals rather than as members of co-operatives. The respondents were between 30 and 75 years old. Trained enumerators administered the questionnaire, which gathered information on various aspects, including household demographics, farm income, RECAP support, perceptions of the mentorship
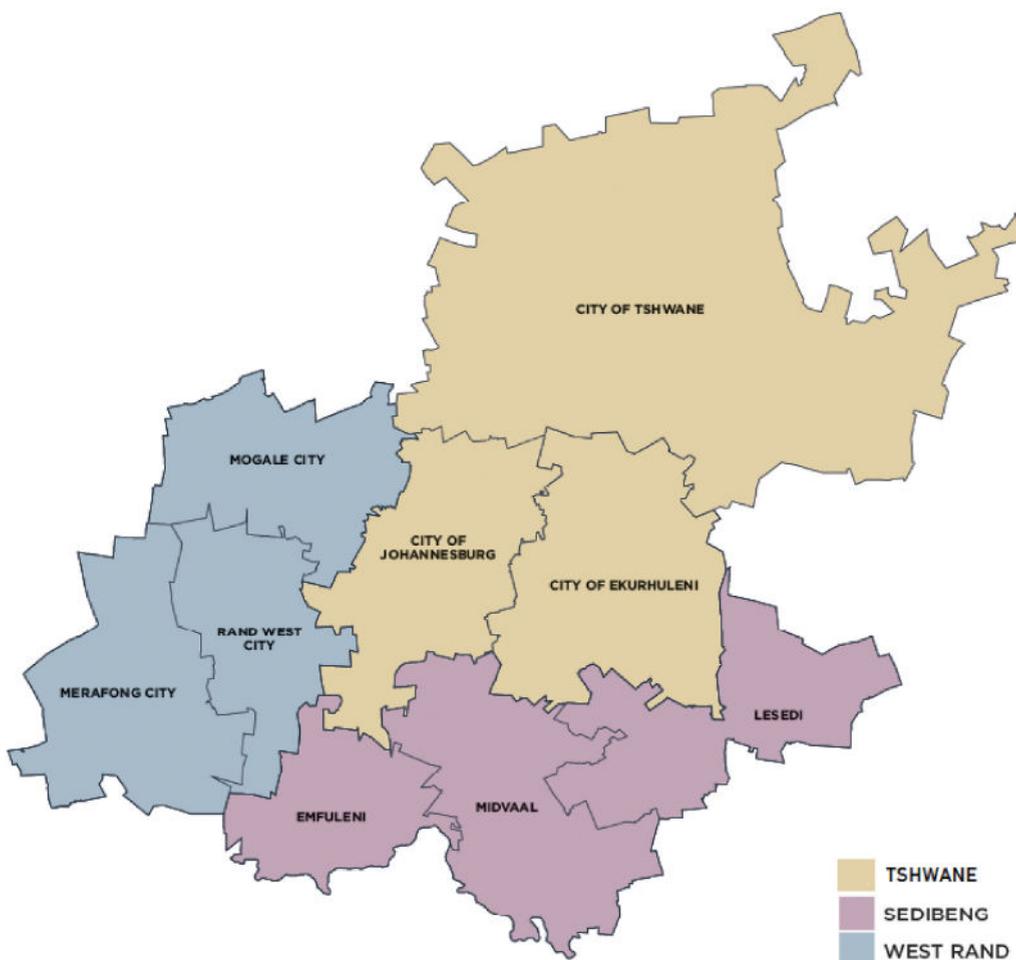

Fig. 1. Map showing the three districts of Gauteng province.
Source: Municipalities.co.za (2021)

programme, farm enterprises, labour, land utilization, extension services, training, and market access.

A stratified random sampling approach was used to select respondents from a list of RECAP beneficiaries provided by the Department of Rural Development and Land Reform in Gauteng province. The study's questionnaire and research procedures received approval from the University of South Africa (UNISA) - College of Agriculture and Environmental Sciences (CAES) Health Research Ethics Committee (HREC) (reference: 2019/CAES_HREC/118), and written informed consent was obtained from all participants. Participants signed the consent form before they were interviewed.

3.3. Analytical framework

3.3.1. Heckman Selection Model

The study employed the Heckman selection model with maximum likelihood estimation to assess the factors influencing farm income among beneficiaries of the land reform program. This model was preferred over the Tobit model because it relaxes the assumption that both zero and positive farm income values come from the same probability distribution. By relaxing this assumption, the Heckman model provides a better fit [21]. Additionally, a two-part model is preferred over a one-part model as it allows the same independent variable to have different effects on the selection and outcome equations. The decision to sell farm produce is preceded by a decision to participate in the market. For RECAP farmers, this decision can be either intentional, where farmers choose to produce for sale, or unintentional, where farmers fail to produce enough surplus to sell in the market. Therefore, it is likely that an individual's participation in the market is not random, introducing potential selection biases. Unlike the Tobit model and other two-part models like the double hurdle, the Heckman model corrects for selection bias, resulting in more efficient and consistent estimates [22]. Following the approach of Cameron and Trivedi [21], the empirical model for the study was defined as follows:

Let y_2^* represent a latent outcome variable which is observed when a second latent variable $y_1^* > 0$. In the study, y_1^* determines whether a farmer has any farm income, i.e., did they participate in the market, y_2^* determines the level of farm income, and $y_1^* \neq y_2^*$. The selection equation for y_1 is given by

$$y_1^* = x_1'\beta_1 + \varepsilon_1$$

where

$$y_1 = \begin{cases} 1 \text{ if } y_1^* > 0 \\ 0 \text{ if } y_1^* \leq 0 \end{cases}$$

The outcome equation for y_2, the log of farm income, is given by

$$y_2^* = x_2'\beta_2 + \varepsilon_2$$

where

$$y_2 = \begin{cases} y_2^* \text{ if } y_1^* > 0 \\ - \text{if } y_1^* \leq 0 \end{cases}$$

The residuals (ε_1 and ε_2) are possibly correlated and are assumed to be jointly normally distributed and homoscedastic. x_1' and x_2' are vectors of independent variables and β_1 and β_2 are parameter estimates.

The likelihood function of the model is given by

Table 1
Description of independent variables included in the model.

Variable	Description	Tshwane	Sedibeng	West Rand	Overall	Expected sign (±)
AGE	Age of the farmer (years)	55.0 (10.3)	56.4 (10.0)	52.5 (9.0)	55.3 (9.9)	+
LANDOP	Land operated (hectares)	128.3 (175.7)	205.2 (220.5)	238.4 (341.5)	184.7 (233.5)	+
LABOUR	Number of farm employees	3.6 (2.8)	3.3 (3.5)	4.8 (6.4)	3.7 (3.9)	+
RECAP_$	Log of RECAP funds	6.2 (0.5)	6.2 (0.4)	6.2 (0.6)	6.2 (0.4)	+
GENDER	Gender of the farmer (1 = female, 0 = otherwise)	58.5 %	42.9 %	52.9 %	50.0 %	+
LVSTK	Farming livestock (1 = farming livestock, 0 = otherwise)	67.7 %	71.4 %	64.7 %	69.0 %	+
EXTENSION	Access to extension (access extension, 0 = otherwise)	88.2 %	79.6 %	94.1	85.0 %	+
TRAINING	Training in financial management (1 = trained, 0 = otherwise)	50.0 %	59.2 %	52.9 %	55.0 %	+
MKT_ACC	Market access (1 = have access to markets, 0 = otherwise)	93.9 %	89.8 %	88.2 %	90.9 %	+
MENTOR	Perceptions on impact of mentors (1 = mentors added value, 0 = otherwise)	23.5 %	10.2 %	29.4 %	18.0 %	+

Source: Survey Data (May 2020)

$$L = \prod_{i=1}^{n} \left\{ \text{Pr} \left(y_{1i}^* \leq 0 \right) \right\}^{1-y_{1i}} \left\{ f\left(y_{2i} \big| y_{1i}^* > 0 \right) \times Pr\left(y_{1i}^* > 0 \right) \right\}^{y_{1i}}$$

where the first term represents the contribution when $y_{1i}^* \leq 0$, and the second term is the contribution when $y_{1i}^* > 0$. The model is estimated using robust standard errors to ensure that the assumption of homoscedasticity of the residuals is not violated. Multi-collinearity was checked using the variance inflation factor (VIF). The rule of thumb states that a VIF of less than 10 shows that multicollinearity is insignificant to cause any biases in the estimated coefficients.

3.3.2. Independent variables

Table 1 presents the independent variables included in the model. The demographic characteristics of the farmers are represented by two variables: age (AGE) and gender (GENDER). In this paper, gender is understood as the socially constructed roles, behaviours, and identities attributed to women and men, as defined by the prevailing social norms and cultural expectations in the study area. LANDOP measures the land operated by farmers in hectares during the 2019/20 production season. LABOUR represents the total number of full-time and hired farm employees. Three variables were included to assess the association between RECAP and farm income: RECAP_$ (the logarithm of funds received from RECAP), MENTOR (farmers' perceptions of the impact that the programme's mentors had on their farm performance), and TRAINING (training received in financial management). Since enterprise choice can influence farm income, a variable for livestock farming (LVSTK) was included. Access to information was measured using the EXTENSION variable, which indicates the availability of extension services to the farmers. MKT_ACC represents farmers' access to both formal and informal markets. All variables were expected to have a positive effect on farm income.

3.4. Study limitations

The study did not encounter any significant limitations. However, one constraint was its focus on Gauteng province, primarily due to financial constraints. A broader comparison across multiple provinces could have provided more comprehensive insights. Therefore, caution is advised when generalizing the findings to all RECAP beneficiaries at the national level.

4. Results and discussion

4.1. Socio-demographic characteristics of farmers under RECAP

Table 1 above provides a comparative analysis of various characteristics of the RECAP individual farmer beneficiaries across three regions in Gauteng province: Tshwane, Sedibeng, and West Rand. Examining the age of farmers, Sedibeng has the oldest farming population, with an average age of 56.4 years, followed by Tshwane at 55.0 years, and West Rand with the youngest group at 52.5 years. These figures are below the national average of 62 years, suggesting that Gauteng province has a relatively younger farming population [23]. The findings indicate that farming in Sedibeng may be dominated by more experienced individuals, whereas West Rand has a relatively younger demographic that could bring innovation and adaptability. In terms of land, West Rand farmers operate the largest land areas, averaging 238.4 ha, compared to 205.2 ha in Sedibeng and just 128.3 ha in Tshwane. This variation suggests differences in land availability, ownership structures, or farming practices. Additionally, the number of farm employees follows a similar trend, with West Rand farmers hiring the most labour (4.8 workers on average), while Sedibeng farmers employ the least (3.3 workers). This is likely due to the larger farm sizes in West Rand, which require a higher workforce. This partially aligns with the Gauteng Census of Commercial Agriculture Report, which also shows that Sedibeng has the lowest employment statistics in the sector [11].

Comparison by gender shows that Tshwane has the highest percentage of female farmers at 58.5 %, followed by West Rand at 52.9 %, while Sedibeng has the lowest representation at 42.9 %. This suggests that Tshwane has a relatively more inclusive farming environment. However, despite these findings, the overall statistics in West Rand and Tshwane indicate a higher male population Statistics South Africa, 2022). This highlights the gender inclusivity efforts under RECAP, which may be contributing to greater female participation in farming. Meanwhile, in livestock farming, Sedibeng leads with 71.4 % of farmers engaged in livestock production, followed by Tshwane at 67.7 %, and West Rand at 64.7 %. The prominence of livestock farming in Sedibeng may be due to favourable environmental conditions or strong traditional livestock-rearing practices.

Access to extension services varies significantly across the regions. West Rand farmers report the highest access at 94.1 %, compared to 88.2 % in Tshwane and just 79.6 % in Sedibeng. The lower extension support in Sedibeng suggests a need for increased advisory services to improve farming productivity. Similarly, training in financial management is most prevalent in Sedibeng (59.2 %), while Tshwane (50.0 %) and West Rand (52.9 %) lag behind. This suggests that financial literacy programmes have been more effectively implemented in Sedibeng, helping farmers manage their resources better. Regarding access to markets, farmers in Tshwane have the highest market access (93.9 %), followed by Sedibeng (89.8 %) and West Rand (88.2 %). The higher market access in Tshwane could suggest better infrastructure, proximity to markets, or stronger farmer-trader linkages. The Gauteng agriculture sector's focus on providing fresh produce to urban markets supports this observation, as proximity to urban centres facilitates market access [24]. However, perceptions of the impact of mentorship programs differ widely. West Rand farmers find mentorship the most beneficial (29.4 %), followed by Tshwane (23.5 %), while Sedibeng has the lowest perception (10.2 %). This indicates that mentorship programs in Sedibeng may not be as effective or well-structured.

4.2. Farmers experience with RECAP

Before the introduction of RECAP, most farmers struggled to recapitalize their farms. However, RECAP reduced the percentage of farmers unable to fund their farms from 83 % to 25 %, indicating that the program helped alleviate financial challenges. This finding is consistent with other studies, such as those by Phasha and Moyo [8] and Wale, Chipfupa, and Hadebe [25], which highlight the lack of credit or finance as a significant constraint for emerging farmers in South Africa. The limited availability of funding from sources like the Land Bank, combined with stringent conditions, means that few smallholder farmers can access financial support. This underscores the importance of financial mechanisms like RECAP.

Table 2 presents the mean RECAP funds received by farmers across the three study areas. The amounts varied significantly, ranging from as little as ZAR72,000 to as much as ZAR11,000,000. This wide variation explains why some farmers still faced financial difficulties even after receiving RECAP funding. The amount received was dependent on the proposed scale of operation and the quality of the business plans submitted with their applications. Notably, there were no significant differences in the mean funds received across locations.

However, farmers reported challenges with the application process, particularly the lengthy waiting periods for fund disbursement after approval. Approximately 47 % of farmers waited 2–3 years to receive funds, while 37 % waited for a year. Around 5 % waited more than 4 years, leaving only 11 % who received funds within six months of approval. These delays affected farmers' ability to plan and implement their business strategies, ultimately impacting farm performance. Bureaucratic delays have long been identified as an obstacle to the success of government programs in Africa [26].

RECAP included complementary services such as mentorship, training in financial management, and marketing, which were mandatory conditions for successful applicants. Mentors were expected to oversee the use of the funds, implement sound business strategies, connect farmers to markets, and transfer technical skills. However, the results of the study show that only 18 % of farmers felt the mentorship programme added value to their farms. Most farmers did not perceive any positive impact from the mentorship. Some reported that mentors were not aligned with their business plans, failing to provide the necessary equipment or purchasing unsuitable items. These issues suggest a lack of shared vision between farmers and mentors regarding the farm's future direction.

Furthermore, farmers indicated that some mentors were more interested in financial gain than in the wellbeing of their farms. Some mentors failed to visit the farms as expected. The selection process for mentors appeared inadequate, leading to the appointment of unsuitable individuals. Many farmers reported being assigned mentors by the government as a condition for receiving funding. Additionally, personality differences between mentors and mentees often hindered effective collaboration. As a result, the mentorship component of RECAP did not function as intended and may have negatively impacted the program's overall success. These findings align with Golele, Mautjana, and Makombe [27], who found that mentorship contracts under the DRDLR were ineffective due to mismanagement of mentorship funds and the lack of legal consequences for misconduct. Maka and Aliber [2] also observed that the mentorship period was too short to adequately equip farmers with the skills necessary to run profitable farms.

4.3. Farm income

The results show that 36 % of the sampled farmers had no farm income during the 2019/2020 production season. These farmers either did not produce enough to sell in the market or did not engage in farming at all. This could be attributed to the impact of coronavirus disease (COVID-19), particularly the disruption of farming activities due to the lockdown and reduced funding support. Interestingly, there were no significant differences in income by gender, indicating that gender-related factors did not contribute to the poor performance.

Significant disparities in farm income were observed among those who participated in produce markets. While some farmers earned as much as ZAR800,000 per month, others only earned ZAR2,000 per month. Table 3 shows the average monthly farm income by study area and enterprise type. The mean monthly farm income was ZAR86,849. Notably, significant differences in income were observed by type of enterprise. Farmers engaged in mixed farming (both crop and livestock) earned significantly higher incomes compared to those involved in crop-only or livestock-only farming. This could be due to the complementarity between the two enterprises, enhancing their cost-effectiveness, efficiency, and overall performance [28,29].

4.4. Empirical model results

Table 4 presents the model results for the determinants of household farm income among RECAP beneficiaries. The model

Table 2
Mean RECAP funds per location.

Location	N	Mean (ZAR)	Std. Deviation	Std. Error	Minimum	Maximum
Tswane	34	2,445,957	2,499,772	428,707	200,000	11,000,000
Sedibeng	49	2,088,830	1,177,230	168,176	200,000	4,400,000
West Rand	17	2,685,609	1,775,159	430,539	72,000	5,300,000
Total	100	2,311,705	1,821,800	182,180	72,000	11,000,000

Note: F = 0.81; p-value = 0.446; ZAR – South African Rand.
Source: Survey Data (May 2020)

Table 3

Mean monthly farm income of RECAP beneficiaries (2019/2020 season).

Variable		N	Mean (ZAR)	Std. Dev	Std. Error	Minimum	Maximum
Location	Tswane	34	105,318	161,800	27,748	0	800,000
	Sedibeng	49	74,798	136,965	19,566	0	660,000
	West Rand	17	84,647	94,089	22,820	0	260,000
Enterprise	Cash crops only	16	71,563	161,820	40,455	0	660,000
	Livestock and poultry only	30	44,060	78,774	14,382	0	260,000
	Mixed farming	54	115,150	153,583	20,900	0	800,000
Total		100	86,849	139,436	13,944	0	800,000

Note: Location (F = 0.48; p-value = 0.621); Enterprise (F = 2.71; p-value = 0.071).
Source: Survey Data (May 2020)

Table 4

Heckman selection model (maximum likelihood) empirical results.

Independent variables	Farm income			Market Participation		
	Coef.	Robust Std. Err.	P > z	Coef.	Std. Err.	P > z
AGE	−0.028[b]	0.014	0.051	0.007	0.018	0.715
GENDER	−0.124	0.341	0.716	0.023	0.377	0.951
LANDOP	0.001	0.001	0.423	0.001[c]	0.001	0.060
LABOUR	−0.013	0.088	0.886	0.352[b]	0.140	0.012
LVSTK	0.643[b]	0.320	0.045	0.259	0.398	0.514
EXTENSION	−0.725[b]	0.313	0.021	0.260	0.461	0.572
TRAINING	−0.261	0.863	0.762	0.694	0.574	0.227
MKT_ACC	1.359[b]	0.585	0.020	0.611	0.887	0.490
RECAP_$	0.544	0.377	0.149	0.527	0.557	0.344
MENTOR	0.296	0.419	0.481	–	–	–
_cons	8.459	3.303	0.010	3.876	4.227	0.359
/athrho	−0.495	1.659	0.765			
/lnsigma	0.085	0.277	0.758			
Rho	−0.458	1.311				
Sigma	1.089	0.302				
Lambda	−0.499	1.561				
No. of observations (selected = 64; non-selected = 35)	99.00					
Wald chi2(10)	69.72			Prob > chi2		0.0000
Log pseudolikelihood	−140.01					
Wald test of indep. eqns. (rho = 0):		chi2(1)	0.09	Prob > chi2		0.7653

Note: ***, **, * shows significance level at 1 %, 5 % and 10 %.
Source: Survey data (May 2020)

demonstrated a good fit, with the Wald test being statistically significant at the 1 % level (p-value = 0.000). To address potential heteroscedasticity, the model was estimated using robust standard errors. Multicollinearity was not a concern, as indicated by a mean Variance Inflation Factor (VIF) of 1.37, well below the threshold value of 10. Additionally, the Wald test for the independence of equations was insignificant, suggesting that the residuals of the two equations were independent, and selection bias was not an issue.

4.4.1. Factors affecting the ability to earn farm income

Only two variables—LABOUR and LANDOP—had a positive and significant relationship with farmers' likelihood of participating in produce markets and earning an income. An increase in farm employees raised the probability of earning an income. Given the scale of operations on RECAP farms, labour constraints could negatively impact essential farm processes, ultimately reducing productivity [30].

The results also indicate that farmers operating larger pieces of land were more likely to earn an income. Cultivating more land, ceteris paribus, increases the likelihood of harvesting a larger output, which aligns with the findings of Nenngwekhulu [31]. However, the ability to utilize larger land areas effectively depends on the availability of complementary resources such as equipment, working capital, and labour. This suggests that market participation and income generation among RECAP beneficiaries are largely determined by their overall capacity rather than just financial assistance.

Notably, none of the RECAP-related variables had a significant association with farmers' ability to participate in markets or their farm income levels. This suggests that RECAP may have overlooked critical factors necessary for farm performance. One such factor is farm machinery. While RECAP included funding for machinery purchases to improve land utilization, challenges with the mentorship component and financial mismanagement hindered the realization of this objective. Another assumption under RECAP was that once farmers received funding, they would allocate resources to address capacity constraints, including labour shortages. However, the extent to which this assumption held true remains questionable. Golele, Mautjana, & Makombe [27] also questioned the success of the

mentorship programme, despite farmers perceiving it positively. Their study found that these positive perceptions were not reflected in actual farm performance.

The findings of this study align with those of Rusenga [32] but contradict those of Shabangu et al. [12]. Rusenga [32] showed that even though post-settlement support is important, it alone is insufficient to drive the expected transformation in the agricultural sector in South Africa. In contrast, Shabangu et al. [12] argue that RECAP support, particularly through mentorship and strategic partnerships, enhances the participation and performance of beneficiary farmers. Meanwhile, Gandidzanwa, Verschoor, & Sacolo [33] conclude that the impact of RECAP varies across provinces and is highly context-dependent.

4.4.2. Factors affecting the level of farm income of RECAP beneficiaries

The study identified four key variables that influenced the farm income of RECAP beneficiaries in the study area: AGE, LVSTK, EXTENSION, and MKT_ACC (Table 4). The age of the farmer had a negative and statistically significant relationship with farm income. Holding other factors constant, a unit increase in the farmer's age resulted in a 28 % decrease in farm income. This finding suggests that younger RECAP beneficiaries tend to perform better and earn higher incomes compared to older farmers. The results highlight the potential role of younger farmers in advancing the national agenda for transformative agriculture. Younger beneficiaries appear to be better equipped to handle the physical and intellectual demands of managing large-scale farms [34].

Livestock farming had a positive and significant impact on farm income. Engaging in livestock production increased farm income by 90 %, suggesting that the choice of farm enterprise is critical in determining the success of RECAP-supported farms. Farms specializing in livestock or adopting mixed farming (livestock and crops) outperformed those engaged solely in crop production. Livestock accounts for approximately 40 % of South Africa's agricultural value, and the price of cattle—the most commonly farmed livestock—has increased more than fivefold since 2000 [35].

Unexpectedly, access to extension services had a negative and significant effect on farm income. While extension services are typically expected to enhance farm productivity and performance [25,36], the poor quality of extension services provided to farmers likely contributed to this outcome. This finding aligns with previous studies by Phasha & Moyo [8] and Chipfupa, Tagwi, & Wale [37], which reported that some smallholder farmers expressed dissatisfaction with the quality of extension services available to them.

Access to formal markets had a positive and significant effect on farm income. Farmers with access to credible formal crop and livestock markets saw their income nearly triple. Ready market access reduced the risk of product spoilage and losses, a key factor affecting the performance of emerging farmers. Additionally, access to formal markets allowed farmers to sell their produce more quickly and in bulk. However, as noted by Khapayi & Celliers [38], market access remains a major constraint for most South African farmers. Cousins [39] found that land reform beneficiaries often fail to capitalize on economic opportunities in formal markets, instead selling their produce to informal traders. Discussions with farmers in this study revealed that some self-excluded from formal markets due to the strict quality standards and consistency requirements, which they struggled to meet. These barriers have been widely recognized as key challenges preventing emerging farmers from successfully entering formal markets [40].

5. Conclusions and policy implications

The study aimed to examine the factors influencing farm income among RECAP beneficiaries. The findings indicate that while RECAP provided financial relief to some land reform farms, this did not necessarily lead to improved farm performance in Gauteng province. One of the key challenges was the ineffective mentorship programme, which was hindered by factors such as conflicting perspectives between farmers and mentors, personality mismatches, and a lack of understanding among farmers regarding the role of mentors. As a result, RECAP had a minimal impact on the productivity of land reform beneficiaries. To enhance future initiatives, it is crucial to refine mentor selection and matching processes and facilitate joint farmer-mentor workshops to establish clear expectations and foster effective working relationships.

Addressing labour shortages also emerged as a critical factor for the success of land reform farms. Human capital plays a vital role in ensuring the full utilization of farm capacity. The transition from subsistence to commercial farming under the land reform programme requires scaling up operations, which must be supported by skilled labour to enhance efficiency and productivity. Similarly, land utilization depends on access to labor, machinery, and technical expertise. RECAP and future similar programs should incorporate robust capacity-building strategies as part of their support package for emerging farmers. While financial assistance is important, the findings demonstrate that it alone is insufficient to achieve agricultural transformation and development goals.

The study also highlights the need for a stronger focus on young farmers in agricultural development initiatives. Although many young people tend to overlook farming as a career, those with a genuine interest in agriculture have significant potential for success. The evaluation of RECAP applications should also consider the enterprise mix on farms, ensuring that farmers adopt business models with higher profitability based on market trends. Additionally, findings point to an urgent need to improve the quality of extension services. This could involve in-service training for extension officers to equip them with up-to-date knowledge and skills in line with evolving agricultural practices. Furthermore, RECAP should continue supporting market-driven strategies to improve farmers' access to profitable markets, addressing barriers to entry and enabling land reform beneficiaries to take advantage of available opportunities.

Specific recommendations were made for the three areas involved in the study. In Tshwane, where landholdings are smaller, RECAP should focus on boosting productivity through modern agricultural technologies and financial support. In Sedibeng, where access to extension services is limited, greater investment in agricultural advisory programs is needed. Given the lower levels of financial management training in Tshwane and West Rand, targeted capacity-building programs should be introduced. Additionally, mentorship programs in Sedibeng should be strengthened to ensure that farmers receive adequate guidance and support to enhance their agricultural performance.

Future research should expand the study to include all provinces in South Africa and incorporate in-depth interviews with mentors to gain a comprehensive understanding of farms supported by RECAP. Furthermore, an impact assessment of RECAP should be conducted to evaluate its influence on key economic and welfare indicators in land reform farms.

CRediT authorship contribution statement

Unity Chipfupa: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Magauta A. Mokoena:** Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Aluwani Tagwi:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Michael A. Antwi:** Writing – review & editing, Supervision, Conceptualization.

Data availability

The data that support the findings of this study are available from the corresponding author upon request.

Disclaimer

The writers' views and opinions mentioned in this article are their own and do not necessarily reflect the official viewpoint of any of the authors' linked agencies.

Funding information

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

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