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Impact of women's share of income on selected value chains expenditure in rural south-east Nigeria

Patience Ifeyinwa Opata[1]*, Adaku Bridget Ezeibe[2], Umaru Ibrahim[1] and Chukwuma Otum Ume[3]

[1]*Department of Agricultural Economics, University of Nigeria, Nsukka*
[2] *Center for Entrepreneurship and Development Research, University of Nigeria, Nsukka*
[3]*Justus Liebig University, Giessen, Germany*

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Abstract
There exists a complex web of value chain expenditures in production and consumption of food by rural farm households. Men and women contribute differently to these expenditures. Addressing zero hunger in the regions with deeply entrenched gender norms requires gender responsiveness, uncovering how best to sustain women's contribution in the selected value chains, as women contribute a greater proportion of gender involved in these web of chains. We used data from a sample of 400 households constituting 2520 members from November 2016 to April 2017 and disaggregated by gender to determine the impact of women's and men's share of income on the performance of selected value chain activities in southeast Nigeria using a bargaining model of household behaviour. We found that increasing women's share of incomes raises the budget share of food preparation, planting, weeding, processing, and storage while increasing men's share of income raised the budget share of clearing and cultivation. Our results suggest that policies aimed at increasing expenditure on any of the value chains should focus on instruments targeting the gender that will more likely spend their money on the value chains activity concerned. This will address gender inequality, food insecurity and poverty among rural farm households.

Key words: Gender-roles, Women-empowerment, Women-income, Value chains of staple food.

Introduction

Women produce to satisfy household food needs or make profit or both. Whether the interest is to produce for home consumption or market, married women have to acquire and prepare food for all the members of the family. The African gender ideologies attach importance to the responsibility of women for household work, especially good mothering, including the provision of food for the households. Therefore to play their roles in providing food diversity for the household, rural women engage in value chain activities of staple food, and some are also wage workers. By contrast, this belief in the duty of women to provide food for the household supports the notion that rural men can spend their money without contributing to expenditure on food but to personal spending the way they like.

Sociologists and development economics argued that these deeply entrenched gender norms in staple food value chains and provision of food in Africa require gender responsiveness strategies to build resilience in women's contribution to staple food value chains, as women contribute a greater proportion of the gender involved in production and consumption. This has attracted greater research

*Author or correspondences: Phone: +234 (0)7066070155, Email: patience.opata@unn.edu.ng

attention and a call by United Nation Sustainable Development Goals (SDGs) to address Goal 5, Gender Equality, Goal 1, No Poverty and Goal 2, Zero hunger (Akresh et al., 2016; Alwang et al., 2017; Doss et al., 2018; Barr et al., 2019; Bernard et al., 2020). Women engage in value chain activities of roots and tubers, vegetables, fruits, grains, and fish products among others, that leave the farms and make their way to the consumers tables to provide food for the family and earn income (Opata and Ezeibe, 2018). They also earn income from employment and private businesses. In doing so, they contribute to national agricultural output, maintenance of the environment and to households food security and income. They have also undertaken the rearing of small farm animals and the execution of certain intricate farm operations. Not only do women play significant roles in food production on family farms, but they also work on their personal farms and are now also mastering those aspects of agriculture that used to belong exclusively to men. For instance, women help with the strenuous jobs of cutting trees and clearing bushes and they were found working all the year round on activities such as food production, processing, storage, transportation and marketing to generate income, while men took part in the pre-planting tasks and staking of yam that occupies small parts of the agricultural year.

FAO (2010) report estimate showed that women contributed over 50 per cent of the labour force in 56 countries out of 82 developing countries in the world. These figures show the importance of women in the agricultural development process. Palacios-Lopez et al. (2017) observed that most African women are significantly engaged in subsistence agriculture, and they classified them as the backbones or pillars of small peasant farmers in Nigeria. Traditionally, women do not have land of their own, they operate family plots for home consumption, rent land in distance farms for market and perform various value chain activities to secure food that will enable them to perform their traditional roles and sell some for other family needs. Through increased participation in agriculture, women have influenced family decisions on production and consumption (Bernard et al., 2020). CTA (2016) showed that women account for 70% of agricultural workers, 80% of food producers, 100% of those who process basic foodstuffs, and they undertake 60-90% of the marketing. Women also make decisions about what their family eats, and therefore, empowering them has a disproportionately beneficial effect and an increase of US$10 in a woman's income has the same impact on household food and nutrition security as an increase in a man's income of US$110 (CTA, 2016). The productivity of female farmers is often hampered by their limited access to productive resources and opportunities. The limited access to resources by women farmers could lead to improper techniques in value chain activities, leading to food loss and waste and these impede food security. Statistics from AgroNigeria indicate that staple foods worth US$ 8.9 billion rot away annually due to the subsistence nature of all the value chain activities in Nigeria (AgroNigeria, 2017).

Globally, it is well established that women spend incomes differently from men. While some studies found that increases in earnings of low-income wives contribute significantly to the family's cash incomes and therefore in production and consumption of staple food (Doss, 2015), others have shown that neither raise in per capita food energy intake nor increase in the quality of food calorie sources for households in rural south-western Nigeria would be attributed to redistributing household income from men to women (Aromolaran, 2004; 2010). Similarly, related studies exist globally on gender and performance of activities related to food production and consumption to find answers to some of the thorny issues affecting them (Akresh et al., 2016; De la O Campos et al., 2016; Bernard et al., 2020) . However, none of these studies investigated the impact of women's share of income on selected value chain activities in rural farm household in southeast Nigeria, and moreover, the data set they

used in the analyses were not reliable because most of them did not use gender-disaggregated data. Again the methodologies adopted by most of these studies were regarding households as a unitary entity that assumed income pooling as if the family members were maximizing single welfare. The current study will contribute to the ongoing empirical debate by analyzing the impact of women's share of income on selected value chain activities in rural farm households in southeast Nigeria.

The comparison between the women's and men's share of income on selected value chain expenditures in rural farm households is relevant to policy. Estimates of total expenditure per hectare of the budget share of each selected value chain activity performed by men and women were calculated, such as clearing, cultivation, planting, weeding, processing, transportation, storage, and marketing. The policy formulated based on such scientific evidence was expected to devise an approach of dissemination of good practices for the selected value chain activities in rural farm households for empowering women in order to realize a stable and sustainable food system. Hence, the key policy question was, what was the impact of women's share of household income on selected value chain activities in rural farm households in southeast Nigeria? What was the percentage distribution of women, men and children based on the type of labour used in selected value chain activities? What were the patterns of staple food value chains expenditure using a bargaining model of household behaviour? What was the policy implication of gender-specific control of household income?

The study investigated the impact of women's and men's share of income on selected value chain expenditures on rural farm households in southeast Nigeria. To achieve this objective, we specifically described the percentage distribution of women, men and children based on the type of labour used in selected value chain activities and employed the bargaining model of household behaviour. An attractive nature of this bargaining model was that it did not assume that income was pooled within the household. Instead, the share of household expenditure devoted to a particular activity in the value chains was a function of the intrahousehold distribution of income. The expenditures on the value chains of staple food budget items considered for the study were those for clearing, cultivation, planting, weeding, processing, storage, marketing, and preparation of foods from staple food such as root and tubers, cereals, legumes, vegetables, fruits, fish, meat.

Material and Methods

Study area and sampling

Our research area was the south-east geopolitical zone of Nigeria. Five states constitute this zone: Abia, Anambra, Ebonyi, Enugu, and Imo. This region falls within the latitude 6' N and 8' N and longitude 42 302 E and 72 30'E. The zone spreads over a total area of 78,618 km^2, representing 8.5% of the nation's total land area. The area has a projected total population of 16,381,729 (World Meters, 2019).

There were four-stage simple random sampling techniques. The first stage was the selection of states through random sampling techniques and this gave rise to two states, Enugu and Abia. The second stage was the selection of Local Government Areas (LGAs), and six LGAs areas were selected from each state to give a random sample of twelve LGAs. The third stage was the selection of communities. Two communities were randomly selected from each LGA to give a sample of twenty-four communities while the fourth stage was the selection of respondents from the communities. Here, lists of respondents were got from the community heads where there were women farmers, and from there, eight or nine household farmers were randomly selected from each village. This amounted to four hundred household farmers. In each selected household, females, males and children were

interviewed, amounting to 2520 individuals. This was done to generate gender-disaggregated data to achieve the objectives.

Data and variables

Data were collected through the use of interview schedules/questionnaires that were personally administered by the field supervisors. Prices of output from the sale of crops and livestock of farm products were obtained from the community market surveys. Quantities estimates and costs of men's and women's self labour and expenditures on hired labour were collected from each member of the household using recall method. Uniform costs of labour per hectare for each of the value chains considered were used for all the households. Information on expenditure on selected value chain activities was collected from both men and women crop-owners in each household. Each household was visited two times per month for six months to reduce measurement error.

Percentage distribution of respondents for selected value chain activities and type of labour used was collected. The expenditure on the men's, women's, and children's labour used in each of the selected value chains was estimated and data are presented in Table 1. Expenditure data were also aggregated into eight categories and expressed as a share of total expenditure on selected value chains in rural farm households. Each of the shares of the eight variables to total household expenditures on selected value chains in the rural farm household was used as dependent variables. Each of the dependent variables was explained by women's share of income after controlling for household demographic composition, and total expenditures on the selected value chains. These regressands were selected value chain expenditures as defined in Table 1.

Data analysis methods

The household bargaining model was the framework of analysis adopted for this study. The model of household assumed that a household was a form of the collective entity where bargaining occured amongst members and not a unitary entity that assumed income pooling as if the family members were maximizing single welfare so that the effect of income distribution among men and women in the household on the performance of selected value chain activities in rural farm household could be determined (Hoddinott and Haddad, 1995; Aromolaran, 2004; 2010 ; Opata et al., 2020).

In this paper, the model assumed that the compositions of the household were: a man (m), a woman (w), and non-income earners who were also members of the household (c); there were different value chain activities preferences performed by each member of the household and each was expressed as an expenditure from men's and women's income; and there was no pooling of household income. It was assumed that utility was derived from two composite value chain activities of rural farm household that were performed by each individual in the household, and that man and woman did not agree in the way in which preferences of a minimum of a subset of these value chains activities of staple foods should be ordered. If a vector of value chain activities of staple foods was performed using woman self labour and income was represented by X_w, those performed with man self labour and income was expressed byX_m. $X_w$could include all the selected value chain activities performed with women labour or hired with women's income and produced, prepared and consumed by men, women and communally by members of the household. If women's share of income was denoted by y_w and the men's share of income by $X_m$the summation of men and women income was represented by y, and p represented the vector of prices associated with each value chain activity. Nash non-pooling solution was used in this study. During the household expenditure decision on each of the value chains, women took X_m as given, and selected X_w such that max u_w (X_m, X_w) subject to p $X_w \leq y_w$

There existed a unique X_w for this such that demand function/reaction could be evaluated as

$$X_w = R_j(X_m, \mathrm{p}, y_w) \qquad (1)$$

There existed a similar reaction/function for given by:

$$X_m = R_m(y_w, p, y_m) \quad (2)$$

The Nash equilibrium is the pair of X_w and X_m that satisfy (1) and (2), simultaneous1y.

Demand for these value chain activities would depend on p, y_m and y_w

Several illustrations could be derived from this model. First, suppose that one person was earning a major share of household income. The Nash equilibrium model could be used to show that the preferred allocation of that person's expenditure could be sustained. Valérie and Preston (2005) argued that as the share of household income of woman rose across the zero to one range, the expenditures share on the set of value chain activities performed by women would rise; the expenditures share on the set of value chain activities performed by man would fall, and the share of the 'value chain activities' to be performed would depend on whether man or woman had the strongest relative dislike for the value chain activities. Third, the framework suggested that only members who had a strong commitment to perform a certain set of value chain activities could pre-commit the household to a minimum expenditure on those value chain activities of rural farm households. Thus the contribution of individual members was related to the person's ability to enforce their preferential ordering of the value chain activities each member was committed to perform.

The proportion of expenditures on a value chain activity was determined by the log of total per capita expenditures on value chains, the log of household size, the share of different demographic groups and dummy variables to show the location of households. Also, we included an ðf as an independent variable; computed here as the percentage share of women's income estimated from the proportion of household income accruing as cash to women from the value chains of crops and livestock, non-farm income such as processing, storage, transportation, and marketing activities, employment and businesses, after controlling for household demographic composition, household size, location and total expenditure on the budget share of each of the selected value chain activities. Women's share of household income appeared as the independent variable (for example, in the budget share food preparation). Thus all the selected value chain activities were required from farm to fork. Each selected value chain was the dependent variable while the percentage shares of household income accruing as cash to women, per capita expenditure, etc were the independent variable.

The determinants of expenditure on eachselected value chain were estimated as follows:

$$w_j = \alpha_j + \beta_{1j}.1\text{pcexp} + \beta_{2j}1\text{siz} + \sum_{K=1}^{K-1} \delta kj.dem_k + \sum_{K=1}^{K-1} \phi\, sj.z + \beta_{3j}\pi f + e \quad (3)$$

represents the proportion of the budget for the *jth* staple food;

1pcexp logarithm of total per capita expenditures;

1siz logarithm of size of household;

dem_k share of demographic group k in the household;

z_k vector of dummy variables showing household location; πf women's share of household cash income; e_j is the error term; and α_j, and $\beta_{1j}, \beta_{2j}, \beta_{3j}$, δkj and ϕ *sj*. parameters to be estimated.

There is an urgent need for measures to identify the persons performing selected value chain activities in rural farm household for policy intervention. Sources of men's and women's share of income were from the sale of crops and livestock, wage employment and owned business activity.

Results and Discussion

Women, men, children and hired labour types performed on selected value chains. To achieve objective 1, we described the labour type used for each of the selected value chains in rural farm household. Labour is a very essential input in any agricultural production process. It is a primary factor of production that involves physical and mental effort undertaken to accomplish a task for some

Table 1. Percentage distribution of respondents by value chains activities and type of labour used

Crop production operations	Women (%)	Men (%)	Other family labour(%)	Hired Labour (%)	Total %
Bush clearing	10	14	10	61	100
Cultivation	10	25	09	64	100
Planting	55	07	28	10	100
Weeding	35	05	10	50	100
Processing	50	15	10	25	100
Transportation	40	20	12	28	100
Storage	60	30	05	05	100
Fertilization	30	30	20	20	100
Staking	05	80	10	05	100
Harvesting	50	30	10	10	100
Marketing	60	30	05	05	100
Food preparation	74	01	15	10	100
Total	479	287	144	283	1,200

monetary reward. The types of labour rural farm household used for the value chain activities such as food preparation, planting, weeding, processing, storage, marketing, clearing, cultivation, fertilizer application, included children, men's, women's, and hired labour as shown in Table 1. The distribution of women, men and children based on the type of labour used is also shown in Table 1. It indicated the percentage of women and men self labour, children and hired labour used for each of the selected value chain activities. Man's self labour or his income was mainly used to hire labour to perform strenuous activities such as clearing, cultivation, and staking of yam, while women's self labour or her income was mainly used for planting, weeding, processing, storage, fertilizer/manure application, marketing and food preparation. Children labour came under four classified sources, *viz.,* boy child aged 6-15; girl child aged 6-15; male child aged < 6; female child aged< 6. Children assisted in each of the selected value chain activities.

Household size referred to the number of persons in a family (parents and their children) living together in the same house. Members of the household could easily provide family labour for the execution of important farm activities such as clearing, cultivation, planting, weeding, processing, peeling, marketing etc. Depending on the structure of the household size, a large household size reduced the cost of hired labour and hence reduced the total variable cost of production, leading to increase in the income level of the rural farm household. The household sizes showed that mean household size for the study was 6.3.

Estimation Issues

Using the variables described in the previous section, the amended version of the Working-Leser expenditure function was estimated for the eight budget shares of selected value chain activities to show their proportion to total expenditures of the selected value chain study. There were two econometric issues worth noting, first, all equations were estimated using the generalized least squares estimation procedure proposed by White (1980). Secondly, the log of per capita expenditures and women's share of cash income might have been endogenous, reflecting a decision to produce staple food rather than leisure. If this were the case, then the correlation with the disturbance term would generate inconsistent parameter estimates. Also, if a particular value chain activity accounted for a large share of total expenditures on the selected value chains, Ordinary Least Square (OLS) estimation of equation (2) effectively involved regressing a variable on itself, leading to the correlation between an explanatory variable and the error term. Hausman (1978) specification tests did not lead to unambiguous rejection of the hypothesis that either variable was exogenous, and consequently, two-stage least squares estimation was done.

Table 3 presents the results of the two-stage least squares estimation. Eight categorical dependent variables were expressed as a share of total

Table 2. Summary statistics of the survey data

Variables	Mean	Standard deviation
Dependent variables (budget shares)		
Clearing	0.1300	0.0040
Cultivation	0.3090	0.0070
Planting	0.0110	0.0050
Weeding	0.1000	0.0070
Processing	0.2511	0.0001
Storage	0.0801	0.0204
Marketing	0.1034	0.0091
Food preparation	0.0800	0.0050
Independent variables:		
Per capita expenditures (log)	13.817	0.3421
Household size (log)	1.8000	0.1761
Share of cash income accruing to wife	0.3456	0.1220
The proportion of household members:		
Men, aged 15-59	0.2430	0.2340
Women, aged 15-59	0.2580	0.1660
Boys, child of head, 6-15	0.0950	0.0430
Girls, child of head, 6-15	0.0890	0.0320
Male, child of head, < 6	0.0670	0.0230
Female, child of head, < 6	0.0660	0.0010
Male. not child of head, 6-15	0.0430	0.0080
Female, not child of head, 6-15	0.0550	0.0789
Male, not child of head. < 6	0.0240	0.0201
Female, not child of head, < 6	0.0290	0.0015
Male, 60-69	0.0190	0.0045
Female, 60-69	0.0180	0.0220
Male, 70 or older	0.0100	0.0330
Dummy variables for household located in:		
Enugu	0.1930	0.329
Awgu	0.1890	0.298
Nsukka	0.1790	0.311
Aba	0.1620	0.287
Umuahia	0.1430	0.345
Ohafia	0.1550	0.342

expenditure. Each of them was used as regressand or dependent variable. Each of the dependent variables was explained by women's share of income after controlling for household demographic composition, location and total expenditures. After the control, wives' share of cash income was found to significantly affect the budget shares of several value chain activities.

The estimated coefficients of women's share of income (ðf value) measured the marginal effects i.e., the response of each of the selected value chains to a unit change in women's or men's share of income, all other independent variables being constant. The sign of the coefficient showed the direction of influence of the variable on the value of each of the selected value chains. It followed that a positive value of women's share of income indicated an increase in the likelihood that the budget share of the particular value chain activity was impacted by women's share of income. A negative value showed that it was less likely that women's share of income influenced the value chain. Therefore, in this study, a negative value of women's share of income implied an increase in the likelihood of the budget share of the particular value chain activity impacted by men's share of income. The significant values (also known as the t-value) showed whether a change in the women's share of income significantly influenced the value chain activity at a given level. In other words, it denoted the degree to which each of the budget shares of the particular value chain activity could be explained by women's or men's shares of income, after controlling for household demographic composition, household size, location and total expenditure on the budget share of each of the selected value chain activities. In this study, the variables were tested at 1%, 5% and 10% significant levels. Thus, if the significant value was greater than 0.01, 0.05 and 0.1 then it showed that there was insufficient evidence to support the view that the women's or men's share of income influenced the budget share of the particular value chain activity performed. If the significant value was equal or less than 0.01, 0.05 or 0.1, then there was enough evidence to support a claim presented by the coefficient value (Opata, 2018).

There was positive and significant coefficient of women's share of income on the budget share for food preparation, planting, weeding, processing, and storage, and negative and significant coefficient on clearing and cultivation. Women's share of income had no significant effect on the budget share of marketing. The marginal effects of the estimated coefficient of women's share of income on food preparation, planting, weeding, processing, and storage were 0.073, 0.057, 0.040, 0.077 and 0.037. The estimated marginal effects of the women's share

Table 3. Two stage least squares budget share regressions

Variables	Food preparation	Marketing	Planting	Weeding	Processing	Storage	Cultivation	Clearing
Per capita expenditures (log)	-0.135 (11.98)**	-0.075 (7.23)**	-0.035 (1.3)	-0. (1.9)*	-0.13(11.98)**	-0.135 (11.9)	-0.135 (1.98)	-0.135 (.9)
Household size (log)	-0.067 (8.01)**	-0.054 (1.7)0	-0.0(3.01)**	0.06(8.01)**	-0.047(8.01)**	-0.067 (8.1)*	-0.067 (.01)*	-0.06 (81)*
Share of cash income accruing to wives	0.073 (2.56)**	071(1.16)	0.06 (3.2)**	0.04 (2.56)**	0.077 (3.56)**	.037 (2.6)**	-0.06 (2.6)**	-.08 (2.56)**
Proportion of household members:								
Male, aged 15-59	-0.174(3.52)**	0.006(3.31)**	-0.174(8.42)	0.17(4.52)**	-0.174(4.52)**	0.079(2.52)**	0.074(4.02)**	0.074(3.12)
Male, child of head, 6-15	-0.137(3.02)	0.004(4.23)**	.137(3.02)*	-0.137(3.02)*	-0.137(3.02)*	-0.107(1.01)	-0.007(3.02)*	-0.107(0.02)
Female, child of head, 6-15	0.167(2.88)**	. 0.045(2.09)**	.07(2.88)**	1.17(2.0)	0.067(2,88)**	0.071(1.07)	0.067(2,88)**	0.147(0.08)
Male, child of head, < 6	-0.213(3.98)**	-0.123(3.19)**	.12(1.78)*	0.123(3.98)**	-0.023(3.98)**	-0.053(1.07)	0.003(3.9)**	0.123(1.08)
Female, child of head, < 6	0.118(1.56)*	0.098(2.56)**	- 0.078(1.56)	0.098(1.56)*	0.078(1.56)*	0.043(0.56)	0.008(1.56)*	0.098(0.66)
Male. not child of head, 6-15	-0.127(2.01)**	-0.087(2.01)**	.009(1.71)*	-0.157(2.01)*	-0.157(2.01)*	0.211(0.01)	-0.157(2.01)*	-0.157(0.91)
Female, not child of head, 6-15	0.271(2.99)**	0.206(1.99)**	0.006(2.99)	0.206(2.99)**	0.106(2.99)**	0.421(0.99)	0.206(2.0)**	0.040(0.19)
Male, 60-69	0.186(2.11)*	0.316(2.11)*	0.156(2.11)	0.186(2.11)*	0.086(2.11)*	-0.036(1.11)	0.126(2.11)*	0.006(0.11)
Female, 60-69	0.098(0.99)	0.068(0.99)	0.058(0.99)	0.098(0.99)	0.098(0.99)	0.082(0.99)	0.068(0.99)	0.053(0.76)
Male, 70 or older	0.041(0.95)	-0.038(0.95)	0.048(0.95)	-0.068(0.95)	0.078(0.95)	-0.065(0.95)	-0.088(0.95)	-0.088(0.28)
Female70 or older	0.025(0.87)	0.085(0.87)	0.045(0.87)	0.085(0.87)	0.065(0.87)	0.034(0.87)	0.025(0.87)	0.085(0.87)
Dummy variables for household located								
Enugu	-0.009(1.02)	0.027(0.79)	.024(1.72)*	0.056(3.44)**	00.015(2.18)**	0.023(5.41)**	0.019(3.56)**	-0.007(1.7)*
Awgu	0.045(2.11)**	0.034(2.89)**	-0.004(1.29)	0.035(2.1)**	0.023(0.88)	-0.041(1.72)*	0.008(0.56)	0.004(1.8)*
Nsukka	0.091(2.66)**	0.0 67(4.34)**	0.007(1.48)	0.019(1.70)*	0.043(01.71)*	-.034(2.81)**	0.006(0.99)	0.009(1.9)**
Aba	0.023(1.33)	0.044(2.15)**	0.006(1.22)	0.032(1.8)*	0.036(0.96)	-.027(3.12)**	0.006(0.45)	0.013(2.1)**
Umuahia	0.021(1.45)	0.036(2.11)**	0.031(0.93)	0.044(1.08)	0.041(0.46)	-.038(2.88)**	-0.002(0.33)	0.011(2.3)**
Ohafia	0.034(1.99)**	0.027(1.78)*	0.051(0.68)	0.056(2.21)**	- 0.056(.72)*	0.005(1.12)	0.003(0.22)	0.033(1.7)*
Intercept	3.345(17.33)**	-2.34(15.78)**	0.031 (1.25)	-0.075 (0.48)	0.535(2.56)**	0.145(7.73)**	-0.023(1.32)	0.038(3.1)**
F-statistics	52.03**	62.37**	0.41**	0.50**	67.01**	51.03**	32.03**	4.75**
Adjusted R^2	0.56	0.57	0.37	0.42	0.62	0.45	0.23	0.18
Sample size	2520	2520	2520	2520	2520	2520	2520	2520

Note: statistics in parentheses **significant at 5%; *significant at 10%

of income on food preparation, planting, weeding, processing, and storage implied that as women's share of income increased by 0.073 or 7.3 %, 0.057 or 5.7%, 0.040 or 4%, 0.077 or 7.7% and 0.037 or 3.7% the expenditure on the budget share of food preparation, planting, weeding, processing, and storage increased by one unit of Nigerian Naira. Secondly, the estimated coefficient of the women's share of income on food preparation, planting, weeding, processing, and storage were statistically significant and positive (at P = 0.05). Thus, the estimated coefficient of the women's share of income was significant at 5% probability level on food preparation, planting, weeding, processing, and storage. This result of the significance of women's share of income on food preparation was in line with the preceding results and consistent with De la O Campos et al. (2016) and Peterman et al. (2011), who used Oaxaca decomposition analysis in Nigeria and Ugandaand found that social issues such as food preparation and child dependency ratio placed a constraint on women's income and labour allocation to the female plot. The result suggests that policies aimed at increasing expenditure on food preparation for rural farm households should focus on the instruments that would increase women's share of household income. This result of the significance of women's share of income on planting, weeding, processing, and storage also agreed with the other researchers like Masamha et al. (2017) who found that women expenditure on budget shares along the selected value chains of cassava in rural farm households of Tanzania exceeded that of the men. The results of this study also agreed with Shamna et al. (2018), who argued that more of women labour were used in the budget share of most of the selected value chains such as planting, weeding, processing, storage of paddy, jute and mustard production in rural farm households of West Bengal, India, as men withdrew their labour from agriculture. The result provides sound empirical evidence to contribute to the previous literature on gender ideologies which attached importance to the responsibility of women for good mothering, including the provision of food for the households. Therefore to play their roles in providing food diversity for the household, rural

women engaged in many value chain activities of various staple foods to earn income, and some were also wage workers.

The negative effect of women's share of income on clearing and cultivation implied that while raising the share of women's income reduced their budget share, raising men's share of income would increase the expenditures on the budget share of clearing and cultivation. The marginal effects of the estimated coefficient of women's share of income on clearing and cultivation were -0.06 and –0.08 and these implied that as women's income increased by 6% and 8%, the expenditure on the budget share of clearing and cultivation reduced by one unit of Nigerian Naira. Secondly, the estimated coefficient of the women's share of income was statistically significant (at P = 0.05). Thus, the estimated coefficient of the men's share of income was positive and significant at 5% probability level on clearing and cultivation. This result of the significance of men's share of income on the budget share of clearing and cultivation was consistent with Ogunlela and Mukhtar (2009), who found that men's income share, participation and decision making were highest concerning land preparation including clearing and cultivation in rural farm household in Zaria, Kaduna state, Nigeria. The overall results of this study also agreed with their findings that in southeast Nigeria, women contributed more than men, and between 70 and 80% of the agricultural labour force was in farm management including land preparation, sowing, manure/ fertilizer application, weeding, harvesting, storage, processing, and other domestic activities as majority of them lived in rural areas, while men migrated to cities and withdrew their labour from agriculture.

Unexpectedly, women's share of income was not significant in the budget share of marketing. This implied that raising men's or women's share of income would not have any effect on the expenditures on the budget share of marketing. This insignificant effect of income is not consistent with literature as agricultural households spend part of their income on expenditure for marketing e.g. on accessing the information on where to sell and means of transportation of their output for higher prices of the output. The explanation for the insignificant impact of income of both men and women on marketing could be that men and women were both targeting household food and nutrition security. This implied that most of the food produced by both that were not consumed in the household were sold at the farm gate or in small quantities at the market.

The study investigated the impact of women's and men's share of income on the budget share of selected value chain expenditures including food preparation, planting, weeding, processing, storage, marketing, clearing, and cultivation in rural farm households in southeast Nigeria, using non-joint household decision-making process of household expenditures model. The bargaining power framework showed that women's power and income share impacted on the budget share of household expenditure on food preparation, and selected farm management or value chain activities such as planting, weeding, processing, and storage while men's power and income impacted on the budget share of clearing and cultivation expenditures and this could be attributed to cultural roles. Therefore, increasing women's share of cash income raised the budget share of food preparation, planting, weeding, storage and processing and reduced the budget shares of clearing and cultivation while marketing was not significant. Our results suggest that policies aimed at increasing expenditure on food preparation, planting, weeding, processing, and storage should focus on instruments that would increase women's share of household income. However, policies aimed at increasing expenditure on clearing and cultivation of farms should focus on instruments that would increase men's share of household income. This would enable the achievement of gender equality, food security and no poverty.

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