

Abstract

In this study, we employed the Cobb-Douglas production function to assume the stochastic frontier approach (SFA). We then investigate the technical efficiency of smallholder women farmers in northern Ghana using data from 320 women gathered through multi-stage sampling technique. We find that that farm level technical inefficiency is highly caused by factors outside the farmers' control. Also, the mean technical efficiency was found to be 58%. We also find that educational level and income earned through off-farm activities improve technical efficiency. We therefore call for programs that will increase the level of knowledge as well access to production resources among smallholder women maize farmers.

Keywords: Women; smallholder farmers; technical efficiency; Cobb-Douglas production function; northern Ghana.

1. INTRODUCTION

Agriculture plays an important role in every economy. In particular, it remains a crucial sector for reducing poverty and achieving the Millennium Development Goals (MDGs) in Ghana. For instance, aside the Service and Industrial sector, Agriculture is the most important sector driving Ghana's economic growth, contributing 25.6% to Ghana's GDP [1]. Agriculture also accounts for the greatest proportion of Ghana's export earnings [2] and [3]. As a result, Ghana in collaboration with other African Heads of State in 2003 adopted an Africa-owned and led initiative, namely the Comprehensive Africa Agricultural Development Program (CAADP), to

assist their countries to revitalize agriculture development as a strategy for achieving the prime Millennium Development Goal of halving the number of hungry and poor by 2015 [4].

Smallholder farmers who produce on subsistent basis on the other hand tend to dominate the farming population with about 80% of total agricultural production [5]. These farmers produce crops such as cocoa, maize, rice, yam and cassava. The most unfortunate news is that, about 70% of the lands used for the cultivation of these crops are 3 hectares (ha) or smaller in size [6].

The implication of this dominance of smallholders in Ghanaian agriculture is that no meaningful policy to enhance the development of the agricultural sector can overlook these farmers. As a result, many authors such as [7]; policy documents such as FASDEP II and CAADP) and institutions such as [5] and [6] have emphasized the reorientation of policies towards the smallholder farmers as a means of improving their livelihoods and development. It is further argued in these documents that advancement of agriculture, with a focus on smallholder farmers, is central to progress in Ghana and other developing countries of Africa. In line with this, the Government of Ghana in 2013 increased budget of the agricultural sector to about 9% to improve quality of agricultural spending on smallholder farmers. Despite this effort, previous studies have indicated that even with the increase, performance of smallholder farmers remains unclear and thus, raise questions about the efficiency with which resources are used by farmers in Ghana even in periods when the country experiences favorable weather conditions.

Women on the other hand constitute an appreciable percentage of smallholder farmer population in Ghana and play significant role in farming and post-harvest activities. In sub-Saharan Africa for instance, women are reported to contribute between 60 and 80 percent of the labour for food production, both for household consumption and for sale. Men traditionally owned land, but plots of land have been cultivated or managed jointly or separately by men and women [6].

Unfortunately, more concentration is on men with women being marginalized in terms of access to production resources. For instance women's access to factors of production such as land, extension service, inputs, including fertilizer and seeds remain limited in Ghana, although policies aimed at creating enabling environments for women to access and manage resources for productive use have been established. The performance of these women is therefore not clear. Even though most studies try to bring to light, the performance, by considering the technical efficiency of all farmers, the technical efficiency of smallholder women farmers which constitute a major part of the whole is largely escaping researchers in northern Ghana. Also, a plethora of these studies relate to cases that are mix-gender or male specific. Findings resulting from these studies are therefore far from being conclusive and thus, necessitate further research efforts. This study therefore sought to concentrate on the performance of smallholder women farmers through technical efficiency and its determinants. This will provide the basis for the formulation of specific policies for boosting the efficiency of maize production in the study area. This could provide the policymakers with information to design programmes that can contribute to measures needed to expand the food production potential of the nation.

2. REVIEW OF LITERATURE

2.1. Technical efficiency and measurements

Technical Efficiency (TE) is defined as the ratio of the observed output to the corresponding frontier output, conditioned on the level of inputs used by the farm. It is associated with the ability to produce on the frontier isoquant [7]. In other words, it is the physical ratio of product output to the factor inputs. This implies that the greater the ratio the greater the size of the technical efficiency and vice versa.

69 Several methods have been proposed for the measurement of technical efficiency. Farrell [7]
70 used an input-oriented scheme while [8] employed an output-oriented scheme to measure
71 technical efficiency. However, [9] showed that the choice of an orientation rarely has an
72 influence on the reported efficiency scores. Parametric and non-parametric approaches are other
73 common measuring tools of technical efficiency. Basically, the proponents of non-parametric
74 frontier technique used the Data Envelopment Analysis (DEA) which does not impose a
75 functional form on the production frontier. Also, the DEA does not make assumptions about the
76 error term and uses linear programming models to estimate firms' level of efficiency. Another
77 method is the goal programming. A disadvantage of this method is that the parameter vectors are
78 not estimated using regression models and thus, making statistical inference about their values
79 complicated. Also, the log likelihood estimates of these do not come with standard errors
80 attached and also cannot be determined by traditional methods as argued by [10] and [11]. A
81 related method is Corrected Ordinary Least Squares (COLS) where OLS is used to estimate the
82 parameter vectors and the intercept value concurrently. Even though this method is relatively
83 simple and easy to use, the estimated variables in natural logs of the production are parallel to
84 OLS regression as argued in [1]. This means that the structure of the "best practice production
85 technology" is the same as the structure of "central tendency production technology" yet the
86 structure of the "best practice production technology" is expected to change from that of central
87 tendency production technology down in the middle of the data where the other producers are
88 less efficient than the best practice producers [13]. Similar to the COLS is the Modified Ordinary
89 Least Squares (MOLS). However, the use of this approach is also limited by possibility of
90 obtaining a technical efficiency score greater than 1. Aside this limitation, MOLS also shifts the

91 intercept term so far that no producer is technically efficient and as well MOLS production
92 frontier is parallel to OLS regression.

93 The stochastic frontier approaches on the other hand impose a functional form on the production
94 function and make assumptions about the data. The stochastic frontier method also makes it
95 possible to determine the efficiency levels for policy formulation purposes as well as being
96 useful for identifying the sources of the inefficiencies in the system. The most common
97 functional forms include the Cobb-Douglas and translog production functions. However, translog
98 production function can cause multi-collinearity problems [14]. The Cobb-Douglas production
99 function on the other hand is however not only simple but it is self-dual and has been widely
100 applied in agricultural production technologies in many developing countries by [15], [16] and
101 [17]. The Cobb-Douglas production function would be employed in this study to analyze the
102 technical efficiency of smallholder women farmers. In this study, the single step estimation
103 approach proposed by [18] would be used to compute the relationship between the farm/farmer
104 characteristics and technical efficiency. Our choice of the single-step estimation stems from the
105 fact that the two-stage estimation procedure is inconsistent in its assumptions regarding the
106 independence of the inefficiency effects in the two estimation stages. Furthermore, the two-stage
107 estimation procedure is unlikely to provide estimates which are as efficient as those that could be
108 obtained using a single-stage estimation procedure [20].

109 2.2. Previous Studies on Determinants of Technical efficiency

110 Empirical studies such as [16], [19] in developing countries on the determinants of technical
111 efficiency of smallholder farmers have considered a broad range of factors. Much of this
112 literature especially by [20] and [21] have classified the determinants into two major groups: (i)
113 human capital and (ii) structural factors. The Human capital includes variables such as formal and

informal education, literacy, agricultural experience, training and farmer's age. The structural factors include family income, family size, access to credit, land tenure status, gender composition of the labour force, off-farm employment and environmental variables. For age the impact on technical efficiency is a two way relationship. While some studies find an insignificant relationship [12], [22] and [21] with technical efficiency others found a significant but negative relationship [23] and [24].

With regards to farm size, some studies established a positive relationship while others established a negative relationship. For example, a study by [25] indicates a positive impact of farm size on technical efficiency while [26] and [27] negative impact on efficiency.

The impact of agricultural extension and training, education and agricultural experience on efficiency has been evaluated in several efficiency studies. An example is provided by [28] who found that education and experience have significant positive effects on the level of efficiency and that in some cases these two variables can be treated as substitutes in explaining farm performance. In Ghana, [21] also examined the technical efficiency of maize production for the 2011/2012 cropping season and found a consistent results with respect to experience. Furthermore, [29] studied the role of agricultural extension on farm efficiency in Ireland and found a positive relationship between these two variables. Kalirajan and Shand [30] indicate that education and training have a strong and positive relationship with TE, especially among low-income farmers. Kuwornu [1] also found similar relationship between technical efficiency and extension visit, FBO membership, formal training. In [31], the impact of these variables on technical efficiency is mixed. While club membership have a significant impact on technical inefficiency of farmers among farming systems in the slash and burn agriculture zone,

educational level has only a significant impact on the technical inefficiency of the farmers practicing the maize mono cropping system.

The impact of credit assistance on TE has been widely studied and also produces ambiguous results. Ekanayake [32] found a positive and significant effect of greater access to credit on TE for rice farmers in Sri Lanka. However, [33] conclude that the availability of credit at the local level has no impact on efficiency for farmers in Colombia. Similar results are obtained by [34], and [31] for a sample of farmers in Vietnam, the Ivory Coast and Cameroun respectively.

A careful perusal of the literature discussed indicates though efficiency of smallholder farmers has drawn much attention in literature, the technical efficiency of smallholder women has received much less attention. This study therefore sought to bridge the gap. The rest of the paper is organized as follows. The next section presents the methodology (study area, sampling method and sample size, empirical model. In the fourth section, the results are presented and discussed and the last section draws conclusion and recommendations for policy.

3. METHODOLOGY

3.1. Area of Study

The study is conducted in four regions of Ghana including BrongAhafo, Northern, Upper West and Upper East. These four regions of Ghana together make up about 57.5% of the country's total land area with a total population of 6,459,926 representing 26.7% of the country's total population. Of the total population in the area, women population takes about 79.5% and majority of these women constitute the population of maize farmers. A maximum temperature of about 42°C is recorded in the Northern part occurring towards the end of the dry season but 32°C is recorded in Brong-Ahafo region. The rainfall distribution is unimodal in the Northern part of Ghana (i.e. Northern, Upper West and Upper East regions) giving a single growing season of 180

to 200 days with an annual mean of 1,100 mm but bimodal in Brong-Ahafo region which has an annual rainfall of 1,197 mm.

Agriculture is predominantly on a smallholder basis. Although there are some large farms and plantations, about 90% of farm holdings in this area are less than 2 hectares in size. Main system of farming is traditional with the hoe and cutlass being the main farming tools. There is little mechanized farming, but bullock farming is practiced in some places, especially in the North. Agricultural production varies with the amount and distribution of rainfall. The duration and distribution of rainfall coupled with temperatures in this area favour the cultivation of annual crops such as cereals and legumes. In addition, the soils in this area have good organic matter and support the cultivation these group of crops. These explain why majority of farmers in the area embrace maize production.

3.2. Sampling Method and Sample Size

A multistage sampling technique was used to select 320 respondent maize farmers for in depth interviews during the 2012/2013 cropping season. In the first stage of sampling, four regions including Brong-Ahafo, Northern, Upper West and Upper East were purposively selected from the ten regions of Ghana. In the second stage, two districts (one of them being a district where Action Aid Ghana is operating) were then randomly selected from each region. This includes Kumbungu and Sagnarigu in the Northern region; Builsa North and Pusiga in the Upper East Region; Wa West and Jirapa-Lambussie in the Upper West and Tain and Nkoranza South in the Brong-Ahafo region. Simple random sampling procedure was again employed in the third stage to select two communities from each district and from which 20 women were also randomly sampled from each community to get a total of 40 respondents for each district and this represented the final stage. Each region had a sample size of 80 respondents, thus a total of 320

maize households for the four regions of Ghana¹. Data were collected from both primary and secondary sources. The primary sources of data were obtained using semi-structured questionnaire and interview schedules. Semi-structured survey questionnaires covering issues relating to household, farm and institutional characteristics, knowledge and access of farm inputs and extension service among other livelihood dimension were administered to the women in households. The findings which reflected in this study are therefore the respondents' subjective view points. In cases where there appear to have discrepancies between respondents' perceptions and the reality issues on the ground, the reader is reminded that such discrepancies usually exist because respondents may be uninformed or misinformed about the issues being investigated. The household surveys were complemented by focus group discussions at REFLECT circle levels. The focus groups discussed issues bordering on women's access to extension services, access to production resources gender roles in agriculture and crop choices. Discussions were also held with opinion leaders notably Assembly men, community women leaders also known as "Mangasias" and Opinion leaders. Opinion leaders' consultations were intended to help the team explore alternatives for dealing with access to production resources in the various communities. Secondary sources of data was collected from textbooks, journals, seminar papers and conference papers, reports from Ministry of Food and Agriculture (MoFA), publications, and internet resources.

3.3. Empirical Model

Review of literature showed that Cobb Douglas and Translog production functions are the widely used forms in agriculture. However, Translog production function specification suffers from multicollinearity problem as a result of the square and interaction terms of the inputs used

¹ The details of the districts and communities sampled in each region can be found in Abdallah and Abdul-Rahaman (2016). Table 1 presents a list of sampled districts and the number of women selected in each district for the study while Table 2 presents the sample districts and communities selected.

[12]. In this study we use a Cobb-Douglas functional form to specify the stochastic production frontier. This is specified as:

$$\ln Y = \ln \beta_0 + \sum_{j=1}^5 \beta_j \ln X_{ji} + v_i - u_i \quad (1)$$

Where $\ln$ represents logarithm to base e , Y is the quantity of maize harvested (in Kg); X_1 is farm size measured in acres, X_2 is the labour measures as the number of hours spent on the farm, X_3 is the quantity of fertilizer used (in Kg); X_4 is the quantity of seed used in production (in Kg) and X_5 is the volume of agro-chemicals used (in liters); v_i is a random error that is assumed to be independently and identically distributed as $N(0, \sigma_v^2)$ random variables and u_i is the non-negative technical inefficiency effects that are assumed to be independently distributed among themselves and between the v_i such that u_i is defined by the truncation (at zero) of the $N(\mu_i, \sigma^2)$ distribution, where u_i is defined by:

$$u_i = \theta_0 + \sum_{j=1}^8 \theta_j Z_{ji} \quad (2)$$

Where Z_1 represents the years of formal education of the female farmer, Z_2 represents the household size (number of people), Z_3 is the off-farm income measured in GH¢; Z_4 is the farming experience measured as the number of years in farming; Z_5 is a dummy variable that has a value of 1 if the farmer is a member of a farmer association and 0 otherwise (*association dummy*) and Z_8 is extension contact measured as the number of times a farmer contacted an extension agent.

For constant returns to scale, the sum of the parameter coefficients, β s must be equal to one (1). For increasing returns to scale, they must be greater than one, and for decreasing returns to scale they must be less than one. In mathematical form the returns can be expressed as follows:

$$\beta_i = \frac{\delta Y/Y}{\delta X_i/X_i} \quad (3)$$

Where β_i is the elasticity of production with respect to input used and considered the most important property of the Cobb-Douglas production function.

4. RESULTS AND DISCUSSIONS

The summary statistics of the variables used for this study are shown in Table 1. With regards to the variables used in the output function, the results show that the mean output realized by the women was 429.37Kg. This was achieved by utilizing on average, 2.74 acres of land, 13.11Kg of seed, 70.62Kg of fertilizer, 3.16L of agro-chemicals and 5.17 hours of labor on the farm. The mean total output of maize among women in northern Ghana is quite high considering the fact that women in this part of the country are marginalized in terms of production resources. However, in comparison with that of males, the mean output is low. For instance the mean output realized by farmers in the Eastern region was found to be 2386.99 Kg/Ha [1]. Fertilizer application is also high, considering the low fertilizer application in Ghana. For instance, in 2008, the average inorganic fertilizer use in Ghana was 8kg/ha [35]

For the variables used in the inefficiency model, the results indicate low level of education among the women as mean schooling years was 3. This result is consistent with the findings of [24]. The mean household size was 7 members. The annual income realized outside the farm is much lower as the mean annual off-farm income was found to GH¢ 51.53 (USD13.32). The mean farm experience of 10.32 years suggests that the farmers have gained enough and better

managerial skills. Meanwhile, 37.0% of the respondents were members of associations while 63.0% of them were not members of any associations in the study area.

Table 1: Summary statistics of variables used for the analysis

Variable	Min.	Max.	Mean	Std. Dev.
Output (Kg)	0.00	2600.00	149.59	429.37
Farm size (acres)	0.00	11.0	2.74	1.63
Labour (Hrs.)	1.00	11.00	5.17	2.18
Fertilizer (Kg)	0.00	550.00	70.62	101.50
Seeds (Kg)	0.00	200.00	13.11	21.388
Chemicals (liters)	0.00	100.00	3.16	8.045
Education (years)	0.00	16	3.05	4.03
Household size (number of people)	1	25	7.47	6.08
Off-farm income (GH¢)	0.00	600.00	51.53	51.37
Experience (years)	1.00	45.00	10.32	9.52
Association (dummy)	0	1	0.37	0.48
Extension (number of contacts)	0	5	0.21	0.67

Source: Result from data analysis (2016)

4.1. Determinants of maize Output

The Maximum Likelihood (ML) estimates of the stochastic frontier (Cobb-Douglas specification) for women maize farmers are presented in Table 2. The function coefficient which measures the proportional change in output when all inputs included in the model are changed in the same proportion is approximately 0.64, which indicates that returns to size are decreasing. That is, if the women maize farmers in the region increase all resources by 1%, maize output

would also rise by 0.64%. This estimate is consistent with [36] who also obtained a value of 0.86, but contrary to [37] who obtained a value of 1.49 depicting increasing returns to scale. With the exception of seeds and agro-chemicals, all the conventional inputs were significant and maintained their expected signs. Farm size and labour were significant at 10% whilst fertilizer was significant at 1%. The coefficients of these variables were also positive and thus have significant effect on output. For example, the coefficient on farm size means that when farm size is increased by 100%, holding all other inputs constant, output would also increase by about 20%. In the same manner, when each of fertilizer and labour are increased by 100%, output would increase by 19.1% and 21.4%, respectively.

The significance of farm size on output did not come as a surprise as women in Ghana are important as food producers. The result implies that if women farmers in Ghana had the same access to land as men, they would increase their farm productivity. Though our result is gender specific, it is consistent with the findings of [23], [24] and [37] which are mix-gender analysis.

The significant and positive impact of labour on output implies that if a woman farmer has time for additional labour, she can increase the size of her farm leading to the expansion of output. This is because food crop production such as maize is labour intensive and therefore will require more labour especially for weeding, fertilizer application and harvesting operations. This result is also consistent with [38] who reveal that farmers who had the main objective of income maximization in food crop production will tend to allocate labour more efficiently. The significance of fertilizer is also consistent with our *a priori expectations*. Fertilizer application replaces crop land nutrients that have been consumed by previous plant growth [1]. It is essential for economic yields. Therefore, application of more fertilizer would lead to increase in output.

4.2. Determinants of Technical Efficiency

278 The sources of inefficiency are presented in Table 2. The parameter $\gamma = \sigma_u^2 / \sigma^2$ is statistically
279 significant at the 5% level, with an estimated value of 0.41. These results indicate that
280 inefficiency is less significant among the studied households. This might also be interpreted to
281 mean that the differences between actual (observed) and frontier output is dominated by factors
282 outside the farmers' control. In other words, the relative contribution of noise or factors outside
283 the control of farmers is very highly significant. From theory, factors outside the control of
284 farmers include climate drought, floods or bushfires.

285 From the results presented, only education and off-farm income emerged as the determinants of
286 technical efficiency of women farmers in the study area. The parameter of education is
287 statistically significant at 5% while the parameter for off-farm income is statistically significant
288 at the 1% level. These results provide some evidence of the importance of education and off-
289 farm earnings on women's Technical efficiency. These variables may therefore be targeted for
290 specific policy formulation.

291 The significance of education supports the premise that an increase in human capital enables
292 rural households to improve resource utilisation and thus achieve higher technical efficiency. As
293 found in some studies like [39], education enable farmers update their emerging technologies and
294 hence become more efficient than their illiterate counterparts. It is often argued that investment
295 in people, especially the poor and women is a key to accelerated growth and development of
296 Ghana. It is further stressed that education increases people's ability to understand issues related
297 to the adoption of technology, thereby raising their productivity. The importance of education as
298 argued above is reflected in this study. Our result is consistent with the findings of [23], [24] and
299 [37] who also argued along similar lines with [39].

Off-farm income is also important as this serve as a supplement to the purchase of farm inputs such as fertilizer seeds, agro-chemicals and hiring of labour. Farmers with high off-farm incomes will therefore tend to have access to the resources and hence increase productivity. The result is consistent with our a priori expectations and the findings of [23].

Table 2: Maximum Likelihood Estimates for the parameters of the stochastic frontier model

Variable	Parameter	Coefficient	Standard Error	Z
Output function				
Constant	β_0	1.8706	0.2906	6.44***
LnFarm size	β_1	0.1974	0.1071	1.84*
LnLabour	β_2	0.2143	0.1228	1.74*
LnFertilizer	β_3	0.19061	0.0538	3.54***
LnSeeds	β_4	0.0983	0.0658	1.49
LnChemicals	β_5	-0.0633	0.0752	-0.84
Inefficiency Model				
Constant	θ_0	1.0779	0.2935	3.67
Education	θ_1	-0.0569	0.0237	-2.40**
Household size	θ_2	-0.0089	0.0175	-0.51
Off-farm income	θ_3	-0.0141	0.0050	-2.82***
Experience	θ_4	-0.0130	0.0107	0.38
Association	θ_5	0.0820	0.1720	0.48

Extension	θ_6	-0.0571	0.2376	-0.24
Variance parameters				
Sigma squared	$\sigma^2 = \sigma_v^2 + \sigma_u^2$	0.4953	0.0948**	
Gamma	$\gamma = \sigma_u^2 / \sigma^2$	0.4134	0.2342*	
Sigma squared of u	σ_u^2	0.2048	0.1485*	
Sigma squared of v	σ_v^2	0.2905	0.0807*	
Mean technical efficiency		0.5791		
Function coefficient		0.6373		
Log likelihood		-188.8016		

*, ** and *** are levels of significance at 10, 5, and 1%, respectively. Source: Result from data analysis (2016)

4.3. Technical efficiency of women maize farmers

The Technical Efficiency of the women in maize production is presented Table 3. Our results revealed that technical efficiencies vary greatly among the maize farmers in the area. Our results also reveal that 4.70% of the farmers have technical efficiency ranging from 21 to 30%. Additionally, the results indicate that majority of women (about 26.3%) are producing maize on a lower level of efficiency (31-40). Also, about 11.3% have technical efficiency ranging between 41 to 50%. Further, the results show that few of the farmers (1.6%) are either producing on the frontier or closely to the frontier (91 to 100%). These results are consistent with [37] who reveals that only 12.1% of maize farmers in the Central Region of Ghana have technical efficiency of above 0.8. The predicted mean technical efficiency of the farmers is 0.58. This indicates that the women in the study area produced 58% of the potential stochastic frontier output based on the

present state of technology as well as the level of inputs. The implication is that the 42% of potential output is not realized. Possibly, the adoption of the practice of the “best farm” will increase maize production in the region by an average of 42% to enable these women farmers to attain the potential stochastic frontier output level.

Table 3: Frequency Distribution of Technical Efficiency of the women maize farmers

Efficiency class	Frequency (No. of farmers)	Percentage
21-30	15	4.69
31-40	84	26.25
41-50	36	11.25
51-60	61	19.06
71-80	69	21.56
81-90	50	15.63
91-100	5	1.56
Total	320	100

Source: Result from data analysis (2016)

5. CONCLUSION AND RECOMMENDATIONS

The study sought to find the technical efficiency of women maize farmers in Northern Ghana using the stochastic frontier approach. A multi-stage sampling procedure was employed in gathering data from 320 women maize farmers in the area for the study. The estimated model showed significant levels of technical inefficiency among the sampled women, which suggests that opportunity exists to expand production using the current level of inputs and the technologies already available in the areas included in this study. Specifically, we find that farm level technical inefficiency or deviations from the frontier is highly caused by factors outside the

farmers' control. Factors influencing technical efficiency include educational level and income earned from off-farm activities. We also find that technical efficiency vary greatly among the women with majority on a technical efficiency range of 31-40%.The mean technical efficiency was found to be 58%.

Based on our findings, the following recommendations are distilled:

- i. Investments in human capital such as education provide the greatest returns in terms of socioeconomic development. Therefore, rural development and natural resource management programs in Northern Ghana should strengthen efforts designed to increase the level of knowledge among smallholder women maize farmers.
- ii. Since off-farm income also improves productivity, women can be supported with credit to purchase farm inputs or to go into other livelihood activities during the off season. The returns from these activities can supplement the purchase of production resources to improve productivity.

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APPENDICES

Survey Questionnaire

Study Topic: Small Holder Women in Agriculture in Northern Ghana

Region:.....

District:.....

Community:.....

Name of Respondent:.....

DEMOGRAPHIC CHARATERISTICS

1. Age (.....yrs)

i. 20 – 30 years

ii. 31 – 40 years

iii. 41 – 50 years

iv. 51 – 60 years

v. Above 60 years

2. Marital status

i. Single

ii. Married

iii. Divorced

- 470 iv. Widowed/Widower
- 471 3. Number of children (.....)
- 472 i. 1 – 5
- 473 ii. 6 – 10
- 474 iii. Above 10
- 475 iv. None
- 476 4. Educational level (.....yrs)
- 477 i. Primary school
- 478 ii. Junior high school/Middle school
- 479 iii. Secondary school/O' or A' Level
- 480 iv. Tertiary
- 481 v. Non-formal education
- 482 vi. None
- 483 5. Household size (.....)
- 484 i. 1 – 5
- 485 ii. 6 – 10
- 486 iii. Above 10
- 487 6. Family status
- 488 i. Homemaker
- 489 ii. Household head
- 490 iii. Both
- 491 SOCIO – ECONOMIC CHARACTERISTICS
- 492 7. Occupation (aside farming)
- 493 i. Petty trader
- 494 ii. Manual worker
- 495 iii. Other
- 496 iv. None
- 497 8. Monthly income level (GH¢.....)
- 498 i. GH¢1 – GH¢25
- 499 ii. GH¢26 – GH¢50
- 500 iii. GH¢51 – GH¢100
- 501 iv. Above GH¢100
- 502 9. Number of years in farming (.....yrs)
- 503
- 504 10. Landholding/land size (.....acres)
- 505 i. Less than 3
- 506 ii. 3 – 5
- 507 iii. 6 – 10
- 508 iv. Above 10

- 509 11. Do you belong to any farmer association?
- 510 i. Yes
- 511 ii. No If No, please go to 14
- 512 12. If Yes, which one?
- 513 i. Women's farmer association
- 514 ii. Farmer cooperative
- 515 iii. Credit society
- 516 13. What is/are your role(s) on the farm? [Tick the ones that are applicable to you]
- 517 i. Land clearing/preparation
- 518 ii. Transplanting/seeding
- 519 iii. Chemical/fertilizer application
- 520 iv. Harvesting
- 521 v. post harvesting activities
- 522 vi. All of the above
- 523 vii. None of the Above
- 524 14. Under what production condition do you cultivate your crops?
- 525 i. Rain fed condition
- 526 ii. Irrigation condition
- 527 15. Which area(s) are you actively involved in decision-making on the farm? (Tick applicable
- 528 ones)
- 529 i. Crop/seed/variatal selection
- 530 ii. Site selection
- 531 iii. Land size
- 532 iv. Inputs acquisition
- 533 v. Crop storage
- 534 vi. Sale of produce
- 535 vii. All of the above
- 536 viii. None of the above
- 537 16. What is the average daily number of hours spent on farm and unpaid care work?
- 538 a. On farm (.....hrs):
- 539 i. < 1
- 540 ii. 1 – 2
- 541 iii. 3 – 4
- 542 iv. 5 – 6
- 543 v. Above 6
- 544 b. Unpaid care work (.....hrs):
- 545 i. <1
- 546 ii. 1 – 2
- 547 iii. 3 – 4
- 548 iv. 5 – 6

549 v.Above 6

550 17. How do you access the following crop production resources?

551 **a. Land**

552 i. Personal

553 ii. Husband

554 iii. Family

555 iv. Hired/Rented

556 v. Group

557 vi. Other.....

558 **b. Farm implements**

559 i. Personal

560 ii. Husband

561 iii. Family

562 iv. Hired/Rented

563 v. Group

564 vi. Other.....

565 **c. Labour**

566 i. Personal

567 ii. Husband

568 iii. Family

569 iv. Hired/Rented

570 v. Group

571 vi. Other.....

572 **d. Improved seed**

573 i. Farmer saved seed

574 ii. Agro-input dealer

575 iii. Seed grower

576 iv. iv. MoFA

577 v. Other

578 18. Do you apply fertilizer on your farm? i. Yes ii. No

579

580 19. If yes to question 19, where do you normally get your fertilizer from?

581 i. Agro-input dealer

582 ii. MoFA agric extension agents

583 iii. Other.....

584 20. Do you receive any agric extension service/advice?

585 i. Yes ii. No

586 21. If yes, from which source?

587 i. Government (MoFA Agric Extension Agents)

588 ii. NGOs

589 a. ActionAid Ghana

590 b. Finatrade

591 c. Plan

592 d. Wienco agricultural

593 e. Other

594 iii. Private companies (State name).....

595 iv. Other farmer organization

596 22. How frequent does the agric extension agent visit your farm/contact you?

597 (.....)

598 23. What extension services do they provide? (Tick the ones applicable)

599 i. Site selection techniques

600 ii. Seed/variatal selection

601 iii. Land preparation

602 iv. Planting/seeding techniques

603 v. Fertilizer application

604 vi. Pest/weed/disease control/management

605 vii. Post harvest technology

606 viii. Group formation and development

607 ix. Credit and financial management

608 x. Poultry/livestock management

609 24. What is your present source of extension advice?

610 i. Husband

611 ii. Cooperatives/farmer group

612 iii. Friends

613 iv. MoFA Agric extension agents

614 25. What key area(s) of agric extension advice do you need most? [Rank them from 1
615 (important) to 7 (least important)]

616 i. Training and group formation

617 ii. Input supply

618 iii. Pest/weeds/disease control

619 iv. Demonstration

620 v. Livestock management

621 vi. General agronomic practices

622 vii. Tractor and implement management

623 viii. Credit and financial management

624 26. What is your gender preference for an agric extension Agent?

625 i. Male ii. Female iii. No preference (any)

626 27. What challenges do you face in accessing agric extension service? (Tick the ones applicable)

627 i. Gender discrimination

628 ii. Type of farming systems

629 iii. Wealth status

630 iv. Educational level

631 v. Age

632 vi. Land ownership

633 vii. Land holdings (land size)

634 viii. Cultural restrictions

635 ix. Lack of credit/Access to credit

636 x. Membership of farmer group/cooperative/community organization

637 xi. Heavy unpaid work

638 28. What challenges do you face on the farm? [Tick the applicable ones and rank them]

639 i. Inadequate land holdings

640 ii. Lack of improved varieties of seed

641 iii. High cost of farm inputs

642 iv. Pest and disease infection

643 v. Weeds invasion

644 vi. Lack of modernized farm implements and tools

645 vii. Lack of water/irrigation

646 viii. Low market price

647 ix. Inadequate labour

648 x. Transportation

649 29. Do agric extension officers organize extension programmes?

650 i. Yes ii. No

651 30. If yes to question 30, do you find it useful?

652 i. Yes ii. No

653 31. What problems do you encounter in attending such programmes?

654 i. Heavy unpaid care work

655 ii. Lack of interest in programme

656 iii. Lack of incentives

657 iv. Usefulness not seen

658 32. What crop(s) do you cultivate?

659 33. What is the distance from your farm to house/input store? (.....km)

660 34. Provide the quantities of the following inputs you used last year?

661 i. Fertilizer (.....kg)

662 ii. Chemicals (Litres)

663 iii. Seed (.....kg)

664 iv. Labour (.....man-days)

665 35. What is the total number of bag(s) usually harvested? (.....bags)

666

667 36. What do you use your produce for?

668 i. For sale

669 ii. As food for the household

670 iii. Other

671

672

673