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Role of Women in Palm Oil Sector in Ghana

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This study focuses on the role of women in a palm oil sector to improve a local economy in Twifo-Hemang Lower Denkyira District in Ghana. The palm oil is mainly produced by small-scale farmers. Especially palm oil processing depends on women labour force in Ghana. This study first analyzes factors affecting palm oil production during the wet and dry seasons, respectively. Second, this study evaluates difficulties faced by women in a palm oil marketing field. The survey in this study is conducted for women who work in a palm oil sector. During the wet season, production price, marital status, household head, education level have positive effects on the palm oil production. The highest education and other sources of income have negative effects on the palm oil production, however the education level is important for negotiating a price of palm oil. During the dry season, most of factors have ambiguous effects on the palm oil production. In addition, this paper evaluates women's marketing challenges such as inadequate market, exploitation by middlemen, lack of storage facilities, fraud, market levy, lack of transport, lack of standard grading, lack of market information. The highly ranked marketing challenges are an inadequate market, exploitation by middlemen, and lack of storage facilities.

[Key Words: Palm oil, Ghana, Women processor, Dry season, Wet season, Marketing challenges]

Ⅰ. Introduction

Small-scale agriculture is an essential driver to boost local economy and to reduce poverty in developing countries (McCarthy, 1989; Due et al, 1992). Processing palm fruits to produce oil plays an important role as an income source of small-scale farms in Africa such as Ghana, Nigeria, Cote d'Ivoire and so on (Poku, 2002). In Ghana, the production of palm oil is dominated by small-scale farms (Fold et al, 2012). In 1983, Ghana implemented the Structural Adjustment Programme (SAP) for economic growth, and the programme successfully influenced on the economy. During that time, many medium size firms disappeared in a market, however, small-scale firms kept to operate their business (Loxley, 2007). It led to the realization in Ghana that small scale processing contributes to the national economic development through the creation of wealth and utilization of local resources.

Palm fruits are relatively available to be produced throughout the year even though there exists a difference of quantity and quality between the wet (July to October) and dry (January to April) seasons. The Ghana government had expanded the cultivation areas of palm fruits under Presidential Special Initiative (Asante, 2012). With government supports, palm oil production in Ghana have increased for the last decade and the annual average increase rate from 2000 to 2014 in palm oil production is 11.48% in Ghana (USDA Foreign Agricultural Service). In 2014, Ghana had an approximately 350,000 hectares of land to cultivate palm fruits and produces about 2.4 million tonnes of palm oil according to the Food and Agriculture Organization of the United Nation (FAO). The government supports make available to develop a palm oil sector in Ghana and to help small-scale farms to increase their income.

The palm oil sector in Ghana has distinguishable features. Although palm fruit production and productive resources are decided by men, the

processing of palm oil are mainly relied on women (Ogunlela and Mukhtar, 2009). There is no doubt that female labor force in a palm oil sector can play an important role to improve the livelihood of a household and to reduce poverty. According to FAO statistics (2015), about 1,351,086 of the Ghanaian female labor works in an agriculture sector. However, the status and power in job markets is still low. Especially, in an agriculture sector, women are considered as unpaid family labor and such women workforce is not captured by FAO statistics (2016). The poor perception of gender equality and weak recognition of women's contributions is an obstacle to promote women's role in an agricultural sector.

Poverty issues about developing countries come from lack of basic needs, income, consumption, assets (material and non-material), dignity, autonomy, social inclusion, equality (gender and ethnicity), political freedom and security (Carney,1999). Although there are several suggestions to reduce the poverty in developing countries, an income enhancement is a common strategy (Chambers and Conway 1992). Carney (1999) expanded the concept of livelihood. He and suggested that livelihoods are affected by internal and external factors and emphasized that external factors such as institutions, policies, financial assets, weather conditions, other sources of income and so on must be considered for the rural poor.

This study adjusts Carney (1999)'s suggestion to analyze the role of women to achieve the sustainable livelihoods for the rural income enhancement. This study focuses on economic factors such as price and other sources of income that affect the role of women in a local economy rather than on gender issues. The general objective of the study is to analyze various social and economic factors related with women processors in a palm oil sector in Ghana. First, this study determines whether or not women' activities influence the change in palm oil production in the Twifo – Hemang Lower Denkyira District. Especially, this study classifies into wet and dry season

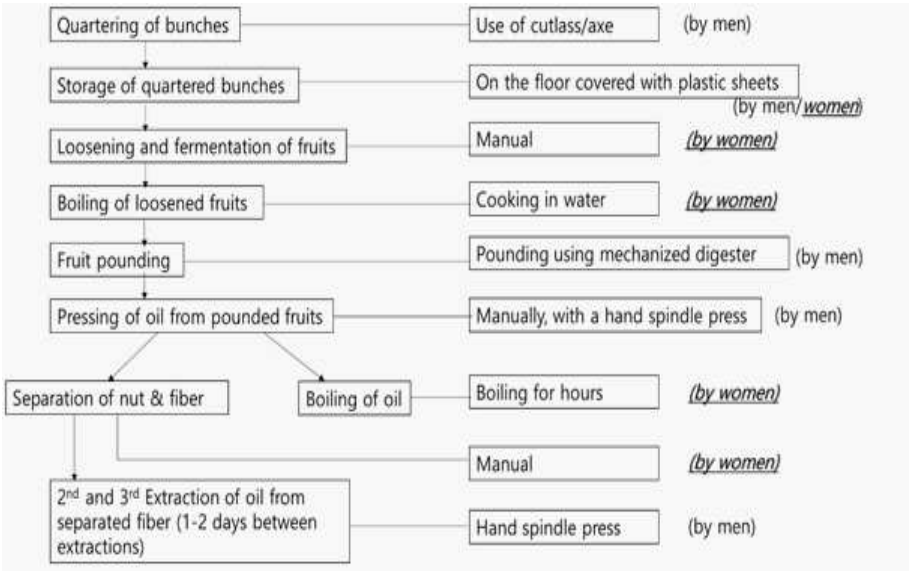
production to compare the seasonal effects. Finally, this study examines the challenges faced by women in a palm oil marketing.

Ⅱ. Literature review

The palm oil (Elaeis guineensis Jacq.) originates from the tropical rain forest region of West Africa, the main belt running through the southern latitudes of Guinea, Sierra Leone, Liberia, Cote d'Ivoire, Ghana, Togo, Nigeria, Cameroon and Equatorial region of Angola and the Congo (Poku, 2002). The palm oil gives relatively high-yielding per unit area. Due to the importance as a source of income, the palm oil is now grown as a plantation crop in several countries where are tropical climates within 10° of the equator (Poku, 2002). The individual fruit consists of an outer skin (the exocarp), a pulp (mesocarp) containing the palm oil in a fibrous matrix, a central nut (endocarp) and the kernel containing an oil. In recent, high-yielding varieties have been developed by breeding programs. This breeding is capable of producing oil in excess of 20 tonnes per hectare (excluding the palm kernel oil), which far outstrips any other source of edible oil (Poku, 2002).

Processing part in an agricultural sector becomes a major field since it can improve the accessibility of agricultural products in Ghana. In a palm oil sector, processing is important. The figure 1 shows different activities by gender in a palm oil processing. Although detail processing techniques to produce palm oil can vary from districts to districts, the palm oil processing is generally classified into nine steps. Except for physically strenuous works, women involve in most of steps of palm oil processing.

〈Figure 1〉 Steps of palm oil processing by gender



(source: authors)

Ⅲ. Data and Methodology

1. Data

A survey is conducted for women who work for a palm oil production from March to July in 2017, using in-person interview. A survey method has its own unique set of strengths and weakness; therefore, a researcher must consider resources availabilities, time limitation, sensitivity of research topic, complexity of survey questions, and probability of errors and characteristics of respondents (Doyle, 2008). This study includes both open-ended and closed-ended questions to collect qualitative and quantitative information of respondents.

The area selected in this study is at the the Twifo – Hemang Lower

Denkyira District. Twifo - Hemang Lower Denkyira district is located in the central region of Ghana. The Ghana government reports that approximately 51% of farmers in Twifo-Hemang Lower Denkyira district are women in 2010. Most of these women work for palm fruit processing and marketing fields. For the study, 30 women who works at a palm oil processing sector are randomly selected from five communities such as Twifo Hemang, Ampenkrom, Wawase, Jukwa and Frami in the Twifo Hemang Lower Denkyira District, respectively. Totally 106 respondents in the study are used for an analysis 〈Table 1〉.

〈Table 1〉 Number of respondents across the study areas

Communities	Number of respondents	Percentage (%)
Twifo Hemang	25	23.58
Ampenkrom	29	27.36
Wawase	20	18.87
Jukwa	18	16.98
Frami	14	13.21
Total	106	100.00

There were some challenges encountered in the course of the survey because of illiteracy, inability of the women to keep records of their processing activities and poor accessibility. To deal with such challenges in this study, we perform a pre-test for clarification of the data collection. For the pre-test, this study collected 20 respondents engaged in small-scale palm fruit processing in the Assin North Municipal. This area was excluded from the selected five communities in order to avoid duplication of responses. From the pre-test, this paper ascertains the time that could be spent in an interview and the number of research assistants to employ. In addition, ambiguous questions are detected during the pre-test and the necessary corrections are made accordingly. Secondary data are collected from books,

internet, journal, newsletters, newspapers, magazines.

2. Methodology

This study determines factors that affect palm oil production and examines the challenges for women in a small-scale farm. There are limitations of collecting women's income data from their working places. Thus this paper asks how much volume of palm oil they produce and how much producer price of palm oil they get. This study assumes that the increases in palm oil production is directly related to the income of household. The palm oil production is considered as the dependent variable, producer prices of palm oil, other sources of income, marital status, age, household head and education level are considered as the independent variables. In addition, this study classifies the effects of the wet and dry season. A multivariate linear regression model is applied for estimating determinants of palm oil production;

$$
\begin{aligned}
Q_{ki} = {} & \alpha_{k0} + \alpha_1 P_{ki} + \alpha_2 A_{ki} + \alpha_3 D_{ki}^{NS} + \alpha_4 D_{ki}^{PS} + \\
& \alpha_5 D_{ki}^{JS} + \alpha_6 D_{ki}^{M} + \alpha_7 D_{ki}^{H} + \alpha_8 D_{ki}^{I} + \alpha_9 D_{ki}^{NS} P_{ki} + \\
& \alpha_{10} D_{ki}^{PS} P_{ki} + \alpha_{11} D_{ki}^{JS} P_{ki} + \alpha_{12} D_{ki}^{T} + \alpha_{13} D_{ki}^{A} + \alpha_{14} D_{ki}^{W} + \epsilon_{ki}
\end{aligned} \tag{1}
$$

where k is a binary variable for the wet season and the dry season, Q_{ki} is palm oil quantity (numbers of jerrican) at ith respondent for the wet and dry season, P_{ki} is the producer price of palm oil (per jerrican) at ith respondent for the wet and dry season, A_{ki} is the age at ith respondent for the wet and dry season, D_{ki}^{NS} is a binary variable that explains no-formal education at ith respondent for both seasons, D_{ki}^{PS} represents primary school level at ith respondent for both seasons, D_{ki}^{JS} represents junior-high school level at ith

respondent for both seasons, D_{ki}^{M} is a binary variable for marital status at ith respondent for both seasons, D_{ki}^{H} is a binary variable for household head at ith respondent for both seasons, D_{ki}^{I} is a binary variable for other sources of income at ith respondent for both seasons, D_{ki}^{T} is a regional dummy for the Twifo-Hemang community at ith respondent for both seasons, D_{ki}^{A} is a regional dummy for the Ampenkrom community at ith respondent for both seasons, D_{ki}^{W} is a regional dummy for the Wawase community at ith respondent for both seasons, $D_{ki}^{NS}P_{ki}$, $D_{ki}^{PS}P_{ki}$, $D_{ki}^{JS}P_{ki}$ are interacting variables to estimate the effects of education level when women processors negotiate a price (palm oil producer price), ϵ_{ki} is an error term for both seasons.

The participation rate of female labor force in an agricultural sector is around 75% in Ghana according to Word Bank (2016). However, their efforts to process palm oil do no connect to marketing activities. Negotiating the price of palm oil with middlemen depends on men. Women processors have difficulties with negotiating price of palm oil with middlemen. There are various reason such as asymmetric market information, unhealthy market environments, man dominated culture, low social status, education level and so on. In the multivariate linear regression model, the study estimates the effects of education level when women negotiate price of palm oil. Besides, the study evaluates asymmetric market information and unhealthy market environments. Such analyses of difficulties related with market functions can provide policy implication to improve a market efficiency. In order to find marketing challenges, this study listed 8 difficulties such as inadequate market, high transportation charge, high market levy, defraud in payment, lack of market information, insufficient grading system, exploitation by middlemen and so on, and asked for the agreement.

After investigating a list of marketing challenges, this study tested how

much respondents agree with each other. For assessing agreement, using the Kendall's W. The Kendall's W is a non-parametric statistic to estimate the agreement among respondents in quantitative or semi-quantitative variables of interest (Legendre and Fortin, 2010). The Kendall's W is written as:

(2)
$$W = \frac{12S}{m^2(n^3 - n)},$$
$$S = \sum_{i=1}^{n}\left(R_i - \overline{R}\right)^2,$$
$$R_i = \sum_{i=1}^{n} r_{ij} = 1 + 2 + \ldots + n = \frac{n(n+1)}{2}$$

where m represents respondents, n is in total objects for marketing challenges (8 difficulties), S is the sum of squared deviations of total ranks. R_i is the total rank given to object i, r_{ij} is the rating rates by respondents j, where there are in total n objects and m respondents and $\overline{R}$ is the mean of total ranks. The F statistic is used for alternative test of significance of the Kendall's W. It is given as:

(3)
$$F = \frac{(m-1)/W}{(1-W)}$$

Ⅳ. Empirical results

1. Social Characteristics of Respondents

〈Table 2〉 provides the explanation and descriptive statistics of variables. The palm oil production and producer prices are continuous variables for the wet season and the dry season for 2017. Since production volume and price

are the direct source of income, these two variables are utilized to measure the impacts of factors related with female labour on palm oil.

〈Table 2〉 Summary statistics

Variables		Definition and Level	Means	Standard errors
Palm oil production	Wet season	In 2017, total quantity of palm fruit oil (# of Jerrican)	9.066	3.897
	Dry season	In 2017, Total quantity of palm fruit oil (# of Jerrican)	4.566	2.395
Producer price of palm oil	Wet season	Producer price (GH¢/Jerrican)	47.189	12.297
	Dry season	Producer price (GH¢/Jerrican)	77.434	10.354
Marital status		Living together (marriage=1) Other (divorced, separated, single, widowed=2)	1.359	0.482
Age		Age of respondents	39.264	12.085
Location	Twifo-Hemang	(Yes=1; No=0)	0.236	0.427
	Ampenkrom	(Yes=1; No=0)	0.274	0.448
	Wawase	(Yes=1; No=0)	0.189	0.393
	Jukwa	(Yes=1; No=0)	0.170	0.377
Education Level	No-formal school	Never been to school	0.236	0.427
	Primary school	Graduate primary school	0.217	0.414
	Junior high school	Graduate Junior high school	0.462	0.501
	High school	Graduate high school	0.085	0.498
Other income source	Wet season	(Yes=1; No=0)	1.434	1.931
	Dry season	(Yes=1; No=0)	1.877	0.498

Note: Jerrican is a liquid container and is equal to 19 liters and GH¢ is the Ghana currency and is about 0.19 US dollar.

〈Table 3〉 shows social characteristics of women respondents. For age, 35% of women is between 31-40 years old, and 26% of women is between 21-30

years old and 21% of women is between 41-50 years old. Only 3% of women is below 20 years old and 7% of women is above 60 years old. This shows that relatively young women involve in a palm oil processing field. The education level is that 2% of women processor graduated from secondary school, 48% of women processor graduated from junior high school, 24% of women processor graduated from primary school and 26% of women processor did not have experience formal education. The 2% women who graduated from secondary school combined with a education level of more than junior high school when it is estimated. From the marital status 64% of women processors live together (marriage). 36% of women processors are in other status (divorced, separated, widow and single). The proportion of women being a head of household is closely related with women's marital status since women make a living for children and men who are not working. The 57% of women are household heads who involve in processing and marketing. 43% of women are not household's heads and they are not directly responsible for livelihood. This is importance for women in terms of decision-making and responsibility to support families and relatives from economic activities.

〈Table 3〉 Social characteristics of responses

(units: %, person)

Social characteristics	Ratio of responses	Numbers of respondents
Age		
≤ 20	3%	3
21 ~ 30	26%	28
31 ~ 40	35%	37
41 ~ 50	21%	22
51 ~ 60	8%	8
≥ 60	7%	7
Education level		
No formal education	26%	28
Primary level	24%	25
Junior high school	48%	51
Secondary school	2%	2
Marital status		
Married	64%	68
Others(Single, Separated, Divorced, Widowed)	36%	38
Household head position		
Yes	57%	60
No	43%	46

2. Factors affecting palm oil production

〈Table 4〉 shows determinants influencing palm oil production during the wet season. The producer price of palm oil positively and significantly (5% level) affects the increases in palm oil production. The age negatively affects the increases in palm oil production. When women get older, their labor productivity is decreased. The effects of education level on palm oil production are negative and not significant. The effects of education level in a palm oil processing are ambiguous because palm oil processing tasks might not require for knowledge or advanced skills from education and thus many

illiterate women can involve in this palm oil processing filed. Marital status in this paper are classified into living together or not. The woman status as a head of household positively affect the increase in palm oil production. Women who need to take care of their family produce palm oil more because the increases in palm oil production is directly related with their income. Other source of income has a negative and significant effect on palm oil production. The interaction terms of the education level and producer price of palm oil shows the positive effect of education level when palm oil producers negotiate a price of palm oil. Producing palm oil does not require techniques from education, however, negotiating price with middlemen requires certain skills.

〈Table 4〉 Determinants of palm oil production during the wet season

Variables	Coefficients	Std. error	p-value
(Dependent variable: palm oil production)			
Intercept	7.746	1.378	〈.0001*
Producer price of palm oil	1.245	0.330	0.000*
Age	-0.163	0.114	0.153
Community 1 (Twifo Hemang)	-0.126	0.100	0.207
Community 2 (Ampenkrom)	-0.156	0.097	0.107
Community 3 (Wawase)	-0.250	0.110	0.022*
Community 4 (Jukwa)	-0.030	0.104	0.771
No-formal school	-1.064	1.576	0.701
Primary school	-1.064	1.952	0.250
More than junior high school	-2.880	1.421	0.038*
Marital status (living together or not)	0.041	0.067	0.621**
Household head (head or not)	0.133	0.067	〈.0001*
Other sources of income	-0.684	0.066	0.026*
No-formal education producer price of palm oil	0.256	0.405	0.720
Primary producer price of palm oil	0.522	0.511	0.279
Junior high school producer price of palm oil	0.734	0.364	〈.0001*

Note: * is significant at 5% level, ** is significant at 10% level

〈Table 5〉 shows determinants influencing palm oil production during the dry season. The producer price of palm oil positively affects the increases in palm oil production, but the coefficient is not statistically significant at 5% level. Age is negatively affect the production. During the dry season, household head status positively affects the production, respectively. No-formal education status positively affects the production, but no-formal education status negatively affects when women processors negotiated a price of palm oil. When comparing determinants with the wet season, there are seasonal differences. The effect of other sources of income negatively affect palm oil production, but it is not statistically significant at 5% level. Most of farmers during the dry season face losing their income sources. Thus other sources of income to maintain household are important.

〈Table 5〉 Determinants of palm oil production during the dry season

Variables	Coefficients	Std. error	p-value
(Dependent variable: Palm oil production)			
Intercept	2.391	1.548	0.122
Producer price of palm oil	0.077	0.370	0.835
Age	−0.236	0.130	0.069**
Community 1 (Twifo Hemang)	−0.171	0.114	0.132
Community 2 (Ampenkrom)	−0.019	0.113	0.865
Community 3 (Wawase)	−0.172	0.128	0.177
Community 4 (Jukwa)	−0.092	0.120	0.442
No-formal education	3.912	1.792	0.029*
Primary	2.619	2.187	0.231
More than junior high school	0.208	1.632	0.898
Marital status (living together or not)	0.091	0.076	0.237
Household head	0.001	0.076	〈.0001*
Other sources of income	−0.733	0.072	0.912
No-formal education producer price of palm oil	−0.985	0.459	0.032*
Primary producer price of palm oil	−0.725	0.573	0.206
Junior high school producer price of palm oil	−0.056	0.418	0.894

Note: * is significant at 5% level, ** is significant at 10% level.

3. Marketing challenges faced by women

This study used 8 scales for ranking: 1=the most encountered problem, two=the second most encountered problem, 3= the next and so on. Inadequate market is listed for the most difficult market challenge. The exploitation by middlemen and lack of storage facilities are highly ranked for marketing challenge. The buyer's fraud in payment, market levy from the fruits, transport cost due to bad roads, lack of standard grading system and lack of market information were ranked on 4^{th}, 5^{th}, 6^{th}, 7^{th} and 8^{th}, respectively. In a palm oil sector, oil prices are mostly established by middlemen rather than by a market. Such middlemen organize a monopolistic association which enables them to control the palm oil market and they bring out chronic market issues. In such market circumstances, a farmer is a price taker.

〈Table 6〉 Rank order for market challenges

Marketing challenges	Mean of rank	Order of rank
Inadequate market	3.591	1st
Exploitation by middlemen	3.822	2nd
Lack of storage facilities	4.925	3rd
Fraud	4.936	4th
Market levy	5.184	5th
Lack of transport	5.293	6th
Lack of standard grading	6.802	7th
Lack of market information	7.621	8th

With such ranks of market challenges, Kendall's W is tested for assessing agreement on the challenges among the 106 women palm fruit processors. Kendall's W tests the null hypothesis that there is no agreement among respondents. 〈Table 7〉 reports the Kendall's test statistics and critical values.

According to the p-value, we reject the null hypothesis. Therefore, most of women agree such rank order for marketing challenges.

〈Table 7〉 Kendall's W test results

Test Statistics	Value
N (respondents)	106
Kendall's W	0.33
Critical value (χ^2)	277.92
Degree of freedom (k subjects)	7
p-value	〈.0001

V. Conclusion and Implication

There is no doubt that the role of women is important for an agriculture industry in developing countries. This study estimates the imapcts of social and economic factors related with female labour on palm oil production in Twifo-Hemang Lower Denkyira District in Ghana. Factors affecting palm oil production are determined through a multivariate linear regression for the wet and dry seasons, respectively. In addition, the study evaluates marketing challenges from asymmetric market information and unhealthy market surroundings in a palm oil market. During the wet season, production price, marital status, household head, education level have positive effects on the increases in palm oil production. However, higher education level and other sources of income have negative effects on the increases in palm oil production during the wet season. From the results, we find different factors between wet and dry seasons. During the dry season, most producers have difficulties to meet the quantity and quality for a commercial palm oil. From the comparison between dry and wet seasons, the dry season has no clear

factors that positively or negatively affect production. From the results, we found that it is not necessary to be educated to produce palm oil, however, the education level can be an important factor to negotiate a price of palm oil. Women processors find difficulties with negotiating a price of palm oil because of inadequate market, exploitation by middlemen, and lack of storage facilities.

In order for stable palm oil production and price, a government needs to have different strategies for the wet and dry seasons. During the dry season, other income source are important to maintain household, but there might not have enough choices of other economic activities in the selected communities. The government can utilize women' organization to provide other economic activities during the dry season. For example, various non-farm activities such as pottery, tailoring, teaching and so on can help women processors to make an extra income. In addition, the negotiation skills for price in palm oil marketing are important for women.

Women in Agricultural Development Directorate (WIAD) and a business incubation office in Ghana can support organizing a membership group of women processors and thus they can access social, educational and financial supports from microfinance institutions. Once women's association is well established, governments, non-governmental organizations (NGO's) and other stockholders can create small information centers that provide processing techniques, negotiation skills and so on. Thus women would improve their social and economic capabilities, improve their skills in managing, processing and marketing.

This paper has some limitations related with the survey design and an empirical model. The study suggests that survey would be better designing for both male and female to emphasize the role of female labour. In addition, technology advancement in a palm oil sector would be consider for future researches. The study included several dummy variables and it could lead to

an overfitting issue in a linear regression. In order to avoid the overfitting issue, mixed error-component model could be applied.

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□□□■□ 국문초록

가나 팜유생산 분야에서의 여성의 역할

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본 연구는 가나의 Twifo-Hemang Lower Denkyira 구역에서 팜유 가공 분야에서 여성 종업인의 활동이 지역 경제에 어떠한 영향을 미치는지 분석하였다. 가나에서 팜유는 대부분 영세농에 의해 생산되어지고 있고, 특히 팜 열매로부터 기름을 추출하는 과정에는 대부분의 여성 노동력이 활용되어지고 있다. 가나 농업에서 여성의 역할은 점점 중요해지고 있다. 그래서 본 연구에서는 건기와 우기 동안 팜유 생산에 영향을 미치는 요소를 분석하고 비교하였다. 또한, 팜유 마케팅 과정에서 여성농업인들이 겪는 어려운 점들을 평가하였다. 본 연구에서 사용된 설문은 팜유 생산과정에 종사하고 있는 여성 농업인을 대상으로 실시하였다. 우기동안은 팜유생산가격, 결혼 유무, 여성 가구주, 교육수준 등의 요소는 팜유 생산에 긍정적인 영향을 미쳤으나, 높은 교육수준과 농외소득은 팜유 생산에 부정적인 영향을 미쳤다. 건기동안에는 팜유생산에 유의한 영향을 미치는 요소들을 찾기 어려웠다. 또한, 본 연구에서는 팜유 마케팅에서 여성농업인들이 겪는 어려운 요인들(부적절한 시장, 중간상인들의 폭리, 저장시설의 부족, 사기, 진입비, 운송비, 시장정보 부족 등)에 대해 평가하였다. 여러 가지 어려움 중 부적절한 시장, 중간상인들의 폭리, 저장시설의 부족 등의 요인들이 여성농업인들에게 가장 어려운 점으로 평가되었다.

[주제어: 팜유, 가나, 여성 농업인, 우기, 건기]

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제1저자(주저자): Albert Appiah Amoakoh는 현재 Ministry of Food and Agriculture in Ghana에서 근무하고 있고, 농촌 발전을 위해 소규모 영세농의 역할 관심이 있다.

제2저자(교신저자): 이윤숙(Yoon Suk Lee)은 현재 강원대학교 농업자원경제학과 조교수로, 개발도상국의 경제발전을 위한 여성농업인 역할 변화와 정책에 대해 관심이 있다 (yoonsuklee@kangwon.ac.kr).