

**ISLAMIC REPUBLIC OF MAURITANIA**

**Honor -- Fraternity -- Justice**

**Ministry of Economy and Finance**

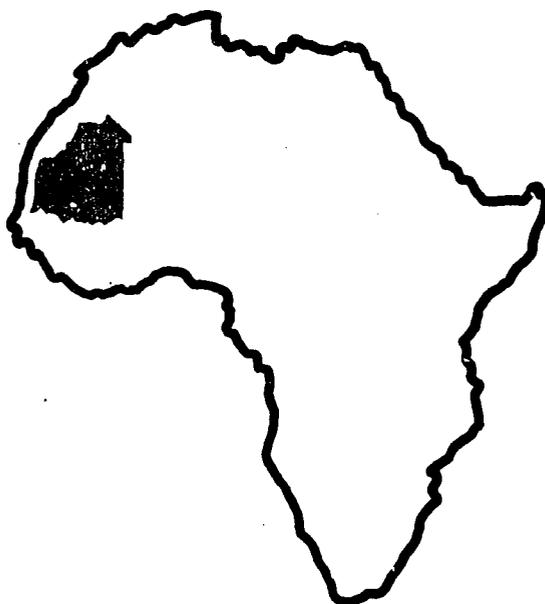
**Directorate of Studies and  
Programming**

**RAMS PROJECT**

**Rural Assessment and Manpower Surveys**

Rural Sector Consumption  
Patterns in Mauritania

AS-5



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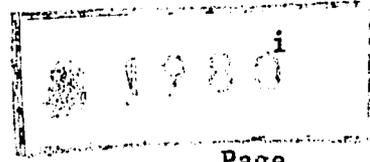
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- FOREWORD -

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This report is an assessment of household consumption patterns in Mauritania's rural sector. All its conclusions are based on the consumer budget survey conducted from November 1979 to November 1980 as part of the RAMS project.

Its main focus is on current consumption patterns in the rural sector as revealed by the four field trips conducted in November 1979 and in April, July and October 1980. It attempts to clarify current trends and to project future needs.

As was the case with the income study, this survey was conducted just a few years after the great drought that ravaged all Sahelian countries. The effects of that drought continue to be felt to this day.

This report simply marks the first stage in our progress toward a better understanding of Mauritania's rural sector, a sector in which the dearth of economic statistics is more the rule than the exception.

**I . - , INTRODUCTION AND METHODOLOGY**

## INTRODUCTION

Political and economic authorities have grown increasingly aware of the economic and social importance of rural society with regard to development. All developmental efforts have to take the rural sector into account, because the greatest number of poor people are concentrated in that sector. Every strategy for rural development must determine the consumption level of the rural population. But in Mauritania, such is the paucity of statistical data that the information indispensable for the design and implementation of development programmes is unavailable.

The last survey of Mauritania's economic and social situation dates back to 1958. That was the MISOES Survey <sup>1</sup>, a survey which covered only that part of the population living along the Senegal River.

Knowledge of the rural world is therefore based on incomplete estimates, and is patently inadequate when it comes to coping with planning needs.

The aim of this study of consumer budgeting patterns is therefore:

- to estimate household expenditure according to zones and ethnic groups;
- to gauge the relative magnitude of expenditure for food and for major non-food items;
- to estimate the magnitude of non-monetary transactions related to consumption;

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1 : J.L. Boutillier et al. La Moyenne Vallée du Sénégal, Presses Universitaires de France, 1962.

- to calculate income and income demand elasticity so as to project rural sector consumer needs and development needs;
- and
- to estimate production levels using as an index consumption patterns coupled with the size of the non-monetary element.

When consumption patterns are studied on the basis of a specific population strata, problems surface at the stage where these patterns are extrapolated to cover the country as a whole.

This approach may be plausible provided one takes pains to observe a number of precautions necessary to minimize errors. The approach we adopted was to determine consumption patterns on the basis of consumption surveys.

Our analysis is limited to observations designed to clarify consumer behavior patterns in Mauritania and the possible trends emanating from them.

This is a first step toward an understanding of the country's consumption patterns. To carry this research to profounder levels and to isolate specific features, it will be necessary to conduct follow-up and complementary surveys at a later date.

#### Methodology

Consumer budget surveys in developing countries are difficult undertakings, and a satisfactory methodology has yet to be worked out. To

compensate for the inadequacy of statistical facilities, two methods are used for information gathering:

- the census-taking method, and
- the polling method.

RAMS considered using the method of polls conducted over specific time intervals because of organizational handicaps, survey personnel quality shortfalls and financial constraints. Data were obtained from "polling surveys" conducted on random samples. On account of time and resource constraints, these surveys were necessarily limited.

The Budgetary - Consumption - Nutrition - Income Survey comprised three major phases:

- a weight-indexed survey of food consumption patterns which included a survey of nutritional habits, a market survey and a survey devoted to infants;
- an income and production survey; and
- a supplementary survey of nomadic population groups in the Tagant, Adrar, Assaba and Hooh regions, conducted during the 4th trip.

The market survey made it possible to assess prices of those commodities produced for auto-consumption which it was feasible for the households to obtain on the local market. Comparisons of the value of consumer items in Mauritania's rural sector should all be made with extreme care because Mauritanian prices are high.

Survey Techniques<sup>2</sup>: Within the context of the RAMS programme, the polling plan was based on a stratification of the population in accordance with the villages' agro-ecological features.

Following this plan, Mauritania was divided into 6 agro-ecological zones<sup>3</sup>, thus:

- the River Valley zone
- the Zone of rain-irrigated farming and transhumance
- the Zone of flood-basin farming, oasis farming and transhumance;
- the pastoralist zone
- the desert zone, and
- the transitional and modern zone.

Next came a process of random selection at two levels of abstraction from the sample base.

- At the first level 32 villages were chosen as the primary units for interviewing out of a sample of 2,343 villages established by the 1977 census<sup>4</sup>. Because of organizational, funding and training limitations, the survey sample of 32 villages was halved by random selection, leaving 16 villages out of the 32 originally selected.

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2 : For a detailed methodological exposition and an analysis of sample selection, see Appendix.

3 : See the RAMS Basic Report : Les grandes zones agro-ecologiques de Mauritanie.

4 : For methodology and sample computation, see Appendix.

SAMPLE<sup>+</sup>

AGRO ECOLOGICAL ZONE	POPULATION	NUMBER OF VIL- LAGES	ACTUAL NUMBER OF VILLAGES TO BE SUR- VEYED	NUMBER OF HOUSEHOLDS TO BE SUR- VEYED	NUMBER OF PERSONS TO BE SURVEYED
1	118,405	200	4	24	320
2	194,294	992	2	4	88
3	102,780	423	2	14	137
4	123,820	259	3	6	78
5	127,119	465	4	8	94
6	147,202	4	1	8	82
<b>TOTAL</b>	<b>813,620</b>	<b>2,343</b>	<b>16</b>	<b>64</b>	<b>799</b>

<sup>+</sup> The number of households and persons varied slightly from trip to survey trip; it fluctuated from 64 to 66 households and from 600 to 800 persons.

At the second level a random selection of 66 households to be interviewed was operated. The number of households to be interviewed depended on the size of the village.

It needs to be pointed out that in our sample we only polled 1 person per 1,000, i.e., 799 persons out of a population of 813,620.

Budget figures for food and non-food item expenditure as well as for income were obtained from daily surveys conducted during sets of six-day periods with 3-month intervals between them (October-November 1979, March-April 1980, June-July 1980, and October-November 1980). This procedure

was adopted in order to account for all possible seasonal fluctuations in consumption patterns, by fixing an average for the four survey trips.

The Consumer Budget Survey of the sedentary rural sector was supplemented by 3 specific and limited random selection surveys of the nomadic population; these surveys lasted 6 days each, and were conducted during the 4th trip. The surveys were conducted in the Adrar, Tagant, Hodh and Assaba regions, and covered a sample of 34 nomadic households representing 33% of the rural population.

#### HOUSEHOLD SIZES

The Consumer Budget Survey was conducted at the level of a homogeneous unit, the household. We define the household as the basic family unit comprising a husband, a wife (or wives in polygamous instances) children and their relatives.

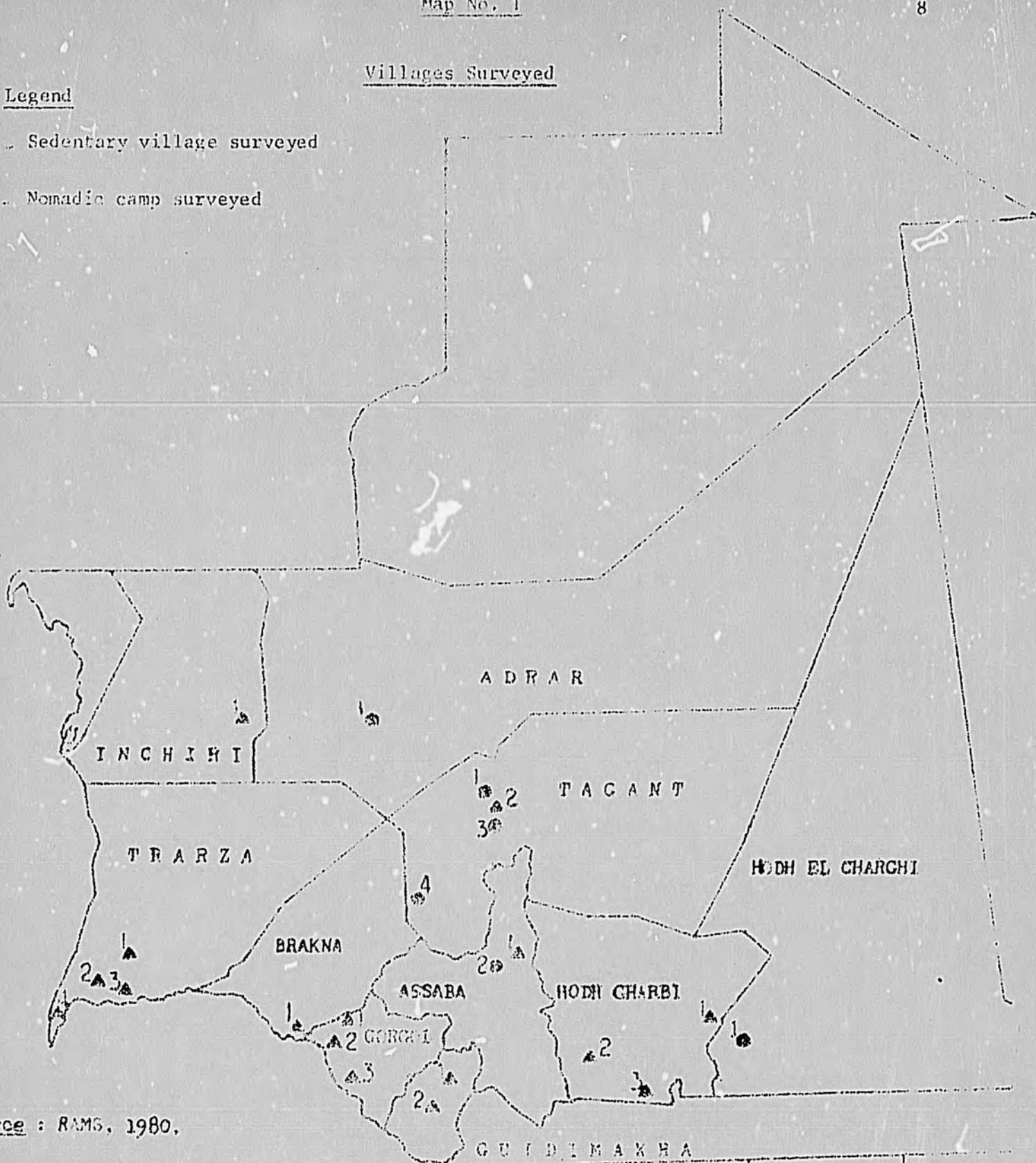
In addition to the basic unit, we have defined another concept: the budgetary unit (B.U.). The budgetary unit is defined as a group of persons dependent on a unit head who exercises authority over all the income and expenditure of component households in the unit. This definition does not preclude budgetary units consisting of only one person each.

Villages Surveyed

Legend

● Sedentary village surveyed

▲ Nomadic camp surveyed



Source : RAMS, 1980.

HODH CHARCHI	ASSABA	GORGOL	BRAKNA	TRARZA	ADRAR	TAGANT
Nomadic Camp	1 Legleib	1 Mouguel	1 Ferralha	1 Tagullalet	1 Nomadic Camp	1 Nomadic C
HODH CHARBI	2 Nomadic Camp	2 Garley	2 Pousse	2 El Aidi	INCHIHI	2 Nimal
Essaf Barka		3 Baadi	1 Vandi	3 Abndah	1 Akjoujt	3 Nomadic C
Sin Tarba			1 Chepur	1 N'Diogo		4 Nomadic C
Gouizamol			2 Pousse			

## BUDGETARY UNIT SIZES

	1st Trip		2nd Trip		3rd Trip	
A.E.Z.	B.U.	Population	B.U.	Population	B.U.	Population
1	23	241	24	348	24	302
2	4	77	4	78	4	87
3	14	111	15	117	16	136
4	6	67	6	78	6	80
5	8	81	8	64	8	72
6	8	92	8	82	8	86
TOTAL:	63	669	65	767	66	763

In the interests of greater precision, we have defined an additional concept, that of the commensal. A commensal is any person who partakes of the meals of a budgetary unit. Members of budgetary units who are absent for less than 3 months are considered temporarily absent.

## AVERAGE SIZE OF BUDGETARY UNITS ACCORDING TO ETHNIC GROUPS

Ethnic Group	1st Trip		2nd Trip		3rd Trip		4th Trip		Number of persons per B.U. according to ethnic groups
	B.U.*	Popul.	B.U.	Popul.	B.U.	Popul.	B.U.	Popul.	
Moors	26	273	27	291	27	281	27	276	10
Toucouleurs	11	96	11	113	11	113	11	98	9.7
Peulh	13	120	14	190	15	176	13	126	11
Wolof	7	95	7	102	7	101	7	109	14.5
Soninke	6	107	6	100	6	209	6	92	17
TOTAL	63	691	65	802	66	780	64	701	11.5

\* Budgetary Units

AVERAGE SIZE OF BUDGETARY UNITS ACCORDING TO REGIONS

Region	1st Trip		2nd trip		3rd Trip		4th Trip		Persons per budgetary Unit according to regions
	B.U.	Popul.	B.U.	Popul.	B.U.	Popul.	B.U.	Popul.	
Hodh El Charbi	6	62	6	51	6	72	6	65	10
Assaba	2	18	2	20	2	18	2	17	9
Gorgol	27	280	29	374	30	348	28	277	11
Brakna	6	51	6	60	6	64	6	57	9.7
Trarza	8	87	8	99	8	79	8	98	11
Tagant	2	20	2	38	2	26	2	40	15.5
Guidimakha	4	81	4	78	4	87	4	69	19.8
Inchiri	8	92	8	82	8	86	8	78	10.6
Total	63	691	65	802	66	780	64	701	11.5

According to the findings of the four survey trips, the average budgetary unit contained 11.5 persons.

For the nomads, the sample comprised 34 budgetary units; this was precisely 50% of the sedentary rural sample.

AVERAGE SIZE OF NOMADIC BUDGETARY UNITS

	Hodh El Charghi	Assaba	Tagant	Adrar	Total
Budgetary Units	10	1	15	8	34
Number of Persons	72	5	71	69	217
Persons per B.U.	7.2	5	4.7	8.6	6.4

Average budgetary unit size among nomads was 6.4 persons per budgetary unit.

AVERAGE SIZE OF BUDGETARY UNITS

	SEMENTARY SECTOR	NOMADIC SECTOR	TOTAL
Number of B.U's	64	34	98
Number of persons	744	217	961
Persons per B.U	11.5	6.4	9.6

Average budgetary unit size in the rural sector was 10 persons per budgetary unit.

The size of households is not expressed simply in terms of persons or commensals. Budgetary unit expenditure is not directly proportional to the number of people per unit. Sex and age distribution are factors which can affect total expenditure and the demand for food items.

For the sake of simplicity we shall use the Oxford scale which gives the following weighting coefficients:

- for the first adult : 1.
- for every other adult : 0.7.
- for children below 15 years : 0.5.

Admittedly, these weighting coefficients constitute an arbitrary simplification; but they do offer a better approach to the evaluation of per capita expenditure.

A statement of expenditure per budgetary unit is tantamount to a measurement of living standards. For any particular income level, an increase in the number of people in a budgetary unit does not bring about a proportional decrease in living standards if we take weighting coefficient into account. The consumption unit thus arrived at gives a closer view of the real situation; it makes it possible to gauge the living standards of the population more realistically than by using figures for unweighted per capita expenditure.

A number of different factors can influence both the level and structure of budgets. Among these factors the most important are the size and the composition of households.

#### Survey Organization

Survey Trips: In order to ferret out fluctuations in consumption and production, four trips were planned:

- the first trip took place in November 1979
- the second trip took place in March 1980
- the third trip took place in July 1980; and
- the fourth trip took place in November 1980.

Personnel Recruitment: The training course as well as the survey itself were directed by a RAMS team comprising an economist, a nutrition expert and a statistician.

Survey personnel were recruited from high school graduates who had finished junior high at least; others were recruited from ENACOFA students. Selection criteria were competence in the area of general knowledge, and linguistic ability.

### Personnel Training

At the first stage survey personnel were given a 15-day course in theory. After this came complementary practical field survey work. This stage meant hard work, and the survey personnel found the going tough.

Before each survey trip, a one-week revision course was organized to recapitulate lessons learned from other trips, to discuss fresh questionnaires on such topics as income and production, and to figure out improvement possibilities.

### Questionnaires

A complete set of questionnaires used during the four survey trips has been appended to the RAMS Manual of Statistical Methodology, together with the instruction handbook used.

### The Surveys

There were four survey trips. Survey personnel worked 6 days in each of the 16 villages surveyed. The nomadic survey was added during the fourth trip.

On the whole, the surveys proceeded satisfactorily, but a number of problems surfaced in the operational period.

- the first trip yielded disappointing results, both because survey personnel were inexperienced and because the organization of a survey with a national scope implied a number of intrinsic difficulties.

Problems encountered during the pilot survey remained, solutions only materializing gradually as survey personnel gained the people's confidence.

Price figures used in estimating auto-consumption are local market price figures. In Mauritania's rural sector price levels are high; this affects consumption levels in important ways.

**II - SUMMARY AND CONCLUSIONS**

## SUMMARY AND CONCLUSIONS

According to the findings of the RAMS Budgetary-Consumption surveys, the level of consumptions among the sedentary rural population was 15,266 UM per capita annually at 1980 prices; this was equivalent to \$339 per capita annually. The corresponding figure for nomads was 13,778 UM per capita annually. Information from other sources <sup>5</sup> indicates that the average annual cash income of the sedentary population was 13,494 UM per capita, while the corresponding figure for nomads was 9,280 UM. Figuring in auto-consumption, we reach a total income figure slightly higher than the level of consumption<sup>6</sup>. With such a level of consumption, amounting to 15,266 UM per capita annually, it is only natural that the modern sector should exercise a powerful pull:

2. In our sedentary sample, budgetary units allocated 82% of their consumer expenditure to food items and 18% to non-food items.

In the nomadic sample, the budgetary units allocated 86% of their consumer expenditure to food items and 14% to non-food items

3. The rate of monetarization is high among the sedentary rural population: they buy 86% of their consumption needs on the market, i.e.,

<sup>5</sup> : See Rural Sector Income Patterns in Mauritania, RAMS, 1980

<sup>6</sup> : See ibid, Chapter on Budgeting

through the monetary circuit. Among nomads the corresponding figure is low: it represents only 49% of nomadic consumption needs.

4. Among the sedentary rural population the portion of needs met by self-sufficient production (auto-consumption) is 18%; among nomads the figure is 51%. Auto-consumption patterns vary from region to region and from ethnic group to ethnic group. Thus the level of auto-consumption is higher in Mauritania than in other West African countries, where it is estimated at 10%.

We might remark at this point that nomadic consumption is somewhat underestimated because we were only able to conduct a single survey of consumption and income patterns; we were therefore not able to take all seasonal variations as well as subtle differences in consumption into account. So our figures for the nomadic sector are only valuable as trend indicators.

5. Consumer patterns in the sedentary sector are quite simple (See Table 7, page 45). The three leading consumption items are:

- meat, which takes 3,148 UM per capita annually, i.e. 20% of total consumption;
- cereals, which take 2,815 UM per capita annually, i.e. 18% of total consumption; and
- transport, which takes 2,306 UM per capita annually; i.e. 15% of total consumption.

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7 "Structure de la consommation des menages en Afrique, Bulletin d'Information Statistique et Economique de l'Afrique de l'Ouest, p.39

. Bulk consumption patterns among the sedentary population may be summarized as follows:

Annual Bulk Consumption Patterns (Sedentary Population)

ITEMS	PER CAPITA ANNUAL CONSUMPTION
<u>Food Items</u>	
- Cereals +	135 kg
- Fruits and Vegetables	24 kg
- Meat ++	33 kg
- Fish	10 kg
- Milk and Dairy Products	29 liters
- Tea	1.75 kg per adult
- Sugar	13.6 kg
<u>Non-Food Items</u>	
- Toiletry (soap)	4.6 kg
- Energy products	
- Kerosene (for lamps)	0.8 liters
- Wood	538 kg
- Tobacco	140 grams

Nomads Bulk Consumption Patterns may be summarized as follows:

Annual Bulk Consumption Patterns (Nomads)

ITEMS	PER CAPITA ANNUAL CONSUMPTION
<u>Food Items</u>	
- Cereals	84 kg
- Fruits and Vegetables	5 kg
- Meat	5 kg
- Fish	-
- Milk and Dairy Products	166 liters
- Tea	1.27 kg per adult
- Sugar	7 kg
<u>Non-Food Items</u>	
- Clothing	245 UN
- Wood	445 kg

+ Cereal Consumption Patterns

Millet/Sorghum	50%
Rice	43
Wheat	6
Other	1

++ Meat Consumption Patterns

Beef	47%
Sheep	18
Goat	3
Camel	29
Poultry + Other	3

Other important items are:

- miscellaneous items like oil, condiments etc., covering 14% of total consumption;
- milk, which takes 8%; and
- fruit and vegetables, accounting for 5% of total consumption.

It needs to be pointed out that with this consumption pattern, 48% of budgetary units do not get enough calories (see page 51, footnote 20).

7. As far as ethnic groups are concerned, Moors have the highest consumption level: 18,090 UM per capita annually. The Soninké figure is 17,360 UM per capita annually. The Peulhs have the lowest consumption level: 10,231 UM per capita annually. Average per capita consumption among Peulhs is only 57% of the figure for Moors.

8. The level of consumption among nomads is only 90% of the sedentary level. Moreover, the rate of monetarization is low (49%) while autoconsumption represents a very high population (51%).

9. To calculate the income elasticity of demand in the rural sector, a coefficient expressing the rural population's consumption aspirations, represented by the backward dextral slope of the logarithmic function of the form:

$$\text{Log } Y = a + b \text{ Log } X,$$

we use the isoelastic function

$$C_i = C_{i0} C^{ei}$$

where  $C_{i0}$  : a constant value for the product

$C$  : total consumption, and

$C_i$  : consumption of the product  $i$ .

Thus, the income elasticity of demand for food items : 0.56, while the income elasticity of demand for non-food items :

1.25. This coefficient is a good approximate evaluation of the rural population's consumption aspirations, with regard to both food and non-food items. These aspirations are still far from being met, except in the case of a few items such as:

Cereals :  $e_c$  : 0.44, and

Meat :  $e_m$  : 0.5. In these cases, the saturation level is reached.

10. Projection of demand for basic products on a simple linear model:

$$\underline{D_r} : p + e_i g$$

where  $D_r$  : the rate of increase of rural demand for a product  $i$ ;

$p$  : the population's rate of increase

$e_i$  : the income elasticity of demand for product  $i$ ;

and

$g$  : the rate of increase of per capita income.

This linear model makes it possible to work out different rates of demand for food and non-food items for hypothetical situations of high, medium and low demand.

On the basis of these rates of increase of rural demand, quantitative projections of demand can be figured out.

11. Demand for a few food items may be summarized as follows:

	1980	1985	1990	1995
<b>Cereals (in 1000s of tons)</b>				
Scenario				
High	147	167	192	220
Medium	147	162	184	207
Low	147	162	179	197
<b>Meat (in 1000s of tons)</b>				
Scenario				
High	40	45	51	58
Medium	29	34	38	44
Low	29	33	37	42
<b>Tea (in 1000s of tons)</b>				
Scenario				
High	1.1	1.2	1.4	1.6
Medium	1.1	1.2	1.4	1.6
Low	1.1	1.2	1.3	1.4

urvey results make it crystal clear that there is a shortfall in cereal production as related to the population's current needs. It is noteworthy that none of the rural budgetary units surveyed in our sample had a balanced cereal production - consumption budget.

2. Results obtained from the survey of consumption patterns in the rural sector make it possible to profile an image of this sector. The results also make it possible to plan changes in the structures of rural production with a view to achieving self-sufficiency in food production in the coming years.

In gain, a necessary reminder: this study is presented as nothing more than a first step on the way to a better understanding of Mauritania's rural sector.

III - REGIONAL CONSUMPTION PATTERNS

## BASIC STUDY

The RAMS Project Study Number AS5 was designed to examine demand for food and non-food items in the rural sector, as well as to find out demand trends. Information on food consumption in Mauritania is sketchy, as for studies of consumption budgeting patterns, they simply do not exist.

So the tables and data given in this study come solely from data generated during the Consumption Budget surveys conducted by the RAMS Project over a one-year period from November-December 1979 to October 1980.

The study examines the following topics in succession:

1. Regional Consumption Patterns (Sedentary Sector)

- Monetary Transactions
- Non-Monetary Transactions
- The Price Problem
- Bulk Consumption Patterns

2. Ethnic Group Consumption Patterns

- Food and Non-Food Consumption Patterns
- Bulk Consumption Patterns

3. Nomadic Consumption Patterns

- Food and Non-Food Consumption Patterns
- Monetary and Non-Monetary Transactions
- Bulk Consumption Patterns

4. Elasticity of Demand as Related to Income

- Computation Method
- Elasticity of Demand for Food
- Elasticity of Demand for Non-Food

5. Demand Trends in the Rural Sector Projected Uptil the Year 2000

- Projection of Demand for Food and Non-Food
- Results
- Bulk Demand Projection
- Projection Results

REGIONAL CONSUMPTION PATTERNS (SEDENTARY SECTOR)

A series of surveys covering the entire rural sector have yielded a certain amount of useful data for the analysis of private consumption patterns in the rural sedentary sector.

The analysis of data generated from the surveys enables us to delineate consumer behavior patterns in the rural sector and to plan for the future evolution of these behavior patterns.

1. In this sector taken as a whole, budgetary units allocate about 75% of total consumption expenditure to food items and 25% to non-food items. Food thus takes up three-quarters of total consumption expenditure. The allocation for food is clearly higher in Mauritania than in other West African countries, where the corresponding proportions are 63% for food items and 37% for non-food items<sup>8</sup>.

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<sup>8</sup> : "Structure de la consommation des menages en Afrique", Bulletin d'Information statistique et Economique de l'Afrique de l'Ouest, p.89.

It might help us get a better idea of consumption levels in Mauritania's rural sector as compared with other African countries if we point that it has been estimated that per capita annual consumption among the Mauritanians covered by our sample of the sedentary rural sector amounts to 15,266 UM, equivalent to \$339.

This figure compares very favorably with consumption levels in other African countries, though such comparisons should be handled with great care because local Mauritanian prices are high.<sup>9</sup>

These data show that if we make allowances for the limitations of the consumption budget survey, consumption levels in the rural sector are higher than one would suppose, in spite of the understatement of expenditure for durable goods such as tents.

2. The rate of monetarization is high in Mauritania's rural sector: 86% of consumption expenditure takes place within the cash nexus.

Thus, of the 15,266 UM spent per capita annually, 87% is spent on the money circuit (13,280 UM per capita annually, equivalent to \$295) while 13% is accounted for by barter, auto-consumption or gifts in kind (1,930 UM, equivalent to \$44 per capita annually. And auto-consumption levels vary from region to region.

Of this 13,280 UM per capita per year, 75% (9,960 UM per capita annually equivalent to \$221) is spent on food items and 25% (3,320 UM, equivalent to \$74) on non-food items. (See Table 1, page 29).

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<sup>9</sup> : See Section on prices.

Is the degree of monetarization in the rural sector an index of that sector's integration into the market system ?

We find that even though the rural sector is an underdeveloped subsistence sector, the concept of cash is accepted by the majority of its population. Moreover, the high volume of trade indicates that far from being closed off in an autarchic system, the rural sector is in fact integrated into a nexus of cash relationships. This monetarization also demonstrates the rural sector's dependence on exchanges with the world beyond such as remittances and market purchases.

Perhaps this is proof that the rural sector is undergoing a transformation which forces all its population to adapt to the market mode of property circulation<sup>10</sup>. Has the rural sector acquiesced, voluntarily or compulsorily, in its integration into the consumer society ?

According to Abercrombie<sup>11</sup>, the degree of monetarization is also an encouraging sign because it makes it possible to situate the rural sector within the framework of a developmental perspective. In his opinion, given a number of conditions, a society can make the transition from a subsistence economy to a market economy in four stages:

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10 - P. Bonte, The Evolution of Modes of Accumulation and Social Change in Mauritania, RAMS, 1980.

11 - K.C. Abercrombie in Readings in Applied Economics of Africa, Cambridge University Press, 1962.

- stage one : subsistence production;
- stage two : sale and barter: at this stage, however, surplus production results not from deliberate planning but from chance--a bumper harvest, for instance.
- stage three : regular production for the market; however, the bulk of production is still intended for auto-consumption; and
- stage four : production for the market.

Using Abercrombie criteria, we may place Mauritania's rural sector between a subsistence economy and a market economy, that is, between the second and third stage of development.

The percentage of non-monetary transactions (auto-consumption, barter and gifts) is about 13% of total consumption. It is worth noting that most non-monetary transactions take place in the pastoralist areas.

In West Africa, auto-consumption is estimated to cover 10% of total consumption<sup>12</sup>. Nomads normally handle a lot of non-monetary transactions and the level of auto-consumption is high among them during their transhumance movements; their consumption patterns will be examined in a separate chapter.

A region-by-region breakdown of auto-consumption and non-monetary transactions shows that Trarza and Brakna lead with 25% and 26% of total consumption respectively. By contrast, a breakdown of monetary transactions shows the regions of Luchiri, Guidimakha and Gorgol leading with 96%, 92% and 91% of total consumption respectively. (See Table 2, page 30).

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12 - See "Structure de la consommation des menages en Afrique", Bulletin d'Information statistique et Economique de l'Afrique de l'Ouest.

TABLE 1  
REGIONAL PER CAPITA EXPENDITURE PATTERNS <sup>1/</sup>\*

Region	Hodh El Gharbi	Assaba	Gorgol	Brakna	Trarza	Tagant	Guidimakha	Inchiri	Total
Food expenditure	93,966	13,583	245,256	28,781	62,723	33,453	63,500	77,906	559,168
Non-food expenditure	10,632	1,407	70,030	12,227	31,347	16,050	30,538	19,363	191,594
TOTAL	44,598	14,990	315,286	41,008	94,070	49,503	94,038	97,269	750,762
Number of B.U's <sup>2/</sup>	6	2	29	6	8	2	4	8	65
Persons per B.U.	10.5	9	11	10	11	16	20	11	11.5
Per capita expenditure									
for food items <sup>3/</sup>	8,195	11,470	11,686	7,291	10,834	15,890	12,065	13,456	11,370
for non-food items <sup>3/</sup>	2,565	1,188	3,337	3,098	5,414	7,624	5,802	3,345	3,896
TOTAL <sup>3/</sup>	10,760	12,658	15,023	10,389	16,248	23,514	17,867	16,801	15,266
Per capita annual expenditure in US \$ <sup>4/</sup>									
	239	281	334	231	361	523	397	373	339

Source: RAMS Surveys, 1980

\* Figures rounded off

<sup>1/</sup> 4 trips each lasting 6 days. Figures are in 1980 UM' ;

<sup>2/</sup> " " " " " "

<sup>3/</sup> Food expenditure + non-food expenditure  $\frac{1}{3}$  (B.U.'s x persons) x 15.2

<sup>4/</sup> \$1 : 45 UM

TABLE 2  
DAILY STATISTICS : FOOD AND NON-FOOD ITEMS<sup>1/</sup>

Region	Hodh el Gharbi	Assaba	Gorgol	Brakna	Trarza	Tagant	Guidimakha	Inchiri	Total
Monetary Transactions (%)	32,311 (72%)	13,078 (87%)	287,645 (91%)	30,200 (74%)	70,375 (75%)	41,161 (83%)	86,648 (92%)	93,126 (96%)	654,544 (87%)
Non - Monetary Transactions (%)	3,643 (8%)	50 -	8,184 (3%)	3,693 (9%)	15,702 (17%)	181 -	3,625 (4%)	1,664 (2%)	36,742 (5%)
Auto consumption (%)	8,644 (19%)	1,861 (12%)	19,457 (6%)	7,115 (17%)	7,994 (8%)	8,161 (16%)	3,765 (4%)	2,479 (2%)	59,476 (8%)
TOTAL	44,598	14,989	315,286	41,008	94,071	49,503	94,038	97,269	750,762
Budgetary Units <sup>2/</sup>	6	2	29	6	8	2	4	8	65

Source: RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures are in 1980 UM's.

<sup>2/</sup> Average from 4 trips

### 3-1 EXPENDITURE PATTERNS : MONETARY TRANSACTIONS

Monetary transactions make up 87% of total consumption as far as the private consumption of sedentary budgetary units is concerned.

Expenditure follows the pattern below:

- Sedentary people in the rural sector allocate 25% of their budgets to cereals, 27% to meat, 10% to beverages and dairy products, 10% to fruits and vegetables and 7% to fish (See Table 3, page 36). Food item consumption levels may be summarized as follows:

- Cereals : 2,455 UM (\$57) per capita annually;
- Fruits and Vegetables : 959 UM (\$21) per capita annually;
- Meat : 2,659 UM (\$59) per capita annually; and
- Milk and beverages : 971 UM (\$21) per capita annually.

Cereals include grain such as millet, sorghum, rice and corn. Cereals form the people's basic staple; the low percentage of expenditure for cereals (25%) is explainable by the fact that we are dealing with a subsistence sector where the bulk of production is consumed by the producers themselves, not bought. There is a close correlation between regions producing cereals and regions in which very little cereal gets bought.

An additional explanation is the fact that it is government policy to keep prices deliberately low in the interests of the rural population. And this price policy does indeed make cereals available to the poor, especially in the urban areas. But this is achieved at the expense of the agricultural sector. This policy of consumer protection, especially favorable to the urban consumer, could have disastrous effects on:

- i. Production : Prices are excessively low; income from sales is correspondingly meager. This acts as a disincentive, discouraging farmers from producing surpluses which could go to feed regions with cereal shortfalls.
- ii. Employment: Jobs generated in the farming sector are bound to be fewer than if a policy giving free play to market forces were followed. Indirectly, the price policy creates unemployment and encourages migration into the urban areas.
- iii. Finally, the rural population's is likely to develop a "welfare recipient's mentality" and to move to the urban areas in the expectation of getting free cereal from the government without having to work or in fact to do anything to earn it; in this way problems associated with an urban proletariat would arise. A salutary price policy, conceived in long range terms and operating in a dynamic context, would give farmers a higher income and thus stimulate production and the demand for services provided by the modern sector. Such a policy would make it possible to explore optimal production and growth levels.
- For all the above reasons, then, the government should rethink its price policy.

All budgetary units allocated 1/4 of their monetary transactions to cereal purchases. The regions of Assaba (33%), Brakna (29%), Hodh Gharbi and Tagant (28% each) were the heaviest cereal purchasers.

We define meat to include all sorts of meat: beef, mutton, camel meat fowl, etc.; our definition also includes canned and preserved meat. The social environment and the people's consumption habits are the key factors behind the high percentage of meat purchases.

On the average, the sedentary population allocated 27% of their monetary transactions to meat purchases--a figure higher than even the cereal percentage. The regions of Inchiri (47% of the monetary budget) and Tagant (32%) head the list of meat purchases, while Brakna and Hodh el Gharbi come last.

In the milk category we include milk and products derived from it: milk, curdled milk, zrig, butter, etc. In the beverage category, we include tea, coffee, kinkelaba, and other derivative products. For purposes of expenditure valuation all drinks are categorized under one group; but when we come to discuss bulk consumption, quantities for each product will be analyzed separately. Beverages take up 10% of monetary expenditure, but tea and coffee alone account for 3/4 of these purchases. Milk is mainly produced for auto-consumption; little of it gets bought. Tagant region allocates the highest percentage of cash expenditure to drinks (27%); Guidimakha spends least on drinks (4%).

Fruits and Vegetables : The regions of Guidimakha, Gorgol and the Hodh Gharbi head the purchase list with 13%, 11% and 11% of monetary expenditure respectively. Lack of transport facilities, which cuts the regions off from each other, coupled with consumer habits, accounts for great varia-

tions in the consumption of fruits and vegetables from region to region.

We define fruits and vegetables to include leguminous plants such as peas, beans and niebe; vegetables such as tomatoes, carrots and cabbage; and fruits such as dates, watermelons, melons, bread-fruits, etc. Tagant region consumes the least fruits and vegetables, allocating 2% of its cash expenditure to their purchase.

Fish : Guidimakha, Brakna, and Gorgol lead with 26%, 11% and 11% of cash expenditure respectively. The Hodh el Gharbi, Assaba and Tagant regions consume little or no fish at all. Consumption habits are deep rooted among the Moors, so it would take a lot of time to change them. Fish is consumed mainly in the areas along the river; the farther one moves from the river, the less fish is eaten.

Miscellaneous: This category includes sugar and related products (sweets, pastry), oil, fatty products (animal fat), salt and condiments (pepper, etc.).

We shall offer a detailed item-by-item examination in the chapter on bulk consumption. The leading regions are Brakna, Hodh el Gharbi, Erarza and Assaba with 35%, 31% and 28% of their budgets going to this category. Most of the money is spent on sugar and tea.

Comparisons of regions spending a lot on tea and sugar give a good idea of the rural population's consumption habits. The Moorish regions consume the most tea and sugar (Tagant, the Hodh Gharbi). Thus we find consumption habits dependent on the environment and the mode of production.

Tagant and Assaba, regions where people make their living mainly from animal husbandry, consume the most meat and dairy products; they eat no fish, and they buy the most cereal. On the other hand, the agricultural regions, namely Guidimakha and Gorgol, consume the most fruit and vegetables as well as fish, and the least meat and dairy products. These consumption habits bring the dichotomy between the agricultural animal husbandry regions into bold relief.

Expenditure on non-food items: The following points are noteworthy (see table 4, page 37).

- The item of highest expenditure is transport: it takes up 54% of non-food expenditure and 15% of total expenditure. The large size of this item is proof that the rural population is highly mobile.
  - The next category is miscellaneous: this takes up 17% of non-food expenditure. This category includes taxes, jewelry and above all clothing. The rural population spends 90% of its miscellaneous allocation on clothes and footwear.
  - The third non-food category covers energy items such as kerosene, coal and firewood. This category takes up 13% of non-food expenditures and 3% of total expenditure.
  - The final category covers toiletry and health items: this takes up 7% of non-food expenditure and 31% of total expenditure. (See Table 4, page 37.)
- This hierarchic arrangement of non-food expenditure gives us some idea of the rural population's consumption needs and aspirations. It makes it possible for the authorities to determine in what order of priority the rural population's basic needs are to be met.

TABLE 3 - FOOD EXPENDITURE ACCORDING TO REGIONS (MONETARY TRANSACTIONS: AMOUNTS IN UM'S)<sup>1/</sup>

ITEMS/REGIONS	HOMH EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	TOTAL
Cereals	6,852	4,035	56,776	5,760	9,455	7,129	15,423	14,539	119,969
(%)	(28)	(33)	(25)	(29)	(23)	(28)	(26)	(19)	(25)
Fruits & Vegetables	2,595	555	24,458	937	3,500	513	8,051	6,249	46,858
(%)	(11)	(5)	(11)	(5)	(9)	(2)	(13)	(8)	(10)
Meat	3,987	2,280	57,604	1,830	10,280	8,080	10,399	35,450	129,910
(%)	(16)	(19)	(25)	(9)	(25)	(32)	(17)	(47)	(27)
Fish	-	-	16,824	2,104	1,510	-	15,314	190	35,942
(%)	-	-	(7)	(11)	(4)	-	(26)	(1)	(7)
Milk & Beverages	3,358	1,873	21,044	2,289	4,175	6,788	2,439	5,509	47,475
(%)	(14)	(15)	(9)	(12)	(10)	(27)	(4)	(7)	(10)
Miscellaneous	7,462	3,349	51,098	6,969	11,508	2,799	8,340	12,864	104,389
(%)	(31)	(28)	(22)	(35)	(28)	(11)	(14)	(17)	(22)
<b>TOTAL</b>	<b>24,254</b>	<b>12,092</b>	<b>227,804</b>	<b>19,889</b>	<b>40,428</b>	<b>25,309</b>	<b>59,966</b>	<b>74,801</b>	<b>484,543</b>

Source: ~~NMS~~ Surveys, 1980<sup>1/</sup> 4 trips each lasting 6 days. Figures are in 1980 UM's.

TABLE 4 - NON FOOD EXPENDITURE ACCORDING TO CATEGORIES & REGIONS (MONETARY TRANSACTIONS)<sup>1/</sup>

37

ITEM/REGION	HCDH EL CHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	TOTAL
Toiletry & Health Products (%)	217 (3%)	112 (13%)	6,828 (12%)	365 (4%)	491 (2%)	815 (5%)	1,442 (9%)	785 (4%)	11,055 (7%)
Energy Products (%)	202 (3%)	760 (86%)	9,394 (16%)	706 (7%)	2,155 (7%)	1,055 (7%)	100 (1%)	6,702 (38%)	21,074 (13%)
Housing (%)	-	-	8,604 (15%)	-	-	-	-	-	8,604 (5%)
Transport (%)	5,000 (62%)	-	29,030 (49%)	9,150 (89%)	21,060 (72%)	10,850 (68%)	2,000 (12%)	7,430 (42%)	84,520 (54%)
Leisure (%)	198 (2%)	10 (1%)	2,010 (3%)	75 (1%)	370 (1%)	727 (5%)	95 (1%)	1,391 (8%)	4,876 (3%)
Miscellaneous (%)	2,400 (30%)	-	3,460 (6%)	-	5,000 (17%)	2,400 (15%)	12,880 (78%)	1,280 (7%)	27,420 (17%)
<b>TOTAL</b>	<b>8,017</b>	<b>882</b>	<b>59,326</b>	<b>10,296</b>	<b>29,076</b>	<b>15,847</b>	<b>16,517</b>	<b>17,588</b>	<b>157,549</b>

Source: RAMS Surveys, 1980.

<sup>1/</sup> 3 trips, each lasting 6 days

### 3-2 NON-MONETARY TRANSACTIONS

Goods and services outside the commercial circuit make up a sizeable part of private consumption in the rural areas. For West Africa as a whole, consumption in this category has been evaluated at an average of 10% of total consumption<sup>13</sup>.

The concept of a non-monetary economy covers many kinds of transactions including

- barter or exchanges in kind;
- gifts or goods given gratis, and
- goods consumed by the producers themselves.

Non-monetary transactions make up about 13% of total private consumption in the rural areas, with 5% for barter and gifts and 8% for auto-consumption.

In Africa, the giving of gifts is a frequent custom, and we have to note that in traditional African economies, gifts were given in return for reciprocal gifts; so we may consider gifts an indirect form of exchange.

The term "gifts" includes very different kinds of property transfers such as fees paid in kind (1/3 to 1/2 the harvest paid to the landowner), charity, gifts in kind (food items sent to the family), etc.

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<sup>13</sup> Bensaid, "Economie de subsistance et comptabilité Nationale", Paper presented at the Study Session on National Accounting Systems in African countries, OCDE, Development Center, Paris, 16-20 February, 1970.

The most important fact relating to non-monetary transactions is that barter, which in the past was very widespread in Mauritania, especially among the nomads, has practically died out. Some barter still gets carried out, but the volume is lower, and small-scale exchanges involving milk, or meat in return for millet, etc. are now often turned into cash transactions. In our sample, 46% of the budgetary units bartered produce in small quantities (see next page). The ethnic groups most involved in barter are the Peulhs, the Toucouleurs and the Moors. The drop in production, entailing a foodstuff shortfall, and the decline in livestock herds, entailing a drop in the production of milk and dairy products, have gradually killed off barter possibilities.

REGIONAL PERCENTAGES OF BUDGETARY UNITS INVOLVED IN BARTER<sup>1/</sup>

HODH EL	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	AVERAGE
66%	-	43%	100%	50%	100%	100%	-	46%

<sup>1/</sup> Percentage of budgetary units in the sample surveyed.

BUDGETARY UNITS INVOLVED IN BARTER ACCORDING TO ETHNIC GROUPS<sup>1/</sup>

Moors	Toucouleurs	Peulhs	Wolofs	Soninkes	Average
33%	36%	100%	29%	33%	46%

<sup>1/</sup> Percentage of the sample surveyed

### AUTO CONSUMPTION

Auto-consumption accounts for the bulk of the non-monetary economy, and this is an important component of the rural sector's economy. Auto-consumption is important in both relative and absolute terms. It mainly involves staple foodstuffs such as cereal, meat and milk.

Delicate problems arise in the estimation of auto-consumption, especially with regard to non-food items---a category in which the principal items are energy products, i.e. wood and coal.

Overall, auto-consumption accounts for 8% of private rural consumption and it varies according to item categories, regions and ethnic groups. Hodh el Gharbi is the leading region, with 19%, while Inchiri has the lowest percentage, 2% (see table 2).

Food Items : Non-monetary transactions and auto-consumption mainly involve meat (32% of non-monetary transactions and auto-consumption), milk (29%), cereal (24%) and vegetables (10%).

- These percentages vary from region to region. Meat : Tagant region leads in auto-consumption, with 51% of total non-monetary transactions and auto-consumption. Next come Trarza and Guidimakha, with 43% and 42% respectively (see table 5, page 42).

Milk : Assaba, Inchiri and Hodh el Gharbi lead with 97%, 64% and 61% of non-monetary transactions and auto-consumption involving milk.

Here the correlation between regions practising animal husbandry and those producing milk and dairy products for the producers' own consumption becomes clear.

Cereals : Guidimakha, Trarza, Brakna and Gorgol with 34%, 34%, 29% and 28% respectively, lead in auto-consumption and non-monetary transactions.

Non-food items: The most noteworthy categories are Energy Products and Miscellaneous (see table 6, page 43). Energy products mean wood, coal and kerosene. This category accounts for 34% of non-monetary transactions, auto-consumption, barter and gifts.

Miscellaneous; this category includes clothes, shoes, etc. Clothes are the chief item, taking up 32% of non-monetary auto consumption transactions, barter and gifts.

TABLE 5 - FOOD EXPENDITURE ACCORDING TO REGIONS <sup>1/</sup> (NON-MONETARY TRANSACTIONS AND AUTO-CONSUMPTION)  
(in UM 1980 Current Prices)

ITEMS/REGIONS	HODH EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	TOTAL
Cereals	1,310	-	4,846	2,551	7,599	-	1,189	110	17,605
(%)	(13%)	-	(28%)	(29%)	(34%)	-	(34%)	(4%)	(24%)
Fruits & Vegetables	167	-	1,859	2,264	662	1,555	665	390	7,562
(%)	(2%)	-	(11%)	(25%)	(3%)	(19%)	(19%)	(10%)	(10%)
Meat	2,037	50	5,354	635	9,670	4,120	1,500	545	23,911
(%)	(21%)	(3%)	(30%)	(7%)	(43%)	(51%)	(42%)	(18%)	(32%)
Fish	-	-	1,169	699	533	-	-	-	2,401
(%)	-	-	(7%)	(8%)	(2%)	-	-	-	(3%)
Milk & Beverages	5,895	1,441	3,575	2,480	3,402	2,496	120	1,936	21,318
(%)	(61%)	(97%)	(20%)	(28%)	(15%)	(30%)	(3%)	(64%)	(29%)
Miscellaneous	303	-	649	263	429	-	60	124	1,828
(%)	(3%)	-	(4%)	(3%)	(3%)	-	(2%)	(4%)	(2%)
TOTAL	9,712	1,491	17,452	8,892	22,295	8,144	3,534	3,105	74,625

Source: RAIS Survey, 1980.

<sup>1/</sup> 4 trips of 6 days each.

TABLE 6 - NON-FOOD EXPENDITURE ACCORDING TO CATEGORIES AND REGIONS<sup>1/</sup>  
(NON-MONETARY TRANSACTIONS AND AUTO-CONSUMPTION)

43

ITEMS/REGIONS	HODH EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	TOTAL
Toiletry & Health Products (%)	-	-	1,990 (14%)	-	-	20 (10%)	-	130 (13%)	1,540 (7%)
Energy Products (%)	1,145 (44%)	420 (100%)	5,974 (59%)	1,666 (87%)	1,401 (100%)	78 (39%)	959 (31%)	108 (10%)	11,746 (58%)
Housing (%)	-	-	-	-	-	-	-	-	-
Transport (%)	-	-	250 (2%)	-	-	-	-	-	250 (1%)
Leisure (%)	-	-	210 (2%)	250 (13%)	-	-	-	-	460 (2%)
Miscellaneous (%)	1,430 (56%)	-	2,300 (23%)	-	-	100 (51%)	2,100 (69%)	800 (77%)	6,730 (32%)
TOTAL	2,575	420	10,124	1,916	1,401	198	3,054	1,038	20,726

Source : RAMS Surveys, 1980

<sup>1/</sup> 3 trips each lasting 6 days

### CONSUMPTION PATTERNS IN THE SEDENTARY SECTOR

Table 7, page 45, gives a presentation of consumption patterns in the rural sedentary sector, involving monetary transactions, non-monetary transactions, and auto-consumption.

The main consumption categories in the rural sedentary sector are:

- Meat : 20% of total consumption;
- Cereals : 18% "
- Transport : 15% "
- Miscellaneous food items (oil, condiments, etc.): 14% of total consumption.

Thus, in Mauritania's rural sector, expenditure for three categories takes up 53% of the consumption budget.

The following table of consumption patterns gives a good overall idea of the sedentary rural population's current consumption levels.

TABLE 7 - CONSUMPTION PATTERNS IN THE RURAL SEDENTARY SECTOR <sup>1/</sup>

ITEMS	MONETARY TRANSAC- ACTIONS: PER CAPITA ANNUAL EXPENDITURE	PERCENTAGE OF TOTAL CONSUMP- TION EXPENDITURE	NON-MONETARY TRANS- ACTIONS: PER CAPITA ANNUAL EXPENDITURE	PERCENTAGE OF TOTAL CONSUMPTION EXPENDITURE
<u>FOOD</u>				
Cereals	2,455	(16%)	360	(2%)
Fruits and Vegetables	959	(6 %)	152	(1%)
Meat	2,659	(17%)	489	(3%)
Fish	732	(4 %)	49	-
Milk and Beverages	971	(6 %)	436	(2%)
Miscellaneous	2,136	(14%)	37	-
<u>NON FOOD</u>				
Toiletry and Health Products	301	(1 %)	42	-
Energy Products	575	(3 %)	320	(2%)
Housing	234	(1 %)	-	-
Transport	2,306	(15%)	6	-
Leisure	133	(1 %)	12	-
Miscellaneous	748	(4 %)	183	(1%)

Source : RMS Surveys, 1980

<sup>1/</sup> Figures in 1980 UMs

Per capita annual expenditure = 15,266 UM

## THE PRICE PROBLEM

In the course of each survey trip local market price data were collected and rural consumption estimates of purchases, exchanges or auto-consumption were arrived at on the basis of current prices on the various regional markets. Knowledge of these price data made it possible to assess the situation with regard to consumption and to gauge its indirect effect on the allocation of resources, jobs and income. The market survey indicated that:

- actual market prices paid for consumer items on the regional markets were higher than official prices;
- prices varied considerably from region to region; and
- seasonal price variations within a single region were high. For example, between the transitional period and the rainy season, a sheep could be sold for double its original price depending on the period of sale. Rainfall is a key variable here, since it determines farm production volume and herd sizes. Price variations are high: at times they reach 500%.

Prices are much higher in regions with structural food deficits which also happen to be far from the capital. Price variations are also greater there.

The following factors affect price levels--and thus consumption levels--in the rural areas: distance, the shortage of transport facilities, the isolation of some regions during the rainy season, storage capacity outside the producer regions; the absence of rural credit facilities, and the consequent high price of capital.

TABLE 8 - REGIONAL PRICE LIST FOR FOOD ITEMS <sup>1/</sup> (UM)

47

ITEMS	NODEL EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	RURAL AVERAGE PRICE	OFFICIAL PRICE
<u>CEREALS : KILOS</u>										
Polished rice	25	23	19	20	19	20	21	15	20	35
Chipped rice	25	25	20	20	18	-	22	-	22	17
Wheat	34	18	-	-	22	20	-	-	36	-
Flour	-	25	25	-	24	-	30	22	25	-
Couscous	50	60	38	-	30	-	-	-	47	43
Millet	23	25	19	14	28	25	16	45	24	-
Sorghum	22	25	15	15	10	25	16	25	19	-
<u>MEAT : KILOS</u>										
Mutton	132	90	90	70	113	140	66	135	105	130
Beef	66	70	80	80	96	80	56	90	77	125
<u>LIVESTOCK</u>										
Sheep	1,366	1,200	3,000	800	2,250	1,400	1,350	2,755	1,765	-
Goats	1,000	1,300	-	-	1,700	1,000	1,400	-	1,280	-
Camels	10,000	15,000	-	-	18,833	-	30,000	26,000	21,566	-

TABLE 8 (CON'T)

ITEMS	HODH EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	RURAL	OFFICIAL AVERAGE PRICE	PRICE
<u>FRUITS &amp; VEGETABLES</u>											
Dried black dates	60	-	61	40	115	55	49	-	63	-	-
Niebe	45	25	187	20	45	100	38	70	66	-	-
Tomato paste (canned)	133	-	79	78	69	-	97	-	87	60	60
<u>DAIRY PRODUCTS</u>											
Powdered milk (canned)	70	60	63	-	164	85	-	-	88	54	54
Condensed milk	40	20	40	-	69	70	70	70	51	24	24
Butter (pounds)	239	120	155	-	143	465	122	122	207	-	-
Dried fish	100	-	99	120	-	-	188	60	113	-	-
Sugar bread (2 kilo- loaves)	165	116	140	101	130	110	114	113	124	105	105
Tea . kilos	771	950	577	1,350	660	766	883	560	815	590	590
Kerosene: liters	61	-	37	45	35	36	51	-	44	-	-
Tobacco: kilos	773	-	300	-	400	325	400	-	439	-	-
Soap (Marseilles)	94	37	29	25	28	30	-	32	39	-	-

Source : RAMS, 1980

1/ Average from 4 survey trips : November 1979, March 1980, July 1980 and October 1980.

Table 8, page 47, lists product prices in the various regions during the different survey trips. A reading of it should argue for a change of the present price system through the institution of improvements in such areas as the price policy, credit arrangement, storage facilities and transport.

### 3-4 BULK CONSUMPTION PATTERNS (SEDENTARY SECTOR)

Data from the Consumption Survey, gathered in the course of four trips, show that the following quantities are consumed annually in Mauritania's sedentary rural sector:

#### ANNUAL BULK CONSUMPTION (IN KILOS)<sup>14</sup>

ITEMS	TOTAL ANNUAL PER CAPITA CONSUMPTION	ANNUAL PER CAPITA PURCHASES	ANNUAL PER CAPITA AUTO- CONSUMPTION
Cereals	135	118	17 <sup>+</sup> kg
Fruits and Vegetables <sup>15</sup>	24	17	6
Meat	33	29	4
Fish	10	9	1
Milk & Dairy Products	29	8	21
Tea <sup>16</sup>	(1.75 adult) 0.96	0.96	-
Sugar	13.6	12	-

14 . Average from 1st, 2nd, 3rd and 4th trips. Figures rounded off

15 : Vegetables make up 80% of this total.

16 : In the 8 regions surveyed, adults over 15 years old made up 55% of the population

+ The low level of auto-consumption may derive from sampling strata methodology. 48% of UB surveyed are cereal producers.

The above figures give a pretty accurate idea of product-by-product bulk consumption in the rural sector.<sup>17</sup> We know that 82% of consumption passes through the cash nexus, while 18% is accounted for by auto-consumption. But for a few items such as milk, the level of auto-consumption is much higher. Where nomads are concerned, auto-consumption levels for dairy products can go as high as 98%.<sup>18</sup> Bulk consumption statistics make it possible to gauge rural sedentary sector consumption levels, and they show that statistics for Mauritania are under-estimated.

Consumption statistics show that Mauritania's sedentary population enjoys a privileged status as compared to its counterparts in other West African countries.

Per capita consumption of cereal in the form of grain (millet, sorghum, rice) as well as processed cereal (bread, pastry, couscous) is high. It reaches an average of 135 kilos per capita annually. Of this, 17 kilos come from the consumers' own production. Thus auto-consumption accounts for just 12.5% of cereal consumption in the sedentary sector (see Table 11, page 56).

The category Fruits and Vegetables includes fruits like dates and water melons and vegetables like green vegetables, beans and peanuts. Consumption is 23 kilos per capita annually; of this 75% is made up of vegetables, i.e. 17.5 kilos of vegetables per capita annually.

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17 - The nomadic population is studied in a later chapter.

18 - See the Chapter on nomads

- the category Meat includes all meat: mutton, beef, fowl, etc. Annual per capita consumption is 33 kilos.
- Milk and Dairy Products : Auto-consumption accounts for 72% of total consumption---a low percentage if we take the nomadic population into account. Annual per capita consumption is 29 liters.
- Tea : Annual per capita consumption is 0.96 kilos. But among adults over 15 years old<sup>19</sup>, who constitute 55% of the total population, the figure is 1.75 kilos.

In our sample, 48% of the budgetary units suffer from calory deficiencies.<sup>20</sup> 65% of calory intake comes from cereals. Otherwise, only one budgetary unit is deficient in animal protein---and that deficiency was noted in just one trip.

Thus, as far as nutritional quality is concerned, there is still much room for improvement in the rural population's consumption patterns.

#### REGIONAL CONSUMPTION PATTERNS

Consumption habits differ from region to region. The following table gives an idea of prevalent consumption patterns:

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19. Figures from Demographic Projections, RAMS, 1980. p. 133.

20 : See the RAMS Computer printout ETUDE NUTRITIONELLE, 1980

## ANNUAL PER CAPITA BULK CONSUMPTION ACCORDING TO REGIONS

ITEMS	Hodh el Gharbi	Assaba	Gorgol	Brakna	Trarza	Tagant	Guidimakha	Inchiri	Average
Cereals (kg)	163	149	153	145	93	144	122	92	135
Fruits & Vegetables (kg)	11	8	23	38	15	29	42	17	23.5
Meat	23	16	24	10	17	40	43	61	33
Fish	-	-	14	9	12	0.5	16	0.5	10
Milk & dairy products (liters)	32	95	20	35	28	63	5	14	29
Tea	1.5	2.4	0.7	0.2	1.2	1.7	0.5	1.5	0.9
Sugar	17	14	14	13	10	14	10	17	13.6

Source . RAMS Survey, 1980

Cereal consumption ranges from Inchiri, with an average annual per capita consumption of 92 kilos, to the Hodh and Gorgol which respectively consume 166 and 159 kilos per capita annually. Geographical distribution, income distribution and consumption habits all go hand in hand. Regions enjoying high income levels, such as Tagant, Gorgol and Inchiri, have more balanced consumption patterns as far as both quantity and variety of consumer items are concerned, with meat, vegetables, tea and sugar figuring in their diets.

(See above table).

The regions practising animal husbandry (Hodh El Charbi, Tagant, Inchiri) consume a lot of milk, tea and sugar, but very little fish or none at all.

TABLE 9 - BULK CONSUMPTION ACCORDING TO REGIONS <sup>1/</sup>

ITEMS/REGIONS	HODH EL GH/RBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	TOTAL
Cereals	664	176	3,212	552	558	294	635	509	6,600
Fruits & Vegetables	46	9	489	145	92	59	219	92	1,151
Meat	92	19	710	38	104	81	222	336	1,602
Fish	-	-	286	34	75	1	83	3	482
Dairy Products <sup>2/</sup>	335	112	429	133	166	128	28	80	1,411
Tea	6.16	2.87	14.99	0.80	7.04	3.49	2.92	8.59	46.89
Sugar	68	17	293	50	63	28	51	93	663
Average per capita	62	18	320	58	91	31	79	84	743

Source : RAMS Surveys, 1980

<sup>1/</sup> Quantity consumed by our sample during 4 trips, in kilos

<sup>2/</sup> Liters

TABLE 10 - REGIONAL FOOD ITEM CONSUMPTION PATTERNS (BULK AUTO-CONSUMPTION AND NON MONETARY TRANSACTIONS)<sup>1/</sup>

55

ITEMS/REGIONS	LODH EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	TOTAL
Cereal	95	-	331	157	140	-	87	3	813
Fruits & Vegetables	5	-	45	114	15	48	46	7	280
Meat	17	1	90	1	39	30	21	6	205
Fish	-	-	20	11	5	-	-	-	36
Milk <sup>2/</sup>	329	101	171	119	141	119	9	38	1,027

Source : RAMS Surveys, 1980

1/ Quantity consumed from our sample's own production during 4 trips, in kilos

2/ Liters

TABLE 11 - REGIONAL BULK CONSUMPTION PATTERNS (ANNUAL PER CAPITA CONSUMPTION IN KILOS)<sup>1/</sup>

REGION	HODH EL GHARBI	ASSABA	GORGOL	BRAKNA	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI	RURAL SECTOR AVERAGE
Cereals	163	149	153	145	93	144	122	92	135
Fruits & Vegetables	11	8	23	38	15	29	42	17	24
Meat	23	16	34	10	17	40	43	61	33
Fish	-	-	16	9	13	1	16	1	10
Dairy Products <sup>2/</sup>	82	95	20	35	28	63	5	14	29
Tea	1.51	2.42	0.71	0.20	1.17	1.71	0.56	1.55	0.96=1
Sugar	17	14	14	13	11	14	10	17	14

Source : RMS Survey, 1980

1/ 3rd and 4th trips

2/ Per capita annual consumption in liters

NON-FOOD ITEMS

- Soap : consumption per capita is 4.5 kilos annually.

Energy Products: This category includes three main items:

1. - Kerosene: mostly used for cooking and lighting. Per capita annual consumption is 0.8 liter;
2. - charcoal: Per capita annual consumption is 51 kilos. Considering that it takes 5 kilos of wood to produce 1 kilo of charcoal, charcoal consumption is equivalent to 255 kilos of wood per capita annually.
3. - firewood: annual per capita consumption is 271 kilos.

Thus, as far as energy is concerned, average annual per capita wood consumption is as high as 536 kilos, or 1.34 steres. <sup>21/</sup>

- Transport: Per capita annual expenditure is 2,300 UM, i.e. 15% of total expenditure. This category is in fact underestimated since many budgetary units provide their own means of transportation.

- Leisure : Tobacco is the main item consumed under this category. Annual per capita consumption is 140 grams of tobacco and 7 boxes of matches.

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21 - 1 stère = 400 kilos

TABLE 12 - BULK CONSUMPTION OF NON-FOOD ITEMS ACCORDING TO REGIONS <sup>1/</sup>

PRODUCTION/REGION:	HODH EL GHARBI:	ASSABA	GORGOL	BRAKNA:	TRARZA	TAGANT	GUIDIMAKHA	INCHIRI:	TOTAL
Toiletry: Soap	2.2	1.8	90.3	7.2	6.2	11	35	9.6	163.5 kg
Kerosene <sup>2/</sup>	-	-	18.5	6.5	2	1	-	2	30 liters
Charcoal	137	277	648	-	430	74	60	332	1,958 kg
Wood	1,460	174	3,412	1,932	1,132	350	792	682	9,934 kg
Transport	5,000	-	29,280	9,150	21,060	10,850	2,000	7,430	84,770 UM
Leisure	0.15 15	- 2	1.3 100	- 22	0.6 21	1,115 5	0.2 3	1.6 87	5 kg tobacco 254 boxes matches

Source : RAMS Surveys, 1960.

1/ : 2nd, 3rd and 4th trip.

2/ : Nomad excluded.

IV -- ETHNIC GROUP CONSUMPTION PATTERNS

### ETHNIC GROUP CONSUMPTION PATTERNS

Consumption expenditure varies not only from region to region but also from ethnic group to ethnic group. The cultural environment plays an important role in determining consumption habits. Survey findings show that:

- In cash value<sup>22</sup>, the Moors and Soninkes, with 18,090 UM and 17,360 UM respectively, have the highest per capita annual consumption level. Toucouleurs allocate the highest percentage of total expenditure (8%) to food (See table 13, page 63), and the Soninkes allocate the highest percentage of total expenditure to non-food items, i.e. 32%. Differences in consumption levels are vast, with consumption among Peulhs amounting to a mere 57% of Moorish consumption.
  - Degree of monetarization : more than 87% of transactions are cash transactions. The Wolofs and the Soninkes are most involved in the cash nexus, with 96% and 97% cash transactions. By the same token, they are the least involved in auto-consumption and barter (See table 14, page 64).
- Peulhs and Moors are the least involved in the cash nexus (82% and 83%). In other words, they practise relatively more auto-consumption and are the least integrated into the market system.

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22 - for quantities, see the chapter on bulk expenditure patterns.

This is equally valid for nomads on transhumance trips. Comprising both Moors and Peulhs, these practise a high level of auto-consumption.<sup>23</sup>

For certain products such as milk, auto-consumption levels go as high as 98%.

- Food Items (Cash Transactions) : Toucouleurs spend the highest amounts per capita on cereals, 30% of cash expenditure for food items (see tables 15 and 17, pages 65 and 67). Wolofs spend the least, 19%.
- Fruits and Vegetables : Wolofs, Soninkes and Toucouleurs spend most in this category, with 14% and 12% respectively. These figures show that the black Africans consume the largest amounts of fruits and vegetables on account of their dietary habits.
- Meat : Moors and Wolofs lead, with 35% and 31% of per capita expenditure respectively.
- Fish : The Soninkes lead, with 20% of per capita expenditure going to this item.
- Milk and Dairy Products : Moors and Peulhs lead, with 13%. It is logical that these two ethnic groups chiefly dependent as they are on animal husbandry, should consume more milk and dairy products than the others.

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23 - See the chapter on nomads.

-- Miscellaneous : This category groups products as variegated as oil and condiments. All ethnic groups consume about the same proportion, except the Peulhs who consume more.

Non-Food Expenditure : Transport takes up the lion's share (50%) of this category. Next come "Miscellaneous Items", i.e., clothing, etc., with 17%. Last comes Fuel with 13%. (See table 19, page 69).

Peulhs and Wolofs spend the most on transport, with 86% and 63% of expenditure.

The Soninkes spend the most on miscellaneous items (clothing, etc.), with 48%.

Auto-consumption and Non-monetary Expenditure for Non-Food Items:

Fuel takes up the lion's share here. (See table 20, page 70):

TABLE 13 - ETHNIC GROUP EXPENDITURE PATTERNS

63

EXPENDITURE/ETHNIC GROUP	MOCRS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Food Items	244,297	79,419	71,776	80,075	83,601	559,168
Non-Food Items	77,030	19,664	31,883	36,416	26,601	191,594
<b>TOTAL</b>	<b>321,327</b>	<b>99,083</b>	<b>103,659</b>	<b>116,491</b>	<b>110,202</b>	<b>750,762</b>
Number of Budgetary Units <u>1/</u>	27	11	14	6	7	65
Persons per Budgetary Unit <u>2/</u>	10	10	11	17	15	11.5
Annual Per Capita Food Expenditure	13,753	10,974	7,084	11,933	12,102	11,370
Annual Per Capita Non Food Expenditure	4,337	2,717	3,147	5,427	3,851	3,896
<b>TOTAL <u>3/</u></b>	<b>18,090</b>	<b>13,691</b>	<b>10,231</b>	<b>17,360</b>	<b>15,953</b>	<b>15,266</b>
Annual Per Capita Expenditure in US \$ <u>4/</u>	402	304	227	386	355	339

Sources : RAMS Surveys, 1980

1/ 4 trips, each lasting 6 days . Figures in UM

2/ Average from 4 trips

3/ Food + Non Food Expenditure ÷ (No. of BU's x Persons) x 15.2

4/ \$1 = 45 UM

TABLE 14 -- DAILY STATISTICS ON FOOD ITEMS AND NON-FOOD ITEMS <sup>1/</sup>

ACQUISITIONS/ETHNIC GROUPS	MOORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Monetary Transactions	267,938	86,590	85,212	107,895	106,909	654,544
(%)	(83%)	(87%)	(82%)	(93%)	(97%)	(87%)
Non-Monetary transactions	23,188	3,338	4,231	4,318	1,667	36,742
(%)	(7%)	(3%)	(4%)	(4%)	(1%)	(5%)
Auto-consumption	30,201	9,115	14,256	4,278	1,626	59,476
(%)	(9%)	(9%)	(14%)	(4%)	(1%)	(8%)
TOTAL	321,377	99,043	103,699	116,491	110,202	750,762
Number of persons <sup>2/</sup>	280	106	153	102	102	743

Source : RAMS Survey, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

<sup>2/</sup> Average from 4 trips

TABLE 15 - FOOD ITEM EXPENDITURE ACCORDING TO CATEGORIES AND ETHNIC GROUPS<sup>1/</sup>  
(MONETARY TRANSACTIONS)

65

ITEMS/ETHNIC GROUPS	MOORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Cereals	47,702	22,136	13,785	20,73	15,573	119,969
(%)	(24%)	(30%)	(25%)	(28%)	(19%)	(25%)
Fruits & Vegetables	13,945	8,426	4,558	8,990	10,939	46,858
(%)	(7%)	(12%)	(8%)	(12%)	(14%)	(10%)
Meat	68,598	11,915	8,441	15,511	25,045	129,910
(%)	(35%)	(16%)	(15%)	(21%)	(31%)	(27%)
Fish	590	9,004	3,628	15,379	7,341	35,942
(%)		(12%)	(15%)	(20%)	(9%)	(7%)
Milk and Beverages	25,417	5,565	7,112	3,311	6,070	47,475
(%)	(13%)	(8%)	(13%)	(4%)	(7%)	(10%)
Miscellaneous	42,422	16,120	18,396	11,431	16,020	104,389
(%)	(21%)	(22%)	(33%)	(15%)	(20%)	(21%)
TOTAL	199,074	73,166	55,920	75,395	80,988	484,543

Source : RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

TABLE 16 - FOOD ITEM EXPENDITURE ACCORDING TO CATEGORIES AND ETHNIC GROUPS<sup>1/</sup>  
(NON MONETARY TRANSACTIONS AND AUTO CONSUMPTION)

ITEMS/ETHNIC GROUPS	MOGRS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Cereals	2,296	2,464	4,304	1,257	284	17,605
(%)	(21%)	(39%)	(27%)	(27%)	(11%)	(24%)
Fruits and Vegetables	2,377	1,115	2,144	876	1,050	7,562
(%)	(5%)	(18%)	(14%)	(19%)	(40%)	(10%)
Meat	16,332	100	5,249	1,620	610	23,911
(%)	(36%)	(2%)	(33%)	(34%)	(23%)	(32%)
Fish	48	1,146	598	24	585	2,401
(%)		(18%)	(4%)	(1%)	(22%)	(3%)
Milk and Beverages	16,309	1,074	3,092	843	0	21,318
(%)	(36%)	(17%)	(19%)	(18%)	(0%)	(29%)
Miscellaneous	861	354	469	60	84	1,828
(%)	(2%)	(6%)	(3%)	(1%)	(3%)	(2%)
TOTAL	45,223	6,253	15,856	4,680	2,613	74,625

Source : RAMS Survey, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

TABLE 17 - FOOD ITEM EXPENDITURE PATTERNS ACCORDING TO ETHNIC GROUPS (MONETARY TRANSACTIONS)  
(PER CAPITA EXPENDITURE IN UM) <sup>1/</sup>

	MOORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	AVERAGE TOTAL
Cereals	170	209	90	204	152	161
(%)	(24%)	(30%)	(25%)	(28%)	(19%)	(25%)
Fruits & Vegetables	50	79	30	88	107	63
(%)	(7%)	(12%)	(8%)	(12%)	(14%)	(10%)
Meat	246	112	55	152	246	175
(%)	(35%)	(16%)	(15%)	(21%)	(31%)	(27%)
Fish	2	85	24	150	72	48
(%)	-	(12%)	(6%)	(20%)	(9%)	(7%)
Milk & Dairy Products	91	53	46	32	60	64
(%)	(13%)	(8%)	(13%)	(4%)	(7%)	(10%)
Miscellaneous	152	152	120	112	157	140
(%)	(21%)	(22%)	(33%)	(15%)	(20%)	(21%)

Source : RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

TABLE 18 - FOOD ITEM EXPENDITURE PATTERNS ACCORDING TO ETHNIC GROUPS (NON-MONETARY TRANSACTIONS & AUTO-CONSUMPTION) - (PER CAPITA EXPENDITURE IN UM) <sup>1/</sup>

	MOORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	AVERAGE TOTAL
Cereals	33	23	28	12	3	24
Fruits & Vegetables	8	11	14	9	10	10
Meat	58	1	34	16	6	32
Fish	-	11	4	-	6	3
Milk & Dairy Products	58	10	20	8	-	29
Miscellaneous	3	3	3	1	1	2

Source : RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

TABLE 19 - NON-FOOD ITEM EXPENDITURE PATTERNS (MONETARY TRANSACTIONS) <sup>1/</sup>

ITEMS/ETHNIC GROUPS	MOORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Toiletry - Health Products	1,077	1,938	1,237	3,263	3,560	13,075
(%)	(4%)	(14%)	(4%)	(10%)	(14%)	(8%)
Energy Products	11,269	3,240	2,169	1,792	4,247	22,717
(%)	(16%)	(24%)	(7%)	(6%)	(16%)	(13%)
Housing	8,400	-	204	-	-	8,604
(%)	(12%)	-	(1%)	-	-	(5%)
Transport	30,330	7,900	25,180	4,750	16,360	84,520
(%)	(44%)	(59%)	(86%)	(15%)	(63%)	(50%)
Leisure	3,093	261	502	7,195	1,254	12,305
(%)	(5%)	(2%)	(2%)	(22%)	(5%)	(7%)
Miscellaneous	12,695	85	-	15,500	500	28,780
(%)	(18%)	(1%)	-	(48%)	(2%)	(17%)

Source : RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

TABLE 20 - NON-FOOD ITEM EXPENDITURE ACCORDING TO CATEGORIES AND ETHNIC GROUPS<sup>1/</sup>  
(NON MONETARY TRANSACTIONS AND AUTO-CONSUMPTION)

ITEMS/ETHNIC GROUPS	MOORS	TCUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Toiletry & Health Products	160	1,380	-	770	-	2,310
(%)	(2%)	(22%)	-	(20%)	-	(11%)
Energy Products	3,516	4,460	2,141	1,046	680	11,843
(%)	(43%)	(71%)	(83%)	(27%)	(100%)	(55%)
Rent	-	-	-	-	-	-
(%)	-	-	-	-	-	-
Transport	-	-	250	-	-	250
(%)	-	-	(10%)	-	-	(1%)
Leisure	260	-	200	-	-	460
(%)	(3%)	-	(8%)	-	-	(2%)
Miscellaneous	4,230	400	-	2,100	-	6,730
(%)	(52%)	(6%)	-	(54%)	-	(31%)

Source : RAMS Surveys, 1980

1/ 4 crips each lasting 6 days. Figures in 1980 UM

TABLE 21 - NON-FOOD ITEM EXPENDITURE ACCORDING TO CATEGORIES & ETHNIC GROUPS  
(PER CAPITA EXPENDITURE IN UM) <sup>1/</sup> - (MONETARY TRANSACTIONS)

ITEMS/ETHNIC GROUPS	MOCRS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	AVERAGE TOTAL
Toiletry & Health Products (%)	11 (4%)	18 (14%)	8 (4%)	32 (10%)	35 (14%)	18 (8%)
Energy Products (%)	40 (16%)	31 (24%)	14 (7%)	18 (6%)	42 (17%)	31 (13%)
Rent (%)	30 (12%)	-	1 (1%)	-	-	12 (5%)
Transport (%)	108 (44%)	75 (59%)	165 (86%)	47 (15%)	160 (63%)	114 (49%)
Leisure (%)	11 (5%)	2 (2%)	3 (2%)	71 (22%)	12 (5%)	17 (7%)
Miscellaneous (%)	45 (18%)	1 (1%)	-	152 (48%)	5 (2%)	39 (17%)
Number of persons	280	106	153	102	102	743

Source : RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

TABLE 22 - NON-FOOD ITEM EXPENDITURE PATTERNS ACCORDING TO ETHNIC GROUPS  
 (NON MONETARY TRANSACTIONS AND AUTO-CONSUMPTION) <sup>1/</sup>  
 PER CAPITA EXPENDITURE IN UM.

ITEMS/ETHNIC GROUPS	MOORS	TOUCCULEURS	PEULHS	SONINKES	WOLOFS	AVERAGE TOTAL
Toiletry & Health Products (%)	1 (3%)	13 (22%)	-	8 (21%)	-	3 (10%)
Energy Products (%)	13 (43%)	42 (71%)	14 (82%)	10 (26%)	7 (100%)	16 (55%)
Housing (%)	-	-	-	-	-	-
Transport (%)	-	-	2 (12%)	-	-	-
Leisure (%)	1 (3%)	-	1 (6%)	-	-	1 (3%)
Miscellaneous (%)	15 (50%)	4 (7%)	-	21 (54%)	-	9 (31%)

Source : RAMS Surveys, 1980

<sup>1/</sup> 4 trips each lasting 6 days. Figures in 1980 UM

#### 4.1 ETHNIC GROUP BULK CONSUMPTION PATTERNS

Bulk food item consumption patterns according to ethnic groups clarify rural sector consumption habits. As far as the rural sedentary sample goes, according to Table 23, page 74 :

- Moors are the leading milk consumers, with per capita annual consumption reaching 49 liters as compared to the rural sedentary sector average of 29 liters. They also lead in the consumption of tea (with per capita annual consumption at 1.6 kilos), and sugar (16 kilos). Meat consumption is quite high: 39 kilos per capita annually as compared to a 33-kilo average. Moors come last in fish consumption.
- Toucouleurs are the leading cereal consumers (198 kilos per capita annually); they consume higher than average quantities of fruits and vegetables (33 kilos per capita annually) and fish. Meat, milk and sugar consumption fall slightly below the average.
- Peulhs : for all items, the Peulhs consume lower quantities than do the other ethnic groups. They come close to the overall average only in the consumption of fruits and vegetables (22 kilos per capita annually), fish (5 kilos per capita annually), sugar (13 kilos per capita annually), and milk (27 liters per capita annually).
- Soninkes : are the leading consumers of fruits and vegetables (36 kilos per capita annually) and meat (45 kilos per capita annually). They consume more fish than the average (12 kilos per capita annually), but their consumption of milk and tea fall below the average.

TABLE 23 - BULK CONSUMPTION OF FOOD ITEMS ACCORDING TO ETHNIC GROUPS <sup>1/</sup>

74

ITEMS/ETHNIC GROUPS	MOCRS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Cereals	2,406	1,380	1,085	826	903	6,600
Fruits & Vegetables	257	232	223	243	196	1,151
Meat	725	146	216	303	212	1,602
Fish	5	168	46	83	180	482
Dairy Products <sup>2/</sup>	908	111	274	59	59	1,411
Tea	29.41	3.23	6.27	3.93	4.05	46.89
Sugar	294	84	134	67	84	(-) 47 663
Number of Persons	280	106	153	102	102	743

Source : RAMS Surveys, 1980

<sup>1/</sup> Quantity consumed by our sample during 4 trips, in kilos. Figures rounded off

<sup>2/</sup> Liters

TABLE 24 - FOOD-ITEM CONSUMPTION ACCORDING TO ETHNIC GROUP (AUTO-CONSUMPTION AND  
NON-MONETARY TRANSACTIONS) <sup>1</sup>

ITEMS/ETHNIC GROUPS	MOOFS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Cereals	252	151	296	90	24	813
Fruits & Vegetables	64	53	93	49	23	280
Meat	91	1	81	23	9	205
Fish	0	24	7	0	5	36
Milk <sup>2</sup>	751	37	167	32	0	1,027

Source : RAMS Survey, 1980

1/ Quantity consumed from our sample's own production during 4 trips, in kilos

2/ Liters

TABLE 25 - BULK CONSUMPTION OF NON-FOOD ITEMS ACCORDING TO ETHNIC GROUPS

(ANNUAL PER CAPITA CONSUMPTION IN KILOS)

ITEMS	MOORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	RURAL SECTOR AVERAGE
Cereals	131	198	108	123	135	135
Fruits & Vegetables	14	33	22	36	29	23
Meat	39	21	21	45	31	33
Fish	0.3	24	5	12	27	7
Milk <sup>1/</sup>	49	16	27	9	9	29
Tea	1.6	0.5	0.6	0.6	0.6	0.96
Sugar	16	12	13	10	12	13.6

Source : RAMS Surveys, 1980<sup>1/</sup> Annual per capita consumption in liters

- Wolofs consume large quantities of cereals (135 kilos per capita annually), **fish** (27 kilos per capita annually) and vegetables (29 kilos per capita annually). Meat consumption (31 kilos) is normal; but at 9 liters per capita annually, milk consumption is low.<sup>24</sup>

**Overall**, consumption habits among the two major ethnic divisions in Mauritania, the Moors and the black africans, differ as to the following characteristics:

The Moors consume more meat, milk, tea and sugar; the black africans consume more cereals, vegetables and fish, while consuming moderate quantities of meat and tea.

Non-food items: The Toucouleurs are the leading consumers of soap, with 7.5 kilos per capita annually (see Table 26, page 78). Toucouleurs also lead in the consumption of kerosene (2.1 liters per capita annually), but Moors are the highest consumers of charcoal (91 kilos per capita annually). The Peulhs use the most firewood, 472 kilos per capita annually.

- Transport: Peulhs occupy the leading position.

- Tobacco: The Moors are the leading consumers, with 250 grams per capita annually.

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24 See the chapter on income elasticity of consumption.

TABLE 26 -- BULK CONSUMPTION OF NON-FOOD ITEMS ACCORDING TO ETHNIC GROUPS

ITEMS	F'ORS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	RURAL SECTOR AVERAGE
Toiletry (kilos scap)	2.4	7.5	2.4	7.4	7.4	4.5 kg
Kerosene <sup>1/</sup>	0.5	2.1	1.1	0.4	0.2	0.8 liter
Charcoal	91	33	10	37	53	53 kg
Firewood	278	195	472	225	75	271
Transport	2,196	1,511	3,370	168	3,252	2,312 UM
Leisure :	250	6	66	20	179	136 gm
- Tobacco						

Source : RAMS Surveys, 1980

1/ : 2nd, 3rd and 4th trips

TABLE 27 - BULK CONSUMPTION OF NON-FOOD ITEMS ACCORDING TO ETHNIC GROUPS <sup>1/</sup>

79

ITEMS	DIOLAS	TOUCOULEURS	PEULHS	SONINKES	WOLOFS	TOTAL
Toiletry	33	39	18	37	37	164 kg soap
Kerosene	4	11	8	2	5	30
Charcoal	1,257	172	72	187	268	1,957
Firewood	3,846	1,018	3,562	1,132	376	9,934
Transport	30,330	7,900	25,830	4,750	16,360	84,770
Leisure						
- Tobacco	3.5	0.03	0.5	0.1	0.9	5 kg tobacco
- Matches (boxes)	139	34	33	6	42	254 boxes

Source : Rams Surveys, 1980

<sup>1/</sup> : 2nd, 3rd and 4th trips.

V -- NOMADIC CONSUMPTION PATTERNS

### NOMADIC CONSUMPTION PATTERNS

The surveys conducted on nomads in the different regions were rather limited in scope. Nevertheless, they brought out a number of points concerning nomadic consumption patterns.

1. Overall, the budgetary units allocated 86% of consumption expenditure to food items and 14% to non-food items. Food takes up almost 90% of total nomadic consumption. The percentage allocated to food is slightly higher than the corresponding percentage for the sedentary sector (80% of total consumption).

- The level of consumption is 13,773 UM per capita annually, practically the same as for the sedentary sector (15,266 UM).

2. The rate of monetarization is low, covering only 49% of total consumption; and it varies from region to region, from 17% in the Hodh Charghi to 78% in the Tagant region. (See Table 29, page 84).

3. Auto-consumption levels among nomads are high. On the whole, auto-consumption accounts for 51% of consumption, but levels vary from region to region; from 22% in the Tagant to 83% in the Hodh Charghi. Auto-consumption accounts for a higher percentage than do monetary transactions.

The nomadic lifestyle makes this consumption pattern necessary. Livestock is both a form of capital and a means of subsistence. Furthermore, among our sample, consumption levels are somewhat understated because the surveys were limited and we were not able to factor in annual variations.

The "nomadic" consumption cycle follows the transhumance rhythm, and there are significant changes in consumption habits during temporary halts in the oases, especially during the guetna period

4. Nomadic consumption patterns may be summarized as follows (see Tables 30 and 31, pages 85 and 86):

Nomadic Food Consumption Patterns

Items	%
Cereals	15
Fruits and Vegetables	6
Meat	11
Dairy Products	57
Tea and Sugar	9
Miscellaneous	2
TOTAL	100

Food Consumption: Dairy products come in the lead (57% of the total), followed by cereals (15%), meat (11%), tea and sugar (9%), fruits and vegetables (6%). Contrary to common opinion, nomads consume less meat than sedentary people, but they consume a great deal more dairy products.

- In terms of value, cereal consumption among nomads is only half that among the sedentary population. The "tea and sugar" category takes up

TABLE 28 - PER CAPITA "NOMADIC" EXPENDITURE PATTERNS <sup>1/</sup>

83

	: HODH EL CHARGHI :	ASSABA :	ADRAR :	TAGANT :	TOTAL :
Food Item Expenditure	3,736	936	3,011	2,342	10,015
Non-Food Item Expend.	430	-	131	855	1,416
TOTAL	4,166	936	3,142	3,197	11,431
Clothing <sup>2/</sup>	6,200	3,075	1,520	1,860	12,655
Number of persons	19	15	44	75	103
Number of Commensals	9.66	9.99	25.32	15.65	60.62
Per capita annual Expenditure: Food items	23,859	5,037	8,326	11,398	11,830
Per capita Annual Expenditure: Non Food items	3,406	2,965	431	4,310	1,918
	27,265	8,002	8,757	15,708	13,748

Source : RAMS Surveys, 1980

1/ 3 day-surveys, current 1980 prices in UM

2/ Clothing: an average of twice a year

TABLE 29 - REGIONAL BREAKDOWN OF ANNUAL "NOMADIC" EXPENDITURE <sup>1/</sup>

	HODH EL CHARGHI	ASSABA	ADRAR	TAGANT	TOTAL
Monetary Transactions	87,833	81,705	222,283	305,088	696,909
(%)	(17%)	(68%)	(58%)	(78%)	(49%)
Auto-consumption	433,213	38,325	163,033	8,766	719,171
(%)	(85%)	(32%)	(42%)	(22%)	(51%)
TOTAL	518,046	120,030	385,316	392,688	1,416,080
Number of persons	19	15	44	25	103

Source: RAMS Surveys, 1980<sup>1/</sup> 1980 prices in UM

TABLE 30 - FOOD ITEM CONSUMPTION ACCORDING TO CATEGORIES <sup>1/</sup>

	HODH EL CHARGHI	ASSABA	ADRAR	TAGANT	TOTAL
Cereals	101	211	428	741	1,375
(%)	(3%)	(23%)	(14%)	(32%)	(15%)
Fruits & Vegetables	16	-	317	189	522
(%)	-	-	(10%)	(8%)	(6%)
Meat	-	-	820	200	1,020
(%)	-	-	(27%)	(9%)	(11%)
Dairy Products	3,536	159	1,040	702	5,404
(%)	(95%)	(17%)	(34%)	(30%)	(57%)
Tea	41	270	225	238	449
(%)	(1%)	(29%)	(7%)	(6%)	(5%)
Sugar	30	110	126	216	415
(%)	-	(12%)	(4%)	(9%)	(4%)
Miscellaneous	-	-	55	66	123
(%)	-	-	-	-	(1%)
TOTAL	3,726	936	3,011	2,252	9,401

Source : RAMS Nomadic Survey, 1980<sup>1/</sup> In 1980 current UM prices.

TABLE 31 - NON-FOOD ITEM CONSUMPTION ACCORDING TO CATEGORIES <sup>1/</sup>

	HODH EL CHARGHI:	ASSABA	ADRAR	TAGANT	TOTAL
Toiletry & Health Products	150	-	-	20	170
Fuel	280	-	87	-	367
Transport	-	-	-	-	-
Leisure	-	-	44	385	429
Clothing <sup>2/</sup>	6,200	3,075	1,520	1,860	12,655
Miscellaneous	-	-	-	855	855
TOTAL	6,630	3,075	1,651	3,120	14,476

Source : RAIS Nomadic Survey, 1980

1/ In 1980 current DM prices.

2/ Clothing purchases are made twice or three times annually

a sizeable chunk of the consumption budget; it comes higher even than "fruits and vegetables".

5. Non-Food item consumption patterns are quite simple, since nomads' needs are limited. The leading category is clothing, with annual per capita consumption valued at 245 UM. It must be pointed out that budgetary units shop for clothing only twice or three times per year (see Table 31, page 86).

The toiletry category is practically limited to Marseille soap. As far as energy products (fuel) are concerned, firewood is usually foraged, and rarely bought. Nomads use firewood only in the oasis or during stop-over periods. Firewood and charcoal consumption are estimated at an annual per capita total equivalent to 445 kilos of wood.<sup>25</sup>

6. Fish consumption is practically nil.

#### 5-1 MONETARY TRANSACTIONS

Among our sample of nomads, monetary transactions accounted for just 49% of total consumption, i.e., 6,736 UM per capita annually. Of this amount, per capita annual expenditure on non-food items amounted to 1,918 UM, i.e. 28%.

i. The nomads in our sample allocated per capita annual expenditure as follows:

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25. On the average, 5 kilos of wood make 1 of charcoal.

- cereals:	1,624 UM
- meat:	1,205 UM
- dairy products:	85 UM
- sugar:	490 UM
- tea:	530 UM

The cereals category includes grain cereals (millet, sorghum, rice) as well as processed cereal (bread, flour, couscous). Among nomads, per capita annual expenditure for cereals is about half that in the sedentary sector. The level of expenditure is so low because for 8 to 10 months spent in transhumance movements, nomads subsist on just one meal per day. Moreover, economic constraints, notably the fact that rice is cheaper than millet, have resulted in greater daily rice consumption.

- Fruits and vegetables (mainly dates and watermelons): nomads buy almost all they consume in the oasis. The same holds for sugar and tea.

ii. Non-food item consumption: cloth are the main purchases, taking up 245 UM per capita annually, or 13% of non-food expenditure. Other items include toiletry (soap), miscellaneous cookery items, leisure items such as tobacco and matches, and fuel (charcoal, firewood).

#### AUTO-CONSUMPTION

On account of the nomads' special lifestyle, auto-consumption takes up 51% of their total consumption.

Auto-consumption varies according to the region surveyed (83% in the Hodh Charghi, 42% in Adrar, and 22% in the Tagant region). Auto-consumption mainly involves dairy products such as milk and Zrig, and meat. Almost all dairy products are consumed by the producers themselves, not sold.

### 5-3 BULK CONSUMPTION PATTERNS AMONG NOMADS:

1977 census data<sup>26</sup> indicate that nomads still make up 1/3 of the production. Nomadic life demands an ability to cope with the harsh conditions of the Mauritanian environment, a special lifestyle and distinctive consumption habits. There are three main types of nomads: pure nomads, semi-nomads, and transhumance herdsmen.<sup>27</sup> Nomadic consumption habits are different from those of the sedentary rural population.

Our sample includes mainly the pure type of nomads; but semi-nomads and transhumance herdsmen are also represented in it. The Peulhs have been included in the sedentary sample.

It is difficult to assess nomadic consumption, since for 8 to 10 months in a year nomads keep moving in search of pasture, and only settle down in some spot for a couple of months during the guetna period. During the guetna, consumption habits change significantly. In Adrar region, the surveys brought out two types of consumption patterns: nomadic consumption in the guetna period, and nomadic consumption in the course of transhumance movements.

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26. S. Waltz, Demographic Projections, Rams, 1980

27. C. Toupet, La sédentarisation des nomades en Mauritanie sahélienne, Paris 7 Dissertation, 1977. Page 296.

The nomadic survey being merely a limited survey conducted in four regions, average consumption levels were somewhat underestimated.

BULK CONSUMPTION (IN KILOS)+

Items	Per Capita Annual Consumption	Purchases	Auto-Consumption
Cereals	84	80	4
Vegetables	1	-	-
Fruits	4	4	-
Meat	5	-	-
Fish	-	-	-
Milk & Dairy Products	166	1	165
Tea	0.7	0.7	-
	Adults: 1.27 Kg		
Sugar	7	-	-

+ Figures rounded off

Survey findings made it clear that nomadic consumption is far lower than that of the sedentary rural population in all categories except for milk. Nomadic consumption habits are practically identical in all region, with slight differences as to details; specifically, there is only one real meal per day. This Spartan diet is only alleviated by the quaffing of great quantities of milk and Zrig, but even that varies from season to season.

- Cereals are here defined to include grain cereals (millet, sorghum, wheat, rice) as well as processed cereal in the form of bread, pasta, couscous. Annual per capita consumption is 84 kilos. Nomads mostly eat couscous (millet and milk) and goussi (rice, milk and sugar).

For the entire duration of the survey, the nomadic families ate only one meal a day. In addition, there was a tendency to eat more rice, which is cheaper. A small portion of the cereals consumed is grown by the consumers themselves, on rain-irrigated farms near palm groves or watering points.

- Fruits and Vegetables: consumption is low, at an annual per capita level of 5 kilos. The fruits consumed are mostly dates and watermelons, harvested during the guetna period.

- Meat: consumption is low, at an annual per capita level of 5 kilos. Our survey was conducted at a time when livestock herds were being built up again after depletion; meat consumption levels for our sample have been very considerably understated.

- Milk: is mainly produced by the consumers themselves. Consumption is high, at an annual per capita level of 166 liters.

- Tea and Sugar: are bought on the market. Nomads consume appreciably less (1.3 kilos of tea per adult, and 7 kilos of sugar) than the sedentary population (1.75 kilos of tea per adult, and 14 kilos per sugar).

Non-food items: here the key category is fuel consumption (firewood and charcoal. Annual per capita consumption of firewood or its equivalent in charcoal is 445 kilos<sup>28</sup> among the nomads.

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8. 1 kilo of charcoal is equivalent to 5 kilos of wood.

## VI. DEMAND ELASTICITY

## 1 CONSUMPTION ELASTICITY

In this section the objective is to analyse consumer behavior as related to income. The aim of this type of analysis is to provide planners with data to enable them to project total demand for various items for the duration of the Plan, in accordance with a number of hypotheses dealing with income and population levels.

This analysis of behavior is based on the hypothesis that there is a correlation between consumer behavior and income evolution, and that this correlation, as stated at a given moment, will remain constant in future. A rise in income goes with rising demand for food items up to a certain threshold (Engel's Law); the rise in demand is not necessarily exclusively quantitative; it is also qualitative.

For an item  $i$ , the elasticity of demand as related to income is an expression of the percentage of growth in the consumption of product  $i$  for a given percentage rise in income.

Elasticity factors vary with time and differ from region to region. Possibly, income elasticity is lower in urban areas because of the greater opportunity there for finding substitutes for different consumer items.

In addition, elasticity may be reduced as a result of education, the improvement of transport and trade networks, increased food production etc.

In practice, the assessment of demand elasticity as related to income gives a good approximation of consumer aspirations as to the value and quantities of items consumed in developing countries, because increases in income are applied to the purchase of simple food items. In cases where expenditure involves products whose prices include costs significantly in excess of their intrinsic value, the excess costs in question should be factored out so as to bring out the cost of the product per se. For example, expenditure for bread should be weighted to bring out the actual value of wheat in the bread.

Two kinds of elasticity may be used: quantitative elasticity and value elasticity. In practice, it is normal first to calculate elasticity of demand, and then to convert the result to a measure of quantitative elasticity by using coefficient related prices to quantities.

#### 6-2 ELASTICITY COMPUTATION METHOD

- The elasticity coefficient  $e_i$  for product  $i$  as related to total consumption is defined as follows:

$$e_i = \frac{dC_i}{C_i} / \frac{dC}{C}$$

Where  $e_i$  is the consumption of product  $i$  and  $C$  is total consumption. The coefficient  $e_i$  measures the relationships of variance rates of the partial consumption of product  $i$  to total consumption.

Thus, where the income elasticity coefficient of demand is 1.1 and the proportion of food item expenditure to total expenditure is 83%, a 1 UM increase in income will raise food item expenditure by 0.92 UM.

- Within the framework of a constant-elasticity model, consumption is characterized by a log-log type function:

$$\log C_i = \log C_{i0} + e_i \log C$$

where  $C_{i0}$  is a constant for the product  $i$ .

- The estimation of  $e_i$  is based on a standard technic using least squares. The slope of the log for the consumption of product  $i$  expressed as a function of the log for total consumption yields the value of the relevant elasticity coefficient.

As the slope represents elasticity, the coefficient of linear correlation ( $R$ ) measures the quality of data adjustment by the consumption function. The same holds true for the determinative coefficient  $R^2$  which represents the percentage of values expressed by the adjustment curve.

#### Computation Results

To compute food item demand, the FAO has used 4 consumption functions of the following types:

1) Logarithmic function:  $\log y = a + b \log x$

Where  $y$  is per capita consumption,  $x$  is per capita income and  $b$  is the elasticity coefficient.

This function gives an adequate explanation of the situation in countries where consumption is still below saturation level (poor developing countries).

2) Semi-logarithmic function:  $y = a + b \log x$ .

Except for cereals, this function works well for countries where partial consumption levels are still on the rise; in other words, where saturation levels have yet to be reached.

3) Inverse-log function:  $\log y = a - \frac{b}{x}$

This function makes it possible to explain drops in elasticity when consumption rises. It works well for countries where food consumption has reached saturation levels, such as the rich countries and petroleum-exporting countries.

4) Log-Inverse-log function:  $\log y = \frac{a - b}{x} - C \log x$

This function explains situations where consumption rises up to a maximum, then drops when income rises.

Logarithmic function computations (which provide an adequate explanation for the Mauritanian situation, yield the following results (See Table 32, Page 101).

This function represents an isoelastic model of the form:

$$C_i = C_{i0} C^{e_i}$$

here  $C_{i0}$  is a constant for the product  $i$ ,

$C$  is total consumption, and

$C_i$  is the consumption of the product.

For cereals,  $e_{\text{cereals}} = 0.44$

For fruits and vegetables,  $e_{\text{fruits-vegs}} = 0.47$

For meat,  $e_{\text{meat}} = 0.50$

For milk,  $e_{\text{milk}} = 1.03$

For tea,  $e_{\text{tea}} = 0.61$

For sugar,  $e_{\text{sugar}} = 0.79$

Thus, elasticity coefficients for cereals, fruits and vegetables, and meat show that for these items consumption is near saturation levels. These data indicate that for 1980, as far as cereals were concerned, there was no demand for more consumption. They indicate as well that the country is adequately supplied with cereals, (thanks to food imports and gifts). In the case of milk, demand elasticity as related to income (1.03) indicates that rural consumption levels are still below saturation levels, and that the people still aspire to consume more milk.

Elasticity of demand for sugar is 0.79, and that for tea is 0.61. As far as tea is concerned, the relevant factor to be used is the number of adults, not the total number of persons.

There are three food items with regard to which an increase in income does not result in a proportionate rise in consumption. These items (cereals, fruits and meat) are close to saturation levels.

In the Miscellaneous category we find cooking oil and condiments (salt, pepper etc). The elasticity coefficient is 0.81. In other words, budgetary units in the rural sector would like to buy more of those items.

It should be pointed out that these elasticity coefficients are computed for the rural sector as a whole, and that within that sector there is still plenty of room for improvement. Overall, for food items the elasticity coefficient in the rural sector is 0.96. This means that in case of any income rise, we can expect 96% of the increase to be allocated to food.

Non-food items: For this category the elasticity coefficient is 1.25. Elasticity of demand for non-food items as related to income is far below saturation levels. This indicates that for every possible 1% rise in income, the people would wish to raise their allocation for non-food items by 1.25%. The breakdown is as follows:

Toiletry and Health products:	$e_h = 0.57$
Fuel:	$e_f = 1.06$
Leisure:	$e_i = 0.67$

toiletry and health products mean mostly Marseilles soap, while fuel means mostly firewood and charcoal for cooking. The demand for firewood for cooking purposes is far from being satisfied, unless some fuel substitute can be found. Items falling within the leisure category are tobacco and matches.

TABLE 32 - INCOME ELASTICITY COEFFICIENT OF DEMAND FOR FOOD ITEMS  
(ACCORDING TO ITEM CATEGORIES, IN THE RURAL SECTOR).

101

	ELASTICITY COEFFICIENT	CONSUMPTION FUNCTION	CORRELATION COEFFICIENT	DETERMINATION COEFFICIENT
			R	R <sup>2</sup>
<u>FOOD ITEMS</u>	0.96	CA = 0.63 C <sup>0.96</sup>	0.77	0.59
Cereals	0.44	Ci = 4.03 C <sup>0.44</sup>	0.63	0.4
Fruits & Vegetables	0.47	Ci = 0.81 C <sup>0.47</sup>	0.25	0.06
Meat	0.50	Ci = 2.89 C <sup>0.50</sup>	0.46	0.21
Milk & Dairy Products	1.03	Ci = 0.06 C <sup>1.03</sup>	0.54	0.29
Tea	0.61	Ci = 0.52 C <sup>0.61</sup>	0.47	0.22
Sugar	0.79	Ci = 0.21 C <sup>0.79</sup>	0.60	0.36
Miscellaneous	0.81	Ci = 0.17 C <sup>0.81</sup>	0.43	0.19

Source : FAMS Surveys, 1980, and

Author's computations - 4th trip

Ci = consumption of item i

C = total consumption of food and non-food items

TABLE 33 - INCOME ELASTICITY COEFFICIENT OF DEMAND FOR NON-FOOD ITEMS  
(ACCORDING TO ITIM CATEGORIES, IN THE RURAL SECTOR)

	ELASTICITY COEFFICIENT	CONSUMPTION FUNCTION	CORRELATION COEFFICIENT	DETERMINATIVE COEFFICIENT
			R	R <sup>2</sup>
NON-FOOD ITEMS	1.25	$C = 0.03 C^{1.25}$	0.63	0.40
Toiletry & Health Products	0.57	$C = 0.41 C^{0.57}$	0.37	0.14
Fuel	1.06	$C = 0.04 C^{1.06}$	0.67	0.45
Leisure	0.67	$C = 0.08 C^{0.67}$	0.36	0.13

Source : RAMS Surveys, 1980, and

Author's computations - 4th trip

VII - DEMAND TRENDS IN THE RURAL SECTOR

### PROJECTION OF DEMAND FOR FOOD AND NON-FOOD

For quantitative and value projections of food demand the following factors may influence demand:

- Population growth, changes in population distribution, especially the sedentarization of nomads, changes in composition, age group distribution, sex ratios and occupations, increases in income, changes in income distribution, in consumption habits, in distribution methods, etc.

These variables differ from each other in their impact, but there are two key variables which have a preponderant and direct impact on future demand: Population growth and per capita available income.

It is generally agreed that in the Sahelian countries the most important factor is population growth. It is also generally agreed that between 1980 and 2000, the net rate of increase in Mauritania's population will fall between 2% and 3% per annum.

- Available income is an important factor influencing consumption. It is agreed that in developing countries an increase in income is particularly likely to result in increased food consumption.

### ESTIMATION OF FOOD DEMAND

Food demand may be estimated in several ways, using relationships involving the different variables. In the case of Mauritania we shall use a linear estimate of the form:

$$\underline{D_R = p + e_i \cdot g}$$

Where

$D_R$  is the rate of increase of rural demand;

$p$  is the rate of population growth;

$e_i$  is the income elasticity of demand for product  $i$

and

$g$  is the rate of increase of per capita income in the rural sector.

However, the linear approach has shortcomings, for the following reasons:

- 1) - it depends on the "base year". In other words, demand projections may be high or low depending on how representative the base year happens to be -- representative years being free of abnormal fluctuations, etc.
- 2) - it does not facilitate the clarification of price problems. On the one hand, price changes certainly affect demand (the problem of price elasticity). On the other hand, studies conducted in developing countries have demonstrated that demand elasticity as related to price is often higher than demand elasticity as related to income.
- 3) - According to the hypothesis of constant income elasticity of demand over a long period, by virtue of "Engel's Law" (viz: food consumption rises up to a certain level, then declines) income elasticities of demand should vary in the course of time as well as from region to region and from ethnic group to ethnic group.

Furthermore, income elasticities of demand fluctuate with the problem of product substitution. Changes in consumption are often instigated by changes in general economic conditions or by consumer preference for items of superior quality.

In the case of Mauritania's rural sector, projections are indicative exercises only, since the longer the projection period, the vaguer predictions become.

Taking possibilities for changes in the economic environment, changes in taste, and product substitution into account, the estimation of food demand by the linear method is justified in the Mauritanian case over the short and medium terms.

#### BASIC HYPOTHESES

In the making of projections three hypothetical categories of demand will be considered: high demand hypothesis, medium demand hypothesis, and low demand hypothesis:

- Low demand hypothesis: assumes that the rate of increase in per capita annual income equals the rate of population growth. In other words, the net rate of increase in per capita annual income is zero.
- Medium demand hypothesis: assumes a net rate of increase in per capita annual income of about 1%. In other words, there is a gross 3% to 4% annual increase, of which 2.5% is absorbed by population growth, 1% remaining as pure income growth.
- High demand hypothesis: assumes a net per capita annual income increase rate of 2%; i.e., a gross 4% to 5% annual increase, 2.5% of which is absorbed by population growth, with 2% remaining as pure income increase.

7-2 COMPUTATION RESULTS

By applying the formula which integrates the different variables and allowing for the income elasticity of rural sector demand for various products<sup>29</sup> for a rural sector population growth rate of 2.5% per annum,<sup>30</sup> as well as for the three hypothetical scenarios of low, medium and high demand for food items, it is possible to arrive at a figure for the rate of increase in rural sector demand for the Plan period 1981-1985.

Since the estimate of the rate of increase in demand following the formula

$$\boxed{D_r = p + e_i g}$$

is linear, and since income elasticity varies over the long term, the rates of increase in demand will be close to reality over the short and medium terms.

For periods of between 5 and 20 years, the projections give an idea of general trends, but these statistics have to be used with extreme caution. The figures would have to be updated each year.

Results obtained for different rates of increase in demand for food items and non-food items are shown in the following table:

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29. See chapter on Demand Elasticity.

30. See Demographic Projections, Rams, 1980.

TABLE 34  
 RATES OF INCREASE IN RURAL SECTOR - DEMAND FOR FOOD  
 & NON-FOOD ITEMS (ANNUAL %)

ITEMS	RURAL DEMAND HYPOTHESIS		
	Low Demand	Medium Demand	High Demand
<u>FOOD ITEMS</u>	2.5% population:	3.5%	4.4%
	Growth rate		
Cereals <sup>1</sup>	2.5%	2.9%	3.4%
Fruits & Vegetables <sup>2</sup>	"	3 %	3.4%
Meat <sup>3</sup>	"	3 %	3.5%
Milk <sup>4</sup>	"	3.5%	4.6%
Tea <sup>5</sup>	"	3.1%	3.7%
Sugar <sup>6</sup>	"	3.3%	4.1%
<u>NON FOOD ITEMS</u>	"	3.7%	5%
Toiletry & Health Products	"	3.1%	3.6%
Fuel	"	3.6%	4.6%
Leisure	"	3.2%	3.8%

Source : RAMS, 1980 (Author's computations)

Cereal demand elasticity	0.44
Fruit " "	0.47
Meat " "	0.5
Milk " "	1.03
Tea " "	0.61
Sugar " "	0.79

TABLE 34: NOTESSCENARIO 1: HIGH ESTIMATE

- Rural sector per capita annual income growth rate: 2%
- Annual population growth rate: 2.5%
- Item demand elasticity: according to Table 32, page 101.

SCENARIO 2: MEDIUM ESTIMATE

- Rural sector per capita annual income growth rate: 1%
- Annual population growth rate: 2.5%

SCENARIO 3: LOW ESTIMATE

- Rural sector per capita annual income growth rate: 0%
- Demand keeps pace with population growth.

Table 34 shows the different rates of growth in rural sector demand for various consumer items (food and non-food).

For the three scenarios, the rural sedentary population totals 831,000 people, while the rural nomadic population totals 409,000 people.<sup>31</sup>

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31. Figures from Demographic Projections, RAMS, 1980. Page 84.

### 3 BULK DEMAND PROJECTION

To project bulk demand we take average annual consumption, relate it to the rate of increase in demand for each item as calculated above, and thus obtain a figure for rural demand over the Plan horizon.

#### THE RURAL SEDENTARY SECTOR

There are different levels of bulk consumption in the rural sedentary sector.<sup>32</sup> All that needs to be done is to multiply the consumption figure by the figure for the relevant rural population and then to factor in the rate of increase in item demand as in Table 34, page 108. For this computation the base year is 1980; the sedentary rural population is estimated at 831,000,<sup>33</sup> and the plan horizon is the year 2,000.

#### THE RURAL NOMADIC SECTOR

Nomadic consumption patterns differ from rural sedentary consumption patterns.<sup>34</sup> For the base year 1980, the nomadic population is estimated at 409,000.<sup>33</sup> But the nomadic population suffers an attrition rate of 2.14% per annum because of sedentarization.<sup>35</sup> This attrition does not significantly affect 1980 consumption levels.

On account of the rate of sedentarization, nomadic consumption rates will remain constant at 1980 levels, even if income rises and food demand also increases.

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32. See chapter on Bulk Consumption Patterns, page 97.

33. See Demographic Projections, PAMS, 1980, pages 125, 126.

34. See chapter on Nomadic Consumption patterns, page 113.

35. See Demographic Projections, PAMS, 1980, pages 23, 24.

TABLE 35 - RURAL SECTOR FOOD DEMAND PROJECTION <sup>1/</sup> (FIGURES IN 1,000'S OF TONS)

1980 (BASE YEAR)	1981	1982	1983	1984	1985	1990	1995	2000	
<u>HIGH DEMAND HYPOTHESIS</u>									
Cereals	112	116	120	124	128	132	157	185	219
Fruits & Vegetables	20	21	21	22	23	23	28	34	40
Meat	27	28	29	30	31	32	38	45	55
Fish	8	8	9	9	9	10	12	14	17
Milk	24	25	26	27	28	28	34	40	49
Tea	0.8	0.8	0.8	0.9	0.9	0.9	1.1	1.3	1.6
Sugarn	11	12	12	12	13	13	16	18	23
<u>MEDIUM DEMAND HYPOTHESIS</u>									
Cereals	115	119	122	126	127	149	172	199	
Fruits & Vegetables	20	21	22	22	23	26	31	36	
Meat	28	29	30	31	32	36	42	50	

<sup>1/</sup> Figures rounded off

TABLE 35 - Con't

1980 (BASE YEAR)	1981	1982	1983	1984	1985	1990	1995	2000
<u>MEDIUM DEMAND HYPOTHESIS</u> (Con't)								
Fish	8	9	9	9	10	11	13	15
Milk	25	25	26	27	28	32	37	44
Tea	0.8	0.8	0.8	0.9	0.9	1	1.2	1.5
Sugar	12	12	12	13	13	15	17	21
<u>LOW DEMAND HYPOTHESIS</u>								
Cereals	115	118	121	124	127	144	162	188
Fruits & Vegetables	20	21	21	22	23	25	29	33
Meat	28	29	29	30	31	35	40	46
Fish	6	9	9	9	9	11	12	14
Milk	25	25	26	27	27	31	35	40
Tea	0.8	0.8	0.8	0.9	0.9	1	1.1	1.3
Sugar	11	12	12	12	13	14	16	19

TABLE 36 - NON FOOD DEMAND PROJECTION <sup>1/</sup> (SEDENTARY SECTOR)

113

YEAR	1980	1981	1982	1983	1984	1985	1990	1995	2000
<u>Toiletry (soap)</u>	3.8 x								
	10 <sup>3</sup> tons								
<u>Hypothesis</u>									
High		4	4	4	5	5	5	6	8
Medium		4	4	4	4	4	5	6	7
Low		4	4	4	4	4	5	5	6
<u>Kerosene</u>	665 x								
	10 <sup>3</sup> liters								
<u>Hypothesis</u>									
High		695	760	760	795	830	1050	1300	1650
Medium		685	715	740	770	795	980	1200	1400
Low		680	700	715	735	750	850	960	1090

TABLE 36 - Con't

114

YEAR	1980	1981	1982	1983	1984	1985	1990	1995	2000
<u>Firewood</u>	1114 x								
	10 <sup>3</sup>								
	steres								
<u>Hypothesis</u>									
High		1165	1219	1275	1333	1395	1747	2187	2738
Medium		1154	1196	1239	1283	1329	1587	1893	2260
Low		1142	1170	1200	1230	1260	1426	1613	1825
<u>Tobacco</u>	116								
	tons								
<u>Hypothesis</u>									
High		120	125	130	135	140	168	203	245
Medium		120	123	127	131	153	179	209	245
Low		119	122	125	128	131	148	168	190

1/ Figures rounded off.

TABLE 37 - NOMADIC DEMAND PROJECTION <sup>x</sup>, 1980

	HIGH	LOW
<b>FOOD ITEMS</b>		
Cereals (10 <sup>3</sup> tons)	55	35
Fruits & Vegetables (10 <sup>3</sup> tons)	10	2
Meat (10 <sup>3</sup> tons)	13	2
Milk (10 <sup>6</sup> liters)	-	68
Tea (tons)	390	286
Sugar (10 <sup>3</sup> tons)	5.5	2.9
<b>NON-FOOD ITEMS</b>		
Firewood (10 <sup>3</sup> tons)		182
(10 <sup>3</sup> steres)		455

<sup>x</sup> figures rounded off

#### NOTES ON Table 37

Sedentarization has reduced the nomadic population at an estimated rate of 2.14% per annum. The nomadic survey covered only a single time period; it was therefore practically impossible to account for all the nuances of nomadic consumption for the whole year, especially for the guetna period when consumption patterns change a great deal. Two hypotheses were adopted:

High Hypothesis: In this scenario nomadic consumption matches that of the sedentary sector.

Low Hypothesis: This means actual consumption levels registered by the survey.

For the base year 1980, the nomadic population was estimated at 409,000. This population is due to decrease to 282,000 in the year 2000<sup>36</sup>. (The figures for bulk per capita consumption are taken from page 110). For projections of demand for food items, the relevant hypothesis is the low hypothesis. It is expected to remain constant throughout the entire period.

36. Demographic Projections, RAMS, 1980, page 86

Rural sector demand is the sum of sedentary sector demand and nomadic sector demand.

#### PROJECTION RESULTS

A summary of food demand projections for the sedentary sector during the period 1980-2000 can be found in Table 35, page 111. (For projection hypotheses, see page 106).

A summary of non-food demand projection for the same sector during the same period can be found in Table 36, page 113.

Projections of food and non-food demand in the nomadic sector for the period 1980-2000 are summarized in Table 37, page 115.

Rural sector demand for food is the total of sedentary and nomadic demand. (See Table 38, page 120). In the case of food the hypothesis of a constant level of cereal consumption in the nomadic sector fixed at 35,000 tons (84 kilos per capita annually) underestimates consumption; this is so because the guetna period, a time of abnormally high consumption, has not been taken into account. On the other hand, the hypothesis overestimates consumption levels for the year 2000, a time by which the nomadic population would have been halved.

Consumption levels are equally underestimated for 1980, the base year, and overestimated for the horizon year 2000, in the case of meat. The discrepancy is not as serious with regard to milk, whose consumption is more constant. Demand projections indicate that Mauritania will have to keep importing large quantities of cereals up until the year 2000 and

beyond -- unless there are appreciable improvements in domestic food production.

Non-food: no projections were made for the Transport Category.

But transport does take up 15% of total consumption, and its importance in sedentary sector budgeting is perfectly clear.<sup>37</sup>

Fuel: this category comprises kerosene, charcoal and firewood. Kerosene, used for lighting, is consumed at the rate of 0.8 liters per capita annually in the sedentary sector. The survey yielded no information on nomadic consumption.

The amount of charcoal consumed is converted into its equivalent in firewood. Firewood consumption in the sedentary sector is 1.34 steres; among nomads it is 1.1 steres. Thus for our sample, average consumption is 1.25 steres.

Charcoal demand is about 1.25 steres per capita annually. In other words, in the rural sector at least 1,240,000 X 1.25 or 620,000 tons of wood<sup>38</sup> are consumed annually, quite apart from other sources of fuel.

Thus, to keep the rural sector supplied with firewood at a rate of 15 tons of wood per hectare in the River Valley region,<sup>39</sup> a minimum of 42,000 hectares of forest per annum would have to be used up for the needs of the rural sector alone. The human degradation of the environment, even excluding wood used for building and other purposes, is simply enormous.

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37. See the DAMS study, Etude du Secteur Privé, 1980.

38. 1 stere = 0.4 tons.

39. See the DAMS study, Etude sur la Régénération de l'Environnement, 1980, page 132.

projection results show long-term food and non-food demands. These results are relevant to medium-term planning, and should enable the authorities to draw useful developmental conclusions.

The longer the period of projection, the vaguer the result. Therefore data have to be constantly updated as time goes on.

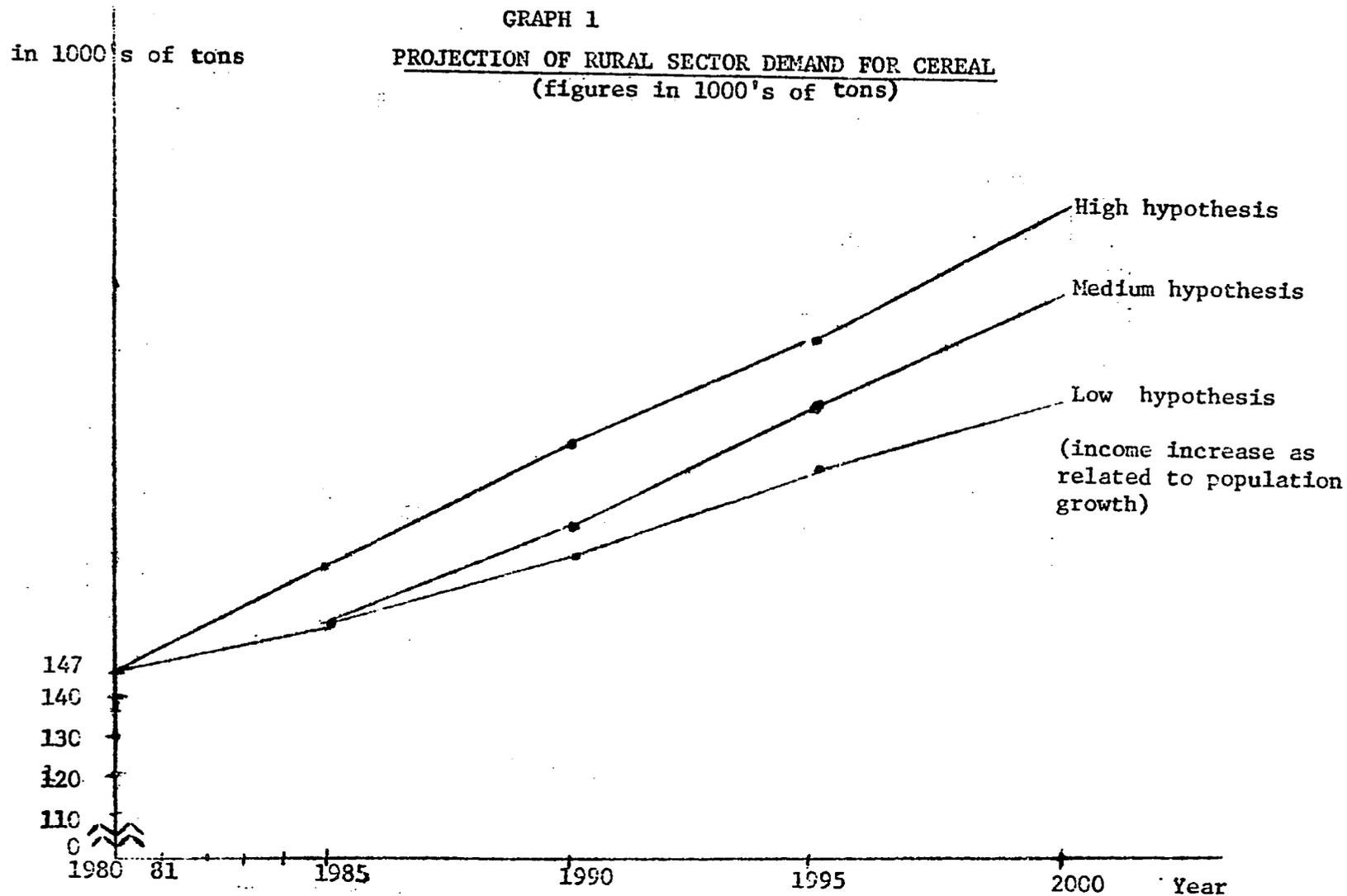


TABLE 38 - RURAL SECTOR FOOD DEMAND PROJECTION

	1980	1985	1990	1995	2000
<u>HIGH HYPOTHESIS</u>					
<u>FOOD ITEMS</u>					
<u>Cereals</u> (1,000s of tons)	147	167	192	220	254
Sedentary Sector	112	132	157	185	219
Nomadic Sector	35	35	35	35	35
<u>Fruits &amp; Vegetables</u> (1,000s of tons)	30	33	38	44	50
Sedentary Sector	20	23	28	34	40
Nomadic Sector	10	10	10	10	10
<u>Meat</u> (1,000s of tons)	40	45	51	58	68
Sedentary Sector	27	32	38	45	55
Nomadic Sector	13	13	13	13	13
<u>Milk</u> (10 <sup>6</sup> liters)	92	96	102	108	117
Sedentary Sector	24	28	34	40	49
Nomadic Sector	68	68	68	68	68
<u>Tea</u> (1,000s of tons)	1.1	1.2	1.4	1.6	1.9
Sedentary Sector	0.8	0.9	1.1	1.3	1.6
Nomadic Sector	0.3	0.3	0.3	0.3	0.3
<u>Sugar</u> (1,000s of tons)	16.5	18.5	21.5	23.5	28.5
Sedentary Sector	11	13	16	18	23
Nomadic Sector	5.5	5.5	5.5	5.5	5.5

1 Figures rounded off

TABLE 38 - Con't

	1980	1985	1990	1995	2000
<u>MEDIUM HYPOTHESIS</u>					
<u>Cereals</u>	147	162	184	207	234
Sedentary Sector	112	127	149	172	199
Nomadic Sector	35	35	35	35	35
<u>Fruits &amp; Vegetables</u>	22	25	28	33	38
Sedentary Sector	20	23	26	31	36
Nomadic Sector	2	2	2	2	2
<u>Meat</u>	29	34	38	44	52
Sedentary Sector	27	32	36	42	50
Nomadic Sector	2	2	2	2	2
<u>Fish</u>	8	10	11	13	15
Sedentary Sector	8	10	11	13	15
Nomadic Sector	-	-	-	-	-
<u>Milk</u>	92	96	102	108	117
Sedentary Sector	24	28	34	40	49
Nomadic Sector	68	68	68	68	68
<u>Tea</u>	1.1	1.2	1.4	1.6	1.9
Sedentary Sector	0.8	0.9	1.1	1.3	1.6
Nomadic Sector	0.3	0.3	0.3	0.3	0.3
<u>Sugar</u>	14	16	18	20	24
Sedentary Sector	11	13	15	17	21
Nomadic Sector	3	3	3	3	3

TABLE 38 (Con't)

	1980	1985	1990	1995	2000
<u>LOW HYPOTHESIS</u>					
<u>Cereals</u>	147	162	179	197	223
Sedentary Sector	112	127	144	162	188
Nomadic Sector	35	35	35	35	35
<u>Fruits &amp; Vegetables</u>	22	25	27	31	35
Sedentary Sector	20	23	25	29	33
Nomadic Sector	2	2	2	2	2
<u>Meat</u>	29	33	37	42	48
Sedentary Sector	27	31	35	40	46
Nomadic Sector	2	2	2	2	2
<u>Fish</u>	8	9	11	12	14
Sedentary Sector	8	9	11	12	14
Nomadic Sector	-	-	-	-	-
<u>Milk</u>	92	95	99	103	108
Sedentary Sector	24	27	31	35	40
Nomadic Sector	68	68	68	68	68
<u>Tea</u>	1.1	1.2	1.3	1.4	1.6
Sedentary Sector	0.8	0.9	1	1.1	1.3
Nomadic Sector	0.3	0.3	0.3	0.3	0.3
<u>Sugar</u>	14	16	17	19	22
Sedentary Sector	11	13	14	16	19
Nomadic Sector	3	3	3	3	3

Source : RAMS, 1980. Author's Computations

## Market Price/Region in UM

Annex

123	REGIONS Trips/ Items	Hodh El Gharbi (2nd Region)			Assaba (3rd Region)			Gorgol (4th Region)		
		2nd Trip	3rd Trip	4th Trip	2nd Trip	3rd Trip	4th Trip	2nd Trip	3rd Trip	4th Trip
	<u>Cereals/kg</u>									
	Husked Rice	24	25	25	20	25	23	20	18	21
	Chipped Rice	-	25	25	-	25	-	22	-	18
	Wheat	84	-	-	20	16	-	-	-	-
	Wheat Flour	-	-	-	25	-	-	-	30	26
	Couscous	20	-	100	-	60	-	56	20	-
	Millet	22	23	25	-	25	25	18	18	20
	Sorghum	18	30	25	-	24	-	-	-	-
	<u>Meat/kg</u>									
	Button	71	250	75	80	100	-	80	-	110
	Beef	58	90	50	70	70	-	50	100	90
	<u>Livestock</u>									
	Sheep	1100	1400	1600	1200	-	-	-	-	3000
	Goats	1000	-	-	-	-	1300	-	-	-
	Camels	23000	-	13000	15000	-	-	-	-	-
	<u>Fruits and Vegetables</u>									
	Dried dates/kg	60	55	65	-	-	-	-	62	60
	Niebe/kg	70	20	-	-	30	20	32	110	45
	Tomato paste/cans	133	-	-	-	-	-	75	63	100
	<u>Dairy Products</u>									
	Powdered milk/cans	75	65	70	-	60	-	61	65	65
	Condensed milk/cans	20	60	-	20	-	-	30	60	32
	Butter/liters	263	160	295	-	100	140	157	160	150
	Dried fish/kg	100	-	-	-	-	-	79	154	65
	Sugar in bread (2 kg)	180	194	122	110	120	120	142	158	120
	Tea/kg	800	840	675	1250	700	900	560	600	573
	Kerosene/liter	120	120	65	-	-	-	25	40	46
	Tobacco/kg	1370	450	500	-	-	-	500	100	-
	Soap (Marseilles)	34	40	20	44	30	-	33	27	29

Cont.

124	REGIONS	* Brakna (5th Region)		Trarza (6th Region)			Tagant (9th Region)		
	Trips Items	2nd Trip	3rd Trip	2nd Trip	3rd Trip	4th Trip	2nd Trip	3rd Trip	4th Trip
	<u>Cereals/kg</u>								
	Husked Rice	-	20	19	18	20	20	20	20
	Chipped Rice	20	20	19	18	17	-	-	-
	Wheat	-	-	19	22	25	-	16	-
	Wheat Flour	-	-	25	25	22	-	-	-
	Couscous	-	-	-	30	-	-	-	-
	Millet	12	15	25	25	38	25	25	-
	Sorghum	-	15	-	10	-	-	25	-
	<u>Meat/kg</u>								
	Mutton	70	-	115	106	120	-	140	-
	Beef	-	60	90	90	110	-	80	-
	<u>Livestock</u>								
	Sheep	800	-	2000	2750	2000	-	-	1400
	Goats	-	-	1500	2200	1400	-	-	1000
	Camels	-	-	15000	18500	20000	-	-	-
	<u>Fruits and Vegetables</u>								
	Dried dates/kg	-	40	70	-	160	50	-	60
	Niebe/kg	20	20	40	35	62	-	50	150
	Tomato paste/cans	77	80	70	60	79	-	-	-
	<u>Dairy Products</u>								
	Powdered milk/cans	-	-	133	290	70	-	-	85
	Condensed milk/cans	-	-	71	-	67	-	-	-
	Butter/liters	-	-	170	116	-	450	480	-
	Dried fish/kg	120	-	-	-	-	-	-	-
	Sugar in bread (2 kg)	114	88	136	142	112	110	110	110
	Tea/kg	1500	1200	700	632	650	650	800	850
	Kerosene/liter	50	40	41	30	34	-	36	-
	Tobacco/kg	-	-	400	350	450	400	250	-
	Soap (Marseilles)	25	25	30	26	30	30	30	-

\* No figures available for the 4th Trip from Brakna

Cont.

REGIONS		Guidimaka (10th Region)			Inchiri ** (12th Region)	
Trips	Items	2nd Trip	3rd Trip	4th Trip	2nd Trip	4th Trip
125	<u>Cereals/kg</u>					
	Husked Rice	20	25	20	15	15
	Chipped Rice	20	25	-	-	-
	Wheat	-	-	-	-	-
	Wheat Flour	30	30	-	20	25
	Couscous	-	-	-	-	-
	Millet	18	12	20	30	60
	Sorghum	-	12	20	25	-
	<u>Meat/kg.</u>					
	Mutton	55	70	80	120	150
	Beef	50	60	60	80	100
	<u>Livestock</u>					
	Shsep	1500	-	1200	2500	3000
	Goats	1600	-	1200	-	-
	Camels	-	-	30000	27000	25000
	<u>Fruits and Vegetables</u>					
	Dried dates/kg	40	80	30	-	-
	Niebe/kg	35	32	-	60	80
	Tomato paste/cans	85	110	-	70	-
	<u>Dairy Products</u>					
	Powdered milk/cans	-	-	-	-	-
	Condensed milk/cans	70	-	-	-	70
	Butter/liters	-	120	25	-	-
	Dried fish/kg	190	175	200	60	-
	Sugar in bread (2 kg)	115	114	-	114	112
	Tea/kg	1200	750	700	520	600
	Kerosene/liter	55	47	-	-	-
	Tobacco/kg	-	-	400	-	-
	Soap (Marseilles)	-	-	-	30	35

\*\* No figures available for the 3rd Trip from Inchiri

APPENDIX I - METHODOLOGICAL OVERVIEW

1. Introduction
2. Polling Base
3. Polling Plan
  - 3-1 Sample Representativity
  - 3-2 Village Stratification
  - 3-3 Primary Unit Selection
  - 3-4 Secondary Unit Selection
  - 3-5 Primary and Secondary Unit Sizes
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4. Estimators
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5. Accuracy of Results
  - 5-1 Factors
  - 5-2 Minimal Margin of Chance Error
  - 5-3 Model Findings from Our Sample
  - 5-4 Use of Simplified Estimators
6. Conclusions

## APPENDIX : METHODOLOGICAL OVERVIEW<sup>1/</sup>

### 1. Introduction

This appendix is designed to provide information on the polling plan followed, the way calculations were made on the basis of observations of our sample, and the degree of accuracy to be expected from them.

### 2. The Polling Base

The polling base was made up of the list of 2,343 villages registered in the "Village File" drawn up after the 1977 census.

This list gives the names, geographical locations, administrative status and population of the villages. This information facilitated the selection of a sample of villages for the conduct of our survey. Village population statistics were not updated. Nor were seasonal fluctuations in village population levels taken into account.

The large urban areas of the modern sector were excluded from the list contained in the "Village File". As a result, we came up with a polling base involving the whole of the rural population.

### 3. The Polling Plan

#### 3-1. Sample representativity:

As a first step the villages were stratified. Next came a process of random selection at two levels for each stratum..

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1 : The Appendix on methodology was contributed by Dr. J. B. Ivin, a Statistician.

At the first level the draw involved primary units (villages), drawn and sorted according to a probability factor proportional to their size within the relevant stratum.

At the second level the draw involved secondary units (households) drawn without prior sorting with the probability factor even.

This random selection is considered representative because every statistical unit has a known chance of becoming part of the sample.

### 3-2. Village Stratification

On the basis of each villages' agro-ecological features, determined by the geographical unit, the 2,343 villages were divided into 5 agro-ecological zones (AEZ). This classification preceded the design of the polling plan and was later modified. It was retained for two main reasons:

1. First, though no numerical evaluation had been conducted, it was apparent that these agro-ecological zones (AEZ) showed sufficient internal homogeneity and enough differences among them to make the stratification exercise appreciably meaningful.
2. Secondly, this division made zonal estimates possible. Still, the fact that only a small number of villages were accounted for in each zone should not obscure the basic weakness of these estimates.

### 3-3. Primary Unit Selection

In each stratum a random selection--cum-resorting operation was conducted for primary units (PU), i.e. the villages. In the conduct of this selection each village was assigned a probability proportional to its size within its particular stratum.

A systematic selection based on cumulative population of the villages made it possible to conduct a draw based on a probability factor proportional to size. This method yielded unbiased estimates with minimal variance as compared with estimates based on an even probability factor<sup>2</sup>.

### 3-4. Secondary Unit Selection

Within the primary unit (PU), individual household constituted the statistical unit surveyed. In the polling plan this unit was called the secondary unit (SU). Secondary unit selection followed a simple method, generally involving a chance shift in the primary unit. Since no household could be drawn twice, this kind of selection is termed a selection without resorting.

### 3-5. Primary and Secondary Unit Sizes

To determine the total number of PU's and their number per AEZ, we had to take organizational constraints such as the number of vehicles available, the number of survey personnel, and geographical distances into consideration. As far as SU's were concerned, in more than half of the villages selected, two households were polled per village.

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2. Cochran, Sampling Techniques, 3rd edition, Wiley, 1977, p. 295.

However, on-the-spot decisions coupled with the availability of a large number of survey personnel made it possible to conduct more polls in some villages. The following table gives the number of villages and the number of households polled in each village. The only households represented are those which yielded useable information on income.

AEZ	Number of villages	Number of Households
1	4	$10 + 5 + 6 + 2 = 23$
2	2	$2 + 2 = 4$
3	3	$2 + 2 + 11 = 15$
4	5	$2 + 2 + 2 + 2 + 2 = 10$
5	2	$2 + 8 = 10$
TOTAL	16	62

### 3-6. Polling Rates

The number of households may be estimated at 60,000, a figure obtained by dividing the total rural population by the number of persons in the average budgetary unit. This means our final polling rate came in the neighborhood of 1 in 1,000. Variations between individual zones range from 1 in 400 (AEZ Number 1) to 1 in 4,000 (AEZ Number 2). At the level of the villages, the highest polling rate occurred in COGUIZEMAL, with 10%, while KAEDI had a rate lower than 1%. As a result, in all the computations, factors relating to polling rates will not be taken into account. (See Section 5-2)

#### 4. Estimators

##### 4-1. Introduction

An estimator is a mathematical factor whereby a particular characteristic of a population may be evaluated on the basis of results obtained from each element in the sample. The form taken by an estimator depends on the specific polling plan adopted.

An estimator may or may not be weighted. The value of the weighting factor is a measure of the difference between the average for all estimates conducted on all the samples made possible by the polling plan and the population's characteristics. Clearly, then, it is advisable to use non-weighted estimators.

##### 4-2. Average Estimators

With regard to the polling plan delineated above, an average estimator for the stratum  $h$  may be written thus:

$$\bar{Y}_h = \frac{1}{n M_h} \sum_{i=1}^{M_i} \frac{M_i}{Z_i m_i} \sum_{j=1}^{m_i} Y_{ij} \quad (1)$$

where  $n$  = the number of PU's in the stratum  $h$

$M_i$  = the size of the  $i^{\text{th}}$  PU

$m_i$  = the number of SU's in the  $i^{\text{th}}$  PU

$Z_i$  = the probability the  $i^{\text{th}}$  has of being in the sample

$Y_{ij}$  = the polling in the  $i^{\text{th}}$  PU of the  $j^{\text{th}}$  SU

$M_h$  = the size of the stratum  $h$ .

In our polling plan a villages' probability of being in the sample was proportioned to its size in the stratum. In other words,

$Z_i = M_i/M_h$  expression (1) may be written thus:

$$Y = \frac{1}{n} \sum_{i=1}^n \frac{1}{m_i} \sum_{j=1}^{n_i} Y_{ij}$$

$$= \frac{1}{n} \sum_{i=1}^n \bar{Y}_i$$

$$\hat{Y} = \bar{Y} \quad (2)$$

At this point the average estimator for a stratum may easily be calculated by figuring out the average of observations obtained in each village, then the average of all the averages obtained from all the villages in the stratum. It can be proved that the estimator thus arrived at is non-weighted.

For the totality of the strata, and thus for all the base population, the average estimator is expressed in the following form:

$$\hat{Y} = \sum_h \frac{N_h}{N} \bar{Y}_h \quad (3)$$

This estimator is lightly weighted because of the hypothetical operation involving a proportional relationship between population size and the number of households. There would be no bias at all if  $N_h$  was in fact equal to the number of households in the stratum, divided by the total number of households in the base population.

#### 4-3. Average Variance Estimators

Using the same notations as above, and using a selection probability proportional to the size of the PU in question, it can be proved<sup>3</sup>

that the variance estimator for the stratum h takes the following form:

$$v(Y_h) = \frac{1}{n(n-1)} \sum_n (\bar{Y}_h - Y)^2 \quad (4)$$

For the totality of the strata (since selection within each stratum took place independently), the variance estimator is formulated thus:

$$V(Y) = \sum_h \frac{N_h^2}{N^2} v(Y_h) \quad (5)$$

As in the case of the average, this estimator is slightly weighted. The computation of the variance makes it possible to evaluate the degree of chance fluctuation derived from the polling plan. It also incidentally provides an index of the degree of error in the sample.

### 5. Accuracy of Results

#### 5-1. Factors

In this polling plan, the magnitude of total variance in an estimate is a function of two factors:

- first, the stratification of the universe makes it possible to lower the total variance to the extent that the variable in question is correlated with the stratification variable. In a survey of budgetary and consumption patterns, the number of variable factors under scrutiny

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3. Cochran, Op.Cit., p. 306.

is high (this kind of survey is often referred to as an omnibus survey). As a result, the gain in precision resulting from stratification varies. As Cochran <sup>4</sup> has pointed out, however, in general the gain in precision obtained from geographical stratification is small. We should note that the establishment of agro-ecological zones prior to the design of the polling plan (an operation for which estimates were necessary) imposed the stratification base adopted.

- Secondly, polling at two levels of abstraction, being less expensive than simple random polling, is also less efficient for a sample of the same size, since it produces a bigger variance. This is due to the cluster effect: i.e. the tendency of elements presenting similar characteristics to cluster together in the same primary unit. In addition, with polling at two levels of abstraction, total variance depends on the respective sizes of PU's and SU's. In a situation where the number of PU's is small in comparison with that of SU's we may expect the sampling error derived from the first level of abstraction to have the greater weight. From the foregoing, we may envisage the computation of the minimal value of the sampling error, i.e. the value obtainable from simple random selection from the sixty odd secondary units polled, at just one level removed, and without stratification.

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4. Cochran, Op. Cit., page 102

## 5-2. Minimal Margin of Chance Error

The process by which a proportional estimate is arrived at is as follows: Assuming  $P$  is the proportion of individual elements presenting a specific characteristic within a set of populations, the variance of the estimator for  $P$  equals<sup>5</sup> :

$$V(p) = \frac{N - n}{N - 1} \frac{P(1-P)}{n}$$

where  $p$  is the unweighted estimator for  $P$ ,

$N$  is the size of the population, and

$n$  is the size of the sample.

In cases where the size of the population is much higher in relation to the sample size, as is the case in our survey, the variance is then expressed thus:

$$V(p) = \frac{P(1-p)}{n}$$

This expression attains its maximal value when the proportion  $p$  equals 50%. In such conditions, for the size of the household sample the value of the variance is:

$$V(p) = \frac{(50)^2}{60} = 41.7$$

This yields a  $\sqrt{\quad}$  type differential of 6.5 % and a coefficient of variation amounting to:

$$C.V.(p = 50\%) = \frac{1}{\sqrt{n}} = 0.13$$

Hypothesizing a Gauss test, with a 95% threshold, we may state that the proportion  $P$  as estimated according to results obtained from the

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5. See Darco and Dussaix, Pratique et analyse des enquêtes par sondage, IUP, 1980, p. 65.

sample falls somewhere within the range from

$$50 - 1.96 \cdot \sigma = 37.3\% \text{ to } 50 + 1.96 \cdot \sigma = 62.7\%$$

In other words, there is a 95% probability that the actual value of the relevant proportion within the population will be between 37.3% and 62.7%.

### 5-3. Model Findings from our Sample

Taking the cash income of the 62 households as recorded during the first trip as an example, and using the estimators formulated in Section 4, we may estimate average income at 154,000 UM and put the characteristic differential for this estimate at 42,000 UM. The following table provides an overview of the set of computations:

AEZ	$N_h/N$	$\frac{y_n}{Y_n} (X10^3)$	$V_h (X10^3)$	Number of villages	Number of households
1	0.16	178	2.96	4	24
2	0.30	191	10.9	2	4
3	0.28	167	7.03	3	15
4	0.18	79	0.56	5	10
5	0.07	104	20.6	2	10

average income equals the average weighted by the  $N_h/N$  factor for the estimation of average income in each stratum. The total variance in the estimation of average income is calculated by using the average weighted by the square of the  $N_h/N$  factor for estimations of partial variance ( $V_h$ ) in the corresponding strata.

This table makes it pretty clear that it is mainly primary units numbering just a few which account for highest proportion of total variance. This is particularly clear in Zones 4 and 5; these zones, with equal numbers of households, present variances ranging from about 1 to 35 when the number of villages drops from 5 to 2.

The estimation of typical total error yields a rather high figure; it may fluctuate considerably because the number of villages per stratum is limited. Nevertheless, these results give a coefficient of estimate variation of 0.33; this figure is twice as high as the coefficient calculated above, which is considered minimal. Because income distribution follows an asymmetrical pattern, and also because the primary units are small, it would be foolhardy to calculate an accuracy range for average income.

A similar computation of household sizes, conducted during the 4th trip, yields results with a pattern comparable to that of results obtained from the income survey. Average size is estimated at 13.3 persons per budgetary unit, while the estimate of typical error yields a figure of 1.43. These results give a variation coefficient of 0.11. The distribution pattern, where household sizes are concerned, is quasi-Gaussian, as can easily be seen on a functional Gausso-arithmetical graph of cumulative numbers, it is therefore feasible to work out an accuracy range. At an accuracy threshold of .95%, data obtained from the sample justify the statement that the average size of budgetary

units within the reference population falls between 10.4 and 16.2 persons. The magnitude of chance error in this estimate is thus about 22%.

It is instructive to compare this measure of chance error with that calculated on the assumption that the size sample was obtained from a process of selection at a single level of abstraction without prior stratification. The average is therefore 11.3, a figure 15% lower than the estimate obtained above. Typical error here is 0.54, i.e. two and half times lower than that obtained from calculations based on the polling plan. This last result should be compared to the observations made with regard to income.

The observations made above about the size of typical errors and of coefficients of variation of estimates make it possible to point out the magnitude of chance error, and thereby to gauge the precision and redibility of results obtained from the sample.

#### -4. Use of Simplified Estimators

The working out of calculations in connection with estimators, as described in Section 4, is a cumbersome process. Moreover, as stated in the text, the fact that the polling base was not updated, coupled with the fact that seasonal variations in village population levels make it difficult to determine the real size of this population, injects certain bias into the computations. To all this must be added another source of bias, originating from the hypothetical assumption that a proportional relationship exists between population size and number of households.

For these reasons, as well as for the reason that a variance computation shows quite substantial margins of chance error, estimates have been calculated as if the polling plan was based on a simple selection at just one level of abstraction, without prior stratification. The observable difference between the two computation methods does not exceed 20%. Considering the magnitude of the typical error margins we have to deal with, we may safely assent that these estimates fall well within the margins of error typical of the sample.

#### 6. CONCLUSIONS

The polling plan adopted made it possible to cut survey costs. The price paid was that the plan fell far short of optimal accuracy, especially as far as absolute and relative sizes of primary and secondary units were concerned.

Accuracy ranges turned out to be wider than we might have wished. Nevertheless, the random selection operated gave the sample a representative character making it possible to locate both structural patterns and trends within the base population. Thus, as stated in our foreword, this report lays no claim to being anything grander than a first probe in the study of the rural milieu in Mauritania. That is precisely how it should be evaluated.