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Full Length Research Paper

Analysis of rural and urban households' food consumption differential in the North-Central, Nigeria: A micro-econometric approach

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This paper examines whether there are differences in food consumption patterns between the rural and urban households in the North-central Nigeria using food consumption data obtained from households' seven days memory recall. While analytical tools like the descriptive statistics were used, the nature of data on fruits and vegetable with a lot of zero consumption led to the employment of the double-hurdle model. The results of the descriptive statistics revealed heterogeneity in consumption and expenditure patterns across households in rural and urban areas. While the urban residents purchase 37.9% of the food they consume, families in rural areas purchase only 26.6%. The most commonly consumed foods among urban populations included rice, fat and oil, bread, soft drink, sugar and milk, while those in rural areas was substantially different and included yam and cassava flour. Urban households in both states consumed more rice, fat and oil, bread, soft drink, sugar and milk with less yam and cassava flour compared to the rural households. Households' decision to participate in fruits and vegetable food group from double-hurdle model was based on their income, location, membership of cooperative group and access to refrigerator. The actual consumption was based on income and their membership of social group. There is the need to increase households' income and access to fruits and vegetable preservation facilities to facilitate the consumption of the food items.

Key words: Consumption, zero food consumption, food consumption differential, double-hurdle.

INTRODUCTION

Food consumption has been a subject of research all over the world. It is especially meaningful in developing countries where food expenditures account for a relatively large share of household income. Studies of food consumption shed light on food-related nutritional policies. They provide estimates of how food consumption is affected by changes in prices, income, and taxation policies (Dunne and Edkins, 2005). Food consump-tion in Nigeria has been an important issue, not only because it is related to poverty and food security, but also because it is highly correlated with living standards and household resource. Essentially, the demand for food depends on population and the dietary habits/per capita daily calorie intake of the people under consideration. On the other hand, the food requirement of the nation is dependent on an additional factor namely; food import and export balance. On the national level, per-capita growth of production of major foods in Nigeria has not been sufficient to satisfy the demands of an increasing population (Kormawa, 1999). The result is a big gap between national supply and national demand for food. Malnutrition is still widespread and eloquently manifested in the high levels of severe and moderate underweight among children coupled with the high rates of infant and under-five mortality and low life expectancy at birth (Maziya-Dixon et al., 2004; UNDP, 2005). Household food consumption pattern in Nigeria has been undergoing dramatic changes over the last few years. There has been an increase in the consumption of carbohydrate foods like yam, cassava, maize and rice and some decrease in the consumption of such food items as fish, fresh fruits, as well as fresh and processed vegetables. Average calorie and protein intake by Nigerians is only at the threshold of adequacy. The daily per capital calorie supply as a proportion of requirement was 90% in 1988-1990 and 85% between 1992-1996 (FOS, 1999). According to FAO

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(1999), Nigeria managed to reduce the prevalence of undernourishment by more than 30% points between 1979-1981 and 1996-1998. The number dropped from 44% to 8%. The depth of hunger in Nigeria remains 210 Kcal per person per day while the diet comprised of 64% cereals and roots and tubers.

Understanding household food consumption pattern in the North-Central zone is therefore very important for market assessment of agricultural products as well as household food security. The main objective of this study is to analyze the food consumption patterns differential between households in the rural and urban areas of the North-central zone, Nigeria.

This paper is discussed under different sections. Methodological considerations presents information in the form of descriptive statistics on household food consumption as well as on the related economic and demographic variables. It also explains the model selection procedure and presents in detail the empirical model used. Results of estimations and discussion reports the estimation results including the parameter estimates of the double hurdle model. A discussion of the results and a comparison with those obtained in similar studies is also presented in this section. The major findings are summarized in the last section, which also includes suggestions for further research.

METHODOLOGICAL CONSIDERATIONS

Data on households' food consumption, food expenditure and related variables

The food consumption survey was carried out in November 2006 to February 2007. The survey through the use of questionnaires, collected detailed information on household food using seven days memory recall as well as socio-economic and demographic characteristics of household. The sample used in the study contains 396 household heads selected through a random sampling technique from Kwara and Kogi states making up one third of the entire states of the North-Central zone.

Model selection

The presence of zero observations in cross-sectional consumption studies raises several methodological questions with regard to model selection and specification (Amemiya, 1984; Vuong, 1989; Green, 1990). Survey data generally do not contain detailed enough information to identify the different sources of zero observations (Vasilis et al., 2001). But such zero observations must be accommodated to obtain consistent parameter estimates. The presence of zero observation in cross-sectional consumption data is attributed to (i) corner solution (ii) true non-consumption or non-participation and (iii) infrequency of purchase (Pudney, 1989). The corner solutions imply that the household chooses not to consume the particular food at the existing prices and income. True non-consumption means that the consumer has decided not to participate in the market of the product in question, and this decision is independent of income and price levels. Lastly, observed zero consumption may be attributed to purchase infrequency (that is, the product under examination has a purchase cycle longer than the survey period length. Thus, one cannot distinguish if the observed zero food consumption expenditure represents a corner solution, non-participation or infrequency purchase.

The presence of too many zero observations rules out the use of ordinary least square (OLS) as a vehicle for estimation (Amemiya, 1984). Indeed, previous consumption studies employed various types of limited dependent variable models for estimation purposes. For instance, McCracken and Brandt (1987) used a simple tobit model. However, the tobit model is very restrictive in its parameterization because the factors that affect the level of consumption are assumed the same as those that determine the probability of consumption. Furthermore, empirical results obtained with the tobit model often are not robust across distributional assumptions (Arabmazar and Schmidt, 1982). Such limitations make the tobit model unpalatable for empirical analysis. Cheng and Capps applied Heckman's two-step procedure in a study of U.S. seafood consumption. In the Heckman procedure, an inverse Mills ratio is included in the demand equation to correct for sample selectivity bias. Although the Heckman procedure allows the flexibility of parameterizing the probability and level of consumption separately, it produces a less efficient estimator than the maximum likelihood (ML) tobit estimator and performs poorly when the normality assumption is violated. Some Monte Carlo experiments also show that the tobit estimator outperforms Heckman procedure under the assumption of normality, but neither performs well when the errors are Cauchy (Paarsch). We therefore explore an alternative approach to addressing the zero observation issues in demand analysis with micro data. Yen (1993) employed a Box-cox double hurdle model and Manrique and Jensen (1998) used a switching regression technique.

In many cases, the use of the specific limited dependent variable empirical model is not adequately justified. The choice of the empirical model depends on the underlying cause of zero observations. The Cragg double-hurdle model is a parametric generalization of the tobit model, in which the decision to consume and the level of consumption are determined by two separate stochastic processes. The probability of consumption in the double-hurdle model also reflects the probability of purchase, and therefore, the double-hurdle model is also appropriate in modeling demand relationship with zeros resulting from infrequency of purchases (Yen and Jones, 1997). The double-hurdle model as suggested that by Jones and Posnett could be viewed as the reduced form of a structural model that augments the demand equation with separate hurdles for different non-behavioral sources of zeros. In some respects, parameterization of the double-hurdle model is similar to that of the Heckman procedure in that two separate sets of parameters are obtained in both cases.

If zero observations are actually corner solutions, then the tobit model is more suitable (Reynolds and Shokwiler, 1991). If zero observations are caused by either corner solutions or non-participation, then the appropriate model is the double-hurdle participation model (Yen and Huang, 1996; Yen and Jones, 1997) and finally, if they are caused by either corner solutions or infrequent purchases, then the infrequency of purchase model should be employed (Su and Yen, 1996).

Recent applications of the double-hurdle model include Burton et al. (1996) application of a double-hurdle model to UK household meat expenditure, Jensen and Yen's (1996) application to US food expenditure away from home, Yen and Jones' (1997) application to US household consumption of cheese and Moffat (2003) application on loan default, School of Economic and Social Studies

The Cragg double-hurdle model

The Cragg double-hurdle model was used to address the issues of zero-valued observations in household food consumption in this study. Theory provides no guidance as to which explanatory variables to include in the first and second hurdles of the double-hurdle model. The variance equation is specified as a function of the

continuous variables of the model (Yen and Su, 1995; Jensen and Yen, 1996; Su and Yen, 1996, Yen and Jones, 1997)

The double-hurdle model assumes that households make two decisions with regard to purchasing an item, each of which is determined by a different set of explanatory variables. In order to observe a positive level of expenditure, two separate hurdles must be passed. A different latent variable is used to model each decision process, with a probit model to determine participation and a Tobit model to determine the expenditure level (Blundell and Meghir, 1987). Understanding the factors shaping expenditure decisions becomes increasingly important with increasing income levels

$E_1 = Z\alpha + \varepsilon$, $\varepsilon \sim N(0,1)$(participation or selection equation)----------1

$E_2 = x\beta + u$, $x \sim N(0,\delta^2_x)$ (expenditure decision or outcome equation) ----------2

$E = x\beta + u$ if $Z\alpha + \varepsilon > o$ and $x\beta + u > 0$ ----------3

$E = 0$ otherwise

Where E_1 is the latent variable describing the household's decision to participate in the consumption of particular food items E_2 is the latent variable describing household consumption of a particular food, E is the observed dependent variable (household expenditure on a particular food) z is a vector of variables explaining the participation decision and x is a vector of variables explaining the expenditure decision, α and β are vectors of parameters, and ε and u are the error terms (Blundell and Meghir, 1987; Cragg, 1971). The dependent variables, which are the budget shares for the food items specified, are zero if a household does not purchase the food item and positive if one does. Zero shares are censored by an unobservable latent variable. In this model it is assumed that the errors ε and u are independently and normally distributed (Haines et al., 1988; Reynolds, 1991).

As a rule the two sets of explanatory variables z and x include the same variables and it is assumed that they influence differently the decision to consume and the decision on the level of consumption (Yen and Huang, 1996). The variables included age, education level, employment status, marital status, household size, household with children younger than 14 years old, location (urban or rural), access to credit, household income, access to refrigerator as well as member of cooperative group. Income squared is included in the analysis to capture the possibility of a non-linear relationship between income and expenditure on food.

RESULTS OF ESTIMATIONS AND DISCUSSION

This section presents the results of the analysis of the cross-sectional data collected from households in the study areas.

Households' aggregation of food items

Households especially in the rural areas consumed over 60 different food items with meat inclusive. Some degree of aggregation was therefore inevitable. This was necessary to limit the parameters to be estimated to a manageable number. Fifteen food items and nine types of meats were used as representative of all food and meat consumed in the study areas (Tables 1 and 3)

The results of this study also show that the way some types of food are perceived significantly affects procurement behaviour by households. For example, many women in the study areas feel that frozen meat has less flavour and is less healthy than that of freshly slaughtered livestock and therefore tend to use less of it in meals prepared at home. Cheyns (1995) attributes this choice of meat for its freshness rather than tenderness to what he describes as a "taste trajectory". Certain dishes are also perceived as "poor people's food" or "rich people's food". For example, the consumption of food such as gari, smoked fish, cassava flour, hide and skin (locally known as "Ponma") etc are considered as food for poor people by some urban dwellers even though they are highly nutritious as argued by some nutritionists. The consumption of such food has therefore strong resistance by some households in the urban areas because of the social class perceptions attached to them.

Household's food consumption from home

The consumption of ready-made dishes, whether at home, in the street, workplaces, and schools or in small restaurants, has become a very common feature of eating habits in Nigeria. Tables 1 to 2 demonstrate large differences between the consumption patterns of rural and urban households in the study areas. From the tables, several foods were commonly consumed in the study areas. Relative to their counterparts in the rural areas, urban households in both Kogi and Kwara states consumed more rice, fat and oil, bread, soft drink, sugar and milk and less yam and cassava flour when compared to the rural households. In Kogi state, 61.6% drank soft drinks in the urban areas while only 22.5% did so in the rural areas. Also in the urban areas of Kwara state, 59.9% of the respondent was found to consume this product compared with only 20% in the rural areas of the state. From Table 1, consumption of cassava flour was generally found to be higher among rural households compared to those in the urban. This finding therefore is an implication that the types of food consumed in rural and urban areas of the two states were substantially different.

Tables 3 and 4 revealed the results of analysis of meat consumption in the study areas. The tables also reveal that variations exist between rural and urban areas of both states with respect to meat consumption. In rural areas of Kwara and Kogi states, meats like bush meat is the major meat type (79% of the households) followed by animal skin (65.9% of the households) and fish (51.4% of the households). However, in urban areas, fish took the lead meat type (62.1% of the households), followed by beef and then goat meat (50.5%). The high percentages of zero-consumptions of meat and meat products as shown in Tables 3 and 4 by the respondents (both in the rural and urban areas confirmed the low level of protein food consumption by household living in the two selected states. This has negative health implication on household members and households food security.

Table 1. Percentage of households with zero food consumption of major 15 commodities in the study areas.

Food items	Kogi state (215)				Kwara state (n=181)				pooled (n=396)			
	Rural (n =129 or 60% of total)		Urban (n =86 and 40% of total)		Rural (n = 85 or 47% of total		Urban (n = 96 or 53% of total		Rural (n =214 or 54% of total)		Urban (n =182 or 46% of total)	
	C	Z.C	C	Z.C	C	Z.C	C	Z.C	C	Z.C	C	Z.C
Bread	22(17.1)	107(82.9)	35(40.7)	51(59.3)	7 (8.3)	78(91.1)	34(35.4)	62(64.6)	29(13.6)	185(86.4)	69(37.9)	132(67.6)
Rice	51(39.5)	78(60.5)	65(75.5)*	21(24.4)	35(41.2)*	73(85.9)	76(79.2)*	20(20.8)	86(40.2)	128(59.8)	141(77.5)*	97(53.3)
Beans	47(36.4)	62(63.6)	57(66.3)*	29(33.7)	24(28.2)	61(71.8)	49(51.0)	47(49)	71(33.1)	123(57.5)	106(58.2)	76(41.8)
Beverages	13(10.1)	116(89.9)	32(37.2)	54(52.8)	13(15.3)	72(84.7)	14(14.6)	82(85.4)	26(12.1)	188(87.9)	46(25.3)	136(74.7)
Fruits	21(16.3)	108(83.7)	28(32.6)	58(67.4)	17(20)	68(80)	24(25)	72(75)	38(17.6)	176(82.2)	52(28.6)	130(71.4)
Fat and oils	102(79.1)*	27(20.9)	79(91.9)*	7(8.1)	33(38.8)	52(61.2)	55(57.3)	41(42.7)	135(63.1)*	59(36.9)	134(73.6)*	48(26.4)
Soft drinks	29(22.5)	100(77.5)	53(61.6)	33(38.4)	17(20)	68(80)	57(59.4)*	39(40.6)	46(21.5)	168(78.5)	110(60.4)	72(39.6)
Wheats	3(2.3)	126(97.7)	27(31.4)	59(68.6)	0 (0.0)	85(100)	2(2.4)	94(97.6)	3(1.4)	211(98.6)	29(15.9)	153(84.1)
Milk	22(17.1)	107(82.9)	34(39.5)	52(60.5)	16(18.8)	69(81.2)	23(24)	73(76)	38(17.8)	176(82.2)	57(31.3)	125(68.7)
Eggs	26(20.2)	103(79.8)	36(41.9)	50(58.1)	14(16.5)	71(83.5)	27(28.1)	69(71.9)	40(18.7)	174(81.3)	63(34.6)	119(65.4)
Yams	114(88.4)*	15(11.6)	56(65.1)*	30(34.9)	65(76.5)*	20(23.5)	59(61.5)*	37(38.5)	179(83.6)*	15(7.0)	115(63.2)*	67(36.8)
Gari	64(49.6)*	65(50.4)	56(65.1)	30(34.9)	50(58.8)*	35(41.2)	64(66.7)*	32(33.3)	114(53.3)*	100(46.7)	120(65.9)*	62(34.1)
Sugar	40(31.0)	89(69.0)	40(46.5)	46(53.5)	17(20)	68(80)	37(38.5)	59(61.5)	57(26.6)	157(73.4)	77(42.3)	105(57.7)
Vegetables	100(77.5)*	29(22.5)	78(90.7)*	8(9.3)	60(70.6)*	25(29.4)	89(92.7)*	7(7.3)	160(74.8)*	54(25.2)	167(91.8)*	15(8.24)
Cassava flour	104(80.6)*	25(19.4)	50(58.1)	36(41.9)	63(74.1)*	22(25.9)	40(41.7)	56(58.3)	167(78.0)*	47(22.0)	90(49.5)	92(50.5)

Source: Estimates from field survey, 2006/2007.
Note: C = food items consumed.
Z.C = zero-consumption (not consumed).
Values in parenthesis = % of frequency.
* = top five commonly consumed food.

Food consumed away from home (FCAFH)

This section presents the results of analysis of the consumption behavior of households for food consumed away from home (FCAF H) in the study areas. The results from Table 5 reveal that urban residents in study areas purchase 37.9% of the food they consume, while families in rural areas purchase only 26.6%. About 37.7% of respondents in Kogi State consumed food away from home, while 62.3% did not consume food away from home but rather prepared their own food from home. The highest proportion of those that consumed food away from home was the singles (52%) in Kogi state spending an average amount of ₦3, 314.41k per month and a maximum of ₦6, 085.71K. This habit creates flexibility that enables people access to types of food that they cannot prepare or

Table 2. Summary of households Zero-food consumption of 15 food commodities.

Food items	Kogi state (215)		Kwara State (n=181)		Kogi and Kwara pooled (396)	
	C	Z.C	C	Z.C	C	Z.C
Bread	57(26.5)	158(73.5)	41(22.7)	140(77.3)	98(24.7)	208(75.3)
Rice	116(54.0)	99(46.0)	111(61.3)*	70(38.7)	277(57.3)	169(42.7)
Beans	104(48.4)	111(51.6)	72(40.3)	108(59.7)	177(44.7)	219(55.3)
Beverages	45(20.9)	170(79.1)	27(14.9)	154(85.1)	72(18.2)	324(81.8)
Fruits	49(22.8)	166(77.2)	41(22.7)	140(77.3)	90(22.7)	306(77.3)
Fat and oils	181(84.2)*	34(15.8)	88(48.6)	93(51.4)	269(67.9)*	127(32.1)
Soft drinks	82(38.1)	133(61.9)	41(22.7)	140(77.3)	123(31.1)	273(68.9)
Wheats	30(14.00	185(86.0)	2(1.1)	179 (98.1)	32(8.1)	364(91.1)
Milk	56(26.0)	159(74.0)	39(21.5)	142(78.5)	95(24.0)	301(76.0)
Eggs	62(28.8)	153(71.2)	41(22.7)	140(77.3)	103(26.0)	293(74.0)
Yams	134(66.98)*	71(33.0)	136(75.1)*	45(24.9)	270(68.2)*	116(29.3)
Gari	120(55.8)*	95(44.20	114(63.0)*	67(37)	234(59.1)*	162(40.9)
Sugar	80(37.2)	135(62.8)	54(29.8)	127(70.2)	134(33.8)	262(66.2)
Vegetables	178(82.8)*	37(17.2)	149(82.3)*	32(17.7)	327(82.6)*	69(17.4)
Cassava flour	154(71.6)*	61(28.4)	103(56.9)*	78(43.1)	257(65.4)*	139(35.1)

Source: Estimates from field survey, 2006/2007.
Note: C = food items consumed.
Z.C = zero-consumption (not consumed).
Values in parenthesis = % of frequency.
* = top five commonly consumed food.

eat at home because of the demands of urban life. It also enables the disadvantaged to feed themselves at relatively low cost. In a similar vein, 24.9% of respondents in Kwara state consumed food away from home. While about 61.1% of the unmarried eat outside home in Kwara, only 22% of the married consumed outside home. Individual consuming food away from home in Kwara state from the finding spends as high as ₦ 4,590.00 per month. This indicates that in Kwara state, eating outside home is costly. This might be responsible for the low food consumption of food by households in this state. In addition, these results indicate that on the average households in Kwara state eat out less frequently than their counterparts from Kogi state. The pattern of households FCAFH in the study areas might not be unconnected with the production theory by Becker's Model which states that "consumers maximize their utility subject not only to the budget constraint but also to a time constraint". Moreover, this model assumes that consumers demand not only the food product itself but also the associated convenience to save time in food preparation. Therefore, the relationship between the value of time and food away from home has a high relevance.

Parameter estimates from the double-hurdle model

The most serious zero consumption problems occurred in fruits and vegetable of the six selected food items. Hence, it is important to improve estimation by considering a censored demand system. The Double-hurdle model estimated using STATA 10 econometric software in order to compute the probability and cumulative density values for this food group with serious zero consumption problems. About 306 zero observations were left censored and only 90 positive observations (uncensored) were observed for this food group. This study then adjusted for zero expenditure in this commodity using the double hurdle two-step procedure proposed by Cragg, (1971) and Shonkwiler and Yen (1999). In the first step, a single equation probit model was estimated in order to compute the probability and the cumulative density values. In the second step, the demand system was estimated with the budget shares of the fruits and vegetable commodity weighted by the cumulative density values, and probability density values included as an additional regressor in the budget share equation for this food group.

In the probit model, the Log Likelihood ratio, given by the Chi-square statistic test was highly significant at 1% level indicating that the chosen independent variables fit the data reasonably well. It is interesting to note that only four out of 15 estimated coefficients of the selection equation are statistically different from zero. Specifically, it appears that participation in fruits and vegetable consumption is influenced only by household income and the influence of cooperative group. In contrast, two out of the 15 estimated coefficients of the outcome equation are statistically significant (Table 6).

Income has a positive and significant effect on household fruits and vegetable expenditure implying that as as household income increases, expenditure on fruits and vegetable also increases. Other significant factors

Table 3. Percentage of households with zero consumption of nine (9) meat products.

Meat products	Kogi state (n =215)				Kwara state (n =181)				Combine (n= 396)			
	Rural (n =129 or 60% of total)		Urban (n =86 0r 40% of total)		Rural (n = 85 or 47% of total		Urban (n = 96 or 53% of total		Rural (n =214 or 54% of total)		Urban (n =182 or 46% of total)	
	C	Z.C	C	Z.C	C	Z.C	C	Z.C	C	Z.C	C	Z.C
Beef meat	18(14.0)	111(86.0)	57(66.3)*	29(33.7)	10(11.8)	75(88.2)	46(47.9)*	50(52.1)	28(13.1)	186(86.9)	103(56.6)*	79(43.3)
Mutton (sheep meat)	10(7.8)	119(92.2)	50(58.1)*	36(41.9)	6(7.1)	79(92.9)	30(31.2	66(68.8)	16(7.5)	198(92.5)	80(44.0)*	102(56.0)
Goat meat	2(1.6)	127(98.4)	6(7.0)	80(93.0)	1(1.2)	84(98.8)	6(6.3)	90(93.8)	3(1.4)	211(98.6)	12(6.6)	170(93.4)
Pork meat	17(13.2)	112(86.8)	7(8.1)	79(91.9)	8(9.4)	77(90.6)	8(8.3)	88(91.7)	25(11.7)	189(88.3)	15(8.2)	167(91.8)
Bush meat	99(76.7)*	30(23.3)	10(11.6)	76(88.4)	70(82.4)*	15(17.6)	8(8.3)	88(91.7)	169(79.0)*	45(21.0)	18(9.9)	164(90.1)
Chicken	5(3.9)	124(96.1)	10(11.6)	76(88.4)	5(5.9)	80(94.1)	7(7.3)	89(92.7)	10(4.7)	204(95.3)	17(9.3)	165(90.7)
Turkey meat	1(0.8)	128(99.2)	8(9.3)	78(90.7)	4(4.7)	81(95.3)	12(12.5)	84(87.5)	5(2.3)	209(97.7)	20(11.0)	162(89.0)
Fish	87(67.4)*	42(32.6)	71(82.6)*	15(17.4)	62(72.9)*	23(27.1)	42(43.8)*	54(56.3)	149(69.6)*	65(30.4)	113(62.1)*	69(37.9)
Snail	3(2.3)	126(97.7)	7(8.1)	79(91.9)	2(2.4)	83(97.6)	10(10.4)	86(89.6)	5(2.3)	209(97.7)	17(9.3)	165(90.7)
Animal skin	89(69.0)*	40(31.0)	39(45.3)	47(54.7)	52(61.2)*	33(38.8)	21(21.9)*	75(78.1)	141(65.7)*	73(34.1)	60(33.0)	127(67.0)

Source: Estimates from field survey, 2006/2007.
Note: C = food items consumed.
Z.C = zero-consumption (not consumed).
Values in parenthesis = % of frequency.
* = top three commonly consumed meats.

Table 4. Summary of households' Zero- meat consumption in the study areas.

Food items	Kogi state (215)		Kwara State (181)		Pooled (396)	
	C	Z.C	C	Z.C	C	Z.C
Beef meat	75(34.9)*	140(65.1)	56(30.9)*	125(69.1)	131(33.1)*	265(66.9)
Mutton	60(27.9)	155(72.1)	36(19.9)	145(80.1)	96(24.2)	300(75.8)
Goat meat	8(3.7)	207(96.3)	7(3.9)	174(96.1)	15(3.8)	381(96.2)
Pork meat	24(11.2)	191(88.2)	16(8.8)	165(91.2)	40(10.1)	356(89.9)
Bush meat	40(18.6)	175(81.4)	23(12.7)	158(83.3)	63(15.9)	333(84.1)
Chicken	15(7.0)	200(93.0)	12(6.6)	169(93.4)	27(6.8)	369(93.2)
Turkey meat	9(4.2)	206(95.8)	16(8.8)	165(91.2)	25(6.3)	371(93.7)
Fish	158(73.5)*	57(26.5)	104(57.5)*	77(42.5)	262(66.2)*	134(33.8)
Snail	10(4.7)	205(95.3)	12(6.6)	169(93.4)	22(5.6)	374(94.4)
Animal skin	136(63.3)*	79(36.7)	73(40.3)*	108(59.7)	209(52.8)*	187(47.2)

Source: Estimates from field survey, 2006/2007. Note: C = food items consumed.
Z.C = zero-consumption (not consumed). Values in parenthesis = % of frequency. * = top three commonly consumed meats.

Table 5. Pattern of food consumption away from home by households in the study areas.

Selected states	Food consumption pattern	Selected Demographic characteristics					
		Location			Marital status		
		Rural	Urban	Total	Married	Single	Total
Kogi state	Consumed	40(31.0)	41(47.7)	81(37.7)	68(35.8)	13(52.0)	81(37.7)
	Zero consumption	89(69.0)	45(52.3)	134(62.3)	122(64.2)	12(48.0)	134(62.3)
	Total	129(100)	86(100)	215 (100)	190(100)	25(100)	215(100)
Average amount spent/household/month (N)		3509.68	3417.49		3491.41	3314.41	
Standard deviation		1189.57	1193.30		1166.92	1314.79	
Minimum amount		1671.43	1757.14		1671.43	2057.14	
Maximum amount		6771.43	8417.14		8417.14	6085.71	
Kwara state	Consumed	17(20.0)	28(29.2)	45(24.9)	37(22.0)	8(61.5)	45(24.9)
	Zero consumption	68(80.0)	68(70.8)	136(75.1)	131(78.0)	5(38.5)	136(75.1)
	Total	85 (100)	96(100)	181(100)	168(100)	13(100)	181(100)
Average amount spent/household/month (N)		5001.93	4973.72		5069.65	4590.00	
Standard deviation		4208.57	1158.44		1280.89	3000	
Minimum amount		3004.29	3000		3004.29	1063.83	
Maximum amount		8417.14	8112.86		8417.14	5785.1	
Kwara and Kogi Pooled	Consumed	57(26.6)	69 (37.9)	126(31.8)	105(29.3)	21(55.3)	126(31.8)
	Zero consumption	157(73.4)	113(62.1)	270(68.2)	253(70.7)	17(44.7)	270(68.2)
	Total	214(100)	182(100)	396(100)	358 (100)	38(100)	396(100)
Average amount spent/household/month (N)		3954.74	4049.00		4047.55	3800.41	
Standard deviation		1426.85	1401.09		1420.94	1355.05	
Minimum amount		1671.43	1757.14		1671.43	2057.14	
Maximum amount		8417.14	8417.14		8417.14	6085.71	

Source: Estimates from field survey, 2006/2007, Note: the single include: the never married, those that have separated and the widow.

identified as influencing household decision on consumption of fruits and vegetables in the study areas include location, membership of cooperative group and access to a refrigerator.

The decision by the household to decide for fruit and vegetable is influenced by their location. Thus, rural households would have negative desire to buy fruits and vegetables since these are easily obtainable from their farms. Household membership of cooperative group was also observed as a significant motivating factor to both household desire to consume and actual consumption. In addition to these, the access to refrigerator was observed as a factor that aid household desire to consume fruit and vegetable in the study area in line with Liu (2003). However, the decision to actually consume this food item in the study area was significantly influenced by both household income and household membership of cooperative group.

SUMMARY AND IMPLICATIONS

The main objective of this study is to analyze the food consumption patterns differential between households in the rural and urban areas of the North-central zone, Nigeria. The results obtained show differences between types of food often consumed in the rural areas known as the (traditional diet) in the study areas, and the one consume in the urban areas. Rice, fat and oil, yams and vegetables are the topmost food consumed in Kogi state. While in Kwara State instead of fat and oil households consume gari in large quantity. The outcome of rural-urban household food consumption pattern also indicate that in the rural area of Kogi state, cassava flour, yam, fats and oil as well as vegetables were the major food consumed compared to rice, beans, fats and oil in the urban areas.

The rural and urban households in Kwara state consume similar foods (such as yams, gari and vegetables). Meats such as bush meat, fish and animal skin locally call “Ponma” were the most common types of meat consumed in the rural areas of both Kogi and Kwara state, while beef, goat meat and fish were the major ones consumed in the urban areas of the two states. The proportion of household consuming other types of protein (such as egg, milk and beans) as well as fruits in the study areas are still very low probably as a result of high cost of

Table 6. Double hurdle results on fruits and vegetable consumption in the study area.

Variables	First stage		Second stage	
	Selection equation (Probit regression)		Outcome equation (Tobit regression	
State	0.1611	0.1589	0.0556	0.1014
Location	-0.3265**	-0.1391	-0.1391	0.1016
Age of household head	0.0007	0.0085	0.0018	0.0055
Educational status	0.2052	0.1612	0.0881	0.1032
Marital status	-0.0387	0.2650	-0.0637	0.1691
Gender	0.1770	0.1777	0.1138	0.1148
Household size	-0.0179	0.0380	0.0160	0.0245
Employment status	-0.1342	0.1480	-0.0925	0.0948
Member of cooperative group	0.2826**	0.1408	0.1764***	0.0613
Percentage of child age≤14 years	0.0519	0.2985	0.0048	0.1919
Access to the food produce	0.0084	0.1634	-0.0263	0.1043
Access to credit	-.0507	0.1988	0.0460	-0.1197
Household income	0.3233*	0.1839	0.2307**	0.1172
Household income square	6.35e-07	2.03e-06	1.09e-06	1.27e-06
Access to refrigerator	-0.3138*	0.26337	-0.1720	0.1131
Constant	-0.6883	0.4883	-0.5283	0.3209
Diagnostic statistics				
Observations	396	Sigma	0.0595	
LR $chi^2(15)$	22.90			
prob>chi^2	0.0863			
loglikelihood	-200.7898			
pseudo R^2	0.0539			

Source: Calculated from field survey, 2006/2007.

these food items and lack of knowledge by the households of the importance of consumption of these food items. There is therefore the need for a proper edu-cation of households on balanced diet in the study areas in order to leave active and healthy lives. Households can also manage their financial resources and prevent the risk of health problem through home preparation and consumption of their own food.

Future research on food consumption patterns may be pursued along the following line. A systematic investigation of the relationship between FCAFH and prepared foods is worth undertaking to identify empirically the nature and magnitude of relationships.

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