

# **Intra-Household decision making: Bargaining over Expenditures in Rural Households in Senegal**

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## **Abstract**

In rural Senegalese households, husband and wife earn their income separately. However, the desire of each agent is to contribute to the well-being of the household. A relevant question in this respect is whether the spouses pool their incomes or keep them separated to some extent. For economists, “pooling income” refers to models where husband’s and wife’s incomes are summed, so that a transfers of money from the husband to the wife or vice versa do not alter the partners’ expenditure patterns. However, women’s “empowerment” research assumes a link between the decision-making authority within the household and expenditures.

The study comprises data from 300 rural dual-headed households in two areas in Senegal on which we estimate Engel curves for the analysis of ‘income pooling’ in expenditures. The results refute income pooling for all goods and show the weakness of the unitary model of the household. Also, the contribution of each agent depends on a number of factors, especially income and other exogenous variables. The study comprises data from 300 rural households on which we estimate Engel curves for the analysis of ‘income pooling’ in expenditures. Finally, this study highlights important determinants of female and male expenditures associated with individual and community factors.

Key words: Decision-making- household - husband – wife – bargaining – expenditures - Senegal

## **1. Introduction**

Household behavior is a field of interesting debate. A theoretical issue concerns whether sources of household income (husband or wife) have an impact on the household pattern of expenditures. In fact, the issue is how the income earned by the husband and the wife separately is spent on various consumption categories. The household unitary model of Becker (1974, 1981) argued that family members behave like one person and have similar preferences which are the preferences of the head of the household or the 'patriarchy.' Samuelson (1956) settles a model which emphasizes a utility function reached by 'consensus' among household members. In these approaches, it is assumed that household behavior would best be analyzed via a household utility function. Even though the unitary model of the household continues to be a strong approach in modeling household decision making, the model has been criticized and rejected by many researchers in many countries (Horney and McElroy, 1980; Browning *et al.*, 1994; Strauss *et al.*, 1995; Haddad *et al.*, 1997). Among the negative impact, the unitary model of the household according to these authors has led to several policy failures in agricultural, a critical one being that targeting one spouse, rather than both spouses, led to non-adoption of particular policies or unexpected policy outcomes (Browning and Chiappori, 1994, Lunderberg *et al.*, 1997). Other models related to 'collective models' (Chiappori, 1992) assume that female and male income could be allocated differently which means that the utility of consumption differs for each spouse. The objective of this study is to provide more evidence about the gender gap in understanding household decision-making and to test the hypothesis that incomes are pooled in the household.

Our study uses data from rural households in Senegal to test how incomes are used by husbands and wives and whether an additional CFA franc of the husband will be spent in the same way as an additional franc of the wife. Further, it describes the determinants of expenditure using individual and community characteristics. In the first part we describe the pattern of expenditures for seven major food consumption goods and three non-food items (health, schooling and clothes) and the participation of each partner in household decision making. We estimate Engel curves to demonstrate whether or not income is pooled. In the last part, we investigate the determinants of expenditures using individual and community characteristic such as human capital and socio-cultural determinants.

## **2. Study area and sample**

This study takes place in Senegal, one of the ten poorest countries in the world (PNUD, 1998). Poverty concerns 38% of the population and is mostly visible in the rural areas (67%) (DAPS, 1995). The reforms proposed within the framework of the Poverty Reduction Strategic Paper (PRSP) in 2002 (IMF, 2006) amongst others prioritize promoting agriculture and gender equality and women's independency by aiming at improving their economic status (access to credit, better education, funding women's development projects). The study concerns 300 dual-headed households (husband and wife) from two contrasting rural areas in Senegal whose principal

earnings are from agricultural activities and secondary earnings from non-agricultural activities or transfers. The research area is characterized as a dry Saharan tropical climate and receives between 400mm and 800mm rainfall per year from north (sylvopastoral area) to south (agropastoral area). The principal characteristic of the climate is the shift from a long dry season (8 months) to an irregular rainy season (3–4 months). During the dry season (October to June), temperature can reach 47°C with a *harmattan* wind, which makes human and animal respiration very difficult. Between a latitude of 10 to 20 degrees north, most of the rainfall occurs between June and end of September. Ecologically, the area can be defined as semi-arid. Conditional on the availability of rainfall, natural vegetation also varies from desert flora to rain savannah flora. The research work was conducted in two different areas: the sylvopastoral (SP) area and the agropastoral (AP) area. In the SP zone, 50% of a farmer's income comes from livestock. In the AP area, livestock is combined with cash crops and food crops and provides only 10 to 50% of a farmer's income. While the SP area is characterized by a wealth of land pasture land that is not suitable for growing crops, the AP area is less suitable for land pasture and livestock growing mostly takes place on agricultural crop residues. Different ethnic groups are spread in these areas comprising Wolofs and Sereers (mostly farmers) and Peulh or Fulani (mostly herders and some farmers).

### 3. Model estimation

Expenditure allocated monthly to major consumption goods in the household (cereals, oil, rice, sugar, fish, tea/coffee and ingredients) by male and female are listed and determined. In addition, health, clothes and schooling have been included in the estimation of Engel curves. In this approach, we follow the work of Phipps and Burton (1998) testing the hypothesis of income pooling. Since demand of goods depends on prices and total income, Engel curves demonstrate the dependence of expenditures upon the sum of husbands' and wives' incomes  $Y_h + Y_w$ , holding price constant and given other demographics characteristics,  $\Delta$ .

$$E = f(Y_w + Y_h; \Delta). \quad (1)$$

Equation (1) is a restriction of the more general Engel curve

$$E = f(Y_w, Y_h; \Delta) \quad (2)$$

Equation (1) is included in equation (2) that can be attributed to any collective model of household behavior and could be generalized in a quadratic specification of the Engel curve:

$$E = \beta_0 + \beta_w Y_w + \beta_h Y_h + b_{ww} Y_w^2 + \beta_{hh} Y_h^2 + \beta_{wh} Y_w Y_h + \sum_i b_i \Delta_i + e \quad (3)$$

$\Delta_i$ ,  $i=1, \dots, n$  are demographic variables reported like the size of the household, the area, the age of husband and wife, the religion, the marital status (polygamous household or not), the transfers from migrants, the ethnic and the wife's access to credit and wife's saving. Access to credit and saving are indices of women's empowerment since it can be used to smooth consumption in the context of developing countries. The level of husband and wife's education and ethnicity are

taken as dummies. The term  $e$  is a random error term. Following Phipps and Burton (1998) we assume that income pooling results in restrictions on (3) such that  $\beta_w = \beta_h$  and  $\beta_{ww} = \beta_{hh} = \beta_{hw}/2$ . Equation (3) then can be re-written in a restricted form giving:

$$E = \beta_0 + \beta_1(Y_w + Y_h) + \beta_2(Y_h^2 + Y_w^2 + 2Y_h Y_w) + \sum_i b_i \Delta_i + e \quad (4)$$

Rejection of these restrictions implies that income is not pooled. The restrictions were tested for all expenditures for major consumption of goods in the household. The income drawn from husband and wife correspond to annual revenues from livestock, agricultural and non-agricultural activities, net of costs (costs are related to expenditures on inputs: fertilizers, seeds, water, animal health, feed and other). Monthly expenditures were estimated for each good regarding food and annual expenditures were used for schooling and health care. We investigated the determinants of expenditures for all households with expenditures on the goods by using OLS.

#### **4. Household expenditures in food consumption and other non-food consumption goods**

In rural Senegalese households, goods produced for consumption are cereals, milk and oil (traditionally processed from the available groundnut). The main consumption goods are cereals, milk and rice (in the North and the south of Senegal where rice is cultivated). But with the change in patterns of consumption (grow of imported goods such as rice, powder milk and others), rural households tend to behave like urban consumers; for example consuming more rice (which is mainly imported) and other imported goods (tea, coffee and sugar). Table 1 shows that for the head of the household, namely husband, the first priority good for the household is cereals, then oil, sugar, rice and fish. Goods like bread, milk or meat are given less priority for households.

Even when most of the households grow food crops, mainly millet, cereals constitute a major part of expenditures for consumption goods. In fact, after harvesting an important part of the millet is sold on the market but to ensure food consumption until the end of the dry season, households frequently are forced to buy the same millet in the market, sometimes at a higher price. From our data, estimations shows that only 10% of the households do not buy cereals and keep all the household production for consumption. Rice, which constitutes a well-appreciated good according to farmers, is purchased by 34% of household. In fact, a change in farmers' attitudes to rice has given it a more and more important place in the daily consumption of households than cereals. The same can be noticed for coffee, tea and oil.

The results in table 1 and table 2 show that women contribute to all household's expenditures, thus highlighting their contribution to food security and well-being of the households. For example, wives contribute 34% of household spending on fish, 32% on rice, 20, 45% on ingredients (vegetables, peanut, spices, tomato and others), 16% on oil, 16% on tea/coffee and 4% on cereals. Other important contributions for women related to schooling, clothes and health expenditures are also reported, amounting respectively to 13%, 36% and 14%. These results show the role of women in decision making and in the provision of consumption goods.

A comparison between areas shows that in general, the SP area spends more on food (rice, sugar, fish, oil and ingredients), except for cereals that are purchased more in the AP area. This can be explained by two possible effects: people in the SP area keep all their production (millet) for consumption or consume much milk in compensation. Comparison between women's contribution to expenditures shows that wives in the SP area contribute more than wives in the AP area (table 2), for all goods including clothes, health and schooling. The differences in contributions are significant for most goods (Table 2). These results suggest that women in the SP area are economically more powerful than women in AP area. Moreover, economic power can explain their participation in decision making and contribution to expenditures.

**Table 1: Average expenditures on consumption goods**  
(Standard errors in parentheses)

Goods	Husband	wife	All sample	SP area	AP area
Food (monthly expenditures)					
Cereals	19309** (1208)	1617 (372)	37904 (2247)	33114** (2458)	45051 (4101)
Oil	13127* (657)	2806** (339)	17191 (37)	18321 (925)	16179 (9743)
Sugar	9317** (477)	1822** (297)	11538 (570)	12864** (775)	9163 (697)
Fish	5833** (822)	3923 (637)	11583 (748)	13396*** (2036)	10777 (578)
Rice	20109 (2360)	1659** (273)	5169 (575)	6066 (853)	4278 (768)
Tea and coffee	7141** (829)	1348** (332)	8702 (915)	8732*** (977)	8440 (2695)
Milk	2120 (1021)	272 (272)	1477 (645)	210* (210)	9500 (3041)
Ingredients (vegetables, spices, peanut)	6777** (833)	2450** (449)	12000 (874)	13200*** (4683)	12000 (875)
No- food (yearly expenditures)					
Schooling	33184 (4804)	5711 (1620)	44300 (5633)	33180* (6094)	55265 (9375)
Health	36331 (3254)	6638 (1000)	48134 (3726)	56735* (6161)	39647 (4130)
Clothes	40000* (2639)	26346** (1960)	74126 (3689)	82355* (5597)	66006 (4745)

Legend: 1 euro=655 CFA      significance across area \* p<.05,      \*\* p<.01      \*\*\* p<.000

**Table 2: Wife's contribution in expenditures**

Wife's contribution	AP area (N=151)		SP area (N=149)	
	Statistic	Std error	Statistic	Std. Error
Tea and coffee	-	-	878***	222
ingredients	1801	298	442**	309
milk	2000	200	-	-
fish	1158	264	879	280
sugar	537	162	1742**	343
cereals	652	309	109	271
oil	892	230	3917***	517
rice	417	200	2907***	489
Total share in food	5459	806	11865***	1319
schooling	4357	1844	7083	2675
clothing	15947	1529	36885***	3427
health	1976	544	11395***	1846

\* p<.05, \*\* p<.01 \*\*\* p<.000

### 5. Test of income pooling and Elasticities

For all goods considered, the estimates from the OLS show that income is not pooled: the restriction that  $b_w=b_h$  and  $b_{ww}=b_{hh}=b_{hw/2}$  is rejected (Table 3) for all expenditures. To test the income pooling hypothesis we used the likelihood ratio test for each Engel curve to be estimated.

To perform the Likelihood ratio-test, we use two versions of equations (3) and (4): the latter being the restricted equation of the former. The likelihood function is:

$$f(u/xi) = \frac{1}{\sqrt{2\pi}} e^{-1/2(xi-u)^2} \quad (5)$$

If we take the logarithm of the function, it becomes:

$$\log f(u) = \log \sqrt{2\pi} - \frac{1}{2} (xi-u)^2 \quad (6)$$

To test the income pooling hypothesis, we used the statistic  $2(LLU-LLR) \cdot \frac{1}{2} \cdot N$ , should be significant at the number of degree of freedom=number of restrictions, in which

$LLU$  = log-likelihood of the unrestricted equation

$LLR$  = log-likelihood of the restricted equation

The results show that the rejection of the null hypothesis of income pooling is binding

for tea/coffee at  $p < .05$ , clothes at  $p < .05$  and health at  $p < .01$  (Table 4). For all other foods and schooling, we cannot reject income pooling. These results suggest that husband and wife may not pool their income in spending on health, clothes, tea and coffee, but probably pool their incomes to spend on food and schooling.

Looking at the likelihood ratio tests in the two areas, results show that in the SP area, income is not pooled for health expenditures (significant rejection of the null hypothesis at  $p < .01$ ), clothes expenditures (rejection of the null hypothesis at  $p < 0.1$ ) and tea and coffee expenditures ( $p < 0.1$ ). However, in the AP area, the rejection of income pooling holds only for schooling ( $p < 0.001$ ) (Table 4).

In many poor countries, access to health care and health facilities may be difficult because of the related costs and the lack of infrastructure in these countries. It can be said that only wealthier people have access to valuable clothes. Thus, husband and wife set priorities: firstly for primary household needs, i.e, food; secondly, with available income, deal with health costs and private goods (clothes). For this reason, husband and wife obviously do not pool their income to spend on clothes and health. The same can be said for tea and coffee which depend on individual needs.

The estimation of elasticities using logarithm function (Table 5) shows that expenditures on clothes and health vary significantly with the husband's income, respectively at  $p < .01$  and  $p < .05$ . One unit increase in the husband's income leads to 8% increase in clothing expenditures and 17% increase in health expenditures, suggesting that these goods enter in the husband's sphere. In fact, since the husband generally earns more than the wife, he may be in charge of these costly goods. On the other hand, expenditures related to schooling vary significantly only with the wife's income ( $p < .01$ ); a priori expenditures related to schooling are more elastic with the wife's income. Nowadays, in many African societies, women more than men care about their long-term children's future, especially that of girls. Also, evidence showed that when the wife's assets increase, school attendance of girls increases (Gallasso, 1999). Because girls are the substitute of their mother in household tasks, one may expect that the decision to push them towards a better education depend on their mother's decision and financial involvement in schooling. Moreover, the gender gap in productivity has been mostly attributed to women's lower education, which is why much effort has been put in girls' education in developing countries (World Bank, 1993; World Bank, 2004; Lewis et al., 2008; Augusto et al., 2005; Lifanda, 2005) and in many countries women are personally responsible for their girls' schooling.

Food expenditures increase significantly both with the husband's and the wife's income (respectively at  $p < .05$  and  $p < .001$ ); one unit increase in the husband's income leads to 45% raise in food expenditures and for the wife, the expected raise is 38%. In fact, expenditures are made jointly in the way that food provision is handled by the couple, both contributing at different levels. The income pooling for food was not rejected. In fact, in the context of West African countries, food expenditures are generally the responsibility of the husband who is the chief of the household. But, wives contribute at important levels depending on their share of income and assets (IFPRI, 2000; Datt et al., 1998; Quisumbing et al., 2000; Maurique et al., 2008). Also, because of the important role women play in social-capital accumulation (depth, breadth, quality of an individual's link to other individuals and other groups), they are able to participate equally in food security and poverty alleviation as men (Cross, 1999). A case study in a developed country reported that expenditures in restaurant food increased more with wives' income than the husband's income (Phipps et al., 1998), highlighting again the important role of wives in food expenditures.

Comparison between areas shows that expenditures on food in the SP area varies significantly only with the women's income (at  $p < 0.001$ ) and to a larger extent than men's (0.069 compared to 0.037) in term of income elasticity. This finding suggests that the wife's income has a large effect on food provision in the SP area. In the AP area, any effect related to the husbands' and the wives' income is captured in food expenditures. Regarding clothes, expenditures vary only with the wife's income in the AP area. For health and schooling, positive significant elasticities are noticed for the wife's income in the SP area: one unit increase in the wife's income in the SP area leads to 19% and 27% increases of health and schooling expenditures, respectively. These findings recognize that wives in the SP area are more willing to spend their earnings on the well-being of the household than those in the AP area (Table 2).

## **6. Determinants of expenditures**

Among the explanatory variables of equation in Table 5 zone, household size, ethnicity and wife's savings are important explanatory variables. The size of the household predicts food expenditures at  $p < .01$ , health expenditures (at  $p < .05$ ), clothes expenditures (at  $p < 0.001$ ) and schooling ( $p < .01$ ). All estimates are positive. One unit increase in household size induces an increase of food, health, clothes and schooling expenditures of, respectively, 2.40%, 8%, 4.20% and 13%. In fact, the number of household members constitutes an important predictor of consumption. The zone of research affects the patterns of expenditures regarding tea/coffee and clothes. When we move from the SA to the AP area, expenditures on tea, coffee and clothes decrease very significantly (both at  $p < .001$ ). In the AP area, expenditures on tea and coffee and clothes respectively decrease by 4% and 5%. In fact, consumption depends on cultural and socio-economic characteristics. In the SP area, the Peulh are the major that are known as consumers of milk and tea, more than Sereer and Wolof. The effect of lower clothing expenditures in the SP area may be explained by the fact that the SP area is economically more powerful than the AP area. Wife's savings predict health and clothing expenditures positively and significantly ( $p < .05$  and  $p < .01$ ). This finding suggests that wife's savings reinforce the household's capability making clothing and facing health expenditures. These findings are evidence that the wife's savings serve as a kind of livelihood diversification through wealth accumulation or social capital (rotated financial help from friendships in most West African countries). Evidence in many studies in developing countries has shown the link between savings and recovery from shocks such as medical health or death following illness (Smith, 1999; Lundberg *et al*, 2003; Kong *et al*, 2005). This result is in line with other findings (e.g. Thomas, 1990) in Brazilia showing that children did better in terms of mortality and morbidity when their mothers controlled a larger fraction of the couple's non-labor income.

Other important predictors of consumption are ethnicity and religion. Belonging to the Peulh group is positively associated with food expenditures ( $p < .05$ ) but negatively associated with health and clothing expenditures (respectively,  $p < .05$  and  $p < .01$ ). This finding suggests that, the relatively wealthy Peulh group make large expenditures on food but is unlikely to spend their additional income on health and clothing. Also, clothing expenditures are significantly lowest in the other ethnic groups (Sereer and Wolofs) suggesting that clothes are not a priority for household expenditures. Also, expenditures on tea and coffee are negatively associated with being Wolof or Sereer.

As for religion, we observed significantly higher expenditures on tea and coffee for Muslims than for Catholics ( $p < .01$ ) and lower health expenditures ( $p < .05$ ). The fact that Catholics spend more on health may be explained as follows. First, there is the indirect effect of education; Catholics generally are better educated than Muslims (30% of Catholics are illiterate compared to 64% of Muslims). In fact, the relation between health status and educational attainment is consistent across diverse racial and ethnic groups (Walton *et al*, 2005). Nowadays, education is the best indicator of socioeconomic position used in health studies because of the association found in many empirical studies (Elo *et al.*, 1996; Ross *et al.*, 1995; Health care Policy, 1999). Second, the effect of religion on health expenditures could be due to the spread of Catholic churches in the AP area. Catholic Church members generally have relatively good access to health care and health facilities, because in rural Senegal, the Catholic Church plays an important role in the provision of health facilities. In fact, Church-based providers which developed mostly in the 1950-70 period, have played a remarkable role in reaching rural areas with public health services (Jutting, 2001; Johannes *et al*, 2004; Diop *et al.*, 1996; Bitran *et al*, 1995).

Men's education significantly predicts expenditures related to schooling ( $p < .05$ ). One unit increase in husband's education leads to 0.91 increases in expenditures in term of elasticity related to schooling. In fact, husbands' education allows for more attention for children's long-term future and may be connected to better schooling of children.

## **7. Conclusion and policy implications**

This research investigated whether income is pooled in rural Senegalese households and examined how husband and wife participate in consumption expenditures. The results show that the income pooling hypothesis is partly rejected in this study. The hypothesis that one additional franc of wives' income is spent the same way as one additional franc of husbands' income is rejected for expenditures related to health, clothing, tea and coffee. For food and schooling, it seems that income could be spent in a consensual way by the partners, respecting a sort of "sharing rule" between husband and wife. Also, our results show that the effect of income on expenditures is gender biased: one additional franc for men is more likely to be spent on clothes and health than an additional franc of women; and for women an additional franc is likely to raise schooling expenditures. Food provision depends on both the husband's and the wife's income with the former being more important. Area also appeared to matter: the wife's income in the SP area significantly raised food, health and schooling expenditures, whereas in the AP area, it did not. For men, in the AP area an additional franc significantly increased clothing expenditures.

The investigation of determinants of expenditures showed that consumption also depends upon individual and community characteristics. While the results concerning household size show that an additional member in the household raises expenditures for almost all goods except tea and coffee, area and ethnicity show a difference in priorities set in consumption. Indeed, in the AP area where households have lower earnings, there is a significantly decreasing consumption of clothes, tea and coffee for each additional franc earned. Moreover, regarding ethnicity, among the Peulh one additional franc is unlikely to be spent on health and clothing and more likely to be spent on food and schooling. Among the Wolofs and Sereer, expenditures on tea, coffee and clothes were significantly lower than for other groups. Religion may positively affect expenditures related to health and negatively those related to tea and

coffee within the Catholic group. Their relative care of health issues can be related to their better education and socio-economic environment. Finally, better educated male heads show higher propensity to spend on schooling, thus inducing positive effects on child education and school attainment.

The lower income of farmers in AP area compare to SP area may explain their dominance for pooling because of the necessity to fulfill household's needs. Thus, individualistic behavior are less visible compare to in SP area.

In terms of policy implications, the results suggest that understanding decision-making processes concerning resource allocation and expenditures is essential in order to avoid policy failures. It is clear that in rural Senegalese households, the rejection of the unitary model of the household holds for different kinds of expenditures and different socio-cultural environments. For example, the choice of programs used for poverty alleviation should take into account heterogeneity in preferences of the spouses, for example, in the domain of health. In contrast, households may be targeted as a whole in the domain of education or food provision. Also, in the case of public transfers by the government, targeting an individual spouse will have gender specific consequences. For example, we may expect that direct transfers to women will have a positive effect on children's schooling. Moreover, taking into account agro-ecological differences, one may expect that direct transfers to women or projects reinforcing their involvement in the labor market may induce better health, decrease illiteracy and even raise food provision. Also, projects aiming at capital accumulation or reallocation of resources within the household through the wife's earnings may achieve the same goal by reinforcing women's capability with a direct impact on health and private good's provision like clothing.

**Table 3 : estimates of the Engel curves and test of hypothesis that  $\beta_w = \beta_h$  and  $\beta_{ww} = \beta_{hh} = \beta_{hw}/2$**

	Foods (cereals, oil, sugar, fish, ingredients)		Thee and coffee		Health		Clothes		Schooling		
	Adjusted R <sup>2</sup>	0.08	0.15	0.18	0.31	0.13	coefficient	T value	coefficient	T value	
Monthly husband's income square		-1.04e-07	-1.48	-1.67e-08	-1.53	-1.55e-08	-1.75	-9.43e-09	-1.18	-3.46e-10	-0.03
Monthly wife's income square		-5.43e-07	-0.68	-1.01e-07	-0.81	-3.25e-07	-3.20**	2.80e-07	3.05**	-2.43e-07	-1.56
Monthly husband plus monthly wife's income		-2.00e-07	-0.43	1.19e-07	1.66	2.16e-07	3.72***	-1.63e-07	-3.11**	-2.90e-08	-0.33
Monthly husband's income		.110	2.58**	.007	1.05	.011	2.04*	.026	5.48***	.005	0.72
Monthly wife's income		.187	1.28	-.040	-1.80	.029	1.61	-.008	-0.50	.079	2.79**

\* significant at 0.05 \*\* significant at p<0.01 \*\*\* significant at p<0.000

**Table 4: likelihood ratio test for the restriction that  $\beta_w = \beta_h$  and  $\beta_{ww} = \beta_{hh} = \beta_{hw}/2$**

	Both husband's and wife's income All sample: N=300		Both husband's and wife's income AP area N=151	
	Both husband's and wife's income All sample: N=300	SP area N=149	Both husband's and wife's income AP area N=151	Both husband's and wife's income AP area N=149
Expenditures on Foods	2.84	2.92	1.39	1.39
Thee and Coffee 's expenditures	9.62**	6.84*	2.78	2.78
Health's expenditures	14.20***	11.68***	5.93	5.93
Clothes' expenditures	8.52**	6.84*	4.17	4.17
Schooling expenditures	5.68	1.46	82.40****	82.40****

\*Significant at p<0.1 \*\*significant at p<0.05 \*\*\* significant at p<0.001 level, \*\*\*\*significant at p<0.000 level

**Table 5: determinants of husband and wife's expenditures**

	Foods (cereals, oil, sugar, fish, ingredients)		Thee and coffee		Health		Clothes		Schooling	
	R=0.12 coefficient	t	R=0.32 coefficient	T value	R=0.07 coefficient	T value	R2= 0.15 coefficient	T value	0.24 coefficient	T value
Adjusted R <sup>2</sup>										
Monthly husband's income	.0451127	2.15*	-.0172678	-0.15	.1783353	2.04*	.0877975	3.36**	.1721241	1.81
Monthly wife's income	.0385664	3.92**	-.1710243	-3.25**	.0728424	1.77	.0097451	0.79	.1414556	3.16**
age of husband	.0003093	0.06	-.0324111	-1.14	.0155272	0.70	.0166559	2.50**	.0060967	0.25
age of wife	-.0070975	-1.30	.022783	0.78	-.0382047	-1.68	-.0108064	-1.59	.0407786	1.64
Zone	.130049	1.16	-3.979717	-6.66***	-.4163334	-0.89	-.4933774	-3.54***	.9418623	1.85
Religion	-.0167142	-0.07	3.089671	2.50**	-1.958454	-2.03*	-.1284046	-0.44	-.1797773	-0.17
Polygyny	.0073683	0.24	-.0387317	-0.24	.0362577	0.28	.0363159	0.95	.0711101	0.51
Household size	.0245527	2.60**	.0670388	1.33	.0832364	2.11*	.0420799	3.57***	.1336056	3.11**
Wife's savings	1.99e-07	1.29	1.08e-06	1.31	1.27e-06	1.98*	5.37e-07	2.79**	1.07e-06	1.53
Wife's access to credit	-.0062846	-0.07	.5665423	1.14	.6442858	1.66	.0798343	0.69	.2573463	0.61
Wolofs and Sereer group	.2147609	1.67	-1.470972	-2.14*	-.2908695	-0.54	-.3133776	-1.95*	-.2548887	-0.44
Peulh group	.2962177	2.12*	.2252241	0.30	-1.180345	-2.02*	-.4203891	-2.41**	-1.127088	-1.77
Husband's education	-.0856176	-0.97	-.1309767	-0.28	-1.145167	-0.39	.0968826	0.88	.9138111	2.28*
Wife's education	-.099082	-1.00	-.2529539	-0.48	-.3152114	-0.76	.2130331	1.72	.8138961	1.80
constant	9.651302	17.33	3.875635	1.30	8.554669	3.68	7.58281	10.92	-1.569027	-0.62
Wald test for the rejection of the null hypothesis (for variables that present significant effect)	F(4, 270)=9 Prob>F=0.0000		F(4, 270)=13.48 Prob>F=0.0000		F(5, 270)=4.48 Prob>F=0.0006		F(7, 270)=7.30 Prob>F=0.0000		F(3, 270)=8.59 Prob>F=0.0000	

\* significant at 5%

\*\* significant at p<1%

\*\*\* significant at p<0.000

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