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Determination of farmers' willingness to pay for improved maize seed in Morogoro using field experiment for enhancing agricultural productivity

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Abstract

This study determined the willingness to pay (WTP) for improved maize seeds among smallholder farmers in Morogoro region using Becker DeGroote Marschak (BDM) and Take It or Leave It (TIOLI) elicitation methods. It also assessed factors affecting willingness to pay for the improved maize seed. The study area includes Kilosa and Mvomero districts in Morogoro region, chosen for their significant maize production and accessibility. A sample size of 208 maize-producing households was selected using purposive and random sampling. The field experiment was done with each household on how they purchase seed in the market. Descriptive statistics was used to explain the household characteristics and to estimate the mean willingness to pay. The Probit and linear regressions were used to assess the factors that influence the willingness to pay for improved maize seeds. By combining incentive-compatible experimental methods with regression analysis, this study provides rare field-based evidence on affordable price thresholds for improved seed adoption among Tanzanian smallholders. Results indicate that the mean WTP for 2kg of improved maize seeds was approximately Tshs 5231 using the BDM method and Tshs 5000 using the TIOLI method. Implying that farmers are ready to purchase the improved maize seed at an average price of 5000Tshs to ensure continuity of using the seeds. The factors influencing WTP included maize yield, plot size, education level, and land terrain. The study concludes that smallholder farmers in the study area are willing to invest in improved maize seeds, particularly when the seeds are reasonably priced and accessible. Key policy recommendations include government subsidies for improved seeds, enhanced agricultural extension services, and promoting farmer cooperatives.

Key words: *BDM; TIOLI; improved seed; maize seeds; productivity; willingness to pay*

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Introduction

Agriculture is a critical driver of economic growth in developing nations, particularly within Sub-Saharan Africa. In Tanzania, the agricultural sector comprises roughly 28% of the national Gross Domestic Product (GDP) and provides employment to about 75% of the country's labor force (NPS, 2022). Maize, a staple crop is pivotal in Tanzania's agricultural framework, covering approximately 2 million hectares of land and contributing nearly 50% to rural cash income (Mutanyagwa *et al.,* 2018). This crop serves as the dietary mainstay for 80% to 90% of the Tanzanian population (Mtaki, 2017), underscoring its importance to both rural and urban livelihoods. Despite the increase in maize production per hectare observed in recent years, average yields remain substantially below the potential yield of 4 tonnes per hectare (Shausi *et al.,* 2019). Limited adoption of productivity-enhancing technologies, such as improved seed varieties and fertilizers, continues to constrain maize productivity, with only 26% of agricultural land currently using improved maize seeds (Mutanyagwa *et al.,* 2018). National and international efforts, including Agenda 10/30, and initiatives from organizations like the Green Revolution in Africa (AGRA) and Feed the Future (USAID), have promoted the development of improved maize seeds. Despite these efforts, adoption of these improved seeds has been low, primarily due to high costs, limited availability, and knowledge gaps among farmers (Lyimo *et al.,* 2014). The economic burden on smallholder farmers, compounded by a lack of consistent access to subsidies following the termination of programs like the National Agricultural Input Voucher Scheme (NAIVS) in 2014, further restricts the adoption of improved seeds. This context poses a challenge as the demand for food production intensifies in response to a growing population, placing immense pressure on Tanzania's agricultural output (Nchembi, 2017).

The success of improved maize seed adoption depends on the willingness of smallholder farmers to invest in these varieties, with factors such as knowledge, attitude, economic constraints, and regional context influencing their decisions (Gonfa, 2015; Lunduka *et al.,* 2019). The structure of input markets and distribution channels also affects farmers' willingness to pay, as high prices and unreliable access deter continued investment in these seeds. Furthermore, the literature suggests that input usage among smallholders is tied to economic limitations, risk preferences, and practical considerations that vary by geographic and socio-cultural context (Minten *et al.,* 2013). This study, therefore, explores farmers' willingness to pay for improved maize seeds, utilizing the Becker DeGroote Marschak (BDM) and Take It or Leave It (TIOLI) methods to address biases inherent in traditional research approaches.

Moreover, there is ongoing debate regarding the economic and environmental sustainability of improved seeds for smallholders, particularly in cases where long-term financial burdens may outweigh benefits. Concerns about accessibility, affordability, and social equity of these seeds remain prominent, given that reliance on high-cost of improved seeds and complementary inputs may not be viable for all farmers. This study, by investigating the factors that shape farmers' willingness to invest in improved maize seeds, aims to offer insights that inform policy design and strategies to promote sustainable agricultural productivity and food security. Ultimately, understanding these dynamics will contribute to Tanzania's broader goals of ensuring food security and sustainable agricultural development, ensuring that the benefits of high-quality seed varieties reach the smallholders who drive the agricultural sector.

Despite sustained policy and donor efforts to promote improved maize seed adoption in Tanzania, uptake among smallholder farmers remains persistently low, largely due to high market prices and limited affordability. While existing studies have documented adoption patterns and identified socioeconomic constraints, much of the evidence on farmers' willingness to pay relies on hypothetical surveys that may overstate true demand. As a result, there is limited credible, incentive-compatible evidence on the prices farmers are actually willing to pay for improved maize seeds under real purchasing conditions. This study addresses this gap by employing two incentive-compatible elicitation methods the Becker-DeGroot-Marschak (BDM) and the Take-It-or-Leave-It (TIOLI) approaches implemented through a field experiment

involving real purchase decisions. By jointly applying these methods, the study provides robust empirical evidence on effective price thresholds and the socioeconomic factors shaping smallholder farmers' willingness to invest in improved maize seeds in Tanzania

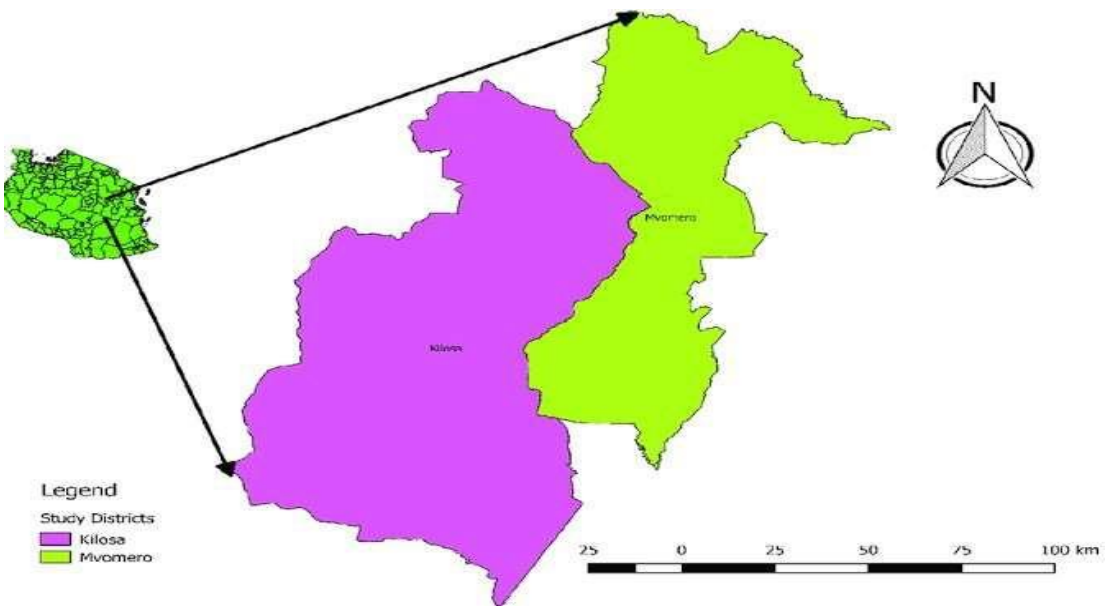
Materials and methods

Study Area

The study was conducted in Kilosa and Mvomero districts in Morogoro region which was purposively chosen as the study area. Kilosa district lies between latitude 6^0 south and 8^0 North and longitudes 36^0 30′ East and 38^0 West. It borders Mvomero district to the Eastern side. Mvomero district is located between latitude 6^0 19′ 0′′ South and longitude 37^0 22′ 59′′ East. The districts are among leading maize producing areas in the region ranking from Kilosa, Kilombero and Mvomero. Hence, the proximity between Kilosa and Mvomero district made it cost effective to conduct the study in these areas and they were close to the seed supplier of the maize variety used in the experiment.

Figure 1

Map of Kilosa and Mvomero districts



Sampling and Sample size

The selection procedure involves stages where initially districts were purposively selected based on their relevance in maize production. Within, wards, villages, and maize producing households were randomly selected using a sample frame assisted by the ward agricultural officer and the village leaders. The sample was obtained using Yamane (1967) formular $N= N/(1-N)^n$ with level of precision of 5% and 95% confidence interval which resulted a sample size of 208 maize producing households that are used in the study.

Research design

Experimental design

The field experiment was done in Kilosa and Mvomero districts. The experiment used two elicitation methods the Becker DeGroot Marschak (BDM) and take it or leave it (TIOLI). The experiment assigned one elicitation method per household where the choice of the method to use was at the discretion of the researcher. The distribution gives two groups of maize producing households, those assigned with BDM and others TIOLI at a particular point in time. The experiment

took 13 days, and we obtained a total of 208 participants. The number of participants in each method was equal since on each day both researchers ensured had four TIOLI respondents and four BDM respondents.

The product

The product was a 2kg bag of improved maize seed. The experiment had included one type of improved maize seed called Tumbili SC419. The seed has attributes including drought resistance, increasing yield with 2 cobs per plant, and short period of maturity (75-80 days). The farmers were explained about the maize seeds and researcher answered any questions that the farmers had about the product. The experiment focused on improved maize seeds due to increased concern on sustainability of food security in Sub Saharan African countries including Tanzania. The recent climatic changes including unreliable rainfall, increased drought and pests and diseases motivates development of research on improved seeds so as to understand how can farmers increase their uptakes of these varieties.

Participants

The maize farmers were educated on the importance of their participation in a study on improved maize seed decision making conducted in the study area. Two screening questions were asked: (i) whether the farmer is ready to participate in the study and (ii) whether a farmer was interested in buying improved maize seeds that day. Farmers who answered 'yes' to both questions were invited to participate in the experiment while those who had no consent were not part of the experiment. The farmers were not paid to take part in the experiment. Instead, farmers were rewarded with 5 000 Tshs cash for their participation after the experiment as a token of appreciation for their time and dedication.

Elicitation of willingness to pay

The experiment was conducted at each maize producing household that when one household is done the researcher moves to the next household at random. The willingness to pay information was obtained as follows;

a) *Take it or leave it (TIOLI)*

The take it or leave it (TIOLI) method is a simple sales offer at a randomized price. The experiment randomized three prices, Tshs 2 500, 5 000 and 10 000 onsite. Farmers were asked to pick a paper from a bowl with either of the prices above. The researcher then asks a question "are you willing to buy improved maize seeds at random picked price?" The farmer who responded "yes" purchased the seeds and a farmer who responded "no" did not purchase the seeds on that day. The farmers were emphasized that the price is picked once and there is no bargaining. The information on price distribution was known to researcher only.

b) Becker DeGroot Marschak (BDM)

The farmer was asked to state his maximum willing to pay price (*b*) for the improved maize seed offered. Then he randomly draws a paper with either of the prices Tshs 2 500, 5 000, 10 000 marked on it from a bowl. When the random price (*p*) is lower or equal to the stated willingness to pay price (*b*) then the farmer purchases the seeds at a random price. Otherwise, when the price drawn (*p*) is greater than willing to pay (*b*) then the farmer did not purchase the seeds on that day. The condition was that the paper with the random price is selected once from the bowl and only the researcher had information on price distribution.

Data Source

The primary data was used, collected using a face-to-face household survey using a questionnaire. The study used a purposive sampling to select Kilosa and Mvomero district as among the districts in Morogoro that engage in maize production. The maize producing households were selected randomly in villages by the assistance of District and Ward Agricultural Extension Officers (WAEO). A sample size of two hundred and eight (208) maize producing households was obtained and used in the study.

Model specification

From a random utility theory explained by McFadden (1975) it has been pointed to be a useful method to study how individuals make decision on willingness to pay for goods and services from given alternatives (Adalja *et al*., 2015: McFadden, 1999: Ngaiza, 2019). It assumes that if faces a number of discrete choices and he is rational, then one will select an alternative that has higher utility.

The choice for specific alternative is given when;

$$\gamma_{in} > \gamma_{jn} \quad for\ i \neq j - - - - - - - - - - - - - - (1)$$

Where; γ_{in} utility from choice i, γ_{jn} utility from choice j, $i\ and\ j$ are alternative choices from given set (w) and n is decision maker (farmer).

Now, the probability of the farmer to choose certain alternative is given as;

$$P(i/w) = \Pr(\gamma_{in} > \gamma_{jn})\ \forall\ i \neq j - - - - - - (2)$$

However, for the dichotomous choices it consists of two alternatives "i" and "j". With a probability that a farmer (n) will choose an alternative i (WTP=1) or j(WTP=0) given as;

$$P_n(i) = \Pr(\gamma_{in} > \gamma_{jn})\ for\ WTP = 1 - - - (3)$$

and

$$P_n(j) = 1 - P_n(i)\ for\ WTP = 0 - - - - - - (4)$$

Each choice made by an individual farmer has an associated utility. It has been proposed by the theory that;

$$\gamma_{ij} = \beta X_{ij} + \varepsilon_{ij} - - - - - - - - - - - - - - - - (5)$$

Where; γ_{ij} - Utility for the choice made by farmers, βX_{ij} – deterministic component of the utility with observable features, ε_{ij} - error term showing unobserved factors that affect utility, β – Parameters to be estimated, and X_{ij} – Observable explanatory variables.

Thus, willingness to pay (WTP) derived from a random utility model:

$$\gamma_{ij} = \alpha_i + \beta X_{ij} + \varepsilon_{ij} - - - - - - - - - - - - - - (6)$$

Where; α_i – Price Converting equation (6) to monetary terms/ mean willingness to pay, divide the equation by α_i to all β.

Analytical Framework

Estimation of the willingness to pay for the improved maize seed in the study area

Descriptive statistics including mean and standard deviation were used to obtain the mean willingness to pay for the improved maize seeds from both elicitation methods. The frequencies and percentages were used to explain other characteristics of farmers in the area

Factors influencing farmers willingness to pay for improved maize seeds

For the respondents assigned with BDM, the linear regression analysis is used to obtain the relationship between willingness to pay with variables hypothesized to explain willingness to pay as follows;

$$Bid\ Price_i = \beta X_{ij} + \varepsilon_{ij} - - - - - - - - - - - (7)$$

Where; Bid price/ maximum WTP_i – willingness to pay, X_{ij}– Variable of interest, and ε_{ij}- error term.

The respondents assigned with TIOLI method; the probit model is used with WTP since is not observed rather a binary indicator for whether WTP is greater a certain value (random price offer). The probit model explains the yes/no decision with variables example household characteristics, institutional factors, economic and geographical factors. The model is given as;

$$WTP_i \geq P_i = \alpha_i + \beta X_{ij} + \varepsilon_i;\ for\ WTP \geq P_i\ is\ 1, otherwise\ 0 - - - - - - - - - - - (8)$$

Where; WTP_i- Willingness to pay for household i, X_{ij}- vector of variables of interest, β parameters to be estimated, and ε_{ij}- standard error term.

Results

Household Profile

The survey results from 208 households, as detailed in (Table 1), reveal that of the respondents, 128 were from Kilosa and 80 from Mvomero. Households were predominantly male-headed (73%) compared to female-headed (27%), suggesting that male-headed households are more engaged in maize production in the study area. The average age of household heads was similar across the two districts, at 49 and 50 years for Kilosa and Mvomero, respectively. Household sizes averaged between 4 to 5 members, indicating small family units. And education levels varied, with majority of household heads having attained primary education, marking a relatively low level of formal education among maize farmers.

Table 1

Household characteristics in study area

Household Characteristics	Kilosa	Mvomero
Sex:		
Male	81	70
Female	47	10
Age	49	50
Household Size	4.3	4.5
Plot Size	3.3	2.7
Education:		
STD 7	102	67
Form 4	11	5
Form 6	1	0
Adult Education	1	0
University	0	1
Diploma	0	2
No formal Education	13	5
Membership in Formal		
Yes	29	5
No	99	75
Land Ownership:	115	58
Fully owned		
Partly Owned	3	6
Rented		
Long-term Lease	7	16
	3	0

Seed Price in the Study Area

As presented in (Table 2), there is a noticeable variation in the price of improved maize seeds in Kilosa and Mvomero, influenced by factors such as seed type, quality, and the distance farmers travel to obtain seeds. The average market price was reported to be Tshs 13 492 in Kilosa and Tshs 13 521 in Mvomero.

Table 2

Mean market price of improved maize seeds

Districts	Minimum	Maximum	Mean	SD
Kilosa	8000	18000	13492.2	2585.53
Mvomero	5000	18000	13521.3	2841.50

Due to these high prices, approximately 94% of farmers opted not to purchase improved seeds (Table 3). Factors contributing to the high costs include the quality and enhanced features of the seeds, as well as markup by agro-dealers to offset logistical expenses. This pricing disparity underscores the relevance of the study, as it reflects real-world challenges that farmers encounter in accessing improved agricultural inputs, which may affect productivity in the region.

Table 3

Barries causing Farmers not buying improved maize seeds

Reasons	Freq	Percentage
Too expensive	171	94
Don't know about them	3	2
They are not available	4	2
Don't know how to grow them	4	2
Total	182	100

Willingness to Pay for Improved Maize Seeds

The mean willingness to pay for 2 kg of improved maize seed, as determined using the Becker-DeGroot-Marschak (BDM) method, was approximately Tshs 5 231. In contrast, results from the Take It or Leave It (TIOLI) method indicated that around 49% of maize farmers are willing to pay Tshs 5 000 for improved seeds (Table 4). These findings suggest a notable level of willingness and capability among farmers to purchase improved seeds at this price, underscoring the potential for expanded use of such inputs.

Table 4

Mean willingness to pay for improved maize seed

Method	Mean WTP	SD	Method	Random Prices					
BDM	5231	2791.22	TIOLI	2500		5000		10000	
			Responses	Yes	No	Yes	No	Yes	No
			Percentages	46%	24%	49%	43%	5%	33%

Factors Influencing Willingness to Pay

Data from the BDM method was analyzed using a linear regression model, which identified key variables with significant impacts on willingness to pay. (Table 5) provides detailed statistical findings.

Table 5

Factors Influencing WTP for Improved Maize Seed

Variables	Linear Regression		Profit Regression	
	B	**Sig**	**B**	**Sig**
Age	-7.1178	0.708	0.0276	0.079*
		(118.01)		(0.02)
Sex	-103.1572	0.870	0.1289	0.733
		(627.58)		(0.38)
Household Size	19.7304	0.868	-0.0311	0.784
		(118.01)		(0.11)
Education	2357.929	0.014***	2.2688	0.001***
		(945.13)		(0.69)
Plot size	150.9539	0.062*	-0.0433	0.656
		(79.34)		(0.097)
Formal Groups	609.9328	0.311	-0.2544	0.586
		(598.66)		(0.47)
Land Ownership	374.7044	0.552	0.1059	0.826
		(628.44)		(0.48)
Land Terrain	927.0127	0.070*	0.8301	0.049**
		(505.71)		(0.42)
Price			-0.0003	0.000***
				(0.00008)
Cons	964.3813		-1.0436	
R^2	0.3677		LR	-34.5587
N	104		N	104

*Note: *** p < .01, ** p < .05, * p < 0 .1*

Maize Yield: A positive and significant relationship (1% level) exists between maize yield and willingness to pay, with a one-kilogram increase in yield correlating with a Tshs 1873 rise in willingness to pay for improved maize seed. This suggests that higher yields encourage farmers to reinvest in improved seeds.

Plot Size: positively influenced willingness to pay at a marginal level (P=0.062), with a coefficient of 150.0539. This indicates that a one-acre increase in plot size could increase willingness to pay for improved maize seed by around Tshs 150, as larger plot owners have more flexibility to experiment with new technologies.

Education of household head: was positively and significantly associated with willingness to pay (5% level), with each additional year of schooling increasing willingness to pay for improved maize seed by Tshs 2358. Educated farmers, therefore, have a higher inclination to invest in improved maize seeds. This suggests that information and cognitive capacity, rather than income alone, shape seed investment decisions.

Land Terrain: Flat land significantly increased willingness to pay for improved maize seed by Tshs 930, relative to sloped terrain. This can be attributed to the challenges of rocky or flood-prone land in hilly areas, which may discourage investment in high-cost seeds.

Using the TIOLI method, a probit regression model analyzed factors impacting the binary outcome of willingness to pay for improved maize seed. Influential factors included:
Age: significant at the 1% level with the P= 0.079 indicating that with each additional year, the probability of willingness to pay for improved maize seeds increased by 2.8% other factors remaining constant. Older farmers may be more inclined to seek seed improvements based on accumulated farming experience.

Education of household head: it positively influenced willingness to pay for improved maize seed with each additional year of schooling increasing willingness to pay by 2.3% keeping other factors constant. Educated farmers are more likely to understand and recognize the benefits of improved maize seeds unlike others.
Land Terrain: similarly significant at 1% with flat terrain increasing willingness for improved maize by 83% when other factors remain constant, compared to farmers on less ideal terrain. This relationship supports a strong link between land quality and willingness to pay for improved maize seeds.

Price: it had a negative effect with a Tshs 1000 increase in price of improved maize seeds leading to a 0.03% decrease in willingness to pay for the seeds, indicating that affordability is crucial for broader adoption of these improved inputs to smallholder farmers in the study area.
In both regression analyses, education and land terrain emerged as significant, highlighting their roles in enhancing willingness to pay for improved maize seeds.

Discussion

The findings demonstrate that socio-economic characteristics and contextual factors play significant roles in influencing the willingness of farmers in Kilosa and Mvomero districts to pay for improved maize seeds. Male-dominated, small-sized households with limited educational attainment reflect a demographic that, while open to productivity enhancements, may be limited by economic constraints.

The players in agricultural input market are incurring several costs from production of the improved seeds especially by seed companies. There have been complains on the high costs of seed breeding and certification which later increases the price of the improved seeds in the market. Majority of farmers shy away from adopting improved seeds, due to the high costs that they fail to keep up each season. The results show that farmers in the study area are willing to pay for the improved maize seed at average of Tshs 5000 for 2kg package of seed. This suggests that interventions aimed at subsidizing seed costs or improving access could boost adoption rates of the improved maize seed.

The study revealed several factors that influence the willingness of the improved maize seeds that

are discussed in detail below.

The relationship between maize yield and willingness to pay emphasizes the impact of expected returns on farmers' investment decisions. By observing increased yields with improved seeds, farmers are likely more willing to reinvest in subsequent growing seasons. Results suggest that yield increase with the use of improved maize seeds has a significant influence to attract farmers to invest in the improved agricultural inputs.

Plot size, the size of the land under cultivation is a key determinant of both production capacity and investment decisions. Larger plot sizes often enable economies of scale, reducing per-unit costs of production inputs and encouraging farmers to adopt new technologies to optimize yields. From the results it indicates that farmers with larger plots are not only able to absorb experimental costs but may also serve as early adopters, demonstrating the potential advantages of improved maize seeds to neighboring farmers with smaller plots. These results contradict the findings by Kumar *et al*. (2014) and Okoffo *et al.* (2016) that reported the size of cropped area negatively influences the willingness to pay for crop insurance.

The education level of the household head strongly correlates with decision-making regarding agricultural investments. These results are consistent with those obtained by Danso-Abbeam *et al.* (2014), and Okoffo *et al*. (2016) that found that education level has significant influence on willingness to insure cocoa farms in Ghana. Thus, higher educational attainment is linked to better awareness of and responsiveness to modern agricultural practices, including the benefits of using improved seeds. Educated farmers are often more skilled in accessing information on innovative farming methods, enabling them to make informed investment decisions. This knowledge positively affects both the production levels and the inclination to invest in improved seed. This indicates the importance of training and informational programs to raise awareness about the benefits and proper usage of improved seeds.
Age of household head, influences farmers' risk tolerance and openness to adopting new technologies. Younger farmers may be more willing to experiment with improved seeds and other inputs due to their longer investment horizons and potentially greater access to information networks. Older farmers, meanwhile, may rely on traditional practices, demonstrating more conservative spending behavior and risk aversion, which can reduce their willingness to pay for costly inputs like improved seeds. However, results showed that as farmer ages then he becomes more willing to pay for improved maize seed based on the experiences that he has with several maize varieties used in previous seasons. This counteracts age-related conservatism, as seasoned farmers might recognize the long-term benefits of such investments. These results contradict the findings by Aidoo *et al.* (2014) which stated older farmers are less likely to pay and insure their farms.

Price of improved seeds, the cost of improved seeds remains a significant barrier to adoption, particularly for smallholder farmers operating with limited financial resources. High seed prices of seeds observed in Kilosa and Mvomero districts have deterred majority of farmers from purchasing improved varieties, especially because they are uncertain about the seeds' effectiveness or cannot secure sufficient credit. The quality of the seeds has been in question for farmers season after season, they are not ensured the product they bought in one season will have the same yields the next season. The presence of fake seeds as observed in a study by Gharib *et al.* (2021) questions the sensitivity of farmers on the prices of these seeds. The uncertainty around the quality and productivity of the improved maize seeds is to be researched to bring clear answers from the field.

Land terrain, the physical characteristics of farmland, such as slope, soil type, and accessibility, impact maize production directly by influencing water retention, erosion risk, and ease of mechanization. Land located on more challenging terrain may limit production potential, thereby affecting the household's return on investment in improved seeds. The results show that flat land terrain has significant influence by increasing the willingness to pay for improved seeds in both regression analysis. This indicates that farmers on difficult terrain exhibit lower willingness to pay for these seeds if they anticipate lower yields due to environmental

constraints unlike those in better lands.
These findings suggest targeted strategies that account for household demographics, economic constraints, and land characteristics could effectively enhance the adoption of improved maize seeds, ultimately contributing to agricultural productivity and food security in Tanzania.

Conclusion and Policy Recommendations

Conclusion

Based on the comprehensive findings and observations within the study area, coupled with the overarching significance of maize as the primary staple in the Tanzanian diet, this research reveals a notable demand for improved maize seeds in the Morogoro region. This emerging demand presents an invaluable opportunity for farmers to embrace innovative agricultural technologies and practices that can enhance productivity and fortify food security in the region. While the current average price for improved seeds averages Tshs 13 500 which is unsustainable for many farmers, their willingness to pay reaches Tshs 5 231 on average in BDM tests and Tshs 5 000 in TIOLI tests, reflecting the need for affordable pricing. Key factors influencing willingness to pay include yield, education level, plot size, age, and terrain, with education and land fertility proving significant in adoption decisions. These findings emphasize the role of educational outreach from extension officers and seed companies, helping farmers to identify and use high-quality seeds effectively. The insights from this study guide policymakers and stakeholders in bridging the affordability gap through fair pricing strategies and potential subsidies, aligning local agricultural needs with economic capacity, and supporting a more resilient maize farming sector in Tanzania.

Recommendations

To enhance maize productivity and food security in Tanzania, this study recommends that the government provide subsidies for improved maize seed production. Subsidies through the Ministry of Food and Agriculture should offset costs for seed companies related to breeding, registration, and certification, thus making improved seeds more affordable for agro-dealers and, consequently, farmers. Additionally, an estimated subsidy of Tshs 8 100-8 500 for a 2kg seed packet would make these seeds accessible for farmers seasonally. Furthermore, a collaborative educational initiative involving government, seed companies, and research institutions is essential to inform farmers of the benefits of improved seeds, emphasizing optimal practices like seasonal seed rotation to avoid the use of non-productive seeds. This dual approach seeks to empower farmers to increase productivity sustainably

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