

TRIP REPORT

CONSULTATION ON BURUNDI AGRICULTURAL SECTOR SURVEY, CONSUMPTION ASPECTS

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PREFACE

This study of nutrition and food consumption in Burundi was undertaken in conjunction with the US AID agricultural sector assessment of Burundi, currently being prepared by a MASI (Multinational Agribusiness Systems, Inc.) team. A slightly abridged version of this report has been transmitted to the MASI team leader for use and possible inclusion in the final sectoral report. The Office of Nutrition Economics (USDA-ICD) commissioned this report; providing the funding and supporting services for its preparation. The author visited Burundi between April 6 and April 23, 1979; during which time the complete MASI team was also in Burundi. While in Burundi, literature relevant to food consumption issues was reviewed and discussions were concluded with appropriate Burundi government officials and international donor personnel. The US AID Bujumbura mission was very helpful in facilitating contact with local government officials and providing in-country support services. Two field visits to the Gitega and Ngozi regions were made. Upon my return to Washington a formal debriefing for US AID and USDA personnel was held. The following report is meant to be descriptive of the Burundi nutritional situation considering the paucity of detailed nutrition/consumption literature, and the briefness of the country visit.

Clark G. Ross
May 1979

SECTION I - Introduction and Description of Burundi Agriculture

This report attempts (1) to depict the typical food consumption pattern and intake of the Burundi population, commenting on socio-economic variations to that diet, (2) to describe the basic nutritional status of that population, (3) to identify principal nutritional inadequacies, (4) to review Burundi government objectives in the nutrition area, discussing those national and donor agencies involved in nutritional programs, and (5) to recommend possible means by which US AID can improve the population's overall consumption status.

Information for this report was gathered from those consumption and nutrition studies available for Burundi (see References) and from a three week visit to Burundi. It should be emphasized that there is a lack of detailed empirical work concerning nutrition in Burundi. Those studies which are available are generally for a small segment of the population and often dated. Consequently, those data presented in this report must be used with caution, and considered more indicative than definitive.

A brief description of Burundi and its agricultural sector now follows.

The Country

"Burundi is a small, landlocked country situated just south of the equator in Eastern Africa at a distance of roughly 2,000 kilometers from the Atlantic and 1,400 kilometers from the nearest port, Dar-es-Salaam, on the Indian Ocean. It covers 27,820 square kilometers, approximately the same area as Belgium. Burundi's population was estimated at 3.8 million in 1976 and has been growing at a natural rate which may be as high as 2.6 percent a year. With the average density of 137 persons per square kilometer, Burundi is the most densely populated country in Africa after Rawanda; however, the population density varies considerably by region. More than 95 percent of the population live in rural areas, making their living from subsistence farming and from one principal cash crop, coffee, which constitutes the major source of foreign exchange for the country. Bujumbura, the nation's capital with a population estimated at 175,000 is also the largest city and the only important business and industrial center. Burundi's GNP per capita was estimated at US \$120 in 1976 and is one of the lowest in

the world. The literacy rate of the population is about ten percent."¹

Geography

Four distinct geographic regions can be identified. First, there is the low altitude area (1,000 meters or less above sea level) comprised of the Ruziz Valley and lands along the shores of Lake Tanganyika. Second, the intermediate altitude lands (1,000-1,500 meters above sea level) of the Mosso Plain and the country's eastern portion are among the least densely populated of the country. Significant livestock activity is found in these areas. Third, the middle altitude (1,500-1,900 meters) lands approach Zaire and the Nile crest. Finally, the high altitude (1,900 meters) lands comprise the crest of the Nile and extend to the border with Rwanda. The most populated portions of the country are characterized by a hilly, or even mountainous terrain with marshy valleys.

Social Setting

Approximately fifteen percent of the Burundi population are Tutsi, who have traditionally been involved in livestock. The current government is dominated by Tutsis, with nearly all important positions restricted to members of that ethnic group. About 80-85 percent of the population are Hutu, the preponderance of whom are engaged in subsistence agriculture. While the social dynamics between the two groups are complicated and difficult to summarize, it is correct to state that relations between the groups are characterized by suspicion and a degree of hostility.

Agricultural Exploitation

The CDSS report on Burundi provides a succinct description of the typical Burundi farmer: "The representative Burundi is a Hutu farmer with a bit over a hectare of land, often broken into fragments managed by himself and his immediate family. He is illiterate; it is unlikely his sons go to school and even less likely for his daughters. There is an even chance he grows coffee and if so his farm family earns less than \$400 annually. He

¹World Bank, Economic Memorandum Burundi, April 1978, p.1

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pays almost no taxes. He owns four animals, none of them cattle. He grows three crops a year, survives on a diet of beans, cassava, maize, vegetables, and occasionally some meat. Up to a fifth of his land is under bananas, mainly used for beer. One member of his immediate family may be off-farm seeking work. His life expectancy is 40, that of his wife 43. He has four living children; his wife is pregnant. One of the living children will not survive childhood. He does not have access to pure drinking water, reliable medical help, regular public transport, and has likely never seen an extension agent. He attends the local Catholic parish. The farm family lives in a single homestead (called a rugo), in reality a cluster of huts, surrounded by a fence and containing places for his animals and a small storage unit. The rugo shares a hill with a dozen other like units, occupied by relatives or kinsmen. The nearest road is five miles, but the hill is connected by a well-developed trail network. The land is now largely treeless, apart from bananas, is overgrazed, and showing signs of gully and sheet erosion."¹

To this description must be added the tendency for the size of the typical exploitation to be declining. Land is inter-generationally transferred from father to sons. The high population density found in the middle and high altitude areas has considerably reduced the amount of uncultivated land. Consequently, farm size has been declining during the last few years. Currently, there is a tenuous balance between land availability and farmer subsistence. Such a situation can not long prevail, continued population growth will quickly reduce land availability per farming family below that needed for farmer self-sufficiency. Migration schemes to encourage resettlement from the middle/high altitude areas to the less densely populated eastern portion of the country have met with little success. No evidence of significant birth control usage is noted and the government is generally unsympathetic to its introduction or discussion. Because of (1) overfarming, (2) a reduction of manure usage due to increased concentration of cattle in the southern portion of the country, and (3) the lack of any chemical input application, yields per hectare have been declining in Burundi. Obviously, the combination of high population growth and declining land productivity/

¹CDSS, Burundi, US AID, 1978

availability implies the probability of serious food deficits in Burundi's near future.

Agricultural Seasons

Two rainy season plantings are common throughout Burundi. The first of these planting on the hilly terrain occurs in September with a harvest in February. The second crop is planted in February or March with a harvest in June or July. Certain farming groups, particularly those having access to hilly recession lands, can plant a third crop in June or July with a harvest in October. These marshy depression plantings, however, only account for about ten percent of total Burundi agricultural production, and engage an equally small proportion of farming families. While the proportionate distribution will vary with region, all major Burundi crops (beans, sweet potatoes, cassava, sorghum, maize, peas, white potatoes, and greens) can be planted during each of the two rain-fed cropping seasons. Depending on the terrain, rainfall patterns, and altitudes, farmers vary the composition of their plantings. Coffee is generally harvested in June and July with the farmer receiving the bulk of his cash income during this period. The most difficult period for the typical farm household is between November and the first harvest in February. With the limited production by each farm household and with the heavy on-farm storage losses from humidity, food tends to be in short supply preceeding the February harvest.

Marketing

Little empirical evidence concerning percentage of production marketed, farm prices, trader margins was available in Burundi. The general consensus is that only a small percentage of the peasant's total agricultural production enters the market. Apparently, the difference between the typical rural producer price and the consumer price in Bujumbura is quite large. While the lack of competition among market intermediaries is the most often cited reason for this substantial price differential, it would also seem that high transport and storage costs (direct and losses) must also be considered. There are few market outlets for the Burundi peasant; rural markets are infrequently held and often a great distance separates the peasant from the nearest periodic market. Those peasants in the interior of the country

usually install themselves along a principal highway and await one of the travelling traders who frequent the route by truck. In the ensuing bi-lateral negotiation session between the peasant and trader/trucker, the peasant is relatively disadvantaged. He does not want to return home without having sold his product. Further, he does not know when the next trucker will be coming through the area. Presumably, this scenario represents the uncompetitiveness referred to above. Nevertheless with gasoline selling at about \$3.50/gallon legally, when available, and reaching \$8.00/gallon on the black market, the relatively high cost of transport in Burundi and its eventual inclusion in the trader's margin can not be ignored. Coffee is also collected by these truckers who theoretically pay the farmer the official government producer price; again, widespread claims of trucker noncompliance and underpayment of the producer are common. In summary, the preponderance of the farmer's cash income is derived from coffee sales with some supplement from vegetable and banana sales.

Extension

Organized government extension is quite ineffective in Burundi. In principle, monitors should be visiting the rural producer instructing him in land preparation, crop rotation, weeding methods, and harvest/post-harvest techniques. In fact, the producer only sees the extension agent when the agent makes an inspection of the producer's coffee trees to verify that the farmer is growing the requisite coffee and tending his trees. Official government policy is to promote coffee growth for export, representing the principal source of foreign exchange for Burundi. While there are training schools for both agricultural technicians and monitors, the training is little adapted to the realities of the Burundi farmer and no major initiative is made to reach the farmer or to improve his standard of living.

Food Versus Commercial Crop Production

Currently the typical Burundi farm household produces a modest amount of coffee, the value of which is estimated at \$300-400 per year. This represents the near totality of the household's cash income since food crops are not extensively marketed. World coffee prices are currently attractive and it could be argued that encouraging additional coffee production by the rural household would be an efficient means to increase rural incomes.

This premise can be disputed from several perspectives. First, the Burundi farmer receives only about twenty percent of the final export price for coffee, with the government and intermediaries sharing the other 80 percent. Second, the World Bank projects a decreasing world price for coffee during the 1980s. Finally, were the rural household to devote additional labor and land to coffee, it would be increasingly obliged to rely on purchased food. Assuming a majority of farmers were in this situation, decreasing food supplies would simply bid up food prices and the farmer would be unable to purchase at a reasonable price the needed food items. Since the government and the intermediaries receive such a large portion of the coffee income, the farmer does not really have a comparative advantage in coffee versus food production. For this reason, increasing the monetary income of the household through increased coffee production probably will not lead to an improved rural standard of living. Rather, concentrating development resources into increased food production would better serve the rural family.

Summary

To conclude this section, a brief listing of the major problems facing the Burundi farmer and the national agricultural sector will be made.

1. Given the limited amount of suitable agricultural land, population growth has led to over cultivation and a decline in fallow rates. This has resulted in decreasing land productivity, a problem which will become increasingly serious.
2. A decline in cattle ownership by the typical Hutu farmer, stemming from declining grazing land availability in traditional agricultural regions, has led to a reduction in natural fertilizer usage, further deteriorating agricultural lands.
3. As a landlocked country situated 1,400 kilometers from the nearest port, Burundi currently has a macro-comparative advantage only in coffee production. Imports of all goods, including agricultural materials, are prohibitively expensive. The typical farmer receives no direct benefit from any commercial imports.
4. A lack of internal markets, due to both supply and demand constraints, effectively negates any effort at individual farmer specialization and trade.
5. There is no real system of producer credit for agricultural inputs and no effective government extension reaching the rural producer.

6. The Tutsi-dominated government shows little concern for Burundi's growing problems in the agricultural sector. No effective plan for vitalizing the rural sector or for limiting population growth has been advanced by the national government. Donor groups working in Burundi cite the lack of interest by and cooperation from the local government in donor rural development programs.

7. Increased food production rather than increased coffee production would best serve to improve rural living standards.

The succeeding evaluation of nutrition and food consumption must be considered in light of these problems. Also, efforts and projects to improve rural living standards must be assessed within the social and political context of Burundi life.

SECTION II - Basic Description of Nutritional and Consumption Patterns.

For this basic description of food consumption patterns, the Burundi population (3,827,200 people - 1976) can be simplistically divided in an urban sector (five percent) and a rural sector (95 percent). The urban population is essentially located in Bujumbura (approximately 160,000) and Gitega (25,000); the rural population is spread throughout Burundi's eight provinces. There is, of course, great socio-economic diversity among Burundi's rural population; however, this basic description of consumption and dietary practices is essentially relevant to the broadly classified rural population.

General Food Consumption Habits

1. Meals - In rural areas, two meals per day are common. A late morning meal, sometime between 10 a.m. - noon and an early evening meal are typical in rural areas. Generally in urban areas, three meals per day are consumed; the timing of these meals is patterned after European practices.

2. Cooking Practices - In rural areas cooking is almost exclusively done on wood fires. The wood is daily collected by women and children. Wood is essentially viewed as a "free good" by rural inhabitants. With little care for proper management of forest resources, wood is collected where conveniently available. Cooking of food is done by the wife in the rural areas, with the wood fire often in a small room of the house.

At best only a small hole in the roof of the hut serves as a chimney.

In urban areas charcoal (price 20-25 BU.F/KG) is used for cooking.¹ Meal preparation is the responsibility of the women, or in rare cases where both spouses have salaried employment, the responsibility of a hired domestic.

3. Household Membership - Both urban and rural areas are characterized by nuclear families, occupying individual residential structures. Thus, in both areas, food preparation and consumption is on a family basis - the typical household numbering between five and eight individuals. While some polygamy exists in Burundi, monogamy tends to characterize the typical household.

4. Food Supply/Procurement - In rural areas households for the most part depend on their own grown product for their food supplies. Non-produced items like salt and sugar are purchased in periodic (once or twice weekly) rural markets. Considering the emphasis on rural food self sufficiency and with the general lack of marketable produce surpluses, organized markets in the rural areas are not common and do not display the wide variety of products often found in rural West African markets.

Not all farming households in the rural areas of Burundi are self-sufficient in basic food crops. The small size of the typical agricultural exploitation and its declining productivity force many families to rely on purchased food items. These households must either use receipts from the sale of coffee or from other sources to sustain themselves after their own food supplies have been exhausted. While empirical evidence is not available, it appears that many rural households, lacking the necessary financial resources, are forced to reduce their daily food intake until the next harvest replenishes their supplies. Food availability in rural areas is primarily a function of season (see Section I) and region (see Section III, Part B). The variety of food products in rural areas is considerably more limited than that found in Bujumbura.

In urban areas the near totality of food is purchased. Either the wife or a domestic will go on a daily basis to the Bujumbura market to purchase the needed food items. All major food products (see Section II, Major Food Items) can be found in this typical African market.

¹89.55 BU.F/\$

5. Attitudes Towards Food - Of interest is the Burundian attitude towards food. Apparently, in rural areas, food consumption does not play the important social role which it does in many West African countries. Holidays, baptisms, marriages and other social occasions do not revolve around food or special meals. Such occasions in Burundi, when celebrated are more associated with beer consumption.

It is claimed that this relative lack of interest in food consumption has accentuated poor nutritional habits like lack of attention to regular meal hours, nutritionally poor food combinations, and inefficient food preparation practices.

Major Food Items

This part of the nutrition report details the major food items available to the Burundi population, indicating the fashion in which they are typically prepared and eaten. The estimated caloric content of each food item is shown in Table II.

1. Grains

Maize - Maize is the most important grain in the Burundi diet. Maize in grain form is boiled in water and often mixed with beans. Maize cooked and then eaten on the cob is common. Finally, maize ground into flour for preparation as a "mush" type meal is frequent. Some maize bread is also made from the maize flour.

Sorghum-millet - These grains play a limited role in the average diet. Some sorghum is destined for beer consumption.

Wheat - A large portion of the wheat consumed in Burundi is imported and primarily used for bread in urban areas.

Rice - Part of the rice consumed is imported for consumption primarily in the Bujumbura area. Some local rice is grown on the plains bordering Lake Tanganyika. Rice is generally cooked in water and less often with oil. Rice with a sauce can complement a fish or meat dish.

2. Tubers, Root Vegetables

Sweet Potatoes (Ipomoea batatas) - Sweet potatoes, a major staple in the Burundi rural diet, are usually boiled.

Cassava (Manihot dulcisor) - Whole cassava can be boiled or fried; also cassava flour is commonly used in various mushes, cakes, or porridges.

Colocase Taro (Colocasia esculenta) - The colocase is usually boiled; and occasionally prepared with beans, some oil, and onions.

White Potatoes (Solanum tuberosum) - Either boiled, fried, or mashed potatoes are eaten as part of the urban and high altitude diet.

3. Legumes, Vegetables, Fruits

Beans - Beans are the major protein source for the Burundi population. Brown, white, and fresh green beans are all common. Beans will generally be boiled for use in soups or served directly after cooking. The preponderance of beans are dried. More elaborate bean dishes with additional cooking in oil, onions, garlic or condiments are also popular.

Peas - Peas can be prepared in the same manner as beans, but are generally boiled.

Bananas - A number of types of bananas are native to Burundi. The yellow banana (Musa sapientum) when ripe is eaten raw; green bananas are often boiled; while the long yellow banana (Musa paradisiaca) is generally fried. A major portion of the banana production is destined for banana beer preparation.

Fresh Vegetables and Fruits - A number of other fresh produce items play a role in the Burundi diet, varying with the ecological conditions of the region. These include carrots, onions, cauliflower, cabbage, tomatoes, cucumber, spinach, pineapple, avocado, guava, lime, grapefruit, papaya, and mango. Consumption of these fresh vegetables and fruits is more common among higher income, urban groups.

3. Animal Protein Sources

Meat - While cattle are relatively plentiful in Burundi, per capita beef consumption is very limited. Cattle are primarily viewed as a source of wealth and status; regular and planned marketing of cattle is rare. Beef consumption is considerably higher in urban areas than in rural areas. Goat and sheep meat consumption is also very low on a per capita basis. These meat products, including beef, are most apt to be boiled or grilled when eaten. Chicken is not eaten often. Eggs are rather expensive and extensive consumption is limited to higher income groups.

Fish - Fish consumption is primarily limited to Bujumbura and areas near Lake Tanganyika. Internal transport difficulties, as well as the lack of organized markets account for the lack of fish consumption in rural areas.

Interior lakes and rivers are not well stocked with fishery resources. Further, many rural people look with disdain on fish consumption, stemming from traditional superstition and occasional contamination.

Milk - The most important source of animal protein in Burundi is milk. Even though human destined milk production per cow is relatively low, the large number of cows in Burundi results in relatively high per capita milk production. Cheese and butter processing, however, is very low.

4. Other Food Items

Peanuts (vigna) - In areas where peanuts are grown, their consumption in the form of either whole nuts or oil is important.

Oil - Both peanut oil and palm oil (elais) are used to varying degrees for cooking purposes. Their use is primarily a function of income and accessibility. Palm oil is produced in the south western portion of Burundi.

Salt and Sugar - Income permitting, these items are used in the typical diet.

5. Gathered Foods - No data is available in-country on foods other than the major items above. Given ethnological experiences in neighboring countries where similar conditions exist, it would appear that "gathered" foods play a role in rural diets. These "gathered" foods would be either from trees and plants growing on the farm plots or from uncultivated, naturally growing sources away from the tended plots.

Typical Consumption Pattern

Food availability and resulting intake vary with respect to age, sex, region, and income. These variations will be discussed in some detail later in this report. In this section a description of the typical diet of the low-middle income Burundian will be presented.

In urban areas sweet potatoes, cassava, maize and bananas are the staple items in a low income diet. While beans are important, recent price increases caused by increasing demand have led to some per capita diminution in urban bean consumption. In a low income diet fish would be more likely consumed than higher priced meat. The importance of each of these dietary components would vary with seasonal availability and consequent price levels. Higher income urban residents would benefit from increased meat, milk, white potatoes, vegetable and fresh fruit consumption.

In rural areas the individual farm production predominately determines the daily diet. Regional and seasonal variations to the diet will be more pronounced in rural areas. Since family food production is generally limited and on-farm storage methods inefficient, little food is stored beyond a crop season. The production from a harvest must sustain the rural family until the succeeding harvest. Bananas, of course, are available most of the year. Thus, to promote diet diversity and to minimize production risk most rural households interplant a variety of crops.

While varying with season and region, the typical rural diet will be dominated by maize, beans, sweet potatoes, cassava and bananas. Milk when available, banana beer, and water are the principal liquids consumed.

The following section attempts to estimate the food intake of the Burundi population.

SECTION III - Food Availability, Socio-economic Variation, and Nutritional Indicators

PART A

Food Availability, Caloric Intake, and Food Expenditure

In this part of the nutrition report various estimates of food availability and daily consumption will be presented. Further, an evaluation of the typical Burundi diet will be made, based on available nutritional indicators.

As will be evident from the ensuing discussion, the quality of the empirical evidence concerning nutrition and consumption is very poor and inadequate. Nevertheless, some broad conclusions can be reached and certain nutritional deficiencies noted.

Further, the empirical estimates differ widely; complicating an accurate assessment of Burundi food consumption. Some of the reported variation results from using different sample time periods and populations. Nevertheless, this wide variation should convincingly demonstrate the need for more comprehensive and precise data collection procedures in Burundi.

Table I provides estimates of domestic agricultural production from the Burundi Plan, the FAO and the World Bank. Further, recorded net imports of these products are noted. The wide discrepancy among the three estimates of domestic production is striking. Of interest is the fact

TABLE I

ESTIMATES OF NATIONAL FOOD AVAILABILITY

Food Source	(000 tons)				Total ⁴
	1977 Plan ¹	1977 FAO ²	1976 World Bank ³	Net Imports 1976 ³	
<u>Cereals</u>					
Maize	140*	255	419.6		140
Sorghum/Millet	32*	137	119.8		32
Wheat	6*	13	N.A.	6.1*	12.1
Rice (Grain)	4.5*	5.2	N.A.	.2	4.7
<u>Tubers/Roots</u>					
Sweet Potatoes	420.5*	755	1,425.8		420.5
Cassava	396*	975	2,494.5		396
Colocase/Taro	111.5*	N.A.	N.A.		111.5
White Potatoes	37*	80	N.A.		37
<u>Animal Protein</u>					
Beef	18.0*	16.0	N.A.	-.3*	17.7
Fish	20.3*	N.A.	N.A.	.15*	20.45
Milk	30.5*	15	N.A.	.56*	31.06
<u>Legumes/Vegetables/Fruit</u>					
Beans	307*	150	500.5		307
Peas	33*	45	N.A.		33
Other Green	35*	N.A.	N.A.		35
Bananas	1,320*	1,475	N.A.		1,320
Fresh Fruit	65*	N.A.	N.A.		65
<u>Other</u>					
Peanuts	9.5*	18	N.A.		9.5
Oil/Butter	N.A.	N.A.	N.A.		N.A.
Salt	0*	N.A.	N.A.	12.5*	12.5
Sugar	5*	N.A.	N.A.	5.1*	10.1

N.A. = Not Available

¹Rural Production in 1977 from 1978-1982 Burundi Plan
Fresh fruit and vegetables were estimated at 100,000 total;
paddy (rice) at 7,000; resulting modifications in table were made by
the author.

²FAO annual production estimates

³Economic Memorandum - Burundi; World Bank, April 1978

⁴Indicates estimate used in calculations on Table II

* Used in total estimate shown on far right of this table.

that official Burundi production estimates are significantly below those of the other sources.

All three sources confirm the dominance of sweet potatoes, cassava, beans, and bananas in total agricultural production. Also, the relatively low individual animal productivity should be noted. Fish production given the abundant resources of Lake Tanganyika, as well as certain inland bodies of water, is very underdeveloped.

The great variance in these production estimates complicates their use as accurate indicators of domestic production and nutritional status.

Table II collects from various sources estimates of per capita daily caloric intake. These sources are identified in the notes to that table. The macro-production figures are derived by taking the sum of 1977 domestic production (Burundi Plan) and net imports then dividing them by the estimated 1977 population (3.9 million) and finally converting them to a daily ration.

Some comment on each of these estimates is needed:

1. The Stanford study basically shows a diet dominated by sweet potatoes, beans, cassava, and white potatoes. Low beef consumption and non-existent fish consumption are indicated by these figures. Mean caloric intake would appear satisfactory.¹ Also, of interest is that beer consumption, both banana and sorghum is not alarmingly high.

2. The WHO report indicates reduced sweet potatoe and cassava consumption in comparison to the Stanford Study. Banana consumption both edible and in fermented beverage form, however, is considerably higher. Finally, total caloric intake is approximately fifteen percent lower than that of the Stanford Study. One interpretation of this difference is that available food supplies have been sharply reduced from those of 1962, the time of the Stanford Study. The "softness" of the data casts doubt on the extent to which such a statement can be accepted.

3. The SEDES Study suggests even lower daily caloric intake. This study, conducted in the Ngozi-Muyinga regions, indicates a diet dominated by sweet potatoes, beans, cassava, and bananas.

4. The caloric estimates from the macro-production figures are the most baffling. They suggest significantly higher per capita food availability than the other studies. Certain explanations can be advanced.

¹Such a statement is general since it does not consider differing caloric requirements with respect to sex, age, and work demands.

TABLE II
DAILY PER CAPITA FOOD INTAKE
(Various Sources)

	Cal. Gm.	Stanford ^a 1962		WHO 1976 ^b		SEDES-1971 1st Survey ^c		SEDES-1971 2nd Survey		MACRO-Production Figures-1977 ^d (Table I, Col.4)	
		Grams	Calories	Grams	Calories	Grams	Calories	Grams	Calories	Grams	Calories
<u>Cereals</u>											
Maize		19.08	66.60			3.92	13.69	9.82	34.26	98	342
Sorghum/Millet		1.96	6.85			1.44	5.03	.02	.06	22	76.7
Wheat						1.62	5.67	.95	3.30	8	27.9
Rice						.28	.99	1.29	4.49	1	3.49
Other Cereals								5.63	19.65		
Total Cereals	3.49			90	314.4						
<u>Tubers, Root</u>											
Sweet Potatoes	1.16	583.2	676.50	200	232.4	312.7	362.67	351.1	407.31	295	342
Cassava	3.33	115.6	385.11	70	233.6	55.4	184.38	59.9	199.29	278	926
Colocase/Taro	2					41.2	82.28	49.3	98.49	78	156
White Potatoes	2	168	336			1.31	2.63	.7	1.38	26	52
<u>Animal Protein</u>											
Beef/Meat	1.67	6.8	11.32	14	23.4	3.5	5.93	2.2	3.65	12.0	20
Fish	3.66			9	33	.6	2.16	.2	.65	14	51.2
<u>Legumes, Fruit</u>											
<u>Vegetables</u>											
Beans	3.04	212.7	646.5	150	456.4	241.5	734.04	265.6	807.33	215	654
Peas	3.04					4.35	13.24	8.68	26.40	23	69.9
Other/Green	.43	39.5	16.98	80	34.4	6.6	2.82	13.0	5.60	25	10.8
Bananas	.53	10.9	5.82	150	80.1	495.6	262.69	228.8	121.30	927	491
Fresh Fruit	.41			30	12.3	22.2	9.10	36.4	14.92	45	18.5
<u>Other</u>											
Peanuts	5.33			8	42.6	1.7	9.18	1.55	8.25	7	37
Oil/Butter	8.78			15	131.7	.50	4.40	.22	1.90		
Diverse (salt, etc.)						N.A.	.02	N.A.	.05		

Table II continued

	Cal. Gm.	Standard ^a 1962		WHO 1976 ^b		SEDES-1971 1st Survey ^c		SEDES-1971 2nd Survey		MACRO-Production Figures-1977 ^d (Table I, Col.4)	
		Grams	Calories	Grams	Calories	Grams	Calories	Grams	Calories	Grams	Calories
<u>Liquid</u>											
Beer-Banana	.44	46.5	20.46	700	308.2	285	125.16	136	59.86		
Beer-Sorghum	.44	127.5	56.10			143.5	63.16	35.6	15.66		
Milk	.77	12.3	9.48	30	23.2	.55	.42	.08	.06	22	16.9
<u>TOTAL</u>		1344.0	2237.7	1546	1925.7	1623.5	1889.66	1207.0	1833.86	2096	3295.4

^aLieurquin, "Agricultural Change in Ruand-Urundi 1945-1960", Stanford University: 1963. Figures given in Leurquin's article have been converted to grams per day and transformed to adult equivalents.

^bWorld Health Organization, "Aperçu sur l'alimentation et nutrition au Burundi, 1976." These figures are for women.

^cSEDES, Enquête Statistique Alimentaire et Budgetaire 1970-71. March 1974. These samples were taken in the Ngozi-Muyinga regions of Burundi. These regions cover the north and northwestern portions of Burundi. The N'Gozi region, primarily because of a high population density, has lower than mean per capita food availability, while the Muyinga region has greater than mean food availability. Three surveys of nearly 2000 household were conducted during the 1970-71 period. The results used in this report are the mean results from the two regions.

^dMacro-production figures; taking estimates of global 1977 production given in the 1978-1982 Plan and converting to grams per capita per day. The total grams per day (2096) is essentially identical to that calculated in the Plan (2165) and show on page 110 of the Plan. Note: Banana and sorghum beer consumption has not been netted out of these figures. Also it is not clear from the Plan to what extent post-harvest and transformation losses have been considered and netted out.

First, 1977 was a relatively good agricultural year. Production in succeeding years (1978, 1979) was considerably less (see Le Renouveau, le 29 mars, 1979, p. 1). Thus, these 1977 figures are not terribly representative. Second, it is not clear to what extent post-harvest storage, milling, and processing losses, which could easily approach 20 percent of total production, have been considered. Third, these global figures mask regional shortages-surpluses which are not easily equilibrated due to the lack of organized marketing and high internal transport costs in Burundi. Fourth, a major source of the caloric variation is in the estimated consumption of cassava. The Macro-production figures indicate a per capita ration of cassava 150-500 percent greater than that of the other sources. Due to the great difficulty in measuring cassava yields and production, these macro-production estimates may be greatly overstating cassava consumption and resulting caloric intake. Finally, the overall reliability of these figures again must be questioned.

In summary, the WHO and the SEDES studies, the most recent micro-level surveys available, indicate a low daily caloric intake. This situation could become progressively more serious as an increasing Burundi population places additional pressures on per capita land availability. Food production on a per capita basis will fall unless compensatory agricultural development programs are successfully introduced.

As will be discussed in Part C of this Section, nutritional problems are currently more related to the quality of food than the absolute quantity.

Food Expenditure

This part of the nutrition report attempts to estimate per capita and family food expenditures.

In assessing the statistics presented in this discussion the following qualifications must be mentioned.

1. The daily diet assumed is subject to great socio-economic variation, which will be discussed in the succeeding section. Also, this diet is one of only 1,890 calories/day; such caloric intake would be below most conventionally accepted standards. Thus, the daily expenditure would be biased downward.

2. Prices are not stable in Burundi. Intra-annual price variations are quite significant due to the seasonality of crop production, the lack

of adequate storage facilities, and the inefficiency of the existing marketing system.

3. Since farmers grow a large portion of their own food, they do not pay explicitly for consumed food. To some extent the prices shown represent an opportunity price, if the farmer were to sell his produce. Thus, the reported expenditure is more implicit than explicit. Some farmers, however, must purchase food after their own supplies have been depleted. In this case the values become explicit costs to the farmer.

Illustrative food expenditures are shown in Table III. The SEDES figures, Survey 1 (see Table II), have been arbitrarily assumed for this exercise. The first column of Table III shows the price (Burundi francs) per kilogram used to value rural production in the 1978-1982 plan. These prices would be considerably lower than either rural or urban market prices. They are used in this exercise simply as a point of reference.

The 1979 Bujumbura market prices were collected during April 1979. Agricultural prices have been annually increasing in Burundi as population growth increases demand. Also, intra-annual increases occur with prices generally rising in the August-January period (see Section I). These urban market prices, however, would exceed those generally prevailing in rural markets. In a sense the two price lists provide a range from an unrealistically low producer valuation to the high prices prevailing in Bujumbura. The rural family, depending upon regional location and season of the year, would pay some intermediate price.

Table III shows the relative expensiveness of food in Burundi. For an inadequate diet the adult daily expenditure in Bujumbura is 56.89 francs. This implies a yearly expenditure of 20,764.8 francs per capita (\$231.88) or \$927.52 for a family of four adult equivalents.¹ At the producer values used by the plan the per capita annual cost would be \$36.15 or \$144.61 per family of four adult equivalents.

Thus, if rural per capita income is only \$50-60 per year, even at the unrealistically low producer values, 60-70 percent of family resources must be spent on food, for an inadequate diet.

At more realistic market prices, this percentage increases and can approach one hundred percent.

¹89.55 BU.F./\$

TABLE III
SELECTED ESTIMATES OF DAILY PER CAPITA FOOD EXPENDITURE

	1977 Plan Price Bu.F./Kg.	1979 B'bura Market Price Bu.F./Kg.	SEDES 1971 Survey 1 Grams/Day (See Table II)	Daily Expenditure Plan Prices Bu.F.	Daily ¹ Expenditure Market Prices Bu.F.
Maize	11	20	3.92	.043	.078
Sorghum	11	40	1.44	.016	.058
Wheat	21	N.A.	1.62	.034	N.A.
Rice	18	80	.28	.005	.022
Sweet Potatoes	4.5	20	312.7	1.41	6.26
Cassava	4	20	55.4	.22	1.11
Colocase/Taro	4.5	20	41.2	.186	.824
White Potatoes	15	40	1.31	.12	.05
Beef	80	250	3.5	.28	.88
Fish	N.A.	60	.6	N.A.	.04
Beans	17	45	241.5	4.10	10.9
Peas	30	65	4.35	.13	.28
Bananas	4	30	495.6	1.98	14.86
Fresh Fruit/Greens	10	N.A.	28.8	.288	N.A.
Peanuts	30	55	1.7	.05	.09
Beer	N.A.	50	428.5	N.A.	21.42
Milk	16	35	.55	.01	.02

Table III continued

	1977 Plan Prices Bu.F./Kg.	1979 B'bura Market Price Bu.F./Kg.	SEDES 1971 Survey 1 Grams/Day (See Table II)	Daily Expenditure Plan Prices Bu.F.	Daily Expenditure Market Prices Bu.F.
Per Capita/Per Day (Bu.F.)				8.87*	56.89
Per Family of 4 Adult Equivalents/Day				35.48*	227.56
Per Year Per Adult				3,237.55*	20,764.85
Per Year Per Family of 4 Adult Equivalents				12,950.20*	83,059.40

* Does not include beer expenditure

¹ Since actual rural prices were unavailable, this estimate is more appropriate for the urban than the rural sector.

While these figures are quite illustrative and subject to considerable variance, the high cost of food in terms of the family's overall financial resources should be evident.

Finally, in Table IV the cost per 1,000 calories of the principal food items in the Burundi diet is shown. These costs are expressed using both farmgate prices of the Burundi Plan and the observed Bujumbura market prices (April 1979). While the level of cost is sensitive to the price series used, the relative ranking of the food products is essentially the same under both the Plan and the market prices. Certain points deserve comment. First, the cost of 1,000 calories from beef is significantly more expensive than from any other food source. With both price series, maize, sorghum, cassava, and colocase are the least expensive sources of calories. Sweet potatoes are only slightly more expensive. Thus, the typical Burundi diet, comprising maize, sweet potatoes, and cassava does approach a least-cost per calorie diet. The major problem is that this diet, while providing low cost calories, lacks certain essential nutritional properties. These will be discussed in Part C of this Section.

This part has described the typical Burundi diet and estimated the cost to the consumer of the diet. Succeeding parts to this section will discuss the socio-economic variation to this diet and possible nutritional inadequacies associated with the composition of the diet.

PART B

Socio-Economic Variability

In this part of the report the socio-economic variation to the general food intake estimates previously presented will be discussed. Attention will be given to such factors as sex, age, region, income, and intra-annual.

1. Sex - Only the SEDES report discussed the extent of food consumption variation between men and women. Their findings suggest that caloric intake by an adult female could be 10-15 percent less than that of an adult male within the same family. No information for male/female children was provided.

The inferior caloric intake by females is probably explained by two factors. First, choicer food items and greater quantities of food are usually reserved for adult males. Second, males receive considerably more caloric

TABLE IV

COST (BU.F) PER 1,000 CALORIES OF PRINCIPAL FOOD ITEMS

Commodity	Calories Per Gram	Kg. needed for 1,000 Calories	Cost/1,000 ¹ Calories Farmgate (Bu.F)	Cost/1,000 ² Calories Bujumbura (Bu.F)
Maize	3.49	.286	3.15	5.72
Sorghum	3.49	.286	3.15	11.44
Sweet Potatoes	1.16	.862	3.88	17.24
Cassava	3.33	.300	1.20	6.00
Colocase/Taro	2.00	.500	2.25	10.00
White Potatoes	2.00	.500	7.50	20.00
Beans	3.04	.329	5.59	14.81
Peas	3.04	.329	9.87	21.39
Bananas	.53	1.887	7.55	56.61
Beef	1.67	.599	47.90	89.70
Fish	3.66	.273	N.A.	16.38

¹Calculated using those prices shown in Table III under the heading 1977 Plan Price, Bu.F/kg.

²Calculated using those prices shown in Table III under the heading 1979 B'bura Market Price BU.F/kg.

intake by virtue of their greater consumption of banana and sorghum beer. This points out the trade-off between banana usage for beer and food with its nutritional implications.

Of further importance, the SEDES study indicated that the variation in caloric intake by sex was most pronounced in the 25-34 year age group. Since most women are pregnant or nursing during this age period, such deficiencies pose serious problems for both the mother and the child. Of relevance is the great demand on woman's time from both agriculture and domestic work. Burundi women apparently work considerably more hours than males. This further intensifies nutritional problems associated with the lower mean caloric intake by women.

Certainly, this question of differing caloric food intakes by sex must be carefully studied. More precise statistical information is needed to judge the true extent of this problem.

2. Age - Little statistical information on the variation by age of food intake is available. Indications are that serious qualitative nutritional deficiencies hinder the growth and development of Burundi children. As will be discussed in Part C of this section, insufficient calcium, protein, and vitamin intake are major factors in child disease and infant mortality in Burundi.

Clearly the 15-45 adult male is benefiting from the greatest caloric intake. The predominant cause of this phenomenon appears to be more a function of sex than of age.

While not providing direct statistical evidence, a UNICEF nutritional expert working in Burundi felt that at least 50 percent of rural children had inadequate height and weight for their physical age.

Thus, from the perspective of nutrition, children and women (ages 25-34) seem to be of the most vulnerable age groups. Deficiencies seem to be more qualitative than quantitative. Nevertheless, many children undoubtedly suffer from an overall lack of caloric intake.

3. Region - The primary source for regional food intake is the recently released Belgian study for development of the Kirundo region, in the north of Burundi. Table V indicates the per capita availability of food in major regions of Burundi.

With the exception of peanuts and maize the weighted national mean for each product is similar to the national per capita mean expressed in

TABLE V
 AVAILABILITY PER YEAR PER PERSON/1977-78
 (Kilograms)

	<u>Population (000)</u>	<u>Beans</u>	<u>Peas</u>	<u>Peanuts</u>	<u>Maize</u>	<u>Sorghum</u>	<u>Wheat</u>	<u>Rice</u>	<u>Total</u>
Bubanza	242	109.3 ^a	15.4	15.9	98.2 ^a	.7	0	16	255.5 ^a
Bujumbura	363	51.5 ^b	11.1	0	24.6 ^b	.1	4.5	0	91.8 ^b
Bururi	418	98.4 ^a	9.5	1.2	55.2 ^a	2.4	2.9	.9	170.5 ^a
Gitega	650	127.4 ^a	.7	9.4	57 ^a	12.3	0	0	206.8 ^a
Muramuya	429	46.9 ^b	12	2.0	31.4 ^b	6.2	6.7	0	105.2 ^b
Muyinga	462	84 ^a	11.8	6.6	64.2 ^a	17.7	0	0	184.3 ^a
Ngozi	749	61.8 ^b	13.8	1.3	36.9 ^b	6.7	1.1	0	121.6 ^b
Ruyigi	374	35.4 ^b	2	4.9	13.1 ^b	9.1	0	.4	64.9 ^b
Weighted Mean		77.98	9.18	4.65	45.69	7.72	1.78	1.19	148.19
National per Capita Consumption (KG's) From Plan (Table II)		78.47	8.39	2.6	35.7	8.0	2.9	.37	136.43

^a Above mean

^b Below mean

NOTE: Statistics available only for those products shown.

the Burundi Plan. Thus, the implied caloric intake would be similar to that shown under Macro-Production in Table II. In principle, storage and other post-harvest losses were deducted from the Belgian estimates and the weighted mean would reflect their exclusion.

Again, a satisfactory mean per capita food availability is expressed in these figures. Nevertheless, the validity of both these production and availability figures cannot be established. Further, the micro-level studies presented in the previous part of this section did indicate that per capita food intake was somewhat deficient. The importance of the fundamental issue of food quality versus quantity again becomes evident from this discussion.

It should not be assumed, of course, that production on a per capita basis is equivalent to per capita consumption. Inter-regional transfer of food products must be considered. The surplus Bubanza region, for example, would be a supplier to the deficit relatively urbanized Bujumbura region. Nevertheless, with the relatively meager quantities of food crops marketed, these regional figures are indicative of inter-regional consumption differences. Of course, intra-regional differences related to income need be considered before drawing conclusions about a typical regional diet.

The above figures would indicate below mean per capita availability of the principal agricultural crops in the Bujumbura, Muramuya Ngozi and Ruyigi regions. To what extent these deficiencies are compensated by inter-regional transfers is not clear.

Further, in certain regions other food items not referenced in the Belgian study are available. Fish consumption, for example, would be greater in the Bujumbura area, bordering Lake Tanganyika, than in other parts of the country. Meat and milk consumption would be greater in the urban Bujumbura area, as well as in the southern region where cattle grazing predominates.

Thus, the available empirical evidence does not lead to clear-cut indications of regional food deficiencies. The Ngozi, Muramuya, and Ruyigi areas, however, appear to be less advantageously placed with respect to availability of the various food sources considered.

4. Income - There is little data on food consumption by income levels. In rural areas, higher income farming groups, defined to include those possessing access to above average hectarage and land quality, undoubtedly have superior production and food supplies. Further, these groups are most

apt to have some production surplus which can be sold to generate cash income for supplemental food items.

In urban areas, higher income groups have greater access to meat, fish, and other expensive, but nutritionally sound, foods. Further, no estimates of the actual income distribution in Burundi were found.

As detailed in Section I of this report, lower income groups, depending on regional characteristics, have a diet dominated by cassava, beans, maize and sweet potatoes. This diet is minimal in certain important requirements and leads to malnutrition and disease. Thus, with poorer groups both quantity and quality are lacking in the diet. Furthermore, during the months of October-February before the first harvest, poorer families which have exhausted their food supplies will be less able to purchase supplementary food.

5. Seasonal - Seasonal diet variations are difficult to differentiate from those attributable to regional differences. Two harvests, one in February and one in June or July account for about 80-90 percent of Burundi Agricultural production. (See Section I for a more complete description of Burundi agriculture.) The period between December and February is particularly difficult since many families have nearly exhausted their production from the July harvest. Increasing proportions of cassava and bananas would be eaten during this time period. Those families fortunate enough to have some cash reserve from coffee sales or other transactions will buy increased amounts of food during this period.

Also, families having access to cultivatable swamp or marsh lands can plant a crop in June for harvest in October. Total production from these marsh areas, however, is very limited.

Thus, there is a strong seasonal pattern to consumption in Burundi.

Nutritional and health problems caused by an inadequate diet can be accentuated by seasonal, income, and regional factors.

PART C

Nutritional Problems

In this part of the report various nutritional deficiencies and groups most affected by these deficiencies will be identified.

Again, quantitative information for the principal nutritional indicators is generally lacking or out-dated. The SEDES report, using 1971 data for the

Ngozi-Myinga region, is the only comprehensive source.

Their findings are presented in Table VI below:

TABLE VI
NUTRITIONAL INDICATORS (SEDES REPORT)
(Estimated needs are those established by SEDES)
Per Person/Per Day

<u>Items</u>	<u>Survey 1</u>	<u>Survey 2</u>	<u>Survey 3</u>	<u>Estimated Needs</u>	<u>Mean Coverage of Needs</u>
Calories	1,899	1,921.1	1,855.6	2,140	.88
Proteins (g)	63.3	75.5	68.7	58.75	1.17
Calcium (mg)	576.9	716.1	695.7	990	.67
Iron (mg)	35.4	39.0	38.1	11.8	3.18
Retinol/Vitamin A (ui)	1,830.4	2,155.8	2,065.7	4,470	.45
Thiamine/Vitamin B-1 (dmg)	14.9	16.3	16.3	11.4	1.39
Riboflavin/Vitamin B-2 (dmg)	6.7	7.4	7.06	14.8	.48
Vitamin C (mg)	204.7	185.0	219.0	70.5	2.88
Fats (mg)	6.9	7.4	6.93	Not Stated	N.A.

A mixed picture emerges from this table; the major items of which are discussed below.

1. Calories - As mentioned in the previous discussion, mean per capita caloric intake of foods is probably not greatly below recommended standards. However, this survey was taken in 1971, since then the additional population has undoubtedly further reduced per capita food supplies. In the future this problem will be even more acute as farms are further subdivided for inter-generational transfer.

Also, the previous discussion identified certain groups which are suffering from insufficient food/caloric intake. These were:

- (a) women of child-bearing age and children,
- (b) rural and urban poor,
- (c) inhabitants of the Ruyigi, Muramuya, and Ngozi regions,

(d) seasonally affected groups during November-February. The exact magnitudes of these deficiencies cannot be established based on the available evidence.

2. Proteins - The evidence on protein intake is confused by the regional bias of the SEDES sample. In the Muyinga region per capita bean and maize availability is above the mean. When these foods are consumed in common, the beans facilitate the release of protein from the maize. Thus, protein intake would be enhanced in this area. Beans, of course, have a high protein content themselves.

In less advantageously situated regions, like Ruyigi, bean and maize per capita availability is less and protein intake would be a more serious problem.

Throughout the country, it appears that children exhibit protein deficiencies.¹ Weaning foods composed of high carbohydrate cassava are a direct factor: Cassava should be supplemented by some other protein source. Recently much attention has been given to introducing soybean supplement into the child's diet. A major problem with this is the long cooking process involved with soybeans. Declining wood supplies force children and women to search over increasingly dispersed areas for wood. Thus, the additional pressures on forest resources, as well as the increased expenditure of energy by those collecting wood, would render the soybean a relatively inefficient source of supplemental protein. Some modification to the soybean cooking process may be possible. Continued use of beans, with milk, oil, animal/fish, peanut, and egg supplements would be more desirable to increase protein content.

3. Calcium and Retinol (Vitamin A) - Inadequate calcium and vitamin A intake is reported by the SEDES survey. Often these two nutritional elements are received in common, particularly from milk. While overall milk supplies, on a per capita basis, seem adequate, the unequal distribution of cattle result in a similar unequal consumption of milk. These deficiencies are particularly harmful for growing children and hinder proper bone development. Some discussion

¹While data on the incidence of protein deficiencies among children were not available, all in-country sources indicated that it was a serious problem. Both expatriates working at UNICEF and WFP, as well as sources within the Ministry of Social Affairs confirmed this. A visit to a children's clinic at the Katara mission center also revealed the extent of the problem.

of introducing fortified powdered milk in rural areas has occurred. This is not an entirely desirable solution due to the difficulty of children to digest the powdered milk and some problems with poor water supplies. However, adding the powdered milk in dry form to other food sources mitigates these problems.

4. Thiamine (Vitamin B-1) and Vitamin C - Both vitamin B-1 and C intake appears to be adequate. Beans are an important source of thiamine and fruit consumption in certain areas accounts for the sufficient vitamin C levels. In areas where bean and fruit production are limited, intake of these vitamins could be a problem.

5. Riboflavin (Vitamin B-2) - Mean levels of vitamin B-2 intake, as estimated by SEDES, are below recommended standards. The meager per capita consumption of meat and fish products is the primary reason for this deficiency. Attitudes towards fish and meat consumption were discussed in the first section of this report. Increasing consumption of these products has complicated social and economic implications. It would seem that some initial effort towards increasing the rural population's receptivity to fish would be desirable. Complementary production programs aimed at stocking inland lakes and rivers could then be initiated. Also, increased use of dried fish is a possibility which should be considered.

6. Fats - Per capita consumption of fats may be inadequate. Again, this could be particularly damaging to children. Increased peanut oil, and perhaps butter production, could mitigate this problem.

Unfortunately, these items are rather expensive for the typical rural inhabitant. Some consideration to lower cost fat sources should be given.

7. Banana and Sorghum Beer Consumption - Due to the prevalence of local beer consumption with its nutritional and social implications, some discussion is merited. The Burundi Plan estimates that 66 percent of banana and 11 percent of sorghum production is destined for transformation into beer. Again, using figures from the Plan 3,520 tons of sorghum and 871,200 tons of bananas would have been transformed into beer in 1977.

Estimating the quantity of beer from this banana and sorghum production is difficult. The transformation rate is primarily a function of the amount of water added during the process. Beer destined for sale, since its price is a function of quantity, has a much higher water content and reduced alcohol content. The SEDES report cites the following rates

of transformation for their sample groups:

	<u>Ngozi</u>	<u>Muvinga</u>	<u>Mean (liters/Kg.)</u>
Banana	.66	.41	.535
Sorghum	2.37	1.37	1.87

Applying the mean rate to the national production of bananas and sorghum assumed destined for beer gives the following estimated annual national production of local beer.

TABLE VII
ANNUAL BEER PRODUCTION-CONSUMPTION

	<u>Liters</u>	<u>Liters Per Capita</u>	<u>Adult Male Equivalent</u>
Banana	466,092,000	119.51	239.02
Sorghum	6,582,400	1.69	3.38
Total	472,674,400	121.20	242.40

To this total per capita beer consumption must be added the consumption of Primus, the national premium beer. During the season when payment for coffee is made, rural inhabitants are prone to purchase this premium beer. Unfortunately, no estimates of per capita consumption are available. The last column above, entitled adult male equivalent, simplistically assumes that the adult male drinks twice the per capita ration of beer. In this case, 50 percent of the local beer production would be destined for the 16-50 male¹. This assumption is arbitrary and could be changed as additional survey information becomes available. This greater intake of beer by males is one of the reasons that their caloric intake exceeds that assumed for females. For males the daily caloric intake from beer represents between 188 calories (SEDES/Survey 1, Table II) and 292 calories (242 liters/year or 663 grams/day x .44 calories/gram).

As previously implied the actual alcohol content of this beer will vary greatly depending on water content. An alcohol content (5-10 percent volume) lighter than an American premium beer is possible. More commonly, however, the alcohol content exceeds that of the local premium beer (10-12

¹ Approximately 25 percent of the Burundi population are in this age/sex classification (16-50 male). The other 75 percent of the population would have an implied per capita consumption of 80.8 liters.

percent) and can reach nearly 40-50 percent of volume. As a result, it is difficult to evaluate the extent of excessive alcohol intake among rural Burundi males. Conflicting observations and opinions on this question are prevalent. There are cases of males neglecting their fields after beginning to drink beer in the early morning. On the other hand, there are those who claim that the beer is an important social outlet whose consumption is relatively restricted. No definitive or general statement appears applicable. Regional and family variation is extensive.

It does appear that beer consumption does contribute to social tensions and problems - women resent men being absent for long periods of the day engaged in drinking and socializing. Women must work in the fields, prepare meals, collect wood and water, as well as care for children. It is understandable that women would be resentful of the greater freedom enjoyed by men and would, to varying extents, associate excessive beer consumption with this socializing. Further, local marketing of bananas represents one of the few sources of income for women, with which they can purchase small food items or some clothing for children. Thus, devoting large quantities of bananas to beer effectively reduces the woman's purchasing power and her ability to satisfy certain family obligations. Men generally control the disbursement of coffee receipts and tend to purchase items other than those needed by the women. Again, a conflict of values develops.

This discussion has shown that the question of banana beer and its role in Burundi life is complicated. The separation of the nutritional aspect from the social aspect without detailed surveys of quantity consumed and alcohol content is impossible.

PART D

Summary of Major Findings

1. Per capita caloric intake is somewhat below recommended levels.
2. Great variation in per capita consumption is present. Women of child bearing age, the poor, and certain regionally disadvantaged groups have less than mean consumption levels. These people undoubtedly suffer from overall consumption deficiencies.
3. Unless agricultural production programs are successfully introduced or external food supplies increased, per capita food availability

will become an increasingly serious problem over time. With annual population growth at 2.5 percent a comparable growth in food availability is needed just to maintain the status quo.

4. Protein deficiencies among children are a serious problem.
5. Calcium and retinol deficiencies affect most of the population.
6. Riboflavin and fat consumption are both inadequate.
7. The use of banana and sorghum beer has both nutritional and social implications which are difficult to separate.

SECTION IV - Efforts to Improve Nutrition

Government Goals

One of the expressed goals of the Government of Burundi is to maintain food self-sufficiency and eventually to produce an exportable surplus of basic food products. Increasing farm incomes and improving the quality of rural life are major priorities expressed in the Plan.

The specific targets for increasing food production, shown in the Plan, are reviewed in Table VIII.

The Government, based on the figures in Table VIII, foresees a 2 percent increase in the per capita ration of foods during the planning period. The initial ration of 790.1 kg./year (Base: 1977, Table VII) is essentially that shown under Macro-figures of Table II.¹ The implied content of that ration (Table II) is 3,295 calories/day. It is unlikely, however, that this is a realistic base figure; the mean daily ration is undoubtedly below that level. Nevertheless, the planned 806 kg./year ration would be more than adequate if the requisite production is forthcoming.

Some adjustment in the composition of the diet is envisioned. A slight reduction in banana and cassava consumption is planned. The major increase in consumption would be in more nutritious grains. Milk, fish, and meat consumption is expected to remain at relatively low levels.

While protein and fat inadequacies will be lessened by increased bean/maize and oil consumption, respectively, this "improved" diet will

¹The 2,096 gram/day ration shown in Table II is equivalent to an annual ration of 765 kilograms.

TABLE VIII

FOOD PRODUCTION GOALS OF THE GOVERNMENT OF BURUNDI
(Kg.'s Per Capita)

Commodity	Base 1977	Target 1982	1977-1982 Percent Change in Ration	Percent ³ Increase in Production
Bananas	347.3	341	-1.8	10
Roots ¹	253.9	249.2	-1.8	10
Beans, Peas, Colocase	89.5	95.8	7.0	20
Grains ²	48.7	56.8	16.6	50
Fresh Fruits/Vegetables	26.3	31.7	20.5	50
Oil	5.5	9.9	80.0	100
Sugar	1.2	1.4	16.7	1,100
Milk	8.0	9.3	16.3	30
Fish	5.0	5.9	18	30
Meat	4.7	5.3	12.8	25
Total	790.1	806.3	2.05	

SOURCE: Burundi Plan p. 109

¹Cassava, sweet potatoes, and white potatoes.

²Maize, sorghum, millet, rice, and wheat.

³This is the percentage increase in production over the planning period (1977-1982) needed to supply the targeted 1982 ration for the estimated 1982 population (4.47 million inhabitants).

not overcome the calcium and vitamin inadequacies previously discussed. Further, no assurances of an equal distribution of these foods have been made.

The last column of Table VIII shows the percentage increase in total production of each product needed to provide the per capita increases. Given the limited resources and effectiveness of agricultural development programs in Burundi, these production increases are not likely to occur.

In summary the Burundi Plan does not really confront the issue of inadequate nutritional intake. The base of the GOB (1977) per capita consumption figures are unrealistically high; and the projected production increases are overly optimistic given the resources committed to agricultural development. Finally, the composition of the typical diet will not be sufficiently altered to reduce significantly the protein and vitamin deficiencies previously noted.

Burundi Government Agencies

As discussed in the previous section, Burundi's objectives in the area of nutrition and consumption cannot be achieved with existing programs and resources. This portion of the report describes governmental efforts in this area.

1. Promotion Sociale - Under the direction of the Ministry for Social Affairs, Promotion Sociale directs the operations of the Foyers Sociales and the Foyers d'Animation. Approximately 65 Foyers Sociales are spread throughout Burundi engaged in teaching literacy, explaining basic nutrition and providing some basic agricultural training. While open to the whole Burundi population, the majority of those attending classes in the Foyers Sociales are young unmarried women. In the nutrition area, the training is not directed to the low income rural farming family. Little attempt at improving the nutritional content of typical meals is made. The training is somewhat classroom, formally oriented, and often discusses the usage of foods priced beyond the income of the typical Burundian.

In an attempt to reach the busy Burundi wife and mother, the Foyer d'Animation concept has been introduced. Programs centered at these Foyers, which are usually located closer to concentrations of population, are less time consuming and formal than those of the Foyer Sociales. While some preventive health measures have been introduced, little has been done to

improve nutritional practices, particularly those of children. Some research on and development of ways to improve the nutritional content of the typical child's diet is vitally needed. These Foyers d'Animation would then provide a structural outlet for their introduction to the rural Burundi population.

In summary Promotion Sociale has a structure capable of reaching most rural inhabitants. It lacks the practical programs (i.e. better ways to improve the nutrition output from cassava in a child's diet) needed to affect positively rural life.

Also, some inducement to attract the busy Burundi mother to the programs of the Foyers must be devised.

2. Nutrition as Part of Agricultural Education and Extension - In each of the various agricultural education institutions, a portion of the curriculum is devoted to nutrition. In some cases the treatment of nutrition is very theoretical, in others very superficial. While it is vital that the nutritional content of improved plant varieties or new crops be considered before their introduction, such an evaluation does not seem to be emphasized. Attention to this problem must be given priority when agricultural extension programs are improved, restructured, or reorganized. A more complete discussion of the treatment of nutrition in agricultural extension is found in the training section of the Burundi agricultural survey.

Also, within the limited Burundi agricultural research effort, little or no attention is given to nutrition and its relationship to improved varieties or seeds. Improved livestock feed, however, has been given some priority at the training institution for agronomic technicians.

International Programs

International agencies are involved to varying degrees in projects and programs aimed at improving Burundi nutritional standards.

This discussion is not an evaluation of these programs but a simple identification of the relevant international agencies with which potential US AID collaboration in the nutritional area can be considered.

First, missionary groups are spread throughout Burundi. These groups commonly provide food, clothing, and medicine to particularly disadvantaged segments of the population. Some groups engage in basic agricultural and

nutritional training to interested rural residents. Certainly, the experience, if not the actual use of these missionary groups would be helpful in establishing any nutritional program in Burundi.

Second, Catholic Relief Services (CRS) is involved in food-aid distribution programs aimed at the most vulnerable population groups. A large part of their effort is an under 5 year age supplemental feeding program, reaching perhaps 40,000 recipients. Of importance is the preventive and monitoring aspects of this CRS program. Other preschool and self-help projects constitute CRS's activities in Burundi. CRS should be an important information source, and potential implementing agency for any nutritional programs in Burundi.

In addition, other international charitable organizations are involved in food distribution programs. Again, these agencies would be valuable sources of information in establishing nutritional programs and identifying particularly disadvantaged groups.

Finally, both the World Food Program and UNICEF have functioning offices in Burundi. A brief description of their activities follows.

1. World Food Program (WFP) - The World Food Program has four on-going projects in Burundi.

(a) Supplemental feeding of wheat, eggs, fish, sugar, and vegetable oil reaches an estimated 7,000 patients per year confined in Burundi hospitals and medical centers.

(b) A school feeding program benefits 16,850 children with a balanced, nutritionally sound diet provided. This diet includes canned fish, meat, powdered milk, and vegetables.

(c) Food Grants to those involved in resettlement projects have been budgeted but the project is not now operating.

(d) A self-help program in which road maintenance workers are partially reimbursed with 3 rations daily of flour, canned fish, and vegetable oil, affects about 2,300 families.

2. UNICEF - Under new direction in Burundi, UNICEF is reorganizing its activities. Some preliminary nutritional surveys are planned. Following this, UNICEF will aid the Foyers Sociales in developing a more appropriate and effective nutrition course. Also, monitors will be sent

into the rural areas to encourage more preventive health methods and to promote sounder nutrition practices.

This discussion has shown that while there are both national (Burundi) and international efforts, of varying natures and effectiveness, aimed at improving Burundi nutritional standards, there is no real national nutritional program or policy.

SECTION V - Recommendations

The following recommendations to US AID are based on the findings presented in this report.

*1. The lack of reliable and comprehensive statistical information concerning food intake and resulting deficiencies necessitates that a well designed random sampling of Burundi's population be made to identify nutritionally disadvantaged socio-economic groups. This survey could be done in conjunction with Promotion Sociale, interested mission groups, or independently.

2. While Promotion Sociale needs to be strengthened and upgraded, it appears to have a structure adaptable to any national nutritional effort. Thus, it would be unnecessary at this time for US AID to support the creation of any new governmental agency in the nutritional area.

*3. US AID could consider providing technical assistance to the Foyers Sociales. A well trained nutritionist responsible for training the agents, developing nutritional materials for distribution, and experimenting with local food products would be a valuable addition to the staff of the Foyers.

4. US AID support of programs implemented by the Foyers should include some provision to have families visited in their homes, when possible. The busy Burundi woman, particularly one having many children and most in need of some aid, generally does not have time to participate in formal, classroom type training programs.

*5. US AID should also support the Foyers in their attempt to sensitize families towards changing their consumption patterns, when desirable.

* Indicates recommendations with elements for a potential US AID nutrition project(s).

For instance, encouraging rural groups to eat fish could greatly reduce the incidence of protein deficiencies. Complementary production programs to stock inland bodies of water or to market dried fish need to accompany this effort.

*6. Some form of storage/marketing program to facilitate the transfer of products from deficit to surplus regions of Burundi would be desirable. For example, beans from the northeastern region of the country could be shipped to more southerly regions in exchange for palm oil. Currently, due to a variety of marketing and storage inefficiencies, such transfers are not substantial. Excessive price differentials and product losses currently result from the lack of market transfers.

*7. In conjunction with either the University of Burundi or another educational institution, a program of research and development aimed at a more nutritious use of Burundi's national agricultural produce could be established. For instance, programs to develop indigenous supplements of cassava and sweet potatoes, especially as weaning foods, could greatly reduce the incidence of malnutrition among children.

*8. US AID could consider additional support to currently operating organizations like the Catholic Relief Services or the missions. Providing medicines and high protein foods (those comparable to local products) to these organizations could also reduce the incidence of malnutrition among children.

9. All agricultural programs supported by US AID in Burundi should be evaluated for their nutritional impact. For instance, before improved seed varieties or higher yielding cultures are introduced, the nutritional content of the resulting product should be considered.

10. At this time, any attempt to induce the Burundi farmer towards increased specialization in certain crops should be cautiously approached. The current diversity of his plantings provides some assurance of his having different food items in his diet. Without complementary marketing and storage programs, crop specialization destined for commercial outlets and resulting purchase of food items could be a risky process for the Burundi

* Indicates recommendations with elements for a potential US AID nutrition project(s).

farmer. As explained in Section I, this conclusion about specialization also applies for the food crop versus coffee trade-off. Increasing rural incomes through augmented coffee production will not necessarily improve rural living standards. A decreased availability of food and higher food prices would undoubtedly occur, offsetting any benefit to the rural family from higher monetary resources.

11. Additional nutritional recommendations, particularly those aimed at vulnerable groups or specific dietary deficiencies, must await the results and analysis of a comprehensive nutrition/health survey of the Burundi population.

12. Finally, as a general policy, US AID's activities in Burundi should be primarily directed towards improving the quantity and quality of food production/consumption. Such efforts would have their major impact on the poor rural farm household and other nutritionally vulnerable groups. Further, due to the wide geographic dispersion of nutrition problems in Burundi, a comprehensive country-wide development approach rather than a regional approach should be undertaken. The country-wide approach is particularly desirable when the problem of future food deficits is considered. Current population growth coupled with declining land productivity and land shortages will lead to serious national food shortages in Burundi's near future.

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- (2) World Food Program
- (3) United Nations Development Program
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- (7) Ministry of Social Affairs
- (8) Ministry of Agriculture, Livestock, and Rural Development
- (9) Field Visit to Gitega:
 - (a) Technical Institute of Agriculture for Burundi (ITAB)
 - (b) German Mission (Catholic)
- (10) Field Visit to Kyanza Region:
 - (a) Public Health Dispensary near Banga
 - (b) Katara Mission Center for Treating Children (South of Kyanza)
- (11) MASI Team Members working on the Burundi Agricultural Assessment
- (12) USDA and US AID personnel in Washington