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Impact of women's share of income on household expenditure in southeast Nigeria

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Abstract

The main focus of this paper was to: (i) determine the impact of women's share of household income on the pattern of expenditure on various categories of basic goods in southeast Nigeria; (ii) explain the pattern of household expenditure using the bargaining model of household behaviour; and (iii) extrapolate the results to the policy implications of gender-specific control of household incomes. We used cross-sectional household data elicited from a sample of 400 households constituting 2 520 members collected from November 2016 to March 2017 and disaggregated by gender. We found that increasing women's share of incomes raises the budget share for food, children's clothes, children's school fees, fuel for household services and other expenditure, although not significantly with the budget shares for alcohol and meals out of the home. Our results suggest that any strategy by policymakers in southeast Nigeria to improve any of the expenditure items should target the empowerment of the gender that will more likely spend their money on the items concerned.

Key words: women's income; household expenditure; women's role, women's empowerment

1. Introduction

There currently is renewed, worldwide interest in sub-Saharan Africa (SSA) concerning power dynamics within the household and how these relate to better production and consumption outcomes (Akresh *et al.* 2016; Apedo-Amah *et al.* 2020; Bernard *et al.* 2020). These sociologists and development economists use women's participation in household decision-making as a proxy for women's empowerment, which could be a method of achieving Sustainable Development Goals (SDGs) 5 (gender equality), 1 (no poverty) and 2 (zero hunger) (Alwang *et al.* 2017; Doss & Quisumbing 2019; Doss *et al.* 2018). The researchers who worked on how household power dynamics can contribute to better production outcome focused on sources and consequences of agricultural productivity differences between male and female farmers (Peterman *et al.* 2011; Anderson *et al.* 2016; Asfaw & Maggio 2017). Vast empirical evidence has been accumulated, supporting a strong, positive relationship between productive assets such as financial services, education, livestock, extension, land, labour and technology and women's agricultural productivity in sub-Saharan Africa (De la O Campos *et al.* 2016; Kilc *et al.* 2016; Doss *et al.* 2018; Kosec *et al.*

2018; Ambler *et al.* 2019; Doss & Quisumbing 2019; Apedo-Amah *et al.* 2020). Other groups of researchers were interested in contributing to the proposition in support of or opposition to a hypothesised, strong positive relationship between the identity of the income earner and the pattern of household consumption expenditure, which has been subjected to only little econometric testing and has lagged. Hopkins *et al.* (1994) argue that household food expenditure responded positively to changes in annual women's income in the Niger while controlling for male income. Hoddinott and Haddad (1995) found that, in Cote d'Ivoire, changes in women's annual share of household income increased budget share of food, along with more socially desirable household items. Aromolaran (2004, 2010) argues that the redistribution of income in favour of women would not motivate an increase in the quality or quantity of calorie intake in southwest Nigeria. The present study contributes to the few discourses on the impact of women's share of household income on the household expenditure of various categories of household goods, especially in southeast Nigeria, using gender-disaggregated data.

The goals of the interest of development economists and sociologists in learning how the identity of the income earner affects how money is spent are to inform policy interventions on the gender to target to close the asset gaps between men and women, thereby enhancing the productivity of African agriculture. Agriculture contributes substantially to the gross domestic product (GDP), export earnings and employment, and women provide between 42% and 80% of its labour force, depending on the region (Peterman *et al.* 2011; Alwang *et al.* 2017; Diiro *et al.* 2018; Oyinbo 2019). Most researchers dealing with gender dynamics for better production outcomes have found that the agricultural sector will better play its central role of spurring industrial growth, achieving economic growth and as an instrument for the reduction of rural poverty and food insecurity in SSA if assets gaps are closed. This is because empirical evidence shows that SSA is lagging and is below its potential yields compared to other parts of the world. This suggests that a lot of studies have to be done in the areas of gender dynamics, especially in SSA, where gender inequality persists in terms of asset gaps between men and women (Diirro *et al.* 2018). There is a need for policymakers to recognise the gender that makes a tangible contribution to alleviating poverty and food insecurity so as to strategise by focusing on that gender. Sub-Saharan Africa now accounts for about one-fifth of the world's 822 million hungry people and over half of the world's 736 million extremely poor, and urgent attention is needed to target them (Oseni *et al.* 2015; Palacios-Lopez *et al.* 2017; Diirro *et al.* 2018; FAOSTAT 2018; Ambler *et al.* 2019; Doss & Quisumbing 2019). By enhancing greater access to capacity building and productive resources to close the asset gaps, women will be positioned to increase the productivity of major food crops, such as roots and tubers, grains, legumes, fruit and vegetables, in SSA, which will increase their income for the better consumption of more socially desirable household expenditure items. According to Doss *et al.* (2018), these types of gender dynamics are required for achieving at least 11 out of the 17 Sustainable Development Goals (SDGs).

The scholarly works in sub-Saharan Africa (SSA) on power dynamics within the household and how these relate to better production are many, although those relating to income and consumption are not common. De la O Campos *et al.* (2016) and Peterman *et al.* (2011) used Oaxaca decomposition to show that agricultural productivity differences between male and female plots resulted from physical and human capital as well as other social issues, such as the child dependency ratio, which places constraints on labour allocation to female pilots. Kilc *et al.* (2016) argue that they got different answers from men and women on questions about asset ownership. Other, related studies have focused on the effects of information asymmetry between spouses and their productivity in Togo (Apedo-Amah *et al.* 2020). Ambler *et al.* (2019) found a positive welfare effect of women's asset ownership and involvement in household decision-making in Bangladesh, while Bernard *et al.* (2020) showed the household's welfare effect of women in decision-making in Senegal.

There is limited empirical evidence for the effect of changes in women's share of income on household expenditure on various goods in Nigeria. To date, empirical studies on the effect of changes in women's share of household income on household expenditure have focused on differences in agricultural productivity between men and women's plots and have not filled the gaps by comparing income share by gender and consumption outcome (Oladeebo & Fajuyigbe 2007; Ogunlela & Mukhtar 2009; Peterman *et al.* 2011; Oseni *et al.* 2015). A few exceptions include work on the effect of redistributing household income from men to women on the calorie-demand behaviour of low-income household in southeast Nigeria (Aromolaran 2004, 2010). Most of the investigations on the effect of household resource control have been on the major contribution of women to agriculture and rural development, their minimal decision-making and the predominance of gender inequality in the sector causing constraint to productivity (Ogunlela & Mukhtar 2009). Oladeebo and Fajuyigbe (2007) argue that, although women are more productive in agriculture, they face daunting constraints to their productivity arising from limited access to productive assets. No study was found on the impact of women's share of household income on household expenditure in southeast Nigeria. Therefore, our interest and objective in this study were to fill this gap.

This study is interesting because it provides empirical evidence that makes a direct contribution to the discourse on the impact of women's share of household income on various categories of household expenditure, thereby enhancing the promotion of women's empowerment to achieve its objective of gender equality. Secondly, apart from estimating the impact of women's share of income on food alone, as in Aromolaran (2004, 2010) in the southwest, we also estimated non-food items such as children's school fees, children's clothing, fuel, household services, alcohol, meals eaten outside the home and other expenditure, such as hospital bills and housing. Thirdly, it makes an interesting case study in southeast Nigeria because the majority of the women are engaged in commercial vegetable farming and need policy interventions to improve their productivity to ameliorate malnutrition, especially among infants and pregnant women. Little is known, however, about the impact of women's share of household income, and southeast Nigeria is widely perceived as a test case to obtain possible quantitative evidence of the impact of women's share of income on food eaten within the house, food eaten outside the house, children's school fees, household services, fuel, alcohol, and other expenditure, such as costs of renting and health services and even diffusion of the outcome to other African countries. To our knowledge, this is the first study to use gender-disaggregated data to analyse the impact of women's share of household income on household expenditure in southeast Nigeria.

Therefore, the specific objectives of this study were to find out which goods are affected by the rising women's share of cash income, holding overall household income constant and using the non-cooperative bargaining model of household expenditure. The attractive aspect of this model is that it does not assume that income is pooled within the household. Instead, the share of household expenditure devoted to particular goods is a function of the intrahousehold distribution of income. The household budget items considered for the study are food, children's school fees, children's clothing, alcohol, other household services, fuel, meals eaten outside the home, and other household expenditure.

2. Materials and methods

2.1 Study area, data and variables

The study area is in the south-east geopolitical zone of Nigeria. Five states constitute this zone: Abia, Anambra, Ebonyi, Enugu and Imo, with an area covering latitudes 4°50'N to 7°10'N and longitudes 6°40'E to 8°30'E. The zone spreads over a total area of 78 618 km², representing 8.5%

of Nigeria's total land area. The area has a projected total population of 16 381 729 (World Meters 2019).

A six-stage sampling procedure was employed for the study. In stage one, two states were randomly selected from the five states using a simple random sampling technique. The two states were Enugu and Abia. In stage two, all three zones in Abia were selected, while three zones from the six zones of Enugu state were selected using a simple random sampling technique. The zones in Abia were Aba, Umuahia and Ohafia, while those in Enugu were Enugu, Awgu and Nsukka. Stage three involved the selection of local government areas: 12 rural local government areas were selected from the 34 local government areas using simple random sampling techniques. Stage four involved the selection of rural communities. This stage involved the random selection of two rural communities from each of the 12 rural local government areas selected. This means that 24 rural communities were used for the study. Stage five involved the selection of villages. A list of villages that make up each of the 24 communities was obtained from the community head. From this list, two villages were randomly selected from each of the 24 sampled communities. This amounted to 48 villages. Stage six was the selection of respondents. For this, a list of respondents was obtained from the village heads in areas where there are women farmers, and from these eight or nine household farmers were randomly selected from each village. This amounted to 400 household farmers. In each of the selected households, the relevant women, men and children were interviewed, amounting to 2 520 individuals. The reason for this was because the work needed gender-disaggregated data to achieve the objectives, and the information needed was collected through the use of interview schedules/questionnaires that were personally administered by the field supervisors. Prices of household goods were obtained from surveys of the community markets. Estimates of the size of household expenditure on food, clothes and education were collected from each member of the household using the recall method. Household expenditure information was collected on common food items, clothes for children, clothes for men and women, and the amounts spent on children's school fees, alcoholic beverages, meals eaten outside the home, transportation and household services. Information on household income and expenditure on crops cultivated were collected from each crop-owner member of the household. Each household was visited two times per month for six months to reduce measurement error in the household income expenditure.

Expenditure data were aggregated into eight categories and expressed as a share of total expenditure. Each of the shares of the eight variables in total household expenditure was used as regressand or dependent variable. Each of the dependent variables was explained by women's share of income after controlling for demographic composition, location and total expenditure of the household. These regressands are food consumed in the home, both cash and imputed value of subsistence consumption; fuel; children's school fees, children's clothing; meals consumed outside the home; other expenditure; alcohol; and household services (these are defined in Table 2).

2.2 Methods of data analysis

The household bargaining model was the framework of analysis adopted for this study. The model of the household assumes that the household is a form of collective entity in which bargaining occurs amongst members, and not a unitary entity that assumes income pooling as if the family members are maximising a single welfare. This was done so that the effect of income distribution on household demand could be determined (Hoddinott & Haddad 1995; Aromolaran 2004; Lechene & Preston 2005; Aromolaran 2010).

In this paper, the model assumes that the composition of the households is a man (m), a woman (w), and non-income earners who are also members of the household (c); that each member of the household has different preferences; and that there is no pooling of household income. We hence assume that utility is derived from two composite goods that are purchased by each individual in the

household, and suppose that the man and woman do not agree on the way in which preferences for a minimum of a subset of these goods should be ordered. A vector of household expenditure bought with the woman's income is represented by X_w , while that bought with the man's income is represented by X_m . Note that X_w can include all the purchases that are consumed by the men, women and communally by members of the household. The women's share of income is denoted by y_w and the men's share of income by y_m , while the summation of men's and women's income is denoted by y and p represents the vector of prices associated with each commodity. The Nash non-pooling solution is used in this study. During the household expenditure decision, women take X_m as given and select X_w , such that $\max u_w(X_m, X_w)$, subject to $p X_w \leq y_w$.

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

$$X_w = R_j(X_m, p, y_w) \quad (1)$$

There is a similar reaction/function for X_m , giving by:

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

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

The demand for these goods will depend on p , Y_m and y_w .

Several illustrations can be derived from this model. First, suppose that one person is earning a major share of household income. The Nash equilibrium model can be used to show that the preferred allocation of that person's expenditure can be sustained. Lechene and Preston (2005) argue that, as the share of household income of women rises across the range from zero to one, the household expenditure share of the set of goods preferred by women will rise; the household expenditure share of the set of goods preferred by men will fall, and the share of the 'commodity agreed upon' to use in the house will depend on whether the man or the woman has the strongest relative dislike for the other's preferred good. Third, the framework suggests that only members that have strong incentives to purchase a certain set of goods can pre-commit the household to a minimum expenditure on those goods. Thus, the contribution of individual members is related to the person's ability to enforce his or her preferential ordering of household items.

The proportion of expenditure on household commodity items is determined by independent variables:

First, X_1 = the log of total per capita expenditure (sum of sale of crops, the net sale of livestock, wage employment, own business activities, remittances and miscellaneous).

Second, the log of household size, the share of different demographic groups and dummy variables to show the location of households.

We also include πf as an independent variable, here computed 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 after disaggregating them by gender, and 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 budget share of each product. Women's share of household income appears as the independent variable (for example, in the budget share of food). Thus, each product regarded as a component of household expenditure was the dependent variable, while the percentage share of household income accruing as cash to women per capita expenditure, etc. was the independent variable.

The determinants of expenditure on each commodity were estimated as follows:

$$w_j = \alpha_j + \beta_{1j}.lpcexp + \beta_{2j}.lsiz + \sum_{k=1}^{K-1} \delta_{kj}.dem_k + \sum_{s=1}^{S-1} \phi_{sj}.z_s + \beta_{3j}.\pi f + e \quad (3)$$

where w_j = represents the proportion of the budget for the j th good;
 $lpcexp$ = the logarithm of total per capita expenditure;
 $lsiz$ = the logarithm of the size of the 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 = the error term; and
 $\alpha_j, \beta_{1j}, \beta_{2j}, \beta_{3j}, \delta_{kj}$ and ϕ_{sj} are parameters to be estimated.

2.3 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 to show their proportion of total expenditure. There are two econometric issues worth noting: first, all equations were estimated using the generalised least squares estimation procedure proposed by White (1980). Second, the log of per capita expenditure and women's share of cash income may be endogenous, reflecting a decision to consume goods rather than leisure. If this were the case, then the correlation with the disturbance term will generate inconsistent parameter estimates. Also, if a particular good accounts for a large share of total expenditure, ordinary least squares (OLS) estimation of equation (3) effectively involves regressing a variable on itself, leading to the correlation between an explanatory variable and the error term giving the possible bidirectional causality. Therefore, the specification as stated above, if estimated using OLS, may suffer from an endogeneity problem, given the possibility that the log of per capita expenditure and women's share of household cash income may be endogenous.

To address this issue of endogeneity bias due to simultaneity, the researcher adopted the technique employed by Hoddinott and Haddad (1995) and Aromolaran (2004, 2010), which is the standard instrumental variable framework with a two-stage least squares (2SLS) approach in order to obtain consistent estimates of the regression parameters such that a causal-effect relationship is achieved.

In the first stage of the 2SLS regression (Equation 3), new variables that will represent the endogenous variables (log of per capita expenditure and women's share of cash income) are created using the instrument variables included in the first-stage regression. In the second stage, the model-estimated values from stage one are used in place of the actual values of the problematic predictors to compute an OLS model for the response of interest. Based on the foregoing, the reduced form equation of the log of per capita expenditure and women's share of cash income consists of all the regressors in Equation 3 stated above, with additional regressors (instrumental variables) not included in the regression model, which is specified as:

$$\bar{z} = \alpha_j + \sum_{k=1}^{K-1} \delta_{kj}.dem_k + \sum_{s=1}^{S-1} \phi_{sj}.z_s + \beta_{3j}.\pi f + \Upsilon_1 + \Upsilon_2 + e \quad (4)$$

where \bar{z} = problematic predictors;
 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;
 Υ_1 = vector of instrument specific to per capita expenditure;
 Υ_2 = vector of instrument specific to women's share of cash income

In Table 1, we describe the instrument specific to per capita expenditure and women's share of cash income.

Table 1: The instrument specific to per capita expenditure and women's share of cash income

Exclusion restrictions used to identify 2SLS	Mean	SD
The amount of land owned by the household in hectares	1.3	2.4
The logarithm of the per capita value of holdings of consumer durables in Naira value	1.5 m	0.5 m
The number of rooms per capita in the dwelling in a number	4.0	2.0
The per capita floor area of the dwelling in square metres	3.4	4.3
If the walls of the dwelling are cement, stone or brick (dummy)	0.6	0.25
If the dwelling is owned by the household and is located in an urban cluster (dummy)	0.26	0.16
1 if the household grows oil palm (dummy)	8.5	1.2
1 if the household grows cashews (dummy)	0.76	2.0
1 if the household grows oil bean fruits (dummy)	0.81	0.2
Instruments specific to women's share of cash income		
The difference in educational attainment between the household head and his spouse in years	3	2
The proportion of household landholdings operated by adult women between 0 and 1	0.43	0.47
The proportion of household own business capital held by adult women (0 and 1)	0.36	0.41
The ratio of the spouse of the head's (oldest) education to the male head's education	0.62	0.26

Source: Field survey, 2017

2.4 Measurement of women's and men's shares of household income

In Nigeria, rural communities and food entrepreneurs depend heavily on activities such as food production, processing, storage, transportation and marketing for their income. Incomes earned from the crop they managed were recorded separately for men and women. Expenditure incurred by men and women was recorded separately. The calculation of women's share of income and household's cash income included farm produce consumed at home and household services that are not marketable, and was done using the current wage rate and included as women's income. Other incomes calculated include women's share of income or household's cash income calculated from the sum of sales of crops, net sale of livestock, wage employment, own business activities, remittances and miscellaneous sources. The people in southeast Nigeria, where the study was conducted, include Enugu, Awgu, Nsukka, Aba, Umuahia and Ohafia. The area is inhabited by Igbo-speaking people, who are culturally fairly homogenous, as both men and women grow the same crops but separately from each other. For instance, amongst the people of rural southeast Nigeria, both men and women grow yellow peppers, tomatoes, garden eggs (a type of eggplant), fluted pumpkin, sweet potatoes, cocoyam and cassava.

3. Results and discussions

3.1 Summary statistics of the survey data

In this sub-section, we describe the general descriptive statistics of the survey data, including means and standard deviations for house goods, and the share of women's income and the control are given in Table 2.

Garden egg, yellow peppers, tomatoes, fluted pumpkin leaves, sweet potatoes and cocoyam are usually grown commercially, with both men and women earning a cash income, and the reported profit from these crops was used in this analysis as part of the cash earned by each. Most of the cassava grown by both men and women was part of the farm produce consumed at home. Most women in the area grow amaranths for cash, especially as a dry-season vegetable, while yam is grown mainly by men as food and cash crop, as it requires stakes. Rice is grown in selected Fadama areas where irrigation water is available and, due to the huge amount of resources required, it is grown mainly by men for cash.

Table 2: Summary statistics of the survey data

Variables	Mean	Standard deviation
Dependent variables (budget shares)		
Food	0.6964	0.1940
Fuel	0.0090	0.0070
Children's clothing	0.0110	0.0050
Children's school fees	0.1000	0.0070
Meals consumed outside the home	0.0011	0.0001
Other expenditure	0.0801	0.0204
Alcohol	0.0034	0.0091
Household services	0.0900	0.0050
Independent and endogenous variables		
Per capita expenditure	65 143	23214
Per capita expenditure (log)	13.817	0.3421
Share of cash income accruing to wife	0.3456	0.1220
Other independent variables		
Household size	6.3000	2.8122
Household size (log)	1.8000	0.1761
Independent variables used as controls		
The proportion of household members		
Men, aged 15-59	0.2370	0.2340
Women, aged 15-59	0.2480	0.1660
Boys, child of head, 6-15	0.0950	0.0430
Girls, child of the 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 as control		
Enugu	0.1930	0.329
Awgu	0.1890	0.298
Nsukka	0.1790	0.311
Aba	0.1610	0.287
Umuahia	0.1330	0.345
Ohafia	0.1450	0.342

Source: Field survey, 2017

Women may supply the labour needed for the transportation of yam and for scaring birds in rice paddies, and this is not accounted for as women's income. In a situation where women assist men in producing rice or yam and are not paid, then women's income will be underestimated. Other annual crops, such as okra, maize and melon, are mostly intercropped on men's yam farms by women and are part of the farm produce consumed at home, so they were calculated as men's income as they were harvested from their plots. Some men tap palm wine from the palm trees, while women process the palm fruit into palm oil and palm kernel.

Women pay their husbands a specific amount from the proceeds of processing oil palm depending on the number of palms, because men claim it is harvested from their land. Cash income from crops such as kola nut, coconut, banana, oranges, plantain and peas all accrues to men. Men and women own livestock harboured in the same pen, especially goats and sheep, while cattle are owned mainly by men. Most of the revenue from local poultry is owned by women, while the revenue from exotic poultry accounts for men's and women's cash income. Some women also engage in sewing clothes, hairdressing, as food vendors, in processing and marketing fruit, vegetables, roots and tubers, grains

and fish, and earn their income from these activities, while men also earn income from bricklaying, carpentry work, marketing of fruits and vegetables, grains, and the cultivation of crops. Some of the men and women also occupy government positions as primary school teachers, secondary school teachers, catechists and nurses and receive wages. Using this approach, we find that 34% of total household income accrues as cash to women who are the wife or wives of the male head. Of this, 1.32% of women's income comes from wage employment, 9.7% per cent from own business activities, and 22.98% from agriculture.

3.2 Two-stage least squares estimation

Table 3.1 and Table 3.2 present the results of the two-stage least squares estimation. It is assumed there is a multi-member household in which decisions regarding expenditure are made. Eight categorical dependent variables were expressed as a share of total expenditure. Each of them was used as a 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 expenditure. After the control, the 2SLS addressed the endogeneity and showed that the coefficient of wives' share of household cash income was positive and significant in explaining expenditure on food at the 1% level of probability ($p < 0.01$). This suggests that an increase in the share of household income of women will enhance the likelihood of an increase in the budget share of household food. This is because women are assumed to provide food from the farm for children in rural households. The result is consistent with Hopkins *et al.*'s (1994) and Hoddinott and Haddad's (1995) non-cooperative model of expenditure on the household, and that of Bernard *et al.* (2020) in West Africa. Hopkins *et al.* (1994) found that, in Niger, changes in female annual income while controlling for male income increased household food expenditure, while Hoddinott and Haddad (1995) found similar results of an increase in food budget share in Cote D'Ivoire. Bernard *et al.* (2020) found that children and members of the household where women contribute to consumption decisions have better haemoglobin levels than those households where women do not contribute to consumption decisions in Senegal.

The analysis also found that the coefficient of women's share of household income was positive and significant on the budget shares of children's school fees, as well as the budget share of children's clothing at the 10% level of probability ($p < 0.1$). This implies that an increase in women's share of household income will enhance the likelihood of an increase in the budget share of children's school fees as well as an increase in the budget share of children's clothing. The result is also consistent with the result of Drajea and Sullivan (2014), who found that a mother is more likely to insist on payment of children's school fees, as well as to make sure they buy clothes for their children. The study also suggests that better-paid and better-educated parents are more likely to take their children to school and to reduce household poverty. The coefficient of women's share of household income was positive and significant on the budget share of other expenditure at the 10% level of probability ($p < 0.1$). This suggests that an increase in rural women's share of household income increases the budget share of other expenditure, such as adults' clothing and health care.

There was also a positive and significant coefficient of women's share of income on the budget share of fuel at the 1% level of probability ($p < 0.1$). This suggests that, as women's share of income increases, there will be a greater likelihood of allocating more of the household budget to fuel. This is because, in the culture of the people of rural southeast Nigeria, women have to fetch firewood for cooking food. Firewood is the major fuel used by rural households.

Table 3.1: Two-stage least squares budget share regressions

Variables	Food	Other expenditure	Children's clothing	Children's school fees
Per capita expenditure (log)	0.005 (0.393)	0.02 (0.21)	0.01 (0.37)	0.01 (0.38)
Share of cash income accruing to wives	0.885 (0.000)***	0.34 (0.06)*	0.53 (0.09)*	0.55 (0.06)*
Household size (log)	0.025 (0.567)	0.09 (0.42)	0.09 (0.31)	0.09 (0.29)
The proportion of household members:				
Male, aged 15-59	-0.006 (0.200)	0.00 (0.91)	-0.00 (0.95)	0.00 (0.96)
Female, aged 15-59	0.019 (0.879)	0.71 (0.00)***	0.01 (0.21)	0.01 (0.20)
Male, child of head, 6-15	-0.007 (0.760)	-0.05 (0.41)	-0.08 (0.08)*	-0.08 (0.09)*
Female, child of head, 6-15	-0.048 (0.608)	0.12 (0.61)	-0.01 (0.46)	-0.01 (0.45)
Male, child of head, < 6	-0.022 (0.530)	0.01 (0.95)	-0.08 (0.22)	-0.08 (0.23)
Female, child of head, < 6	0.004 (0.825)	-0.23 (0.09)*	0.01 (0.72)	0.01 (0.73)
Male, not child of head, 6-15	-1.276 (0.127)	2.42 (0.41)	-0.79 (0.62)	-0.90 (0.55)
Female, not child of head, 6-15	-0.032 (0.061)*	0.08 (0.18)	-0.06 (0.07)*	-0.05 (0.07)*
Male, not child of head, < 6	-0.003 (0.952)	0.05 (0.75)	-0.05 (0.57)	-0.04 (0.59)
Female, not child of head < 6	0.554 (0.371)	-0.09 (0.96)	1.60 (0.15)	1.47 (0.17)
Male, 60-69	-0.216 (0.254)	0.53 (0.39)	0.06 (0.86)	0.03 (0.91)
Female, 60-69	0.122 (0.228)	0.24 (0.29)	0.26 (0.17)	0.25 (0.17)
Male, 70 or older	0.011 (0.809)	-0.11 (0.48)	-0.07 (0.39)	-0.07 (0.42)
Dummy variables for household located in:				
Enugu	0.003 (0.562)	0.03 (0.09)*	0.01 (0.41)	0.01 (0.44)
Awgu	-0.015 (0.913)	0.15 (0.27)	0.07 (0.06)*	0.07 (0.07)*
Nsukka	0.002 (0.600)	-0.01 (0.63)	0.00 (0.86)	0.00 (0.82)
Aba	-0.006 (0.226)	-0.00 (0.82)	-0.01 (0.41)	-0.01 (0.35)
Umuahia	-0.001 (0.896)	0.01 (0.50)	-0.00 (0.97)	-0.00 (0.96)
Ohafia	0.006 (0.073)*	-0.01 (0.63)	0.00 (0.76)	-0.00 (0.74)
-cons	0.788 (0.163)	-0.33 (0.18)	0.03 (0.75)	0.04 (0.65)
Adjusted R ²	0.9600	0.7987	0.8713	0.8829
Prob > chi ²	0.000	0.000	0.000	0.000
Wald chi ²	5 608	1 080	14 928	16 507
Sample size (observations)	2 520	2 520	2 520	2 520

Source: Field survey, 2017

Note: statistics in parentheses show P value: * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3.2: Two-stage least squares budget share regressions (continued)

Variables	Household services	Fuel	Meals out	Alcohol
Per capita expenditures (log)	0.01 (0.59)	0.01 (0.28)	0.00 (0.34)	0.00 (0.52)
Share of cash income accruing to wives	0.48 (0.08)*	0.65 (0.00)***	-0.00 (0.47)	-0.00 (0.95)
Household size (log)	0.13 (0.10)*	0.08(0.18)	0.00 (0.95)	-0.00 (0.78)
The proportion of household members:				
Male, aged 15-59	0.00 (0.56)	-0.01 (0.30)	-0.000 (0.87)	0.00 (0.67)
Female aged 15-59	-0.02 (0.12)	0.01 (0.10)*	-0.00 (0.53)	0.00 (0.84)
Male, child of head, 6-15	-0.06 (0.28)	-0.03 (0.33)	-0.00 (0.83)	0.00 (0.52)
Female, child of head, 6-15	-0.01 (0.38)	-0.01 (0.34)	0.00 (0.74)	-0.00 (0.62)
Male, child of head, < 6	-0.04 (0.53)	-0.03 (0.45)	-0.00 (0.71)	0.00 (0.71)
Female, child of head, < 6	0.01 (0.66)	0.01 (0.65)	0.00 (0.78)	0.00 (0.68)
Male, not child of head, 6-15	-1.01 (0.47)	-1.72 (0.09)*	-0.00 (0.08)	-0.04 (0.78)
Female, not child of head, 6-15	-0.04 (0.17)	-0.03 (0.21)	0.00 (0.64)	-0.00 (0.68)
Male, not child of head, < 6	-0.07 (0.39)	0.01 (0.81)	0.00 (0.39)	-0.01 (0.38)
Female, not child of head < 6	0.72 (0.51)	0.77 (0.28)	0.00 (0.15)	0.01 (0.91)
Male, 60-69	0.03 (0.91)	-0.27 (0.18)	-0.00 (0.31)	0.02 (0.55)
Female, 60-69	0.27 (0.09)*	0.21 (0.09)*	-0.00 (0.68)	-0.00 (0.96)
Male, 70 or older	-0.01 (0.86)	-0.12 (0.83)	-0.00 (0.18)	-0.01 (0.14)
Dummy variables for household located in:				
Enugu	0.01 (0.37)	0.00 (0.53)	0.00 (0.48)	0.00 (0.43)
Awgu	0.08 (0.05)**	0.03 (0.21)	0.00 (0.50)	0.00 (0.87)
Nsukka	0.00 (0.51)	0.00 (0.90)	0.00 (0.09)	0.00 (0.92)
Aba	-0.01 (0.07)*	-0.01 (0.13)	0.00 (0.87)	-0.00 (0.81)

Umuahia	0.01 (0.39)	-0.00 (0.77)	0.00 (0.58)	0.00 (0.16)
Ohafia	0.00 (0.78)	0.01 (0.21)	0.00 (0.84)	0.00 (0.31)
-cons	0.06 (0.50)	0.11 (0.11)	0.00 (0.00)	0.01 (0.30)
Adjusted R ²	0.8875	0.9448		
Prob > chi ²	0.000	0.0000	0.8349	0.7988
Wald chi ²	16 540	36 672	15	16
Sample size (observations)	2 520	2 520	2 520	2 520

Source: Field survey, 2017

Note: statistics in parentheses: ** significant at 5%; * significant at 1%

Women's share of household income was found to be negative but not significant in relation to meals eaten outside of the home and alcohol. This implies that a household's budget share of alcohol and meals outside the home in rural households is very small and has no impact, and this was also shown in the descriptive results for both variables. The result implies that men's share of income is positive in relation to meals eaten outside the home and alcohol, although not significantly so. The coefficient of women's share of household income was positive and significant in relation to household services, with a probability of 10% ($p < 0.1$). This is consistent with the work of Kornrich and Roberts (2017), who found that an increase in women's share of household income increases the household budget share of household services. This is because women in the southeast have to take care of children and most of the cleaning in the house. The elasticities of the coefficients of women's share of household income in relation to food were estimated as 88% on food, 53% on children's clothing, 55% on children's school fees, 48% on household services, 65% on fuel and 34% on other expenditure.

The impact of women's share of household income on budget share of various expenditure (e.g. budgets share of household services, food, children's clothing, children's school fees, fuel, meals outside the home, alcohol and other expenditure) was examined by investigating how the budget shares of each of the household expenditure items changed when the distribution of income within the household was altered. To this end, we considered three cases: if women did not earn cash; if the cash income earned by women was equal to the 34% of household income; and if the cash income earned by women was 68% of household income. The result shows that doubling the proportion of household cash income received by women who are wives of the head of household from 34% to 68% would lead to a 30% increase in the budget share of food eaten in the household; a 13% increase in the budget share of children's school fees; a 16% increase in household services; a 15% increase in children's clothing; and a 19% increase in the budget share of fuel. However, there was no significant increase in the household budget share of meals eaten outside the home and alcohol respectively.

4. Conclusion and policy implications

The descriptive analysis showed that about 70% of the household budget was on food expenditure, while the non-food expenditure part of households' budgets accounted for about 30%, showing that the sampled households were relatively poor rural households. Both men and women contributed to the own-farm product consumed in the home, at a ratio of 50% each.

The policy implications are: first, the elasticities of the coefficients of changes in women's share of household income on food increased drastically when the women's income was doubled, showing that most of the households are food insecure and will increase their budget for food if women's income is increased. Second, this result supports the general thinking that intra-household resource allocation from men to women would increase food intake. Thus, the result implies that food intake by household members increases when more income is in the hands of women relative to men. Third, there are positive increases not only in the budget share of food as a result of changes in the income share of women's income, but also in the budget share of children's clothing, children's

school fees, fuel used for cooking food and household services, as well as other expenditure such as adult clothing and health, showing that women are the major caregivers to children in rural households in southeast Nigeria.

Some reasons can be deduced from this. First, the descriptive results show that most of the incomes earned by households were used to purchase food, while the inferential results show a positive relationship with women's income spent on food, although the effect of an increase in men's income was negative on food. Thus, men spent their money on non-food items such as building houses. Second, a major cultural norm in southeast Nigeria is that unemployed men who depend mainly on agricultural productivity for their income will provide a house for their wife or wives. When a woman is married, she is entitled to most of the parcels of her husband's inherited and communal land. The husband may ask his wife not to use the parcels of land that are meant exclusively for the cultivation of yam and his own crops. She is also entitled to all the perennial trees, such as bread fruits, oil bean trees, vegetable trees and plantain, which are mainly processed and used for the preparation of food. However, she may process some of the palm fruits for her husband and give the proceeds to him. This enables him to purchase tobacco or other items, while the rest of the proceeds from palm fruits are used for the purchase of food items and ingredients that are not available in the household and are needed for the preparation of food. Sometimes during the harvesting periods, which last four months of the year, men might provide harvested yam, maize, cocoyam and cassava from their plots for preparing food, but in the next eight months before the onset of the next harvest, women are expected to source food – either from cassava plots, which are harvested throughout the year, or from their processed farm products, which are stored, or from their businesses – to make food available for the household. Most of the men in the rural areas do not receive any regular income except during the harvest period, while some have plots of cassava for their family to harvest throughout the year, and others engage in carpentry work, bricklaying or tapping palm wine.

These findings have interesting research and programme implications. Our results suggest that the goal of increasing any of the household expenditure should target the gender that will more likely spend money on purchasing the needed items discussed above. The distribution of income in favour of women will motivate an increase in the number of household items such as food eaten in the house, children's clothing, children's school fees, fuel for cooking food, household services and other expenditure, all of which are positively and significantly related to women's income. Therefore, women's share of household income comes from producing tomatoes, peppers, garden eggs, fluted pumpkin and amaranth, processing food, hairdressing, sowing, and some from government employment. These activities should be supported by the government to improve the welfare of members of the rural household. Improving women's share of household income will empower women and contribute to gender equality, and will also help in achieving most of the sustainable development goals.

The result also suggests that women share a greater percentage of what they earn with their children and other members of the household, and account for more than 70% of the world poor. The farm plots owned by them have more problems, as they are smaller in size, have limited prospects for profitability and technology adoption, and fail to provide collateral for obtaining a loan. The results are consistent with the findings of Doss *et al.* (2018), who suggest that seven out of every ten poor people are women, that they produce 60% to 80% of the food and own 1% to 2% of the world's land. They also are intrinsically better stewards of the environment, especially in rural areas, where they depend on agriculture for their livelihood (Doss *et al.* 2018). The government should also support women's education and their active participation in leadership so that women's voices are equitable with those of men and so that they can also be involved in setting the priorities for research and policies. The result of this will be that rural women in agriculture are also served

by government. This will enable at least 11 of the 17 sustainable development goals that relate to gender dynamics to be achieved.

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