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Smallholder Rice Farmers' Information Needs And Access: An Empirical Study in the Asunafo North Municipality, Ghana

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Abstract

Access to information is crucial to the development of agriculture and communities. However, a lack of access to information about agricultural production may affect farmers' awareness of new farming practices and their ability to increase yield. Considering this as a potential driver for improving food security in poor regions, this study examined smallholder rice farmers' information needs and access in the Asunafo North Municipality of Ghana. It focused on the socioeconomic factors affecting information access among smallholder rice farmers. This study used a multistage sampling technique to obtain information from 154 smallholder rice farmers. Descriptive statistics and a probit regression model were used for data analysis. The study revealed that respondents sourced major information from fellow farmers (98%), extension agents (79.2%), and the radio (75.3%). They needed information on high-yielding varieties (98.7%), credit support options (94.8%), market access (85.7%), and disease and pest management (85.1%). The inferential statistics show that gender, household size, farming experience, and household income significantly influenced respondents' access to rice production information. This study recommends that efforts by policymakers to improve smallholder rice farmers' productivity should consider social interventions (i.e., encouraging farmer group formation, expanding rural information networks, and strengthening extension capacity) that promote farmers' information access. Policy implications include identifying and training community members to become information intermediaries to assist farmers in accessing the needed information for rice farming. This study contributes to the body of knowledge by understanding the socioeconomic factors that affect smallholder rice farmers' access to information. The study further provides insight for agricultural policymakers to enhance smallholder rice farmers' access to information in Ghana.

Keywords: agriculture, rural livelihood, socioeconomic factors, productivity, probit model

Besoins d'information des petits producteurs de riz et accès : une étude empirique dans la municipalité d'Asunafo Nord, Ghana

Résumé

L'accès à l'information est crucial pour le développement de l'agriculture et des communautés. Cependant, le manque d'accès à l'information sur la production agricole peut affecter la sensibilisation des agriculteurs aux nouvelles pratiques agricoles et leur capacité à augmenter les rendements. Considérant cela comme un moteur potentiel d'amélioration de la sécurité alimentaire dans les régions pauvres, cette étude a examiné les besoins en information et l'accès des petits riziculteurs dans la municipalité d'Asunafo Nord au Ghana. Elle s'est concentrée sur les facteurs socio-économiques affectant l'accès à l'information parmi les petits riziculteurs. Cette étude a utilisé une technique d'échantillonnage à plusieurs étapes pour obtenir des informations auprès de 154 petits riziculteurs. Des statistiques descriptives et un modèle de régression probit ont été utilisés pour l'analyse des données. L'étude a révélé que les personnes interrogées obtenaient l'essentiel des informations auprès d'autres agriculteurs (99,4 %), d'agents de vulgarisation (79,2 %) et de la radio (75,3 %). Ils avaient besoin d'informations sur les variétés de semences améliorées (98,7 %), les options de soutien au crédit (94,8 %), l'accès au marché (85,7 %) et la lutte contre les maladies et les ravageurs (85,1 %). Les statistiques inférentielles montrent que le sexe, la taille du ménage, l'expérience agricole et le revenu du ménage ont influencé de manière significative l'accès des personnes interrogées aux informations sur la production rizicole. Cette étude recommande que les efforts déployés par les décideurs politiques pour améliorer la productivité des petits riziculteurs envisagent des interventions sociales (c'est-à-dire encourager la formation de groupes d'agriculteurs, étendre les réseaux d'information ruraux et renforcer les capacités de vulgarisation) qui favorisent l'accès des agriculteurs à l'information. Les implications politiques incluent l'identification et la formation des membres de la communauté pour devenir des intermédiaires d'information afin d'aider les agriculteurs à accéder aux informations nécessaires à la riziculture. Cette étude contribue à l'ensemble des connaissances en comprenant les facteurs socio-économiques qui affectent l'accès à l'information des petits riziculteurs. L'étude fournit en outre un aperçu aux décideurs agricoles pour améliorer l'accès des petits riziculteurs à l'information au Ghana.

Mots-clés : agriculture, moyens de subsistance ruraux, facteurs socio-économiques, productivité, modèle probit

1.0 Introduction

Rice in the Ghanaian economy is an important staple food crop that contributes substantially to the total crop share of the agricultural gross domestic product (GDP) (Ministry of Food and Agriculture [MoFA], 2021). Recent estimates show that despite significant growth in smallholder rice production, the national average yield of 2.96 Mt/ha has not caught up with the potential yield of 6.0 Mt/ha (MoFA, 2021). Several authors have attributed the low yield to factors such as low technology adoption by farmers, reliance on rainfall, poor farm management practices, and limited access to agricultural information (Anang et al., 2020; Angelucci et al., 2013; Food and Agriculture Organization, 2022; Ragasa et al., 2013).

Smallholder farmers face challenges accessing accurate and relevant agricultural information on improved farming methods, appropriate inputs, prices, weather forecasts, and market opportunities (Baker & Musker, 2017; Kenneth et al., 2021). According to Shiferaw et al. (2015), poor access to agricultural information can result in low adoption of technology, which can affect productivity. To this point, it is believed that access to accurate, reliable, timely, and need-based agricultural information by smallholder farmers can effectively increase agricultural productivity, marketing, and distribution strategies (Das, 2018; Naveed & Anwar, 2013; Fadoyin et al., 2015). The acquisition of such information can increase farmers' awareness and knowledge of improved rice farming practices, while reducing the fear of uncertainties regarding agricultural production. Mittal and Mehar (2013) noted that farmers with access to information can respond better to different risks. This can also influence the adoption of farming practices (Thuo & Njoroge 2019). Mbagwu et al. (2018) and Singh et al. (2011) emphasized that farmers can become competitive in the current global economy if they receive up-to-date information on new farming technologies, crop production, weather, marketing, water management, seed, and agricultural policies.

In most parts of Ghana, including the Asunafo North Municipality, smallholder farmers face significant challenges in accessing timely and adequate agricultural information, which negatively affects their productivity and livelihood (Acheampong et al., 2019; Anaglo et al., 2020; Arthur et al., 2019). Despite the existence of information sources like extension services, information centers, and others, these resources are often inadequately resourced, making it difficult to provide sufficient information to farmers (Acheampong et al., 2019; Lamptey et al., 2016). This is evident in the disproportionate extension agent-to-farmer ratio in the Asunafo North Municipality, where a single extension agent is responsible for a significant number of farmers, thus,1:3,134 (Asunafo North Municipal Assembly [ANMA], 2019). This affects smallholder rice farmers' yields (MoFA, 2019). Furthermore, during glut periods, farmers are vulnerable to exploitation by rice aggregators because of their limited access to marketing information (ANMA, 2019). This often compels farmers to rely on informal and unreliable information sources. According to Acheampong et al. (2017), reliance on such sources of information often results in low productivity. This underscores the urgent need for interventions to improve farmers' access to information, particularly smallholder rice farmers. Providing timely information to farmers is important for enhancing productivity and livelihoods (Benard et al., 2018; Food and Agriculture Organization, 2022).

Previous studies show that smallholder farmers' information needs are continuously changing because of the development of new agricultural innovations, changing

agricultural policies, technologies, and environmental changes (Chunera, 2018; Kaske, 2020). However, the level of information needs differs among individuals based on their socioeconomic status, education, awareness level, and information usability (Chen & Lu, 2020; Masele, 2023; Kaske, 2020). For instance, while farmers in China need information on health care, social security, and daily consumption (Chen & Lu, 2020), studies show that farmers in other parts of the world, such as Nigeria, India, and Nepal, require information about weather, markets, input availability, disease control, marketing, plant protection, and varietal selection (Baral, 2020; Nikam et al., 2022; Olaniyi & Ogunkunle, 2018). As noted by Mittal and Mehar (2013) and Bachhav (2012), farmers can decide what, when, and where to plant and sell their produce when they have access to information. Moreover, several factors that influence farmers' access to information have been identified. Rehman et al. (2013) found that farmers' education and the size of landholdings influence agricultural information access in Pakistan. Benard et al. (2018) similarly found formal education, income, age, and farming experience to influence fish farmers' information accessibility in Tanzania. Diouf et al. (2019) observed that ethnicity, place of residence, and gender perceptions influence gendered access to climate information services in Senegal. Akinola (2017) observed a positive influence of farm and family size on the use of mobile phones among farmers for agricultural information in Nigeria. Despite several studies on farmers' information access, factors influencing smallholder rice farmers' information access have not been sufficiently explored in recent studies. Considering this backdrop, the main objective is to examine smallholder rice farmers' information needs and the factors affecting their access to information. This study answers the following questions: (1) What information do smallholder rice farmers need for rice farming? (2) What socioeconomic factors affect smallholder rice farmers' access to rice production information? This study adds to the body of knowledge in understanding the socioeconomic factors affecting smallholder rice farmers' access to information. A better understanding of smallholder rice farmers' information needs and access can provide insights for policymakers to enhance farmers' access to information in Ghana.

2.0 Methodology

2.1 Study Area

This study was conducted in the Asunafo North Municipality. It is located in the Ahafo Region of Ghana. We selected this area because rice has recently become a competing crop, with an average yield of 1.57Mt/ha (MoFA, 2019). The Municipality experiences a bimodal rainfall pattern, with major rains occurring between April and July, whereas September and October represent minor seasons (Ghana Statistical Service [GSS], 2014).

According to the 2021 population and housing census, the municipality has a population of 150,198 people. The male population is slightly higher than the female population with approximately 50.8% (GSS, 2021). Economically, agriculture represents a major occupation and employs more than half of the working population (ANMA, 2019; GSS, 2014). Crop production accounts for approximately 97.2% of all agricultural production in the area (GSS, 2014). The main crops include maize, cassava, rice, cocoyam, plantain, vegetable farming, and cash crops such as cashews and cocoa.

Figure 1: Map of Ghana showing the study area.
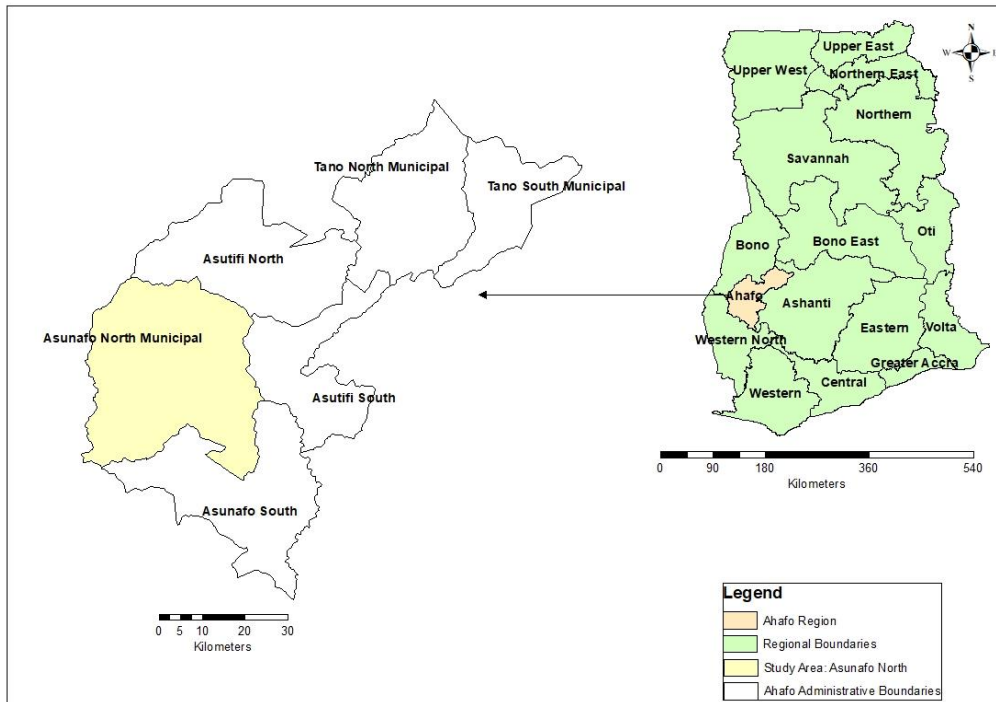
Source: Author, 2023.

2.2 Sampling Techniques, Data Collection, and Analysis

The study area and respondents were selected using a multi-stage sampling technique. In doing so, we first used purposive sampling to select Asunafo North Municipal because it is among the major rice producing areas in the Ahafo region and rice production has recently become competitive in the area (MoFA, 2019). In the second stage, we purposively selected five rice-growing communities because they accounted for the bulk of municipal rice production (ANMA, 2019). These are Kasapin, Bitre, Ayomso, Goaso, and Asumura. In the final stage, we randomly selected thirty-two (32) rice farmers from each community to obtain 160 rice farmers for the study. The sample size for the study was estimated based on Taro Yamane's formula (Yamane, 1973), which is used to compute the sample size of a population when little information is available (Brhane et al., 2017; Popoola et al., 2020; Ullah et al., 2022). The population of rice farmers in the municipality is about 1,014 (Municipal Planning Coordinating Unit, 2021). The estimated sample size was 135. We then adjusted this sample size to 160 to cater for some design effects that may have arisen in the study. Of the 160 responses received, 154 were used for the final analysis, representing a response rate of 96.3%. The remaining six responses were excluded due to incomplete information.

Both primary and secondary data were used in this study. Regarding primary data, the study adopted a semi-structured questionnaire design to collect data from the respondents. The questionnaire was divided into three sections. The first relates to the demographic profiles of rice farmers. The second part was about rice farmers' information sources, and the third pertained to respondents' rice production information needs and access. The secondary data sources included annual reports from the Ministry of Food and Agriculture, relevant articles, and other online reports.

To ensure the reliability and validity of the interview instrument, the questionnaire was first pre-tested with a small group of rice farmers to refine the interview questions before undertaking the main data collection. The reliability of the instrument was determined using Cronbach's alpha as an index to check the internal consistency of the data (Cronbach, 1951). An alpha value of more than 0.70 is considered reliable (Hair et al., 2013). We obtained an alpha score of 0.74, which suggests that the questionnaire had good internal reliability. Primary data were collected by two extension officers who had worked with farmers for the past ten years in the municipality. The survey was conducted between October and November 2020. Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 25 and STATA 13 software package. We then used descriptive statistics such as frequencies, means, and percentages to summarize and describe the study results.

$$n = \frac{N}{1+Ne^2} = \frac{1014}{1+1014(0.08)^2} = 135.3 \approx 135$$

where n is the sample size, N is the rice farmer population = (1,014), and e is the margin of error (which is 0.08 with a reliability level of 92%).

2.3 Empirical Model

The logit and probit models have been widely used to predict binary outcomes. However, several econometric studies have used the probit model to examine the influence of a set of predictor variables (e.g., age, gender, experience, level of education, among others) on any given binary dependent variable (e.g., technology adoption, access to information, willingness to pay, among others) (Acheampong et al., 2017; Bavorová et al., 2020; Ghimire et al., 2015; Nonvide, 2021; Nikam et al., 2022; Linh et al., 2016). The probit model is often preferred over the logit model, largely because of the normality assumption, and it is mostly used to analyze several specification problems due to the properties of the normal distribution (Wooldridge, 2013). Again, the probit model can correct the problem of heteroscedasticity in the binary dependent variable (Asante et al., 2011; Wiredu et al., 2010). In this study, we used a probit model to understand the factors affecting the probability of information access by smallholder rice farmers. This analysis provides detailed information on the characteristics of farmers who have access to rice production information. Smallholder rice farmers' access to information is specified as

$$Z_i^* = \beta_i X_i + e_i \tag{1}$$

$$Z_i = \begin{cases} 1, & if \; Z_i^* > 0 \\ 0, & Otherwise \end{cases} \tag{2}$$

where Z_i represents the binary dependent variable (in this case, a respondent who has access to rice production information is assigned 1, and 0 otherwise), X_i includes all independent variables that may influence a respondent's access to rice production information, β_i represents the parameters to be estimated, and e_i denotes the error term.

The empirical model for smallholder farmers' access to rice production information in the study area is given as

$$Z_i^* = \beta_0 + \sum_{i=1}^{6} \beta_i X_i + e_i \tag{3}$$

where Z_i^* = access to agriculture information, X_1 = gender, X_2 = age of respondent, X_3 = household size of the respondent, X_4 = years of formal education of the respondent, X_5 = farming experience, X_6 = income, β_s = unknown parameters.

3.0 Results and Discussion

3.1 Socio-Demographic Characteristics of Respondents

The results in Table 1 show that males (61%) dominated rice production compared with females (39%). In Ghana, rice production is considered labor-intensive compared with other crops (Addison et al., 2018). This means that most female farmers in the study area are most likely to venture into less intensive farming activities, such as cocoyam, cassava, and plantain farming (GSS, 2014). The majority (66.23%) of the respondents were between 40–59 years with a mean age of 44.6 years. Considering the total life expectancy in Ghana of 66.3 years (World Health Organization, 2023), this mean age indicates an aging trend among the respondents. About 54.5% of the respondents had household sizes between 1–5. However, the mean household size of five persons in comparison to the national mean household size of 3.6 is higher (GSS, 2021). This implies an important source of family labor and information searching for agricultural production. Regarding education, 65.6% of the respondents had some form of formal education. This implies that respondents with such qualifications can access and interpret relevant information and other support services to improve rice farming. The mean number of years of rice farming in the area was six years. Regarding respondents' income, 63.6% had between Gh₵ 3,100-5,000 with an average income of about Gh₵ 2,986. Compared to the national mean annual income of Gh₵33,937 (GSS, 2019), the respondents' mean income level is not a substantial addition to their livelihood.

Table 1. *Demographic Characteristics of Respondents (n = 154)*

Variables	Category	Frequency	Percentage (%)	Mean
Gender	Male	94	61.0	
	Female	60	39.0	
Age	20-39	33	21.43	
	40-59	102	66.23	44.6
	≥ 60	19	12.34	
Household size	1-4	84	54.5	
	5-10	68	44.2	5
	≥11	2	1.3	
Education	Primary	43	27.9	
	Secondary	57	37.0	
	Tertiary	1	0.7	
	No formal	53	34.4	

Table 1 continued

|				
Farm experience	1-4	58	37.7	
	5-9	89	57.8	6
	≥10	7	4.5	
Average annual income (Gh₵)	3,100-5,000	98	63.6	
	1,000-3,000	40	26	2,986
	≥5,100	16	10.4	

Note. 1 Ghana cedi (GH¢) = US$ 0.1616 as of 2021.

Source: Field survey, 2020.

3.2 Respondents' Rice Production Information Access

In this section, respondents were asked to indicate whether they had received information about rice production. In response, 98% of the respondents answered affirmatively (see Fiure 1). This was consistent with Mittal and Mehar (2013), who asserted that in decision-making, access to information can be beneficial to an individual or organization in making better choices. Only 2% of the respondents indicated that they did not have access to rice production information. A possible reason for the low information access by farmers in the study area is the limited extension capacity, with an extension agent-to-farmer ratio of 1:3,134 (ANMA, 2019). This implies that not all farmers in rural areas can access agricultural information, which could affect productivity.

Figure 2: Access to rice production information by respondents (n = 154).
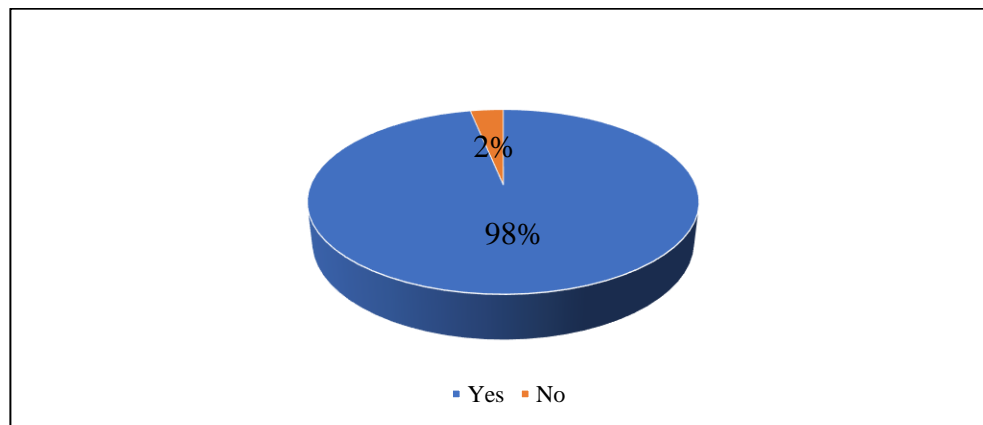
3.3 Respondents' Information Sources

Here, we asked respondents to indicate their most trusted information sources to help increase their rice yield. Our findings suggest that respondents tended to rely on multiple information sources to obtain the information needed for rice farming. We observed that 98% of respondents obtained information from their colleagues (see Table 2). In most rural areas, communal activities and other occasions bring farmers together, which helps them learn from other farmers' experiences through information sharing. This is because they find approaching and interacting with their

fellow farmers easily with immediate feedback, as they do not need to pay to seek information from their friends. This result is in line with Modirwa (2019), who observed that farmers in the Ngaka Modire Molema District of South Africa consider their fellow farmers to be the preferred source of information. Maina et al. (2021) similarly found that most farmers rely on their fellow friends because they engage directly in marketing and production. Our study further showed that 79.2% of the respondents obtained information about rice farming from extension agents. In Ghana, extension officers play an important role in disseminating appropriate agricultural information to farmers at the community level during home and field visits. According to Donkor et al. (2016), extension contacts significantly promote the adoption of chemical fertilizers in the Bawku and Kassena Nankana Districts of Ghana. Regarding radio, 75.3% of the respondents indicated that they learned about rice farming from this source. According to Maina et al. (2021), the use of mass media channels such as television and radio can reach a large group of people with the necessary information quickly and efficiently. This makes them an effective tool for creating awareness and disseminating common information. Another 30.5% of respondents indicated television. This could be because most farmers become exhausted after farm activities and do not spend time watching television programs. Jafri et al. (2014) noted that sometimes inappropriate timing of media programs makes it difficult for farmers to listen because they may be tired after their day's work. A few respondents (4.5%) relied on the newspapers. This is consistent with the GSS (2014), which observed that people who had no formal education in the study area could not read and write. This prevents them from using this information source. Omoregbee and Banmeke (2014) observed that farmers find it difficult to access agricultural information packages in printed media, because they cannot read them.

Table 2. *Rice Farmers' Information Sources (n = 154)*

Information sources	Frequency	Percentage (%)
Colleague farmers	151	98.0
Radio	116	75.3
Newspapers	7	4.5
Television	47	30.5
Extension agent	122	79.2

Note: Frequency is based on multiple responses.

3.4 Respondents' Rice Production Information Needs

To understand the information needs of the respondents, we asked them what rice information they needed to improve their yield. We provided respondents with options, including information about weed control, input/tool provision, credit support options, pest and disease management, high-yielding varieties, and fertilizer application based on multiple responses.

In response, 98.7% of the respondents affirmed that they needed information about high-yielding varieties (see Table 3). Diaka and Matsui (2023) found three major rice varieties cultivated by the farmers in Asunafo North Municipality, including

AGRA, Jasmine, and a local variety called *Lapese*. They observed that the average yield obtained from these rice varieties was below the regional and national average. According to Chandio and Yuansheng (2018), promoting and adopting high-yielding seed varieties is important for increasing rural farmers' rice productivity and income. Regarding credit support options, about 94.8% of the respondents indicated a need for credit information to invest in farming. In the Asunafo North Municipality, farmers' primary sources of financing agricultural operations are personal savings, bank credit, private moneylenders, government subsidies, and family members' support (ANMA, 2019). However, limited information about where to obtain credit for farming affects their productivity. Benard et al. (2014) contended that financial problems make it difficult for most farmers to participate in relevant agricultural seminars and workshops. Our study further indicates that 85.7% of the respondents needed more information about market access. One of the major challenges faced by farmers in the study area was insufficient access to market information. This makes middlemen exploit farmers' vulnerability, particularly during glut production (ANMA, 2019). Other information needs indicated by the respondents were disease and pest management (85.1%), weed control (66.9%), and inputs/tools provision (46.8%). In the study area, the inadequate capacity of agricultural extension officers affected productivity. The ratio of agricultural extension agent-to-farmer is estimated to be 1:3,134 (ANMA, 2019), which is higher than the national average ratio of 1:706 (MoFA, 2022). This implies that most rural farmers may not have access to extension services, which could affect their awareness of new farming methods that improve productivity.

Table 3. *Type of Rice Production Information Needed by Respondents (n = 154)*

Type of information needed	Frequency	Percentage (%)
Weed control	103	66.9
Marketing	132	85.7
Credit support options	146	94.8
High-yielding varieties	152	98.7
Inputs/tools provision	72	46.8
Diseases and pest management	131	85.1

Note: Frequency is based on multiple responses.

3.5 Extent of Rice Production Information Needs

We asked respondents the extent to which they needed rice production information to help them increase their yield. The results (see Table 4) showed that 86.4% of the respondents needed rice production information to a high extent. Further, 7.8% indicated a moderate extent, while 5.8% responded that they needed it to a low extent. The higher percentage of respondents could imply that farmers in much need of rice production information do so mainly to improve their farming practices and maximize their farm returns. On the other hand, respondents who require little information about

rice farming may engage in other livelihood activities that they consider more important and about which they seek more information than rice farming.

Table 4. *The Extent of Information Needs of Respondents (n = 154)*

Extent of information need	Frequency	Percentage (%)
High	133	86.4
Moderate	12	7.8
Low	9	5.8

3.6 Socio-Economic Factors Influencing Respondents' Access to Rice Farming Information

We performed a probit regression analysis to understand how socioeconomic factors affect respondents' access to information that promotes rice farming. Among the variables included in the regression model, household size, gender, experience, and income significantly explained respondents' access to information. We interpreted the results using the marginal effects (see Table 5). According to Donkor et al. (2018), marginal effects, rather than coefficients, offer an appropriate interpretation. This is because the marginal effect indicates both the magnitude and direction of the independent variables' impact on the outcome variable (Donkor et al., 2018). The marginal effect of gender was significantly positive at the 5% level. This finding indicates that male farmers have a higher probability of accessing information about rice production than their female counterparts. In most cultural settings, socioeconomic norms and values allow males to have a higher probability of access to information and productive resources. This result is consistent with Fidelugwuowo (2022), who observed a positive correlation between gender and smallholder farmers' access to agricultural information in South-East Nigeria. A similar result was observed by Parmar et al. (2019), who studied farmers' access to agricultural information in India. The marginal effect of household size was positive at a 10% significance level. This means that any increase in the number of households by a member leads to a higher probability of information access. This finding agrees with the literature that a larger household tends to have a growing demand for food, which could probably lead to access to agricultural information (Koskei et al., 2013), but contradicts the findings of Linh et al. (2016) in their study on factors affecting the use of information sources by farmers in Vietnam. Farming experience had a significant negative effect on the probability of accessing rice-farming information. The implication is that an increase in the number of years of rice farming decreases the probability of a respondent's access to rice farming information. This is because respondents who have many years of farming could trust and rely on their experiential knowledge rather than other sources of information. This result agrees with the findings of Mahindarathne and Min (2019) in their study on the factors influencing vegetable farmers' information-seeking behavior in Sri Lanka. Other studies consistent with this finding include those by Akinola (2017) and Benard et al. (2018). Household income was found to have a positive and significant effect on respondents' information access. This implies that

for a 1% increase in respondents' income, the probability of accessing rice-farming information will increase by 0.047%. In other words, the more a respondent engages in an income-generating activity, the higher is the financial capacity, which could increase his/her probability of access to agricultural information. This result corroborates the findings of Benard et al. (2018), who studied the information needs and accessibility of fish farmers in southern Tanzania.

Table 5. *Factors Influencing Respondents' Access to Information*

Factors	Coefficient.	Std. error	z-value	P>|z|	Marginal effect
Gender	2.9912	1.3405	2.23	0.026	0.1259**
Age	-0.0404	0.0436	-0.93	0.354	-0.0017
Household size	0.5347	0.2848	1.88	0.060	0.0225*
Education	0.0615	0.0722	0.85	0.394	0.0025
Farm experience	-0.8667	0.3594	-2.41	0.016	-0.0364**
Household Income	1.1275	0.6351	1.78	0.076	0.0475*
Constant	2.9129	1.8712	1.56	0.120	-

Number of observations   154
Prob > chi²   0.0035
Log-likelihood   -12.33374
LR chi² (6)   19.44
Pseudo R²   0.4408

*10% level of significance, **5% level of significance, *** 1% level of significance.

4.0 Conclusion

This study examined smallholder rice farmers' information needs and access in the Asunafo North Municipality of Ghana. Overall, this study provides a deep understanding of the socioeconomic factors associated with rice farmers' access to information in the area. This study shows that smallholder farmers rely on multiple sources of information to access the information needed for rice production. These farmers mainly rely on colleagues, extension agents, and the radio for information related to rice production. Thus, access to several sources of information can be a means for rice farmers to enhance their efficiency and productivity. The study further found that farmers required major production information, mostly on high-yielding varieties, credit support options, inputs/tools provision, and disease and pest management. It is important to provide smallholder farmers with the information they need to help them make better production decisions and increase productivity. The inferential statistics show that gender, household size, farm experience, and household income influence smallholder rice farmers' agricultural information access.

Our findings have several important implications for improving smallholder rice farmers' information needs and access. First, the results show that rice farmers tend to trust information from multiple sources. This suggests that policy efforts should be designed to promote various information sources and ensure farmers' active participation in decision-making. This includes providing access to information through radio, printed materials, online platforms, and community-based training. Furthermore, the findings suggest that agricultural information should be tailored to suit farmers' needs. This can be achieved through the expansion of rural infrastructure (i.e., information centers, road networks, and rural telecommunication networks), which can enhance farmers' access to information. Providing farmers with extension services should be prioritized because regular extension activities enhance information delivery. In doing so, extension agents can encourage and assist farmers in forming groups, because most agricultural stakeholders, such as input dealers, NGOs, and financial institutions, prefer to deal with farmer groups rather than individual farmers. This can ultimately help farmers make informed decisions to improve their productivity and livelihoods. Policymakers should identify and train community members to become intermediaries to assist farmers in accessing information. The information needs of smallholder rice farmers for marketing and credit support implies that the Ministry of Food and Agriculture in the municipality should collaborate with various financial institutions and other stakeholders to enhance smallholder farmers' access to information by identifying and linking farmers to buyers and credit support options.

The results of the inferential statistics suggest that policymakers should consider smallholder farmers' socioeconomic factors that positively influence information access. For instance, gender issues have been widely discussed as limiting women's access to productive resources, such as access to information, extension, and land (FAO, 2022; Lambrecht et al., 2018). Therefore, policymakers should consider designing appropriate strategies and information channels that are accessible and cater to the needs of both male and female farmers. This can help address gender disparities in information access. Again, extension agents should be well educated and trained on farmers' socioeconomic characteristics to enhance farmers' information access. Finally, if the Ghana government wants to increase smallholder farmers' rice productivity, efforts should be directed towards promoting information availability and accessibility, as well as increasing the use of information by farmers.

As this study has advanced our understanding of smallholder rice farmers' information needs and access, it is unavoidably subject to some limitations. First, the study is limited to Asunafo North Municipality and may not be generalized to other parts of Ghana. Second, we focused only on rice farmers, with a small sample size. Further studies should extend this research to other regions of Ghana by considering a larger sample size and other factors to provide a general conclusion on farmers' access to information.

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