

STATISTICAL OFFICE OF THE EUROPEAN COMMUNITIES

HARAMBEE SIMULATION EXERCISE

STATISTICAL HANDBOOK

Munich Centre for Advanced
Training in Statistics
CDG Munich

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University of Oxford

Preface

The Harambee Simulation Exercise has been developed by the Munich Centre for Advanced Training in applied statistics for developing countries of Carl Duisberg Gesellschaft e.V. in Munich and the Food Studies Group at Queen Elizabeth House at the University of Oxford. It has been commissioned and financed by the Statistical Office of the European Communities (Eurostat) in Luxembourg. An earlier version of the exercise was prepared by the two organisations listed above together with INSEE in Paris.

The first version of the Exercise was designed for use in a series of seminars for the users and providers of statistics in the field of food and agricultural statistics which have been held in a number of sub-Saharan African countries. The second version has been prepared for continued use in these seminars, but also so that the Exercise can be made more widely available to training centres in Africa and elsewhere. Both English and French versions of the Exercise have been prepared and a Portuguese version is under development.

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Section 1 Introduction

The Statistical Handbook contains data that have been collected and processed as part of a number of different surveys and other types of enquiry. Data are presented for the past ten years, although not all enquiries have been conducted in each year.

It is important to remember that the entries in the tables have been derived from a number of different types of data collection process. Where information has been generated from sample surveys, the results will be subject to certain degree of sampling error. In addition, some data may be subject to non-sampling error, particularly where they have been collected using rapid assessment techniques. Where available, estimates of the level of reliability are provided in the form of measures of the coefficient of variation of key variables.

The output from future surveys and other enquiries will follow the same format as presented here. The tables will be updated with the most recent information added to the last line and with a maximum of ten years data displayed.

Section 2 Agricultural Production Survey

In the past, the Agricultural Production Survey has been carried out at six yearly intervals. Five tables are produced from the survey with data on: area planted; use of fertilizer by farmers; crop production; sales by farmers to the NFMB; and estimates of crop yield.

The survey is carried out in two parts. The first covers smallholders and is completed by means of a sample survey conducted by teams of enumerators. A two-stage stratified sample is used with results being reported for each region. After an initial listing stage, the selected farmers are visited by the enumerators as soon as possible after planting and areas planted are measured using compass traverses. A second visit is made to farmers after the harvest, when data on production, fertilizer use and sales are collected. Production data are based on farmer estimates which are reported in local units and then converted into tonnes.

The second part of the survey covers large farmers who are enumerated by means of a postal survey. This is administered after the harvesting season and is followed up by personal visits in case of non-response or where errors are detected. In most cases, the information in the large-farm survey is derived from records maintained by the farms themselves. The survey is designed to have 100 per cent coverage, but the reported information may have to be adjusted to take into account the level of non-response.

For the main variables in the tables, the coefficient of variation of the regional totals is estimated at about 2.5 per cent.

AGRICULTURAL PRODUCTION SURVEY

TABLE 2.1: ESTIMATES OF AREA PLANTED

YEAR	AREAS PLANTED ('000 HECTARES)								
	MAIZE			CASSAVA		COTTON			
	EAST	WEST	WEST	EAST	WEST	EAST	WEST	WEST	
	SMALL	SMALL	LARGE	SMALL	SMALL	SMALL	SMALL	LARGE	
1979	984.8	1772.9	121.1	75.6	111.7	1.8	693.2	143.3	
1985	1138.4	2336.7	144.7	155.4	208.6	1.4	594.9	122.4	

TABLE 2.2: ESTIMATES OF FERTILIZER ALLOCATION BY FARMERS (TONNES)

YEAR	FERTILIZER ALLOCATION (TONNES)								
	MAIZE			CASSAVA		COTTON			
	EAST	WEST	WEST	EAST	WEST	EAST	WEST	WEST	
	SMALL	SMALL	LARGE	SMALL	SMALL	SMALL	SMALL	LARGE	
1979	31.1	232.4	49.7	2.1	9.6	0.0	81.3	63.2	
1985	31.4	271.2	65.7	3.8	16.2	0.0	64.6	53.9	

TABLE 2.3: ESTIMATES OF CROP PRODUCTION

YEAR	CROP PRODUCTION ('000 TONNES)								
	MAIZE			CASSAVA		COTTON			
	EAST	WEST	WEST	EAST	WEST	EAST	WEST	WEST	
	SMALL	SMALL	LARGE	SMALL	SMALL	SMALL	SMALL	LARGE	
1979	564.8	1423.7	118.9	458.3	880.8	2.0	575.2	123.4	
1985	500.0	1467.4	128.1	670.3	1204.3	1.3	406.0	102.8	

AGRICULTURAL PRODUCTION SURVEY (CONTINUED)

TABLE 2.4: ESTIMATES OF SALES TO NFMB BY FARMERS ('000 TONNES)

SALES TO NFMB BY FARMERS ('000 TONNES)								
YEAR	MAIZE			CASSAVA		COTTON		
	EAST	WEST	WEST	EAST	WEST	EAST	WEST	WEST
	SMALL	SMALL	LARGE	SMALL	SMALL	SMALL	SMALL	LARGE
1979	101.4	240.8	1.9	0.0	0.0	2.5	659.1	123.6
1985	154.1	461.8	147.7	0.0	0.0	2.3	740.8	110.9

TABLE 2.5: ESTIMATES OF CROP YIELD

CROP YIELD (TONNES/HECTARE)								
YEAR	MAIZE			CASSAVA		COTTON		
	EAST	WEST	WEST	EAST	WEST	EAST	WEST	WEST
	SMALL	SMALL	LARGE	SMALL	SMALL	SMALL	SMALL	LARGE
1979	0.6	0.8	1.0	6.1	7.9	1.1	0.8	0.9
1985	0.4	0.6	0.9	4.3	5.8	0.9	0.7	0.8

Section 3 Household Income and Expenditure Survey

Two household income and expenditure surveys have been conducted in the past ten years, with an interval of five years between them. These surveys, covering a sample of households throughout the country, have collected data on expenditure and income. For the purposes of setting food policy, three tables from the survey are relevant and are reproduced here. These provide data on: the annual average household expenditure on maize; the annual average household expenditure on cassava; and average household incomes.

The sample of households is stratified to provide estimates for the following groups: smallholders in both the Western and Eastern Regions; non-farm households in the East and the West; large farm households in the West; and urban households, classified into low, medium and high income classes.

Income is derived from data obtained by interviews with the selected households. It includes income in kind, for example, from own production of food crops, as well as income in cash. Expenditure is measured using a daily diary kept by the households for a period of two weeks. The diary is used to record each expenditure made by the households. Once again, expenditure in kind, that is the use of food produced by the household has been included.

The sample design is thought to provide regional estimates of both income and expenditure with coefficients of variation of the order of 2.5 per cent.

HOUSEHOLD INCOME AND EXPENDITURE SURVEY

TABLE 3.1: AVERAGE HOUSEHOLD EXPENDITURE ON MAIZE (HCU/YEAR)

YEAR	MAIZE EXPENDITURE (HCU/YEAR)							
	EAST		WEST			URBAN		
	SMALL	NON AG.	SMALL	LARGE	NON AG.	HIGH	MEDIUM	LOW
1981	318	272	338	141	308	72	195	402
1986	301	273	345	128	322	73	194	377

TABLE 3.2: AVERAGE HOUSEHOLD EXPENDITURE ON CASSAVA (HCU/YEAR)

YEAR	CASSAVA EXPENDITURE (HCU/YEAR)							
	EAST		WEST			URBAN		
	SMALL	NON AG.	SMALL	LARGE	NON AG.	HIGH	MEDIUM	LOW
1981	39	36	29	9	27	2	11	34
1986	46	46	37	7	33	2	11	40

TABLE 3.3: MEAN INCOME PER HOUSEHOLD (HCU/YEAR)

YEAR	INCOME (HCU/YEAR)							
	EAST		WEST			URBAN		
	SMALL	NON AG.	SMALL	LARGE	NON AG.	HIGH	MEDIUM	LOW
1981	794	720	821	6586	788	3695	1870	884
1986	1068	888	1119	9223	1025	4628	2535	1136

Section 4 Consumer Price Survey

Consumer prices are measured in Harambee each month at a number of markets and retail stores throughout the country. Enumerators visit a fixed sample of markets and stores and measure prices both by observation and by weighing a sample of items available for sale. The table here reports the annual average price for both maize and cassava for sales made by private traders.

The estimated sampling error for price data is about 1.5 per cent.

CONSUMER PRICE SURVEY

TABLE 4.1: INFORMAL MARKET CONSUMER PRICES (HCU/KG)

INFORMAL MARKET PRICES						
YEAR	MAIZE			CASSAVA		
	EAST	WEST	URBAN	EAST	WEST	URBAN
1981	0.56	0.59	0.60	0.09	0.09	0.09
1982	0.72	0.70	0.73	0.10	0.10	0.10
1983	1.05	1.04	1.11	0.14	0.14	0.13
1984	0.53	0.49	0.52	0.12	0.11	0.11
1985	0.75	0.63	0.63	0.13	0.11	0.12
1986	0.64	0.61	0.62	0.08	0.09	0.09
1987	0.60	0.62	0.62	0.07	0.07	0.08
1988	0.63	0.61	0.63	0.09	0.10	0.11

Section 5 Nutrition Survey

Three nutrition surveys have been carried out in Harambee in the past ten years; recently, they have been completed at two yearly intervals. The surveys are based on a sample of households which is representative of the whole country and they provide measures of the incidence of both stunting and wasting among children aged between 3 and 60 months. All children in the selected households at the time of enumeration are included in the survey. For each child, age in months, weight in kilograms and height (or length for children aged two years and under) in centimetres are measured. Weight and height are measured using scales and measuring boards.

Two tables taken from the nutrition survey are reported here, they provide data on stunting and wasting respectively. Each table reports the mean value of the measure and the prevalence of malnutrition.

NUTRITION SURVEY

TABLE 5.1: MEAN HEIGHT FOR AGE AND PERCENTAGE STUNTED

YEAR	MEAN HEIGHT FOR AGE (%)			PERCENTAGE STUNTED		
	EAST	WEST	URBAN	EAST	WEST	URBAN
1983	93.8%	92.8%	95.0%	41.7%	35.6%	35.0%
1985	90.4%	96.2%	94.1%	35.9%	28.9%	27.7%
1987	93.7%	96.3%	97.2%	29.2%	28.2%	25.2%

TABLE 5.2: MEAN WEIGHT FOR HEIGHT AND PERCENTAGE WASTED

YEAR	MEAN WEIGHT FOR HEIGHT (%)			PERCENTAGE WASTED		
	EAST	WEST	URBAN	EAST	WEST	URBAN
1983	95.0%	97.3%	96.1%	9.1%	8.3%	7.6%
1985	98.0%	96.7%	95.2%	8.7%	7.1%	6.4%
1987	95.9%	99.1%	96.3%	6.8%	6.2%	5.5%

Section 6 Meteorological Records

Information on rainfall in Harambee is collected by the Meteorological Department. Annual totals for each region are presented here. These data can be assumed to be accurate.

METEOROLOGICAL RECORDS

TABLE 6.1: RAINFALL IN MILLIMETRES

YEAR	EAST	WEST
1979	572	898
1980	610	1016
1981	746	1172
1982	556	986
1983	316	541
1984	545	952
1985	263	665
1986	477	862
1987	649	1081
1988	491	891

Section 7 Early Warning System

A crop early warning system has been set up in Harambee and has been operating for the past four years. It is designed to provide rapid estimates of the level of crop production in each region as soon as possible after the harvest. It is based on a number of different inputs which include: reports by agricultural extension staff; field trips by experts from the Ministry of Agriculture during the growing season; and an assessment of rainfall during the critical periods of the crop growth. Summary estimates are produced by the Ministry of Agriculture, with the assistance of the Central Statistical Office.

The estimates in table 7.1 are subject to some degree of error. Comparisons with data from the Agricultural Production Survey indicate that the coefficient of variation of the regional totals is of the order of 15 per cent.

EARLY WARNING SYSTEM

TABLE 7.1: EARLY ESTIMATES OF CROP PRODUCTION

EARLY ESTIMATES OF CROP PRODUCTION						
YEAR	MAIZE		CASSAVA		COTTON	
	EAST	WEST	EAST	WEST	EAST	WEST
1985	337	1384	288	880	1	301
1986	536	1882	697	1040	1	544
1987	402	1725	974	1734	3	784
1988	370	1599	468	1003	2	947

Section 8 Population Census

Population censuses in Harambee are conducted by the Central Statistical Office. Two tables taken from the census reports are provided here. Table 8.1 shows the number of people by region, distinguishing between those living in agricultural and non-agricultural households. Table 8.2 provides a breakdown of the urban population, classifying households by their level of income.

Research based on a post-enumeration survey at the last census suggests that the population totals may have a coefficient of variation of about 1.5 per cent.

POPULATION CENSUS

TABLE 8.1: NUMBERS OF PEOPLE BY REGION AND HOUSEHOLD TYPE

	NUMBER OF PEOPLE (THOUSANDS)								
	EAST			WEST					
YEAR	SMALL	NON AG.	TOTAL	SMALL	LARGE	NON AG.	TOTAL	URBAN	TOTAL
1980	4767	959	5726	9270	17	920	10207	3503	19436

TABLE 8.2: DETAILS OF THE URBAN POPULATION

	NUMBER OF URBAN PEOPLE (THOUSANDS)			
	INCOME LEVEL			
YEAR	HIGH	MEDIUM	LOW	TOTAL
1980	140	338	3025	3503

Section 9 Records of Government Policies

Tables 9.1 and 9.2 provide a record of the food policy decisions made by the Government of Harambee during the past ten years. Table 9.1 shows the production stage decisions and table 9.2 the consumption stage decisions. These tables will be automatically updated and displayed for each year that the exercise is completed.

RECORDS OF GOVERNMENT POLICIES

TABLE 9.1: RECORD OF GOVERNMENT POLICIES FOR THE FIRST STAGE

GOVERNMENT POLICIES IN STAGE 1								
YEAR	FERTILIZER ALLOCATION				PRODUCER PRICES			MAIZE
	EAST SMALL	WEST SMALL	WEST LARGE	TOTAL IMPORT	FERT. PRICE	MAIZE	COTTON	IMPORT
1979	34.5	350.5	123.1	508.1	0.32	0.32	0.42	0
1980	32.1	326.0	114.5	472.6	0.32	0.31	0.43	0
1981	29.8	303.1	106.5	439.4	0.34	0.27	0.44	0
1982	27.8	281.9	99.1	408.8	0.35	0.25	0.44	0
1983	25.8	262.2	92.2	380.2	0.37	0.28	0.44	0
1984	28.4	288.4	101.4	418.2	0.31	0.39	0.45	660
1985	31.2	317.3	111.6	460.1	0.32	0.45	0.45	640
1986	34.3	349.0	122.7	506.0	0.32	0.45	0.46	450
1987	37.8	383.9	135.0	556.7	0.33	0.44	0.44	350
1988	41.6	422.3	148.5	612.4	0.33	0.43	0.46	300

TABLE 9.2: RECORD OF GOVERNMENT POLICIES FOR THE SECOND STAGE

GOVERNMENT POLICIES FOR STAGE 2									
YEAR	MAIZE DISPOSALS					MAIZE CONSUMER PRICES			MIN.
	EAST	WEST	URBAN	STOCK	EXPORT	EAST	WEST	URBAN	WAGE
1979	108	181	80	0	0	0.49	0.49	0.49	1200
1980	107	178	79	0	0	0.47	0.47	0.47	1140
1981	97	162	72	0	0	0.44	0.44	0.44	1080
1982	77	129	57	0	0	0.41	0.41	0.41	1032
1983	55	91	40	0	0	0.48	0.48	0.48	972
1984	306	511	226	0	0	0.48	0.48	0.48	1032
1985	310	560	256	0	0	0.57	0.57	0.57	1098
1986	321	501	272	0	0	0.58	0.58	0.58	1164
1987	317	589	372	0	0	0.57	0.57	0.57	1236
1988	266	571	366	0	0	0.57	0.57	0.57	1308

Section 10 Government Finance Records

Financial statistics on the Government budget are prepared by the Central Statistical Office based on data provided by the Ministry of Finance. Table 10.1 provides a summary of some of that information, with particular emphasis on the activities of the food and agricultural sector. The table shows the trading position for each of the commodities the Government handles: maize, cotton, fertilizer and all others, as well as the effect of taxes and wages. Interest payments on outstanding government debt are also shown.

GOVERNMENT FINANCE RECORDS

TABLE 10.1: HARAMBEE GOVERNMENT FINANCE RECORDS

(MILLION HCU)

YEAR	TRADING BALANCES				TAX	WAGES	INTEREST PAYMENTS	INTERNAL GVT BALANCE	CUM. BALANCE
	MAIZE	COTTON	FERTILZR	OTHER					
1979	62.6	17.3	13.2	-90.2	561	-576	0.0	-12.7	-12.7
1980	58.2	38.2	18.6	-90.0	563	-565	-1.3	21.1	8.4
1981	56.3	49.2	5.5	-89.1	569	-553	0.9	39.2	47.6
1982	42.2	32.0	22.7	-94.6	528	-545	5.3	-9.6	38.1
1983	37.3	34.4	22.4	-102.5	469	-529	4.3	-64.3	-26.2
1984	-56.3	41.6	-3.7	-86.3	590	-580	-3.2	-97.9	-124.1
1985	-23.1	6.2	-8.2	-86.3	590	-637	-15.3	-174.0	-298.1
1986	12.7	23.9	-4.7	-70.6	708	-698	-37.0	-65.9	-364.0
1987	50.4	14.7	-31.5	-58.8	796	-764	-47.3	-40.5	-404.5
1988	147.7	37.3	-26.3	-65.4	747	-835	-53.4	-48.0	-452.5

Section 11 Balance of Payments Records

Balance of payments data are provided in table 11.1. All the data are recorded in millions of US dollars and include the balance of trade for maize, cotton, fertilizer and all other commodities. The interest payments on the external debt are also shown.

Balance of payments statistics are prepared by the Central Statistical Office based on data provided by the Ministry of Finance and the Harambee Central Bank.

BALANCE OF PAYMENTS RECORDS

TABLE 11.1: HARAMBEE BALANCE OF PAYMENTS RECORDS

(MILLION US DOLLARS)

YEAR	TRADE BALANCES				INTEREST PAYMENTS	BALANCE OF PAYMENTS	CUM. BALANCE
	MAIZE	COTTON	FERTLZR.	OTHER			
1979	0.0	208.7	-71.1	-147.5	0.0	-10.0	-10.0
1980	0.0	235.7	-61.4	-143.7	-1.0	29.5	19.5
1981	0.0	281.3	-65.9	-139.2	2.1	78.3	97.9
1982	0.0	240.8	-53.1	-137.4	10.9	61.2	159.0
1983	0.0	152.7	-53.2	-135.6	18.1	-18.0	141.0
1984	-184.8	148.6	-54.4	-125.0	17.1	-198.5	-57.4
1985	-198.4	115.7	-64.4	-122.1	-7.1	-276.3	-333.7
1986	-130.5	172.0	-65.8	-115.2	-41.4	-180.8	-514.6
1987	-80.5	244.8	-83.5	-109.1	-66.9	-95.2	-609.8
1988	-78.0	238.9	-85.7	-105.0	-80.5	-110.3	-720.1

Section 12 World Prices and Exchange Rate Report

Table 12.1 provides data on the level of world prices and the exchange rate. These data represent annual averages which have been calculated by the Central Statistical Office. The table also includes data on interest rates as well as the landing cost for imported and exported commodities.

WORLD PRICES AND EXCHANGE RATE REPORT

TABLE 12.1: WORLD PRICES AND EXCHANGE RATE REPORT

YEAR	WORLD PRICES (US\$ PER KG)				EXCHANGE	INTEREST	LANDING
	MAIZE	CASSAVA	COTTON	FERTLZR.	RATE	RATE	COSTS
					HCU/\$	%	HCU/KG
1979	0.27	0.08	0.32	0.14	1.60	10.0%	0.07
1980	0.24	0.08	0.34	0.13	1.62	10.3%	0.07
1981	0.21	0.08	0.35	0.15	1.65	11.0%	0.08
1982	0.23	0.08	0.34	0.13	1.65	11.1%	0.08
1983	0.33	0.08	0.36	0.14	1.65	11.4%	0.08
1984	0.28	0.08	0.36	0.13	1.76	12.1%	0.09
1985	0.31	0.08	0.31	0.14	1.77	12.3%	0.09
1986	0.29	0.08	0.32	0.13	1.84	12.4%	0.09
1987	0.23	0.08	0.29	0.15	1.91	13.0%	0.10
1988	0.26	0.08	0.31	0.14	1.95	13.2%	0.10

Section 13 Cotton Board Records

Data on cotton purchases and exports are included in table 13.1, which is based on data provided by the Cotton Board.

COTTON BOARD RECORDS

TABLE 13.1: PRODUCTION AND EXPORTS OF COTTON ('000 TONNES)

YEAR	PURCHASES		TOTAL EXPORTS
	EAST	WEST	
1979	2	650	652
1980	2	691	693
1981	2	801	804
1982	2	706	708
1983	1	423	424
1984	1	411	413
1985	1	372	373
1986	1	536	537
1987	2	842	844
1988	2	769	771

Section 14 NFMB Records

Tables 14.1 and 14.2 contain data on the operations of the National Food Marketing Board. The first table records the position of the NFMB at the end of the production stage. It shows the level of purchases as well as the post-harvest stocks which include imports and stocks brought forward from the previous year.

Table 14.2 provides data on the operations of the NFMB during the marketing and consumption stage of the Exercise. The table provides data on sales and the level of stocks carried forward to the next year.

NFMB RECORDS

TABLE 14.1: PURCHASES AND POST-HARVEST STOCKS OF MAIZE ('000 TONNES)

YEAR	NFMB PURCHASES			POST-HARVEST STOCKS			
	EAST	WEST	TOTAL	EAST	WEST	URBAN	TOTAL
1979	98	271	368	98	271	0	368
1980	98	266	363	98	266	0	363
1981	100	231	331	100	231	0	331
1982	78	185	264	78	185	0	264
1983	54	132	186	54	132	0	186
1984	98	284	382	98	284	660	1042
1985	68	375	443	97	389	640	1125
1986	101	453	554	109	534	450	1094
1987	154	631	785	234	693	350	1277
1988	134	543	676	215	634	354	1203

TABLE 14.2: SALES AND CARRY-FORWARD STOCKS OF MAIZE ('000 TONNES)

YEAR	NFMB SALES				CARRY-FORWARD STOCKS			
	EAST	WEST	URBAN	TOTAL	EAST	WEST	URBAN	TOTAL
1979	108	181	80	368	0	0	0	0
1980	107	178	79	363	0	0	0	0
1981	97	162	72	331	0	0	0	0
1982	77	129	57	264	0	0	0	0
1983	55	91	40	186	0	0	0	0
1984	274	495	226	994	32	16	0	48
1985	301	470	256	1026	9	90	0	99
1986	232	431	272	936	89	69	0	158
1987	227	487	312	1025	90	102	60	252
1988	248	509	332	1089	18	62	34	114