Small-scale urban vegetable farmers' knowledge and perceptions about agricultural insurance in the Greater Accra Region, Ghana

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Abstract: This paper seeks to contribute towards bridging the knowledge gap and bringing more clarity to the phenomenon of crop insurance within the Ghanaian context. Specifically, it seeks to measure the perceptions of small-scale urban vegetable farmers in terms of their appreciation, willingness to pay and motivation to enter into crop insurance arrangements. Data were obtained using structured questionnaires administered to 150 urban vegetable farmers in the Greater Accra Region of Ghana, complemented with in-depth interview sessions with senior officials of three insurance companies operating in Accra. Vegetable farmers' appreciation of crop insurance was determined with the use of a Likert scale. The study showed a high level of farmer appreciation of insurance. It emerged that diseases, the financial risk that comes from market uncertainties and theft were the sources of motivation for insurance. Majority of the farmers were willing to pay for insurance premium. While gender and marital status were found to be insignificant at 0.05 significance level and had no positive effect on the probability of farmers' desire to partake in vegetable crop insurance policy, farmers' level of education was significant at 0.05 significance level. The paper makes a strong case for sustained farmer education to create the needed awareness that will expand the knowledge-base of the farmers regarding crop insurance.

Keywords: Small-scale, Urban vegetable, Farmers, Agricultural Insurance, Knowledge, Perceptions, Ghana

1 Introduction

Vegetables have the potential of providing opportunities for better farm income, on one hand, and playing an important role in addressing micronutrient deficiencies, on the other hand. Worldwide production of vegetables has increased over time and the value of global trade in vegetables is reported to exceed cereals [1]. Urban agriculture, on the other hand, is a strategy that enhances food security, stimulates local economic development, and facilitates social inclusion and poverty alleviation [2]. As a remedy to urban poverty, city dwellers have resorted to intensive irrigated agriculture; mostly vegetables for all-year-round, or dry-season, production [3]. Irrigated leafy vegetables contribute to the urban food supply, especially for low-income households [4]. Urban agriculture in cities such as Accra and Kumasi in Ghana, for instance supply up to 90 per cent of the most perishable vegetables [5]. The vegetable sector is a possible source of livelihood for millions of growers and thousands of traders and processors. According to [6], a total volume of over 880 million tonnes of vegetables were being produced globally and it was expected to reach 1.2 billion tonnes by 2015.

The comparative advantages of urban, over peri-urban agriculture are market proximity, no need for refrigeration and storage for perishable crops, and minimal transportation costs [7]. Urban vegetable farmers have to look for effective ways to address risks to their incomes because of various natural and artificial occurrences, which may affect their livelihoods. Agricultural insurance comes in handy as a tool, which ensures cost-effectiveness in farm management decisions [8], stabilisation of farm income, and investment for farmers [9]. Insurance encourages farmers to adopt improved technologies, protects farmers against financial disaster, and empowers them to obtain credit to stabilise income [10]. Crop insurance also assists farmers to begin production activity after a bad agricultural year, and lessens the shock of crop loss by providing farmers with the least amount of safety, while spreading crop loss over space and time, and helping farmers make more investments [9]. The risk-bearing capacity of an average farmer in the semi-arid tropics is limited [4], for the possible reason that a large farm household or a wealthy farmer can spread risks over time and space in several ways.

In Ghana, the crop insurance market is still in its developmental stages, despite the critical need for crop insurance in the light of inherent risks associated with small-scale farming, which relies heavily on rainfall for production. In response to the

threat of climate change to agriculture, the German International Cooperation (GTZ) initiated a project in Ghana in 2009 to develop an insurance product for farmers. Currently, the Ghana Agricultural Insurance Programme (GAIP) provides crop insurance to farmers in Ghana. The insurance is provided by a pool of Ghanaian insurance companies. The array of insurance products includes weather index insurance, specifically drought index insurance for maize, soybean, sorghum and millet farmers as well as multi-peril crop insurance for commercial farmers and plantations. As part of the insurance arrangement, farmers pay one-tenth of the cost of their farm production to the GAIP at the start of the cropping season and receive payments when rainfall is less than 2.5 mm for 12 consecutive dry days. Farmers receive their claims within 30 days after the cropping season. GAIP has provided crop insurance to Ghanaian farmers since 2011 [12]. Similarly, the Ghana Cocoa Board has recently started a pilot insurance project to ensure that cocoa farmers are protected against production uncertainties. In the absence of insurance, most Ghanaian smallholder farmers use crop diversification to spread risks [4]. Even where farmers use crop diversification to spread risks, the introduction of area yield insurance has the potential to reduce production risks and enhance the welfare of agricultural household [13].

1.1 Theoretical issues

The insurance industry exists because people are willing to pay a price for being insured [14]. [14] proposed an economic theory that explains why insured are willing to pay a premium larger than the net premium and the mathematical expectation of the insured loss. This theory postulates that a decision-maker, generally without being aware of it, attaches a value to wealth. According to the theory, to decide between random losses, a comparison is made and a choice is made between the losses with the highest expected utility. With this model, the insured's wealth determines the maximum premium the person is prepared to pay for a random loss. The model stipulates that at some equilibrium it is not important, in terms of utility, if insurance is used. The model applies to the insurer as well, who also has a utility function, and perhaps supplementary expenses, which determines a minimum premium. If the insured's maximum premium is larger than the insurer's minimum premium, both parties involved increasing their utility. According to [15], the farmers' risk attitudes, and risk perceptions, are factors that affect their farm production, investment and management decisions. They state that risk-averse farmers are less willing to take on activities and investments that have higher expected outcomes but carry with them risk and failure.

1.2 Objectives of the study

More needs to be done to secure the future of Ghana's urban vegetable industry against uncertainties. The focus given to the vegetable sector in terms of risks and constraints has brought to light some details of the plight of the vegetable sector. Unfortunately, not much attention in the literature has been given to the concept of insurance as it relates to Ghanaian small-scale farmers and their appreciation of crop insurance. Although a few studies on this phenomenon has been carried out in Ghana [16]; [12]; [17] and [18]; these studies have been mainly limited to northern Ghana and also focused on general crop farmers. Apart from providing evidence from southern Ghana, the current study also focused on a specific group of farmers (vegetable farmers) in a purely urban setting. The study, therefore, sought to contribute towards bridging the knowledge gap in terms of small-scale farmers' appreciation of the phenomenon of crop insurance within the Ghanaian context and from the perspectives of urban vegetable farmers. While contributing to bringing more clarity to the phenomenon, the findings of the study would provide empirical data, which would shape discourse on crop insurance in Ghana and inform policy regarding crop and other forms of agricultural insurance. The objectives of this study were therefore to**:**

1. Measure the acceptance of crop insurance by small-scale vegetable farmers.
2. Determine small-scale urban vegetable farmers' sources of motivation for crop insurance packages.
3. Examine small-scale urban vegetable farmers' willingness to pay for crop insurance packages.
4. Determine how demographic characteristics of small-scale vegetable farmers inform their acceptance of crop insurance.

2.0 Materials and methods

2.1 Study Area

The study was conducted in *Maamobi*, *Dzorwulu*, *Atomic Energy* and *Korle Bu* communities in the Accra Metropolitan Assembly, Accra, Ghana. These areas were selected given the degree of urban vegetable growing activities in these communities. They were randomly selected from six vegetable growing areas identified by [7]. The Greater Accra

Region has a coastline of approximately 225 kilometres, stretching from *Kokrobite* in the west to *Ada* in the east. The soils have low organic content with shallow top soils, which limit the capacity for crop production. The vegetation is mainly coastal savannah shrubs interspersed with thickets. Some trees are found, mostly in the *Dangme* West and *Ga* districts. The Region falls within the dry coastal equatorial climatic zone, with temperatures ranging between 20^0 and 30^0 Celsius and annual rainfall ranging from 635 mm along the coast to 1,140 mm. in the northern parts. There are two rainfall peaks, in June and October. The first rainfall season between April and July is associated with the major cropping season in the Region. With recent floods in parts of the Region during the major season, a significant proportion of vegetable farmers are increasingly depending on the minor season (September-October) for their farming activities. The Region is not well endowed with mineral resources and possesses only granite, clay and salt [19].

2.2 Data collection

Data used for this study were mainly primary and obtained from urban vegetable farmers using structured questionnaires administered during the 2019 farming season. The research design employed was a mixed-method used to collect both quantitative and qualitative data. About the research procedure, a survey was conducted to gain an in-depth understanding regarding perceptions and knowledge of small-scale vegetable farmers about crop insurance and their willingness to pay insurance premiums. The two-stage sampling procedure was employed. The first stage involved the random selection of the four vegetable growing areas: *Maamobi*, *Dzorwulu*, *Atomic Energy* and *Korle Bu* from six areas in the Accra Metropolitan Assembly. The second stage involved the selection of samples from the four selected communities. Here, the simple random sampling technique was adopted to select 150 farmers from a database of vegetable farmers provided by the Vegetable Farmers' Association. From *Maamobi*, 45 vegetable farmers were selected out of 135; *Dzorwulu*, 35 were selected out of 105; *Atomic Energy*, 50 were selected out of 151 and *Korle Bu*, 20 out of 60. The randomisation ensured that every unit had an equal chance of being selected. Furthermore, in-depth one-on-one interview sessions were held with three senior officials of three insurance companies operating in Accra to triangulate data from the quantitative data. The sample thus included one hundred and fifty (150) small-scale urban vegetable farmers and three (3), key informants, from three insurance companies operating in Accra.

2.3 Data analysis

Data analysis was carried out using the International Business Machines Statistical Package for Social Science (IBM SPSS) Version 22. The analysis involved univariate analysis mainly descriptive statistics comprising frequencies and percentages. Some inferential analysis was further undertaken to establish relationships between selected farmer demographic characteristics and their appreciation of the concept of insurance.

3.0 Results and discussions

3.1 Demographic characteristics of small-scale urban vegetable farmers

Demographic characteristics of vegetable farmers in the Accra Metropolitan Assembly were varied (Table 1). Most of the farmers were males confirming observations of [7]. In most Ghanaian communities, cash crop farming is largely considered as work for men on account of its strenuous and time-consuming nature [20]. Male decision-makers were noted to be more technically efficient on farms than females, and this could encourage more males in vegetable production [21]).

The study revealed that the majority of small-scale urban vegetable farmers in the study were adults within the 31-40 age bracket (39.3%), and they could be presumed to be active and adventurous, given the energy-demanding nature of vegetable farming. It is the assumption that these farmers would be more likely to accept agricultural insurance. Furthermore, the results revealed that most respondents were married and had some level of education. They were therefore more likely to be amenable to consider new techniques and farming methods for higher productivity and might critically analyse and make their own decisions between technologies [22]; [23]. Majority of the respondents (93.3%) had family size falling within the 1-5 and 5-10 bracket; a possible source of family labour. In traditional agricultural production, family labour plays a significant role in farm labour supply. The average farmer first exhausts all sources of labour in his family before hiring labour to reduce the cost of production [24]. This may suggest the possibility of available family labour for small-scale urban vegetable farming activities to the farmers.

Distribution of the respondents according to their farming experience showed that all the farmers had been in vegetable production for at least 5 years, the majority of them with farming experience of 11–15years.

Table 1: Demographic characteristics of small-scale urban vegetable farmers

Variable	Frequency	Percentage
Gender		
Male	128	85.0
Female	22	15.0
Age		
20-30	38	25.3
31-40	59	39.3
41-50	21	21.3
51-60	21	14.1
Marital status		
Married	85	57.0
Single	35	23.0
Separation	30	20.0
Household size		
1-5	80	53.3
5-10	60	40.0
11-15	10	6.7
Level of formal education		
None	52	34.7
Primary	48	32.0
JHS/Middle school	27	18.0
SHS/Vocational	23	15.3
Years of experience		
5-10	55	36.7
11-15	57	38.0
16-20	18	12.0
21-30	12	8.0
31+	8	5.3

Source*:* Field data, 2019; JHS = Junior high school, SHS = Senior high school.

Acceptance of Insurance by small-scale urban vegetable farmers

Most farmers from the results of the study had accepted the concept of insurance (Table 2). Urban vegetable farmers' interest in agricultural insurance may stem from its potential impact on the sustainability of vegetable farms, as despite a bad harvest, insurance might allow farmers to keep their productivity tools and maintain their capacity to reinvest in preparing for the next crop season.

Table 2: Acceptance of Insurance by small-scale urban vegetable farmers

Acceptance	Frequency	Percentage
Not at all	2	1.3
Not much	8	5.3
Normal	23	15.4
Much	57	38.0
Very much	60	40.0
Total	**150**	**100.0**

Source: Field data, 2019

3.2 Reasons for insurance coverages for small-scale urban vegetable farmers

The study showed varied reasons which would serve as sources of motivation for vegetable farmers' decision to subscribe to crop insurance packages. These reasons based on the findings, included the threat of pests and diseases, financial risks, risks from market uncertainties and theft (Table 3). These findings, in part, are consistent with those of [15], who also added floods and heavy rains as other factors that would be a potential threat to farm enterprise. According to [15] farmers' risk attitude and risk perceptions may be deemed as crucial factors affecting the desire to take investment decisions in such areas as insurance and farm management decisions. It may therefore be inferred that the greater the perceived risk, the more likely the farmer would be inclined towards making the possible investment. Thus, in the opinion of [15], risk-averse farmers may be less willing to take on activities and investments that may have higher expected outcomes, but carry with them risks and failures. The practical implication, therefore, is that when a farmer buys insurance, some of the risk, perceived or real, is transferred to the insurance company.

Table 3: Reasons for Insurance for urban vegetable farming.

Insurance Coverage	Frequency	Percentage
Disease	60	40.0
Financial	47	31.3
Marketing	28	18.7
Theft	15	10.0
Total	**150**	**100.0**

Source: Field data, 2019

3.3 Relationships between acceptance of insurance and demographic characteristics of small-scale urban vegetable farmers

A correlation table showing the relationship between the acceptance of insurance and demographic characteristics of small-scale urban vegetable farmers is presented in Table 4. To establish the relationship between acceptance of insurance and demographic characteristics, variables were estimated as follows: the overall acceptance of insurance was estimated as composite mean (Y).

Y = Acceptance of insurance
X1= Gender
X2 = Age
X3 = Marital status
X4 = Household size
X5 = Educational Level
X6= Experience

There were significant relationships between acceptance of insurance and four (4) of the demographic characteristics (independent variables) except gender (r=.040; p<.562) at 0.05 alpha level. This implied that gender did not affect whether small-scale urban vegetable farmers in the Accra Metropolitan Assembly would insure their crops or not. This result is consistent with the findings of [25] who assert that gender has no significant relationship with insurance policy. This may be as a result of the fact that even though male farmers are well endowed, they are risk-loving compared to female farmers, hence, may not see the need to ensure their farms and pay for insurance premium. Studies have shown that women are more risk-averse than men [26]; [27]; [28]; [29]; [30]. This means that men are risk-loving and would be less likely to take risk reduction strategies such as insurance even though they are better resourcefully endowed than women.

Similarly, there was a positive (r=246; p>.001) correlation between marital status and acceptance of insurance. This relationship was found to be low according to Table 4. [31] found marital status to be significant at 1% significance level and positively correlated to the desirability of farmers to participate in a cocoa insurance policy. According to [31], this might simply indicate how married farmers consider the survival of their family should any uncertainty strikes, hence; influence their decision to adopt the cocoa insurance policy. However, urban vegetable farmers consider otherwise in this study.

There were positive and significant relationships between small scale urban vegetable farmers and educational level (r=.665; p<.001), training (r=.580; p<.001) and years of experience in vegetable farming (r=.652; p<.000). These positive relationships imply that educational level, household size and years of in vegetable farming contribute to farmers understanding of insurance of their vegetable farms. The implication is that the better-educated farmers are, the more they are likely to understand the policy and are therefore likely to buy the insurance policy than their counterparts with less educational level. This result conforms with the earlier study by [24] in the Nigerian cocoa industry but contrary to that of [16] in the Ghanaian agricultural crop sector who reported a negative relationship between farmer's willingness to take market-based crop insurance and educational attainment. The study is also invariance with that of [32], who suggested that better-educated farmers can manage their farms very well and are exposed to various risk management practice and are therefore less likely to engage in crop insurance. Generally, the study showed that the kind of education, household size and number of years of vegetable farming by small scale vegetable farmers in the Accra Metropolitan Assembly influenced their knowledge and acceptance of insurance. Farming experience, on the other hand, increases the willingness to pay for crop insurance; experienced farmers are willing to pay more to insure their farms. This is because experience in farming enhances human capital so that information accumulated through years of farming experience is channelled into decision making about farming. It is expected that experienced farmers will have more knowledge about the benefits of insurance and therefore willing to pay the higher insurance premium. The result agrees with [33] in a study involving paddy farmers in Malaysia, but at variance with [34] who studied willingness to pay for crop insurance in Eastern Ghana. There was a significant relationship between small-scale urban vegetable farmers and age (r=-.486; p<.001).

Table 4. Relationships between acceptance of insurance and demographic characteristics of small-scale urban vegetable farmers

Independent Variables	Correlation Coefficient (r)	Significance (p)	Type of Correlation	Strength of relationship
Gender X_1	-0.486**	0.001	Pearson	Moderate
Age X_2	0.040	0.562	Point Biserial	-
Marital status X_3	0.246**	0.001	Biserial	Low
Educational Level X_4	0.665**	0.001	Spearman	Substantial
Household size X_5	0.580**	0.001	Biserial	Substantial
Years of Farming experience X_6	0.625**	0.000	Spearson	Substantial

Source. Field Survey Data, 2019. **p< 0.01, *p< 0.05

3.4 Willingness to pay for insurance premium

Almost all urban vegetable farmers were willing to insure their farms (Table 5) consistent with the findings of [34]. Farmers indicated crop insurance could guard against loss of crops through theft and catastrophic events. The amount they were willing to pay varied. The majority of vegetable farmers were willing to pay 10% of their total production cost/acre as insurance premium; a very few, however, were willing to pay 40% of their production cost as premium (Table 5). The farmers who were not willing to pay a premium to insure their vegetable farms indicated lack of information, or knowledge on crop insurance, which could convince or inspire trust in the facility. [12] in a similar study concluded that farmers were willing to pay to insure an acre of maize farm for GH¢ 32.10, an amount deemed to be comparatively rather low. Hence, even though the majority of the respondents agreed that crop insurance was important to protect against catastrophic losses, they were willing to pay amounts that may be deemed to be comparatively less appreciable. The implication may be that farmers either perceive themselves too poor to pay for insurance or they may not fully understand the benefits of crop insurance. The findings of the study therefore call for sustained farmer education on the use of crop insurance. Most subsistence farmers may not carry out farm budgeting and therefore may not adequately be informed about the input-output relationships of their farm businesses and the resultant profitability.

Table 5: Willingness to pay for insurance premium by vegetable farmers

Variable	Description	Percentage
Willingness to insure vegetable farm	Yes	94
	No	6
Minimum premium willing to pay/acre/annum	[a] GH¢32.10	60.0
Maximum premium willing to pay/acre/annum	[a] GH¢128.40	40.0
The average amount of farmers are willing to pay per acre per annum	[a] GH¢ 49.32	

[a]GH¢ is the Ghana Cedi which at the time of the work had an exchange rate to the US$ of GH¢4.52 to $US 1.00

3.5 Awareness of insurance companies on farm insurance policies and interest in providing farm insurance policies or schemes to farmers

Insurance companies interviewed did not provide agricultural insurance as one of their portfolios; however, they were aware of crop insurance (Table 6). The companies indicated that the high risk involved with agricultural activities was the main disincentive for not offering crop insurance. For most companies, smallholder farmers may be resource-poor and therefore not have the capacity to afford crop insurance. Some companies indicated there was a proposal to undertake crop insurance and it was awaiting management decision.

Table 6: Awareness of insurance companies on farm insurance policies and interest in providing farm insurance policies or schemes to farmers.

Variable	Description	Per cent
Awareness on crop insurance	Yes	75
	No	25
Interest in crop insurance policies	Yes	35
	No	65

4.0 Conclusion

This study examined urban small-scale vegetable farmers' perceptions and knowledge about insurance in the Greater Accra Region of Ghana. It showed a high level of farmer appreciation of the concept of crop insurance. It emerged from the study that the risks associated with disease outbreak were the number one reason that would motivate urban small-scale vegetable farmers to insure their crops. Additionally, financial risk was the number-two reason why farmers would want to ensure their crops. The risk that comes from market uncertainties was the third reason why urban small-scale vegetable farmers would want to insure their crops with the fourth reason being theft. The study showed that gender and marital status were found to have no positive effect on the probability of the farmer's desire to partake in vegetable crop insurance policy, while farmers' level of education had a positive effect

on the probability of farmer's desire to partake in vegetable crop insurance policy. Generally, the study showed that the majority of the vegetable farmers were willing to pay for the insurance premium. However, majority of the insurance companies interviewed did not cover crop insurance as one of their portfolios, citing that the high risk of agricultural business activities as a disincentive for not offering crop insurance policy in Ghana.

The study recommends that the Department of Agricultural Extension Services (DAES) of the Ministry of food and Agriculture (MoFA), Ghana should continue educating small-scale urban vegetable farmers about the benefits of insurance in protecting their livelihoods in the event of natural disasters. Additionally, governmentally-subsidised crop insurance schemes are needed to attract small-scale urban vegetable farmers to purchase insurance contracts. Furthermore, awareness creation can also be carried out through extension of education by agricultural extension officers. This will go a long way to increase farmers' level of awareness and subsequently promote uptake of crop insurance by farmers.

4.1 Policy Implications

This paper seeks to contribute towards expanding knowledge on strategies to manage risk through the vehicle of crop insurance. It provides valuable insights for farmers, policymakers, researchers, students, agricultural extensionists, development practitioners and development partners regarding the concept of agricultural insurance. The findings, apart from contributing to shaping the discussions concerning agricultural insurance in Ghana and the developing world, have useful implications for an agricultural insurance policy. The paper is premised on the conceptual understanding that the formation of perceptions is a function of knowledge-based of the individual. Based on this understanding, the paper makes a strong case for policy orientation designed towards communication, education and creation of public awareness among farmers to inform their perceptions about farm insurance and elicit the needed acceptance of the concept among small scale vegetable farmers. Also, it may be more beneficial for government bodies such as the National Disaster Management Organisation (NADMO) of Ghana to redirect the focus of its programmes from post-disaster management strategies to pre-disaster risk reduction policies.

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