

DETERMINANTS OF FOOD CONSUMPTION EXPENDITURE AMONG AGRO BASED FIRMS WORKERS IN SOUTHERN NIGERIA: SIMULTANEOUS EQUATION APPROACH

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ABSTRACT

The study **aims to determine** factors that affect food consumption expenditure of agro based firm workers in Cross River State, Southern Nigeria. Cross-sectional data were collected from 250 randomly selected workers of five rubber estates in the region. Descriptive statistics and two-stage least squares method of simultaneous equation model was used in the analysis. The result of the analysis of the socio-economic characteristic of respondents revealed that, the rubber sub-sector is dominated by the middle age workers who are predominantly males. More than 70% of the workers had some years of formal education; while majority of them had moderate family size. In addition about 97% of the workers have invested more than one year in the sampled estates. Also, 76.8% of respondents belong to the local cooperative society; while only 6% depended solely on their salaries. Furthermore, the results of the empirical analysis revealed that salary, tax, family size, non-food consumption expenditure and farm income determined the food consumption expenditure of rubber plantation estates' workers in Cross River State. To improve workers food consumption expenditures, increase in salary in line with changes in the macro-economic variables in the country is advocated. In addition, policies targeted towards reducing household size and tax including provision of amenities and infrastructures in the rural areas are recommended, as these would upsurge the agro-based workers' food consumption expenditure and increase productivity in the rubber sub-sector.

Keywords: Food, consumption, workers, rubber, income, expenditure, Nigeria.

1. INTRODUCTION

Household food consumption expenditure is a critical issue in most developing countries [30]. In Sub Saharan Africa, food consumption expenditure constitutes greater percentage in the household income share compared to saving. In Nigeria, food consumption pattern had undergone remarkable changes over the last few years. There has been an increase in the consumption of starchy foods like cassava, yams, maize and rice and some decrease in the consumption of protein based food items such as fish and meats [29]. Average protein intake

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by Nigerians is only at the threshold of adequacy [28]. The daily per capita calorie supply as a proportion of requirement was 90% in 1988-1990 and 85% in the period 1992-1996 [27]. On the other hand, aggregate protein consumption was 61.1g/cap/day in 2002 [28]. These protein consumption figures fall short of the critical human body requirement which was put at 70g /cap/day by Food and Agriculture Organisation [28].

Food consumption plays an important role in the economic growth and development of both developed and developing nations [1]. It has a considerable impact on the circular flows of income in the economy, meaning that it has a significant effect on the economic activities of a country. In the agricultural sector increase in the productivity of the sector has a positive linkage with the size of food consumption expenditure, size of disposal income and proportion of net income saved by farmers [4]. It therefore implies that, agro based industry productivity to a large extent will depend on workers' remuneration and the proportion of its consumption and savings [22].

In Nigeria, salaries and wages paid by most agro-based firms are low; as a consequence there is a general decline in labor welfare in the sub-sector [9]. Natural rubber sub-sector is an example of the agro-based firm that falls into this category despite its contribution to economic development of Nigeria [32]. Rubber plantation firms are basically rural based agro-firms; as a result of this, majority of workers are rural dwellers whose income depended considerably on the viability of these firms. To an extent, the sustained productivity of the sub-sector is crucial in combating the scourge of rural poverty and unemployment in the country. Unfortunately, sustained productivity cannot be achieved in the sub-sector without improved workers' welfare which is directly linked to workers' food consumption expenditures. Aggregate household savings and the cost of household consumption have often been used as measures of consumer's welfare [20 and 24].

Food expenditure among workers in the agro-based firms in rural areas could be described as unsatisfactory based on the poverty index of rural dwellers in the country [31, 28]. This is evident in the decline of worker's ability to provide for their consumption expenses as well as basic necessities [5]. As advancement in agricultural sector in the country has remained unsatisfactorily low, the wiggling productivity among most agricultural firms in the country, apart from environmental and policies instability has often been linked to workers' commitment which is directly related to their food consumption expenditures or welfare [1].

The decision of an agro-based firm worker to consume depends on the maximization of his or her utility function which is subject to his or her budget constraint. Apart from income and budget limitation, other variables are responsible for the decision by agro-based workers to channel part of their remunerations to food consumption [5]. The purchase decisions of agro-

61 based workers are affected by various factors (Bamidele *et al.*, 2010). Income, prices,
62 educational status of the individuals, occupation, age, and socio-cultural factors are the main
63 ones [26, 31]. In the midst of these factors, the welfare of these workers is enhanced when
64 they maximize their benefits by giving priority to the purchase of goods and services that
65 avail the most and putting off purchases of the least needed goods and services due to
66 income-bound. Thus, differences emerge according to the worker's behavior and effect of
67 other factors determining these behaviors [8].

68
69 Undoubtedly, the rubber sub- sector has contributed immensely to the overall development
70 of the Nigeria's economy. Given the **increased** market opportunities for the rubber products
71 in the rapidly expanding Nigeria's economy, its increasing demand at international market
72 including its socio- economic impact on the lives of Nigerian [32], there is an overwhelming
73 need to ensure sustains production through good management techniques evolving around
74 improved workers' consumption expenditures or welfare. The study focused specifically on
75 workers of rubber plantation estates in the South- South region of Nigeria. There are many
76 rubber estates scattered in the rain forest belts of Nigeria. This agro-based firm employed all
77 categories of labour in its production and processing activities. **The need for the study on**
78 **food consumption expenditure behavior among rubber plantation estates' workers in the**
79 **region is justified by the following reasons:** in spite of the high unemployment rate and the
80 saturated labor market in the region, labour are not steadily attracted to this high labour
81 demanded agro-based outfits; and the issue of frequent in and out movement of labour in
82 the estates as well as the rationale for low societal ranking of the estate workers compared
83 to other job areas available in the region. **Identification of variables** that motivate the agro-
84 based firm workers to allocate good proportion of their disposable income to food
85 consumption is one of the prerequisites to understanding the well-being of this category of
86 workers.

87 The study, therefore aimed at determining factors affecting food consumption expenditure
88 among rubber plantation estate workers in Cross River State in Southern Nigeria. Being a
89 rural based agro-based firm; the study assumes that the workers depend on job
90 remuneration and farm income. Following the classical income theory, the household income
91 is either consumed or saves. In addition, the study assumes that leakages and injection into
92 the circular flow of income **cycle** of these agro-based workers in **the** rural setting are
93 negligible. Simultaneous equation model was used to specify the saving and consumption
94 functions with a definitional equation relating income to consumption and saving. The use of
95 the simultaneous equation model helps to reduce the influence of endogeneity **of explanatory**
96 **variable (s)** or exogenous variable--error term correlation. This problem usually occurs when

multiple regression model based on Ordinary Least Squares estimation technique is used to estimate consumption function [15].

1.1 LITERATURE REVIEW

Huston [14] and Bruck [7] showed that non- economic factors (that is education, sex and family size) are important determinants of consumers' purchasing decisions. Hopkins et al. [13] in Niger found that changes in female annual income while controlling the male income, impacted positively on household food expenditure for both earned and non-earned income. Hoddinot and Haddad [12] in *Cote D' Ivoire* found a positive but small marginal effect of women's income share on household food budget share. According to him, increasing household disposal income may not be effective strategy for increase food consumption. Gupta [11] and Avery and kannickel [6] in their separate empirically studies discovered that increase income positively influenced food consumption. Adebayo [2] discovered that expenditure elasticity of per capita calorie intake in South-Western Nigeria is between 0 to 4 percent meaning that calorie intake does not get a substantial share of marginal increase in household income. Adewale [3] in Oyo State Nigeria found that household size and level of formal education affect consumption of Soybean. While studying factors affecting pork meat consumption in South Africa Oyewumi and Jooste [19] showed that non-economic factors are becoming increasingly more important when consumers have to make purchasing decision regarding pork meat consumption. Emerole et al. [10] used multiple regression model to determine consumption expenditure and its share to total income in small farm households in Ikwuano, Abia state Nigeria. Results showed that Per- household-member income, and per- household-member wealth was the major determinants of consumption expenditure. Ukoha et al. [24] analyzed the determinants of farmers' welfare in Ebonyi State, Nigeria. Standard welfare function was specified and estimated using Ordinary Least Squares Regression. The results showed that microcredit and household size have significant negative effect on welfare. On the other hand, incomes, physical assets, level of education and age of household heads have significant positive effects on welfare. Matthews-Njoku et al. [16] studied determinants of Pork Consumption among rural households in Rivers State, Nigeria. The study found that consumption level of pork was affected by cultural belief, household size, cost and supply. Onyemauwa [18] analysed household consumption expenditure of cassava products in South-east Nigeria. His findings reveal that household size, household income and cost of substitutes were important variables that affect the consumption of cassava products in the area. Odusina et al. [17] discovered that household size and expenditure on substitutes affect the consumption of

protein among rural households in Oyo state, Nigeria. Seid [21] examined the determinants of household expenditure on Teff in Ethiopia. The double hurdle model for Teff consumption suggested that the household head age, household size, dependency ratio, education, employment status and gender were significant determinants of Teff consumption. Cağlayan and Melek [8] investigated the determinants of household consumption expenditure in Turkey. The empirical results show that the age, income, marital status, insurance and the size of the household were important variables affecting household consumption expenditure. Terano and Zainalabidin [23] analyzed the food expenditure of farm households in Malaysia. Their expenditure function indicated that, off-farm income and number of family members are the major determinants of food expenditure.

From the reviewed literature, it is evident that most researches on consumption expenditure determinants in Nigeria used multiple regression models [3, 10, 24, 16, 17 and 18]. This model does not take into consideration the inherent endogeneity problem of household income among the explanatory variables. The prevalence of this econometric problem usually lead to biased and inconsistent regression estimates [15]. As a consequence, this could lead to faulty policy variables and recommendations. Also, most of the researches focused on arable crop farmers [10, 23, 24] without due consideration to tree crop farmers. Others analyzed determinants of food consumption expenditure based on specific food products [3, 16, 19, 18, 17, 21]; while few researchers [14, 7, 6, 11, 8 and 12] dealt on the general household without distinctively clear definition of the type of households used. However this study differs from other related researches as it employed simultaneous equation model to solve the problem of endogeneity in household income. It also focused specifically on the determinants of rubber plantation workers household food consumption expenditure.

3.0 METHODOLOGY

3.1 The study Area, Data Collection and Sampling Technique

The study was conducted in the Southern senatorial district of Cross River State in the Southern region of Nigeria. The area hosts most of the viable rubber estates in the region. Primary data were collected with the aid of well structured questionnaires and used for analyses. Personal interviews of some respondents were also conducted to re-assess and validate some data collected. Five rubber estates owned by several private companies in the region were randomly selected and used for data collection. 50 agro-based workers were randomly selected from each of the estate. A grand total of two hundred and fifty (250) sample size was used in this study. Baseline information on the socio-economic

169 characteristics, saving, income and consumption expenditures as well as the off-job
170 engagement were collected and analyzed.

171

172 3.2 ANALYTICAL FRAMEWORK

173 Income, saving and consumption are closely related. Several economic studies have shown
174 that income is among the primary determinants of consumption and saving. When the
175 household income increases, the increment is channeled to saving and consumption.
176 Household savings is thus, the complement of consumption. In this study we assumed that
177 agro based worker salary is either save or spent on household consumption. Economic facts
178 have shown that some variables that affect household savings also affect consumption
179 expenditures [5]. Income is one of such economic variables that impact household saving
180 and consumption simultaneously. Implicitly, the relationship between saving and
181 consumption can be express as shown in equations (1), (2) and (3). This relationship usually
182 causes the problem of endogeneity of income in the econometric analysis.

183

184
$$\text{Sav} = \beta_0 + \beta_1 \text{Inc} + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 X_5 + \beta_7 X_6 + \beta_8 X_7 + U_2 \dots\dots\dots (1)$$

185
$$\text{Con} = \psi_0 + \psi_1 \text{Inc} + \psi_2 X_1 + \psi_3 X_2 + \psi_4 X_3 + \psi_5 X_4 + \psi_6 M_1 + \psi_7 M_2 + \psi_8 M_3 + U_1 \dots\dots\dots (2)$$

186
$$\text{Inc} = \text{Con} + \text{Sav} \dots\dots\dots (3)$$

187 Where

188 Inc = Salary of i_{th} worker in naira

189 Sav = Monthly savings for i_{th} worker in (₦).

190 Con = Household consumption expenditure (Con = Inc- Sav) in (₦)

191 X_1 = is a predicted tax (Tax*) derived from (Tax = t + tInc) and expressed in (₦), where

192 Tax = Monthly tax on salary of i_{th} worker.

193 X_2 = Years of formal education of worker.

194 X_3 = Household size in Number.

195 X_4 = Sex of worker (Dummy 1 for male and 0 for female).

196 X_5 = Age of the worker.

197 X_6 = Experience in job measured in years.

198 X_7 = Membership of local Association (worker's cooperative society) in years.

199 M_1 = Monthly Income of other family member (₦).

200 M_2 = Monthly Household non-food consumption expenditure as a proportion of total
201 income (salary + farm income) (₦).

202 M_3 = Monthly farm income of i_{th} worker (₦).

203

204

205 3.3 IDENTIFICATION OF THE STRUCTURAL MODEL

206 Since a unique relationship exist among income, saving and consumption; the OLS
 207 estimation of any behavioral equation in the above structural model will yield bias and
 208 inconsistent estimates [15]. Therefore, the behavioral equations (i.e. equation 1 and 2) were
 209 identified to determine whether a unique estimate of parameters of the specified structural
 210 equation can be obtained by applying appropriate simultaneous equation model. To do this,
 211 we employed the order and rank conditions of identification [15]. The processes and the
 212 result of the exercise are shown below:

213

214 a) ORDER CONDITION TEST

For equation 1

K - M	≥	G - I
13 - 8	>	3 - 1
5	>	2

For equation 2

K - M	≥	G - I
13 - 9	>	3 - 1
4	>	2

215

216 b) RANK CONDITION TEST

217

0	=	-Sav	+β ₁ Inc	+ β ₂ X ₁	+ β ₃ X ₂	+β ₄ X ₃	+ β ₅ X ₄	+β ₆ X ₅	+β ₇ X ₆	+β ₈ X ₇	+0c	+0M ₁	+0M ₂	+0M ₃
0	=	0Sav	+Ψ ₁ Inc	+ Ψ ₂ X ₁	+ Ψ ₃ X ₂	+Ψ ₄ X ₃	+Ψ ₅ X ₄	+0x ₅	+ 0X ₆	+0X ₇	-1c	+Ψ ₆ M ₁	+Ψ ₇ M ₂	+ Ψ ₈ M ₃
0	=	Sav	-Inc	+0X ₁	+0X ₂	+ 0X ₃	+0X ₄	+0X ₅	+0X ₆	+0X ₇	+1c	+0M ₁	+0M ₂	+0M ₃

218

219 Matrix of coefficient

-1	β ₁	β ₂	β ₃	β ₄	β ₅	β ₆	β ₇	β ₈	0	0	0	0
0	Ψ ₁	Ψ ₂	Ψ ₃	Ψ ₄	Ψ ₅	0	0	0	-1	Ψ ₆	Ψ ₇	Ψ ₈
1	-1	0	0	0	0	0	0	0	1	0	0	0

220

221 For equation 1

222

-1	Ψ ₆	Ψ ₇	Ψ ₈
1	0	0	0

2x2 sub-matrix
 Determinant = 0 - Ψ₆ = - Ψ₆

-1	Ψ ₆
1	0

223

224 For equation 2

225

-1	β ₆	β ₇	β ₈
-1	0	0	0

2x2 sub-matrix
 Determinant = 0 - β₆ = - β₆

-1	β ₆
1	0

226

227 The result of the identification shows that the structural model is over- identified, since K – M
 228 > G – 1 (order condition) and the rank conditions are fulfilled. (Where K = total number of
 229 variables in the model, M = total number of variables in each equation and G = total number
 230 of endogenous variables in the model) [15]. This implies that the two-stage least squares
 231 estimation method is appropriate for estimating equations (1) and (2). From equation (1) and
 232 (2) we investigated the relationship between the error terms and established that, the Cov
 233 (U₁, U₂) = 0; meaning that U₁ and U₂ are contemporaneously independent. This further

confirms the relevance of the 2- stage least squares method of simultaneous equation model specification over others. A reduced formed model for income was specified and its estimated value was used to correct for the endogenous variable (or income) specified as exogenous variable in the consumption function presented in the structural model (i.e. equation 2). Hence,

$$\text{Inc} = \pi_0 + \pi_1 X_1 + \pi_2 X_2 + \pi_3 X_3 + \pi_4 X_4 + \pi_5 X_5 + \pi_6 X_6 + \pi_7 X_7 + \pi_8 M_1 + \pi_9 M_2 + \pi_{10} M_3 + U_1 \dots \dots \dots (4)$$

The OLS estimates of equation (4) was used to generate the predicted values of “Inc” (i.e. Inc*). This was incorporated into the consumption equation (i.e. equation 2) which is the equation of interest in this research work. It follows that, the food consumption expenditure function to be estimated, given the variables and the transformation is as shown below.

$$\text{Con} = b_0 + b_1 \text{Inc}^* + b_2 X_1 + b_3 X_2 + b_4 X_3 + b_5 X_4 + b_6 M_1 + b_7 M_2 + b_8 M_3 + U_2 \dots \dots \dots (5)$$

Where variables are as defined previously.

3.4 To test for multi-collinearity among specified variables in the model

Multi-collinearity is among prominent econometric problems of cross sectional data analysis. This property of econometric was tested among variables to ensure the consistency and unbiasedness of the consumption function estimates. The variance inflation factor (VIF) was used. For VIF, the minimum possible value is 1.0; while value greater than 10 indicates a probably collinearity problem. VIF was estimated using the formula stated below:

$$VIF_j = 1 / \{1 - R^2_j\} \dots \dots \dots (6)$$

Where $R^2_{(j)}$ is the multiple correlation coefficient between variable j (dependent variable) and the other specified explanatory variables.

4.0 RESULTS AND DISCUSSION

4.1 Test result for multi-collinearity among specified variables in the model

Table 1 presents the Variance Inflation factors (VIF) test result for collinearity of variables used in the consumption function. The result reveals that there was no significant collinearity between the specified explanatory variables and the dependent variables in the specified model. The result implies that the estimates of the consumption function are consistent and unbiased.

Table 1: The Variance Inflation factors (VIF) test result for Collinearity of variables used in the two hurdle equations

VARIABLE	VIF ESTIMATES
SALARY	2.545
TAX	1.987
EDUCATION	1.876
FAMILY SIZE	2.453
INCOME FROM OTHERS	1.453
NON-FARM INCOME	7.854
GENDER	2.894
FARM INCOME	3.812

Source: Computed by authors.

4.2 SOCIO-ECONOMIC CHARACTERISTIC OF RESPONDENTS

Table 2 presents the socio economic characteristics of respondents in the study area. The results reveal that, the rubber sub- sector in the south-south region of Nigeria is dominated by middle age workers who are predominantly males. More than 70% (192) of the workers had some years of formal education; while majority have moderate family size.

Table 2: Socio-Economic Characteristics of Respondent

Characteristic	Freq. and %	Characteristic	Freq. and %
Age (Yrs)		Family size (No.)	
< 20	26 (10.40)	<3	38 (15.20)
20 – 30	58 (23.20)	3 – 5	102 (40.80)
> 30	166 (66.40)	> 5	110 (44.00)
Total	250 (100.00)	Total	250 (100.00)
Sex (No)		Experience (Yrs)	
Female	55 (22.00)	<1	6 (2.40)
Male	195 (78.00)	1 – 10	116 (46.40)
Total	250 (100.00)	>10	128 (51.20)
		Total	250 (100.00)
Education (Yrs)		Association Membership(Yrs)	
No schooling	58 (23.20)	0	58 (23.20)
Primary School	119 (47.60)	< 1	15 (6.00)
Secondary School	60 (24.00)	1 – 10	107 (42.80)
Tertiary	13 (5.20)	> 10	70 (28.00)
Total	250 (100.00)	Total	250 (100.00)
Av. MONTHLY FARM INCOME (N)		Av. MONTHLY SALARY (NON FARM INCOME) (N)	
0	15 (6.00)	< 10000	75 (30.00)
< 5000	120 (48.00)	10001- 20000	130 (52.00)
5001-10000	90 (36.00)	> 20000	45 (18.00)
> 10000	25 (10.00)	Total	250 (100.00)
Total	250		

Source: Field survey, 2010 and 2011.

In addition, about 98% (244) of the workers have invested more than one year in the various estates sampled. Also, about 76.8% (192) of respondents belong to the local cooperative society (Osuzu) in the estate which is basically a saving oriented cooperative group. The

result further indicates that only 6% (15) of the workers depended solely on their salaries, while the remaining 94% (235) depended on farm income in addition to their monthly pay from the estate. The monthly income distribution shows that about 18% (45) of the workers have above ₦20, 000 monthly incomes. This cadre of workers are mainly administrative and management staff.

4.3 EMPIRICAL RESULT

The estimated food consumption expenditure functions are presented in Table 3. The linear function was picked as the lead equation (L**) because it has the highest coefficient of determination ($R^2 = 0.819$) and more significant explanatory variables compared to other models estimated. The values of the RESET test (11.985***) and the normality test (12.459***) for the linear form behaved better than in other models. This means that the structural rigidity of the linear model is stronger than in other models. The normality test is highly significant in the linear form which justifies the used of the ordinary least squares (OLS) method of estimation. The F-statistic (8.830***) in the linear model is greater than in other models and is highly significant at 1% level of probability. This implies that the estimated R^2 is significant and the model has goodness of fit for variables specified.

Table 3: The OLS estimates of the 2 stage-least squares consumption regression

Variable	Exponential	Linear (L**)	Semi-log	Double-log
Salary (Inc*)	0.00709*** (3.553)	17.485*** (3.891)	2812.99 (0.098)	0.585 (0.378)
Tax (X_1)	-0.0244* (-1.833)	-60.35* (-1.874)	4540.55 (0.071)	0.351 (0.102)
Education (X_4)	0.005 (-1.294)	85.604** (-2.251)	-729.35** (-2.000)	-0.205 (-1.042)
Family size (X_6)	0.055* (1.811)	782.03** (2.022)	2005.010* (1.870)	0.157** (2.266)
Income of other Family Members (X_7)	-0.000049 (-0.3.42)	-0.0.63 (-0.216)	-330.148 (-0.109)	-0.062 (-0.378)
Non-food expenditure (M_1)	-0.08112* (-1.650)	-800.17** (-2.316)	-135.503 (-0.034)	-0.134 (-0.625)
Gender (M_2)	0.243 (1.506)	637.55 (0.453)	-966.61** (-2.370)	-0.370* (-1.688)
Farm income (M_3)	-0.5913*** (-2.895)	-2345.11*** (-4.751)	-1757.14 (-0.773)	-0.093 (-0.761)
Constant	21.707** (2.522)	357.9*** (3.925)	188.20** (2.105)	6.402* (1.665)
R^2	0.797	0.819	0.346	0.284
F-stat	6.891***	8.830***	2.185**	1.998*
RESET test	9.123***	11.985***	1.765	0.954
Normality test	10.675***	12.459***	1.987	0.765

Where *, ** and *** represent 10%, 5% and 1% significant levels respectively. Values in parenthesis are t-value while (L**) is the lead equation.

307 The result revealed that the slope coefficient of the agro-based workers' salary (Inc^*) is
308 statistically significant at 1% probability level and positively related to the food consumption
309 expenditure. This implies that, as the salary of the agro-based worker increases by one
310 naira, the food consumption expenditure also increase by 17.45 naira. This result however
311 indicates that for every one naira increase in the worker salary, a larger increment would
312 occur in the food consumption expenditure. In other words; 10% change in a worker's salary
313 will lead to less than equivalent 10% change in food consumption expenditure of workers.
314 This **result** explains the less positive influence of the agro based workers' salaries to their
315 food consumption expenditures. **The salaries of these workers are relatively constant over a**
316 **period of time, the farm proceeds inform of income or farm products plays a major role in**
317 **influencing the worker' food consumption expenditure in the short run.** Similar result had
318 been obtained from empirical studies conducted by Gupta [11], Matthews-Njoku et al., [6];
319 Ukoha et al.,[24]; Onyemauwa [18]; Çağlayan and Melek [8] and Terano and Zainalabidin
320 [23].

321 Monthly tax on workers' salaries has a significant negative effect (at 5% significance level)
322 on food consumption expenditure of the rubber plantation estate workers in southern region
323 of Nigeria. This means that the current tax system adopted by the government of the region
324 reduces the purchasing power of workers in the rubber sub- sector. One naira increase in
325 the tax paid by the worker would reduce food consumption expenditure by 60.35 naira. This
326 also gives an insight why workers income cannot adequately take care of their consumption
327 expenditure. A naira tax imposed on workers' salaries would reduce disposable income by
328 ₦60.35. Given the current instability in macro-economic variables in Nigeria's economy, the
329 propensity of tax reduction among these workers is almost negligible. Thus, the workers take
330 home pay **might** continue to play a less significant positive role in providing for workers food
331 consumption expenses in the rubber sub-sector in the region.

332

333 The estimated coefficient of education (X_4) is negative and statistically significant at 5%
334 probability level. This means that, a unit increases in the year of formal education of workers'
335 decrease the household expenditure by ₦637.55. This result confirms the fact that most of
336 the workers have lower years of formal education and hence will prefer necessary
337 commodities to luxury ones in attempts to curtail consumption expenditures. This result
338 corroborates the empirical findings of Huston [14]; Adewale [3]; Bruck [7]; Seid [21] and
339 Ukoha et al., [24].

340

341 The non-food consumption expenditure of the workers had a significant adverse effect (at
342 5% significance level) on food consumption expenditure. This means that, as workers

purchase non- food items, their food consumption expenditure is negatively affected. This result indicates that 10% increase in the expenditure on non-food items would lead to about 800.17 naira reductions in household food expenditure. The result may be attributed to the distance of the rubber estates to the metropolis where most of these non-food items are purchased. The proximity between the estates and the metropolis is the measure of the transportation cost incurred by workers when they want to purchase household items and other necessary home accessories. This additional cost reduces the worker's disposable income and also increases the food consumption expenditure. It is also striking to note that most of the rubber plantation estate lack standard schools, well equipped clinics and other infrastructures. Hence most workers have to pay heavily to sponsor their wards to attend good schools in the nearby towns and for their health care needs. These responsibilities increase their monthly non-food consumption expenditure while drastically reducing the household food consumption expenditure.

The family size has a significant positive impact (at 5% significance level) on food consumption expenditure of rubber plantation estate workers in the southern region of Nigeria. That is, a number increase in the household size of the worker would result in ₦782.03 increase in household consumption expenditures. This implies that, workers that have large family size would have increment in food consumption expenditure. This means that, the larger the worker's household, the more difficult it will be for the worker to meet the basic food consumption requirement of the family. Since rubber estates are located in the rural areas, most of the workers are not exposed to modern methods of family planning. In addition, low years of formal education and the rural community influence perhaps contributed to the mental orientation of most workers having large families. Another possible reason for this result could be the low remuneration to workers which prevent them from accessing modern information and facilities for effective family planning. As a consequence, the family consumption expenditure increases as the family size increase. This result is in consonance with the research reports of Huston [14]; Bruck [7]; Adewale [3]; Emerole et al., [10]; Ukoha et al., [24]; Matthews-Njoku et al., [16]; Onyemauwa [18]; Seid [21]; Çağlayan [8]; Oduşina [17] and Terano and Zainalabidin [23].

The coefficient of farm income of workers is statistically significant at 1% probability level and negatively related to food consumption expenditure. The result shows that for every one naira increase in the worker's farm income, about ₦2345.11worth of household expenditure is saved. This means that, majority of workers are engaged in subsistence farming activities; implying that most of their farm products are consumed by them. This result reveals the

important of farming engagement to the welfare of agro-based workers in the region. The possible reasons for this result could be the low level of formal education among workers and the remoteness of the estates which cut them from accessing luxuries commodities. Given this result, it implies that farm income plays a more significant role in the agro-based worker's food consumption expenditure than the salary earned.

5.0 SUMMARY AND CONCLUSION

The study used the simultaneous equation model to estimate the household food consumption expenditure function for rubber plantation workers in southern region of Nigeria. Rubber firm and workers' related factors were specified in the estimated model. The estimated linear consumption expenditure model reveals that salary, monthly income tax, education, family size, non-food expenditure and farm income are significant determinants of consumption expenditure of rubber plantation workers in Cross River State in the South-South region of Nigeria.

The contribution of the natural rubber sub-sector to the economic development of the Southern region of Nigeria cannot be undermined. Improving food-consumption expenditure of workers in the rubber estates will directly increase the productivity of the sub-sector in the region. The study has identified that remuneration in the natural rubber production sub sector in the southern region of Nigeria is generally low and this has a marginal or minimal positive effect on the food consumption expenditure of workers. The study identifies that this hindrance is among the fundamental reasons labor is not steadily attracted to this agro based industry despite saturated labor market in the region. In reaction to this situation, most workers complement their salaries with farm income which has a significant effect on the food consumption expenditure. Apart from the above reasons, the results imply that the rural area where the rubber estates are located and the negative impact of the non-food consumption expenses on food consumption expenditure in addition to the poor facilities and infrastructures in the production areas are among possible reasons for the low societal ranking of workers of these agro based firms; and unsteady labor movement in the sub sector.

5.1 POLICY IMPLICATIONS AND RECOMMENDATIONS

The results of the study identified monthly tax, years of formal education and non-food consumption expenditure to have significant negative impacts on rubber plantation estate workers' food consumption expenditure in the southern region of Nigeria. In addition, the study has revealed that workers salary and workers' family size have significant positive

relationship with food consumption expenditure. Based on the above findings, the following policies were recommended. The employee or owners of the rubber estate should endeavor to increase the worker's salaries periodically in line with the changes in the country macroeconomic and microeconomic variables in the country. Also policies which reduce agricultural production restraints will increase the workers farm income and subsequently improve their food consumption expenditure through increase in their disposable income. Policies which reduce tax and household size will improve food-consumption expenditure of rubber plantation estate workers in the region. Direct tax cut and appropriate birth control measures for these set of workers are advocated. Non-food consumption expenditure has a negative effect on food consumption of the workers. This suggests that government of the region should adopt policies targeted towards development of rural areas through provision of amenities, re-creational facilities, schools, well equipped hospitals and other necessary infrastructures. These will reduce the non-food expenditure while part of the unspent income would be channeled to household food consumption.

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