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A PROPOSED METHODOLOGY FOR
PREDICTING ANNUAL ORS NEEDS
OF THE CDD PROGRAMME/MINISTRY OF HEALTH
KENYA

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1.0 Introduction

1.1 Purpose of the Study

The purpose of this operations research (OR) study was to develop an appropriate strategy(ies) for calculating the number of oral rehydration solution (ORS) sachets that are required annually by institutions supplied by the Control of Diarrhoeal Disease (CDD) Programme, Ministry of Health. While the CDD Programme is responsible for all official policy related to the control of diarrhoeal diseases, the distribution of supplies and drugs related to the treatment of diarrhoeal diseases is managed through a number of different organizations. For example, all rural health facilities are supplied with ORS sachets through the Essential Drug Kit programme. Oral rehydration therapy (ORT) centres in district or provincial hospitals, on the other hand, are supplied directly by the CDD Programme. In addition, NGO facilities which do not receive essential drug kits are supplied with ORS sachets by the CDD Programme. ORS sachets are distributed in communities by community health workers who are supplied by their controlling agency through the support of UNICEF and ORS sachets are also available through private outlets such as pharmacies. The calculations and formulas provided in the following pages will focus on the number of sachets required only by those institutions which are directly supplied by the CDD Programme. Reference will be given, however, to ways in which the calculations can be modified in the future to accommodate any changes in the distribution procedures of the programme. In addition, all of the calculations presented herein refer to 1 liter sachets. A discussion of the implications of using 1/2 liter sachets in the future will be included in Section 4.0.

1.2 Background

As part of the CDD Programme's efforts to reduce morbidity and mortality due to diarrhoea among children under five, the decision was made a few years back to open ORT centres in health facilities throughout the country. These centres were to function in a complementary way to the outpatient clinics and were intended to provide speedy treatment at the health facility for diarrhoea cases among children under age five, especially for those with signs of dehydration. In the initial stages of this aspect of the programme, ORT centres were set up in the district/provincial hospital of high risk districts. ORT centres have since been set up in other health facilities in the high risk districts and the programme is currently expanding its efforts to cover areas where the risk of diarrhoea is lower.

To facilitate monitoring and evaluating the success of the ORT centres in terms of their impact on levels of morbidity and mortality associated with diarrhoea, all ORT centres were requested to fill out a monthly reporting form for recording data on the severity of dehydration associated with cases and the number of cases treated with ORS (see Attachment 1). In addition, data on the total number of ORS sachets distributed to patients by clinic staff during the month was to be recorded on this form.

These forms have been received by the CDD Programme since 1987 when the first ORT centres were established and continue to be received up to the present. To facilitate data processing, a computer data entry programme was developed by staff from the Information and Planning Systems (IPS) Project in 1989 and data from over 300 forms covering the years 1987-1989 have been entered into the computerized data base. A number of important indicators can be measured from the data provided through this reporting system such as ORS treatment rates, the distribution of severity of dehydration among all cases and the average number of sachets distributed per month. The latter provided the basis for predicting the average number of ORS sachets needed annually in ORT centres in district and provincial hospitals which are supplied directly by the CDD Programme.

The second source of data which was used for predicting ORS needs in NGO facilities was the MOH's annual outpatient morbidity reports. Monthly data on the occurrence of approximately 40 diseases are supposed to be recorded by all health facilities nationwide and forwarded to the Health Information System (HIS) Unit of the MOH for national health planning purposes. Due to a number of problems, the flow of these data over the past years has been slow and incomplete but efforts are currently being undertaken by the Unit to strengthen this reporting system. The limitations regarding the use of this data set for predicting NGO ORS needs have been pointed out in the methodology section and recommendations for improving the usefulness of these data have been noted in Section 4.

2.0 Methodology

2.1 District/Provincial Hospital ORT Centre Estimates

In order to estimate the average number of ORS sachets needed per month in the ORT centre of each district/provincial hospital, a subset of the data covering one year from all reporting district hospital ORT centres was developed. For those districts from which data had been sent to the CDD office on a regular basis, returns for each month of the most recent year were used. For districts with poorer reporting rates, data from the ORT centre for as many months as were available in the data set were used in the calculations. The average monthly number of ORS sachets used in that facility was calculated from the available data and the average number of sachets used per year was calculated by multiplying the monthly average by 12. The numbers were then rounded off to the nearest 50 to facilitate future ordering. Data on the average number of cases per month and per year were also retrieved from the data base. This information is listed by district in Section 3.1.1, Table 1 (Part A).

Data which were forwarded to the CDD office on monthly forms but which had not yet been entered into the computerized data base by the time this report was being prepared were manipulated manually to determine the average number of ORS sachets used in these ORT centres. These results are provided in Part B of Table 1 (Section 3.0). Again, these values are rough estimates and once these data have been entered into the computerized data base, the monthly average number of ORS sachets used in the ORT centre of these district/provincial hospitals should be recalculated. The latter should then be compared to those listed in Table 1 and any large discrepancies in the numbers should be investigated and corrected accordingly.

For the remaining non-reporting or non-participating districts, estimates of the average number of ORS sachets required annually in the district/provincial ORT centres were calculated using the following methodology:

A district average for the province as a whole was calculated using data from Table 1 - Part A from all reporting districts falling in that province. This estimate, in turn, was assigned as the district value for any district falling in that province for which ORT centre data were missing. For example, data from the computerized data base for all districts in the Rift Valley Province were averaged together to yield a value of 2700 sachets. This number was, in turn, assigned as the value for any district in the Rift Valley Province from which ORT monthly returns had not been received.

For districts falling in provinces for which no ORT data had been received, a second methodology was used. That is, data from the MOH monthly outpatient morbidity reports for the year 1987 were used as the basis for calculating the average number of diarrhoea cases seen per health facility in that district. This number was multiplied by 2 (the average number of sachets it was assumed were used per case) to give the estimated number of ORS sachets used in the ORT centre in that district. (This same methodology was used to estimate the average number of ORS sachets needed in NGO facilities supplied by the CDD Programme). The results of these calculations are provided in Section 3.1.3, Table 2.

2.2 Non-Governmental Facility Estimates

The other major recipient of ORS supplies from the CDD Programme is NGO clinics. As indicated above, the MOH clinics are supplied with ORS sachets through the Essential Drug Kit programme. In an effort to estimate the need for ORS sachets by NGO facilities in each district, the following methodology was used:

an updated list of all health facilities in the country was obtained which indicates the number of MOH versus NGO health facilities existing in each district, by clinic type (e.g. hospital, health centre, etc) (See Attachment 2). Next, outpatient morbidity data for the years 1987 and 1988 were reviewed to estimate the average number of cases of diarrhoea seen per health facility in each district. As noted in Section 1.2, these data are supposed to be forwarded on a monthly basis from every health facility in the country, GOK and NGO alike, to the HIS Unit of the MOH for processing. Unfortunately, however, the reporting rate for this information sub-system has been relatively low (62.5% for 1987 and 43.2% for 1988) which means that the available data are not truly representative of all health facilities in the district.

Given this limitation, a value for the estimated number of cases seen per health facility per month in each district was calculated using both raw and estimated outpatient morbidity data for the two years. The latter were calculated by adjusting the raw data set values to what it is assumed the numbers would be if all health facilities had reported. That is, the raw data values were increased according to the proportion of health facilities which did not report to give estimated values if there had been 100% reporting. This is a very crude procedure to try to account for poor reporting rates and an assumption underlying this procedure is that the non-reporting facilities experience the same morbidity patterns as the reporting facilities. This, however, may not be a valid assumption. The values calculated using this procedure are listed in Table 3, Section 3.0. The raw outpatient data for 1987 and 1988 are provided in Attachments 3 and 4 for reference.

Provincial averages (rounded to the nearest 50) from the 1987 outpatient morbidity estimated data set were used to estimate the average number of diarrhoea cases seen in NGO facilities in each district on an annual basis. Provincial level data were used in an effort to limit the effect of extreme district values (e.g. Trans Nzoia) which probably reflect inaccuracies in the recorded data. The value for the average number of cases it is estimated are seen in each health facility was multiplied by the number of NGO health facilities existing in each district as of March, 1989 [according to the Planning and Implementation Unit (PIU) health facility inventory list - Attachment 2] to produce an estimated total number of diarrhoea cases seen in NGO health facilities annually by district. These values are provided in Table 5, Section 3.2.2. Again, these values were estimated using 1987 disease occurrence data and, therefore, the values should be recalculated as soon as accurate 1989/90 outpatient morbidity data are available.

2.3 Mombasa and Nairobi Municipality Estimates

The data listed in Table 5, Section 3.2.2 excludes sachets required for Nairobi and Mombasa. The number of additional sachets required for Mombasa was estimated by multiplying the number of municipal council and NGO facilities in the area by the average number of diarrhoea cases seen in health facilities in Mombasa in 1988 (as revealed through the HIS Unit outpatient morbidity data). The number of facilities in the Mombasa area was obtained from the Planning Unit from recent cost sharing documents. The results of these calculations are provided in Table 6, Section 3.3.

Data on the number of health facilities in the Nairobi area were not available from the PIU health facility inventory list and, therefore, data obtained from the CDD Programme on the National Health Insurance Fund (NHIF) were used as the source of this information. The NHIF data, however, were not broken down by NGO versus MOH clinics so the total number of health facilities (hospitals, health centres and dispensaries) was used in this calculation i.e. assuming that the CDD Programme funds all health facilities in the Nairobi municipal area. If, in fact, this assumption is not valid, the estimated value will have to be corrected accordingly. The total number of facilities was multiplied by the average number of cases seen per health facility in the Nairobi area (based on the HIS Unit outpatient morbidity data for 1987) to yield the total number of diarrhoea cases predicted to occur in Nairobi on an annual basis. The results of these calculations is provided in Table 6, Section 3.3.

3.0 Findings

3.1 District/Provincial Hospital ORT Centre Results

3.1.1 Computerized CDD Monthly District Data

Table 1 (Part A) below includes data on the average number of ORS sachets used per month and per year and the average number of cases which were seen per month and per year in ORT centres by district. These data were obtained from a computerized data base at the CDD Programme office. If one divided the number of ORS sachets used by the number of cases, one would find that the average number of sachets used per case varies substantially between districts. This could reflect differences in treatment practices but more likely reflects misunderstandings regarding how to fill out the monthly forms. It is important that this problem be looked into by the CDD Programme staff if this source of data is to be used for predicting future ORS sachet needs.

TABLE 1 (Part A)
THE AVERAGE NUMBER OF ORS SACHETS USED IN
REPORTING DISTRICT/PROVINCIAL HOSPITAL ORT CENTRES

District	Average ORS per mo/year	Average Cases per mo/yr
<u>Rift Valley</u>		
Nakuru	5950/71400	243/2916 **
Trans Nzoia	100/1200	128/1536
Baringo	150/1800	39/468
West Pokot	350/4200	164/1968
Uasin Gishu	300/3600	48/576
<u>Nyanza</u>		
Nyamira	400/4800	82/984
Siaya	200/2400	74/2256
Kisumu	450/5400	37/444
Kisii	700/8400	167/2004
S. Nyanza	350/4200	111/1332

Central

Nyandarua	150/1800	79/948
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Coast

Kwale	75/900	19/228
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Eastern

Marsabit	300/3600	162/1944
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Nairobi	250/3000	94/1128
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Western

Busia	35/420	85/1020
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Kakamega	300/3600	93/1116
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Total	120720	(49320 without Nakuru)
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** The numbers for Nakuru are very high and, given that Nakuru is a depot for distributing drugs to other districts in that province, it is likely that these numbers reflect the number of ORS sachets which were distributed to other ORT units in the district/province. Data on only the number of sachets which were given to patients in the health facility are supposed to be recorded which suggests that there is a need to retrain the data collection staff in that ORT centre so that the correct information is recorded. The total numbers have been included here as entered in the data set and, therefore, it is recommended that they be validated as soon as possible. If the sachets distributed from this clinic to other clinics are, in fact, supposed to be supplied by the CDD Programme (and do not reflect essential drug kit supplies or sachets supplied through other sources), the numbers as recorded in Table 1 should be retained as listed for future ordering purposes.

3.1.2 Non-computerized Monthly CDD District Data

Table 1 (Part B) also includes data on the average number of ORS sachets used per month and per year by district but these data were obtained from monthly returns which had not yet been entered into the computerized data base. These numbers were calculated based on the average of two to four months data, depending upon the number of returns which were available for review.

Table 1 (Part B)

District	Average No. ORS sachets mo/year
<u>Western</u>	
Bungoma	250/3000
<u>Eastern</u>	
Isiolo	120/1440
Machakos	50/600
<u>Central</u>	
Kiambu	300/3600
Kirinyaga	100/1200
<u>Coast</u>	
Tana River	350/4200
Total	14040

Total Table 1 (Part A. + Part B) = 134,760/year (63360 without Nakuru)

3.1.3 Data from Non-Responding/Non-Participating Districts

The estimated number of ORS sachets required annually in the district hospital ORT centre of the remaining districts is listed in Table 2 below. This includes all districts for which ORT centre monthly returns have not been received, either because of poor reporting or because ORT centres have not yet been established in the district. Values which were estimated using the MOH outpatient morbidity data (versus those values which were calculated using the provincial averages from Table 1) are indicated with an asterisk. Once ORT centres have been set up in these districts, these values should be recalculated based on monthly CDD data forwarded from the actual ORT centres.

TABLE 2
ESTIMATES OF THE AVERAGE NUMBER OF ORS SACHETS
USED IN NON-RESPONDING DISTRICTS

Province/District	Average ORS/year
<u>Central</u>	
Nyeri	2200
<u>Rift Valley</u>	
Kajiado	2700
Laikipia	2700
Narok	2700
Kericho	2700
Elgeyo Marak.	2700
Nandi	2700
Samburu	2700
Turkana	2700

North Eastern

Garissa	1160 *
Mandera	1735 *
Wajir	2770 *

Eastern

Embu	1880
Kitui	1880
Meru	1880

Coast

Mombasa	1515 *
Muranga	2200
Kilifi	1885 *
Lamu	1285 *
Taita Taveta	950 *
Total	42,940

Total Tables 1 & 2 = 177,700 (106,300 without Nakuru)

Summing the values from both of these tables, it can be estimated that the average number of ORS sachets which should be distributed annually to supply just the district/provincial hospital ORT centres, once the centres are open, is 177,700.

3.2 NGO Facility Results

3.2.1 Estimates of the Average Number of Diarrhoea Cases/Facility

The first step involved in calculating the number of ORS sachets required by NGO facilities was to determine the average number of cases of diarrhoea seen per health facility in each district/province. Provincial averages were obtained from the HIS Unit outpatient morbidity data sets for 1987 and 1988. These values are listed in Table 3 below.

Table 3
 THE ESTIMATED AVERAGE NUMBER OF DIARRHOEA CASES SEEN
 PER HEALTH FACILITY BY PROVINCE

Province/District	'87 raw data	'87 est.data	'88 raw data
Nairobi	690	662	
Central	851	856	763
Coast	796	796	718
Eastern	941	941	946
N.Eastern	563	571	729
Nyanza	1225	1229	1435
Rift Valley	567	566	917
Western	716	717	3504
Total	793	791	960

As can be noted, considerable variability exists between the data sets in the average number of cases seen per health facility for some provinces (e.g. Western and Rift Valley). For other provinces, the values are quite stable which suggests that they are relatively accurate. The values for 1987 were calculated using only provincial level data whereas the 1988 values were calculated as the average of district level data. Individual district values for 1988 are provided in Table 4 below for reference.

Table 4

THE ESTIMATED AVERAGE NUMBER OF DIARRHOEA CASES SEEN
PER HEALTH FACILITY IN 1988 BY DISTRICT

Province/District	Aver.# cases/health facility
<u>Central</u>	
Kiambu	984
Kirinyaga	1054
Muranga	641
Nyandarua	544
Nyeri	605
<u>Coast</u>	
Mombasa	756
Kwale	659
Kilifi	942
Lamu	643
Tana River	668
Taita Taveta	473
<u>Nyanza</u>	
Kisii	missing
Kisumu	1679
S.Nyanza	1276
Siaya	missing

Rift Valley

Baringo	missing
Elgeyo Marakwet	missing
Kajiado	missing
Kericho	864
Laikipia	missing
Narok	509
Nakuru	733
Nandi	863
Samburu	681
Trans Nzoia	3117 *
Turkana	458
Uasin Gishu	1258
W. Pokot	864

Western

Busia	2007
Bungoma	missing
Kakamega	3692

Eastern

Embu	761
Kitui	1074
Machakos	1150
Meru	591
Isiolo	missing
Marsabit	728

N. Eastern

Garissa	580
Wajir	868
Mandera	1386

* The value for this district appears to be very high and should be verified using other sources of the same data.

3.2.2 Estimates of the Total No. of Sachets in NGO Facilities

The second step in calculating the total number of ORS sachets required in NGO facilities by district was to multiply the number of NGO facilities in each district by the averages listed in Table 3 above. Values for the 1987 data set were used rounded out to the nearest 50. Next, the total number of sachets required for NGO facilities per district was determined assuming that the number of sachets used per case was either 2 or 3. Results assuming two different numbers of sachets used per case are included because, according to the data from the computerized monthly returns data base, it appears as if the actual value varies significantly between centres/districts (See Section 3.1.1). This is an important point which could reflect errors in recording versus differences in treatment practices and which should be looked into as soon as possible by CDD Programme staff. These results are provided in Table 5 below. The asterisk in this table signifies that the number of NGO facilities in this district is high and, if the value of the average number of cases seen per facility is overestimated, the predicted number of sachets required will also be substantially overestimated.

Table 5

THE ESTIMATED NUMBER OF DIARRHOEA CASES SEEN
IN NGO FACILITIES ANNUALLY BY DISTRICT

Central - Average # cases/facility = 850

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Kiambu	29	24650	49300	73950 *
Kirinyaga	9	7650	15300	22950
Muranga	13	11050	22100	33150
Nyandarua	0			
Nyeri	16	13600	27200	40800
sub-total			113900	170850

Coast - Average # cases/facility = 800

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Kwale	4	3200	6400	9600
Kilifi	10	8000	16000	24000
Lamu	1	800	1600	2400
Tana River	8	6400	12800	19200
Taita Taveta	10	8000	16000	24000
sub-total (minus Mombasa)			52800	79200

1994-2000 Average # cases/facility = 230

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Kisii	23	28750	57500	86250
Kisumu	25	31250	62500	93750
S.Nyanza	34	42500	85000	127500
Siaya	9	11250	22500	33750
sub-total (Nyamira included in Kisii)			227500	341250

Rift Valley - Average # cases/facility = 550

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Baringo	6	3300	6600	9900
Elgeyo Marakwet	24	13200	26400	39600 *
Kajiado	5	2750	5500	8250
Kericho	64	35200	70400	105600 *
Laikipia	6	3300	6600	9900
Narok	14	7700	15400	23100
Nakuru	5	2750	5500	8250
Nandi	25	13750	27500	41250 *
Samburu	8	4400	8800	13200
Trans Nzoia	12	6600	13200	19800
Turkana	35	19250	38500	57750 *
Uasin Gishu	13	7150	14300	21450
W. Pokot	13	7150	14300	21450
sub-total			253000	379500

Western - Average # cases/facility = 700

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Busia	5	3500	7000	10500
Bungoma	11	7700	15400	23100
Kakamega	23	16100	32200	48300 *
sub-total			54600	81900

Eastern - Average # cases/facility = 950

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Embu	9	8550	17100	25650
Kitui	8	7600	15200	22800
Machakos	16	15200	30400	46500
Meru	81	76950	153900	230850 *
Isiolo	2	1900	3800	5700
Marsabit	13	12350	24700	37050
sub-total			245100	367650

N. Eastern - Average # cases/facility = 575

	# NGO facilities	Est. NGO cases/yr	# sachets 2/case	# sachets 3/case
Garissa	0			
Wajir	0			
Mandera	0			
sub-total	0			

Total (minus Mombasa and Nairobi) 946900 1,421,250
 (Combined with values from Tables 1 & 2) 1,124,600 1,598,950

3.3 Mombasa and Nairobi Results

3.3.1 Mombasa

According to data obtained from the Coast Province Annual Report for 1987 (UNICEF, 1988), a total of 47 health facilities existed in the Mombasa area during that year. This included 20 municipal council facilities, 3 private hospitals, 2 NGO dispensaries, 2 NGO health centres and a number of private facilities. An update from the PIU Unit of the MOH regarding the number of health facilities which exist in the Mombasa area reveals that there are now 23 municipal council health facilities and 5 private hospitals. Based on data from these two sources, it can be estimated that the CDD Programme should supply enough ORS sachets for at least 31 NGO and municipal council health facilities in the Mombasa area. This is assuming that MOH clinics in the Mombasa area are provided with ORS sachets through the Essential Drug Kit programme. If this is not the case, then the numbers should be increased to supply all of the Mombasa facilities.

Based on data submitted through the MOH outpatient morbidity reporting system, the average number of diarrhoea cases seen in health facilities in the Mombasa area during 1988 was 756 (see data for Coast Province, Attachment 3). The predicted number of cases seen in the 31 health facilities provided through the CDD Programme, therefore, is 23436. Assuming the use of an average of 2 versus 3 sachets per case, ORS needs can be estimated as 46872 versus 70308, respectively. These results are summarized in Table 6 below.

Table 6

THE ESTIMATED NUMBER OF SACHETS USED IN NAIROBI AND MOMBASA

Area	Av. No. cases/facility	# fac.	Total cases	Total sachets 2 vs 3/case
Mombasa	756	31	23436	46872/70308
Nairobi	566	181	102446	204892/307338
Total			125882	251764/377646

Based on the MOH outpatient morbidity data received by the HIS Unit for 1987, the average number of cases seen per health facility in the Nairobi area was approximately 566. According to the NHIF document, there were approximately 181 health facilities in existence in Nairobi in 1987. [This value differs significantly, however, from the number indicated from data available through the HIS Unit for the same year (110 facilities).] Assuming that the NHIF data on the number of facilities existing in the Nairobi area are correct, the predicted annual number of cases in the 181 health facilities in the Nairobi area is 102446. And, assuming the use of an average of 2 versus 3 sachets per case, ORS needs can be estimated as 204892 and 307338, respectively. The information for Nairobi is also summarized in Table 6 above.

3.4 National ORS Sachet Requirements

Summing up the values for the three different types of health facilities which are supplied by the CDD Programme (i.e. district/provincial hospitals, NGO health facilities and Nairobi/Mombasa area facilities) yields a total of approximately 1,373,364 sachets which need to be supplied by the CDD Programme annually - assuming an average of 2 sachets/case in NGO facilities - or 1,972,696, assuming an average of 3 sachets/case. These calculations are summarized in Table 7 below. The Nairobi value for Kenyatta National Hospital (KNH) from Table 1 was subtracted out so that this number would not be included twice in the calculations.

Interestingly, the CDD Programme has routinely been ordering approximately 2,000,000 sachets per year which is very close to the value predicted assuming that an average of 3 sachets are used per every case of diarrhoea seen.

TABLE 7

ESTIMATES OF THE TOTAL NUMBER OF ORS SACHETS
REQUIRED ANNUALLY BY THE CDD PROGRAMME

ORS sachets req. for ORT centres	sachets.req.for NGO facilities @ 2/case	Mombasa + Nbi @ 2/case	Total
177,700 (-3000 KNH in NBI)	946,900	251,764	1,373,364
ORS sachets req. for ORT centres	sachets.req.for NGO facilities @ 3/case	Mombasa + Nbi @ 3/case	Total
177,700 (- 3000 KNH in NBI)	1,421,250	377,646	1,973,596

For reference purposes, district level ORS values from Tables 1, 2, 5 and 6 have been summed so that annual district totals are available. These are listed in Table 8 below.

TABLE 8
ESTIMATES OF THE TOTAL NUMBER OF ORS SACHETS
REQUIRED ANNUALLY BY THE CDD PROGRAMME BY DISTRICT

Dist.	ORS sach. ORT centres	sachets. NGO fac. @ 2/case	Total	sachets. NGO fac. @ 3/case	Total
<u>Rift Valley</u>					
Nakuru	71400	5500	76900	8250	79650
Trans Nz.	1200	13200	14400	19800	21000
Baringo	1800	6600	8400	9900	11700
West Pok.	4200	14300	18500	21450	25650
Uasin Gis.	3600	14300	17900	21450	25050
Kajiado	2700	5500	8200	8250	10950
Laikipia	2700	6600	9300	9900	12600
Narok	2700	15400	18100	23100	25800
Kericho	2700	70400	73100	105600	108300
Elgeyo	2700	26400	29100	39600	42300
Nandi	2700	27500	30200	41250	43950
Samburu	2700	8800	11500	13200	15900
Turkana	2700	38500	41200	57750	60450
Province Total			356800		483300

Nyanza

Nyamira	4800		4800		4800
Siaya	2400	22500	24900	33750	36150
Kisumu	5400	62500	67900	93750	99150
Kisii	8400	57500	65900	86250	94650
S. Nyanza	4200	85000	89200	127500	131700
Province Total			252700		366450

Central

Nyandarua	1800	0	1800	0	1800
Kiambu	3600	49300	52900	73950	77550
Kirinyaga	1200	15300	16500	22950	24150
Nyeri	2200	27200	29400	40800	43000
Muranga	2200	22100	24300	33150	35350
Province Total			124900		181850

Coast

Kwale	900	6400	7300	9600	10500
Tana Riv.	4200	12800	17000	19200	23400
Mombasa	1515	46872	48387	70308	71823
Kilifi	1885	16000	17885	24000	25885
Lamu	1285	1600	2885	2400	3685
Taita	950	16000	16950	24000	24950
Province Total			110407		160243

Eastern

Marsabit	3600	24700	28300	37050	40650
Isiolo	1440	3800	5240	5700	7140
Machakos	600	30400	31000	46500	47100
Embu	1880	17100	18980	25650	27530
Kitui	1880	15200	17080	22800	24680
Meru	1880	153900	155780	230850	232730
Province Total			256380		379830

<u>Nairobi</u>	3000	204892	207892	307338	310338
(minus 3000 KNH)		201892	204892	304338	307338

Western

Busia	420	7000	7420	10500	10920
Kakamega	3600	32200	35800	48300	51900
Bungoma	3000	15400	18400	23100	26100
Province Total			61620		88920

North Eastern

Garissa	1160	0	1160	0	1160
Mandera	1735	0	1735	0	1735
Wajir	2770	0	2770	0	2770
Province Total			5665		5665

Total			1373364		1973596
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4.0 Discussion and Recommendations

4.1 NGO ORS Needs

A number of important assumptions were included in determining the calculations provided herein which need to be verified in order for this information to be useful to the CDD Programme for annual ORS supply predictions. The major assumptions are discussed below.

In terms of predicting NGO sachet needs, it was assumed that the number of NGO facilities which exist in each district is correct as indicated on the PIU inventory. This inventory is updated annually by staff from the Planning Unit of the MOH and, therefore, it is assumed that it is a relatively accurate source of this information. The numbers, however, do not correspond to those used by the HIS Unit for calculating reporting rates by district. This suggests that further investigation into the accuracy of the PIU inventory data is warranted. This is especially important for districts for which the number of NGO health facilities listed on the PIU inventory is fairly high (e.g. Meru) or very low (or nil, e.g. Garissa).

It was also assumed that the values calculated for the average number of diarrhoea cases seen using the HIS outpatient morbidity data set are representative of the experience in NGO facilities. This issue is raised because if one looks at the number of facilities which reported each year compared to the total number of MOH facilities that exist in each district, the numbers are very close. This suggests that the data received by the HIS Unit represent data from MOH clinics and not NGO clinics. If, for some reason, patients who attend NGO clinics do so for different reasons than those who attend MOH clinics, the average values calculated from the MOH data may not be valid. One way to validate this would be to request outpatient morbidity data from the NGO controlling agencies at the central level and to compare these values with those listed in Table 4.

An important assumption which was used in predicting NGO sachet needs was that the estimated values for the average number of cases seen do not differ significantly by type of health facility. The average values were calculated from district totals which are supposed to include data from all district/provincial hospitals, health centres and dispensaries in a district. If, however, the health facilities which actually reported represent the large facilities (e.g. the district hospital) and the number of cases seen there was relatively high, the average values will be skewed upwards. To the contrary, if the facilities which reported were mostly small dispensaries, the average values would be skewed downwards. The experience of the HIS Unit over the years has been that the large institutions tend to report, especially the district hospitals, because this is where the district HIS Office exists.

Ideally one would use a weighted average for calculating the number of cases seen by type of health facility (i.e. hospital versus health centre versus dispensary). In a recent OR study by the HIS Unit in two districts (Kwale and Muranga), values for such weights were calculated for a number of diseases including diarrhoea. According to fairly complete 1987 outpatient morbidity data collected during special follow-up visits to the two districts, the average number of cases of diarrhoea seen by type of facility was as follows:

Table 9

THE AVERAGE NUMBER OF DIARRHOEA CASES SEEN
PER TYPE OF HEALTH FACILITY IN TWO DISTRICTS

District - Kwale

Type of facility	Average # cases/yr	%
hospitals	2311	.59
health centres	850	.22
dispensaries	700	.16

District - Muranga

Type of facility	Average # cases/yr	%
hospitals	3806	.72
health centres	1253	.24
dispensaries	224	.04

As can be noted, the proportion of the total number of diarrhoea cases which were seen at dispensaries versus hospitals is significantly different. The implication of this is that if the number of NGO facilities listed in Table 5 represents mostly dispensaries (versus hospitals or health centres), it is probable that the average values are too high and, in turn, estimates of the average number of cases seen in NGO facilities will probably also be too high. This is especially true for districts in which the number of NGO facilities is high and the facilities are mostly dispensaries. Cases of this sort have been noted in Table 5 with an asterisk. It is recommended that the CDD Programme validate the average number of cases seen in NGO facilities in these particular/questionable districts by requesting the NGOs to forward copies of their outpatient morbidity data for these districts. It is also recommended that the data for N.Eastern Province be reviewed to confirm that, in fact, there are no NGO facilities existing in those districts.

The distribution of cases by facility type for all districts for the years 1987 and 1988 is unknown because the outpatient morbidity data are entered into the computerized data base at the HIS Unit as district totals. It is not possible with the available data, therefore, to determine the average number of cases seen by facility type. It has been recommended by the IPS Project, however, that outpatient data should be entered at the central level into the computerized data base as individual facility values. If this modification in data entry/processing procedures at the HIS Unit is introduced, values for the average number of diarrhoea cases seen by type of facility (e.g. hospital versus health centre) and by type of controlling agency (e.g. GOK versus NGO) can be calculated on a running basis. When this new data processing procedure is introduced at the HIS Unit, values for the average number of cases seen by facility type should be calculated and the formula for predicting NGO needs should be modified to include weighted averages according to facility type. It is important to note that the proportions for the two districts listed in Table 9 are not similar for dispensaries and hospitals which suggests that, if and when data are entered into the computerized data base by health facility (versus district totals) if possible, the weights for each district should be calculated separately.

In order to determine the number of sachets required by each district, an assumption also had to be made regarding the number of sachets used per case. In this report two assumptions were used: a) that all cases receive ORS to take home and that each case is given 2 sachets, or b) that some cases are treated in the ORT facility before being sent home but that and all cases receive 2 ORS sachets to take home.

Based upon the results of analyses of the ORT Centre monthly data, it was revealed that the overall average ORS treatment rate was only 43.8%. That is, according to the data, only 43.8% of all cases seen in the reporting ORT Centres were treated in the unit with ORS. This value, however, was calculated averaging in values of 0% for districts which did not report correctly. Among districts for which the value was greater than 0%, the range of values was between 53.2% and 93.3% (for some districts the value was over 100% which indicates that the data were also recorded incorrectly). A conservative estimate of a 50% treatment rate was used in the calculations made throughout this report under the second assumption (i.e. an average of 3 sachets were used/case). The way in which the monthly CDD form is currently formatted provides no space for recording whether ORS sachets were given to cases for home treatment versus ORT unit treatment. It is likely that most data collectors total the number of patients given ORS sachets to take home together with the number of cases treated at the unit with ORS. Given the need of the CDD Programme to differentiate between these two values, it is recommended that the monthly data collection form be modified (and the data collectors retrained) to record the values separately.

Finally, if one assumes that the 50% treatment rate also applies to the proportion of patients given sachets for home treatment, the values listed in Table 5 under 2/case should be reduced by 50%. If, however, the policy which is promoted by the CDD Programme is followed which is to give ORS sachets to all cases of diarrhoea, regardless of whether or not they show immediate signs of dehydration, then the value of 2 sachets/case should be used. If, on the other hand, one further assumes that 50% of all cases are treated with 2 sachets in the ORT unit and all cases are given 2 sachets to take home for treatment, the values listed under 3/case should be used for ordering purposes.

4.2 ORT Centre ORS Needs

In reference to the ORT Centre data, it is important to note that the computerized data entry programme is currently set up so that the name of the reporting facility is entered into the computer rather than a facility code number. That is, due to the fact that the data were originally entered by facility name, it is possible that some of the values listed in Table 1 represent numbers from district facilities with ORT units other than the district/provincial hospital. For the purposes of this report, data for facilities with the name "ORT Unit" were separated out assuming that this represented data from the district hospital ORT centre. In order to validate the average values listed in Table 1 Part A, however, a computer programme should be developed so that the monthly average number of ORS sachets used in just the ORT centre of the district/provincial hospital in each district can be calculated on a running basis.

A number of modifications should also be made to the data entry programme to render the data base more useful to CDD Programme staff e.g. each facility should be allocated a unique identifying code and a reference data base should be developed which includes the codes of just the ORT centres of all district/provincial hospitals. Once these modifications have been completed, monthly averages for all reporting district/provincial hospital ORT centres can be calculated on a running basis and the values can be compared with those indicated in Table 1. Wherever there are large discrepancies in the average numbers, the values listed in Table 1 should be replaced by the new values, assuming that the revised computer programme can correctly identify data corresponding to the ORT centres of the district/provincial hospitals.

As noted elsewhere, the data from Table 2 are based on 1987 disease estimates and, therefore, may not reflect current disease occurrence rates in these districts. Once accurate outpatient data from 1989/90 are available from the HIS Unit, these estimates should be reviewed and replaced as required. Alternatively, one could use an adjustment factor to account for predicted changes in the number of cases that will occur in facilities in the future in each district. The latter could be calculated by determining the rate of change, if any, in the average number of diarrhoea cases seen per health facility over the past few years. However, while it is expected that the absolute number of diarrhoea cases will increase over time due to increases in the population size, if new health facilities are opening up to accommodate increases in the population, the average number of cases seen per facility may not change substantially. It is recommended, however, that efforts be directed at obtaining accurate and current outpatient morbidity data from the health facilities (and the HIS Unit of the MOH) rather than complicating the calculations by including an adjustment factor.

4.3 Nairobi and Mombasa (and other municipality) ORS Needs

It is important to note that the number of facilities listed for Nairobi is high and if the CDD Programme does not provide ORS sachets to all of these facilities, the results will be incorrect. The CDD Programme staff, therefore, should verify the number of health facilities in the Nairobi area which are supplied with ORS sachets directly by the CDD Programme (i.e. not through the Essential Drug Kit Programme or through private outlets) and this number should be substituted in the formula for calculating ORS requirements in Nairobi. Similarly, if the number of facilities in Mombasa which are supplied with ORS sachets directly by the CDD Programme includes more than just the municipal and NGO facilities, this number should also be modified in the formula.

It is also possible that other municipal health facilities (e.g. in Kisumu) do not receive ORS sachets through the Essential Drug Kit programme and that the predicted number of sachets that should be provided to these districts by the CDD Programme should be increased to cover the municipal facility needs. Before modifying the numbers presented in this report, however, it should be determined whether the number of NGO facilities per district, as indicated in Table 5, excludes or includes municipal facilities. It is expected that municipal facilities would be included under the category "GOK" and, therefore, that the numbers should be increased to accommodate the needs of any municipal facilities in areas other than Nairobi and Mombasa.

4.4 The Reliability of the Results

In order to assess the reliability of the data presented in the tables, values for the average number of diarrhoea cases seen per year and the average number of ORS sachets used per year were compared between the ORT centres and district health facilities in general. The ORS sachet values for the ORT Centre were obtained directly from the reported data whereas the "Other Facility" ORS sachet values were calculated using outpatient morbidity data on the average number of cases per year. As is revealed in Table 10 below, there are substantial differences in these values for a number of districts. This suggests either that a) the ORT centres are not representative of other health facilities in the district in general and, therefore, that predictions of ORT Centre ORS needs should not be made using general outpatient morbidity data or b) that there are significant errors in one or both of the data sets. Given that a computerized information system has been developed for processing monthly CDD ORS data, it is recommended that efforts to improve this source of information be continued and that this information be used routinely to predict annual ORT Centre ORS sachet needs. In addition, once the outpatient morbidity information sub-system has been modified so that data can be processed by individual facilities (versus as district totals), NGO facility sachet needs can be more accurately calculated using the outpatient morbidity data set.

TABLE 10

A COMPARISON OF THE AVERAGE NUMBER OF SACHETS USED ACCORDING TO
ORT CENTRE VERSUS OUTPATIENT MORBIDITY DATA

Province/District

	ORT centre Average ORS/year	ORT centre Average Cases/yr	Other fac. Average ORS/yr 2 sach/3 sach per case	Other facil. Average case/yr
<u>Rift Valley</u>				
Nakuru	71400	2916	1466/2199	733
Trans Nzoia	1200	1536	6234/9351	3117
Baringo	1800	468	missing	
West Pokot	4200	1968	1728/2592	864
Uasin Gishu	3600	576	2516/3774	1258
Kajiado	2700		missing	
Laikipia	2700		missing	
Narok	2700		1018/1527	509
Kericho	2700		1728/2592	864
Elgeyo Marak.	2700		missing	
Nandi	2700		1726/2539	863
Samburu	2700		1362/2043	681
Turkana	2700		916/1374	458

Nyanza

Nyamira	4800	984	missing	
Siaya	2400	2256	missing	
Kisumu	5400	444	3358/5037	1679
Kisii	8400	2004	missing	
S. Nyanza	4200	1332	2552/3828	1276

Central

Nyandarua	1800	948	1088/1632	544
Kiambu	3600		1968/2952	984
Kirinyaga	1200		2108/3162	1054
Nyeri	2200		1210/1815	605
Muranga	2200		1282/1923	641

Coast

Kwale	900	228	1318/1977	659
Tana River	4200		1336/2004	668
Mombasa	1515		1512/2268	756
Kilifi	1885		1834/2825	942
Lamu	1285		1286/1929	643
Taita Taveta	950		946/1419	473

Eastern

Marsabit	3600	1944	1456/2184	728
Isiolo	1440		missing	
Machakos	600		2300/3450	1150
Embu	1880		1522/2283	761
Kitui	1880		2148/3222	1074
Meru	1880		11182/773	591

<u>Nairobi</u>	3000	1128	1132/1698	566
<u>Western</u>				
Busia	420	1020	4014/6021	2007
Kakamega	3600	1116	7384/11076	3692
Bungoma	3000		missing	
<u>North Eastern</u>				
Garissa	1160		1160/1740	580
Mandera	1735		772/1158	386
Wajir	2770		1736/2604	868

4.5 Predicted ORS Needs Vs Past ORS Distribution

As noted in Section 3.4, the total number of ORS sachets it can be predicted are required annually nationwide (assuming 3 sachets/case) does not differ substantially from the number of sachets (2,000,000) which have routinely been ordered from UNICEF by the CDD Programme. In the following table, the number of ORS sachets predicted to be needed annually in each province according to the calculations used herein are compared with the number of sachets which were distributed in 1988 in five provinces (provided to the author by Mr. Maina of the CDD Programme) to assess how comparable the two values are. Where the values differ significantly, CDD Programme staff should review the data which were used to calculate predicted ORS needs to determine if the data are accurate. In addition, provincial CDD Programme liaison officers in these areas should be contacted to find out if the amount of ORS sachets which have been routinely supplied to them are appropriate for their needs.

Table 11

PREDICTED ORS NEEDS VS. PAST ORS DISTRIBUTION

Province	# dist. in '88	predicted # req. @ 2/case	predicted # req. @ 3/case
Nyanza	300,000	252,700	366,450
Western	250,000	61,620	88,920
Rift Valley	200,000	356,800	483,300
Coast	100,000	110,407	160,243
Central	100,000	124,900	181,850

5.0 Conclusions

Using data from a variety of sources within the MOH, it has been possible to develop a strategy for determining how many ORS sachets should be provided to each district annually by the CDD Programme. As noted throughout this report, these calculations cover only the ORS needs of the ORT Centre of the District/Provincial Hospital in each district, the NGO facilities in rural districts, the municipal and NGO facilities in Mombasa and all Nairobi facilities. In time it is assumed that the Essential Drug Kit programme will be terminated and that the MOH will supply all facilities with drugs. At this time, the formulas used in this report will have to be modified to include all health facilities in the district (not just NGO facilities).

The formula which was used to calculate ORS sachet needs for the country as a whole can be summarized as follows:

Annual ORS needs in the ORT Centre of the District/Provincial Hospital + Annual ORS needs in all NGO facilities in the district + Annual Mombasa Municipal/NGO ORS needs + Annual Nairobi ORS needs in all facilities.

According to this formula, the number of ORS sachets which need to be supplied annually by the CDD Programme is:

$177700 + 946900 + 46872 + 204892$ (minus 3000 for KNH) = 1,373,364
The above calculation assumes 2 sachets are used/case.

Assuming 3 sachets are used per case, the number of ORS sachets which need to be supplied annually by the CDD Programme is:

$177700 + 1421250 + 70308 + 307338$ (minus 3000 for KNH) = 1,973,596.

In an effort to validate the estimates provided herein, a less complicated, albeit less precise, methodology for predicting overall ORS sachet needs was developed. The simple methodology for calculating ORT Centre needs is as follows: referring back to the computerized ORT centre data set, values for the average number of cases seen in the district ORT centre for the years 1987 through 1989 ranged from 444/year to 2004/year. This yields an overall average of 1135/diarrhoea cases per district ORT Centre per year. And, according to the results of the data analysis, on the average 50% of the cases were treated at the ORS unit before being sent home. Given these two pieces of information, it can be estimated that an average of 567 cases are treated in each district hospital ORT centre annually. If one assumes that an average of 2 sachets are distributed to each case which presents at the centre to take home and that 2 sachets are used for each case treated at the ORT centre, this yields an estimate of 3404 sachets used per ORT centre per year. This value should be compared with the actual values calculated using the computerized data base for each reporting district ORT centre (Table 1) to determine the usefulness of the overall average for annual ordering purposes. For example, for districts like Nakuru, the overall average value is much too low.

If the value of 3404 sachets per district ORT Centre is multiplied by the number of districts, an estimate of the total number of ORS sachets needed to supply just the district/provincial hospital ORT centres on an annual basis can be determined. For example, assuming that there are 42 district ORT centres which need to be supplied on an annual basis, it can be estimated that the CDD Programme should order 142,968 sachets to supply just these units.

One problem with this simplified calculation is that the number of districts has changed since 1987 and it is anticipated that there will be additional changes in the coming years. Some of the data available (e.g. 1987 outpatient morbidity results) are provided for 39 rural districts (and Mombasa and Nairobi) whereas other data are broken down into 42 district totals. Tables 1 and 2 include data on 40 districts (minus Nairobi) and, therefore, if one multiplied 40 X 3404 sachets/year this would yield a value of 136,160 total sachets. This number is fairly close to that calculated using all the individual district estimates listed in Tables 1 and 2 (i.e. 106,300 not including Nakuru values) which suggests that this simple methodology may be useful to quickly determine the overall ORT centre sachet needs. The obvious problem with this methodology is that it provides only an average value and does not take into consideration district/provincial differences in the incidence of diarrhoea. In order to more accurately predict district specific ORT centre requirements, the methodologies used to produce the values in Tables 1 or 2 should be employed.

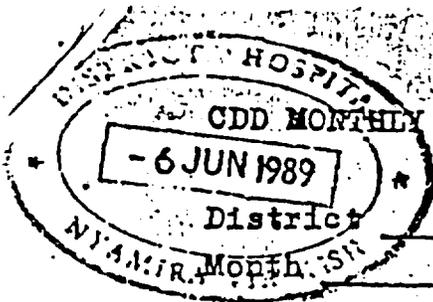
In order to quickly calculate overall NGO facility needs, another simple methodology can be used. That is: based upon the data presented in Table 5, an overall average number of diarrhoea cases seen per health facility in 1987 can be estimated as 810. Given that in 1989 there were approximately 599 rural NGO health facilities existing in the seven provinces (minus Mombasa and Nairobi) (See Attachment 2) and assuming that the average number of cases seen per health facility has not changed substantially since that time, one can estimate that there are approximately 485,190 cases of diarrhoea treated in NGO facilities annually. Assuming that 2 sachets are required to treat each case (that is, that all cases are given sachets for home treatment and none are treated in the health facility), this yields an estimate of 970,380 sachets needed to supply NGO facilities. This value is fairly close to the total calculated using individual district values (i.e. 946,900, see Table 5).

If one assumed, on the other hand, that 50% of the cases are treated in an NGO facility with 2 sachets before being sent home, and that all cases are given 2 sachets for home treatment, this would raise the required estimate to 1,432,090 sachets needed annually to supply all NGO facilities. Again, this value does not differ significantly from that determined using individual district data (1,421,250) which suggests that this simple methodology can be used as a quick way to determine the overall NGO facility annual ORS needs. This same methodology can also be used to determine the number of sachets required for Mombasa and Nairobi and for any other municipality whose health facilities are not supplied through the Essential Drug Kit programme.

As noted in the introduction to this report, all calculations have been made assuming the use of 1 litre sachets. This assumption was used because all of the data which were available for calculating ORS needs were collected when 1 litre sachets were being used. It is anticipated that in the near future, however, the CDD Programme will modify its treatment policy to include the use of 1/2 litre sachets. If it is assumed that the same amount of ORS will be used for treating cases, the values for all numbers calculated using the methodologies described herein should be doubled. That is, if four 1/2 litre sachets are used per case of diarrhoea, the CDD Programme will need approximately 2,746,728 sachets annually. If, on the other hand, six 1/2 litre sachets are used per case of diarrhoea, the CDD Programme will need approximately 3,947,192 sachets annually.

It has been noted, however, that one of the advantages of using 1/2 litre sachets relates to potential reductions in ORS wastage. For example, in terms of treating small infants with diarrhoea and no or few signs of dehydration, 1 litre of the oral rehydration solution may be more than is required to improve the infant's condition. In such cases, it might be more appropriate to use a 1/2 litre solution instead. The implication of this is that it may not be appropriate to double the values for all numbers calculated in this report but that increasing the values by a factor of one and a half may provide more accurate estimates. This is an issue which should be addressed once the 1/2 litre sachets are introduced, possibly through an OR study in a sample of health facilities.

ATTACHMENT 1



Dr. Harlan
2-8-89

KISI
MAY

Health Facility KEBIRIGO DISPEX
Year 1989

Age	Initial assessment of degree of dehydration			Treatment Outcome					
	None/Mild	Moderate	Severe	None	ORS	I.V.	Dis.	Adm.	Die
1 year									
1-4 Years	2				5				
5 years									
Total	2				5				

Number of ORS sachets used this month: 5 sachets

Comments to CDD Management Unit
H is going on nicely despite
some of the things we do not have.

Report submitted by
Name: X Julia B. Okoro Designation: KECH
Signature: X Okoro Date: 2-6-89

ATTACHMENT 2

NATIONAL SUMMARY OF RURAL HEALTH FACILITIES

13/03/89

PROVINCE	DISTRICT	GOVERNMENT OF KENYA FACILITIES						NON-GOVERNMENTAL FACILITIES							GRAND TOTAL			
		HOSP	RHDC	RHTC	HC	SHC	DISP	TOTAL	HOSP	RHDC	RHTC	HC	SHC	DISP		MAT	NURS	TOTAL
	21 KIAMBU	4	3	1	14	0	20	42	4	0	0	6	0	19	0	0	29	71
	22 KIRINYAGA	1	0	0	4	4	22	31	1	0	0	1	0	7	0	0	9	40
	23 MURANGA	1	1	1	6	0	40	53	3	0	0	0	0	10	0	0	13	66
	24 NYANDARUA	1	0	0	6	0	22	29	0	0	0	0	0	0	0	0	0	29
	25 NYERI	5	0	0	7	1	40	51	2	0	0	0	0	7	7	0	16	67
CENTRAL		11	4	2	37	8	144	206	10	0	0	7	0	43	7	0	67	273
	31 KILIFI	2	3	0	4	0	29	41	1	0	0	1	0	7	0	1	10	51
	32 KWALE	1	1	1	3	0	23	33	1	0	0	0	0	0	0	0	4	37
	33 LAMU	1	0	0	3	0	10	16	0	0	0	0	0	1	0	0	1	17
	35 TAITA TAVETA	1	0	0	5	0	20	28	0	0	0	0	0	10	0	0	10	38
	36 TANA RIVER	1	0	0	3	0	16	20	0	0	0	0	0	8	0	0	8	28
COAST		10	4	1	20	5	98	138	2	0	0	1	0	29	0	1	33	171
	41 EMBU	1	1	1	5	0	20	29	1	0	0	0	0	8	0	0	9	38
	42 ISIOLO	0	0	0	2	0	15	18	0	0	0	0	0	2	0	0	2	20
	43 KITUI	0	0	0	10	0	22	44	0	0	0	0	0	4	0	0	8	52
	44 MACHAKOS	0	0	0	11	0	50	69	0	0	0	0	0	14	0	0	16	85
	45 MAKESANI	0	0	0	0	0	2	4	0	0	0	0	0	8	0	0	13	17
	46 MERU	1	1	0	7	1	30	41	4	0	0	0	0	69	2	0	81	122
	EASTERN		14	5	1	35	1	149	205	11	0	0	1	0	105	2	0	129
	51 GARISSA	1	0	0	3	1	15	20	0	0	0	0	0	0	0	0	0	20
	52 MANDERA	1	0	0	0	0	2	6	0	0	0	0	0	0	0	0	0	6
	53 WAJIR	1	0	0	2	0	10	17	0	0	0	0	0	0	0	0	0	17
NORTH EASTERN		3	0	0	8	0	27	39	0	0	0	0	0	0	0	0	0	39
	61 KISII	2	0	0	12	4	35	41	2	0	0	6	0	12	2	1	23	64
	62 KISUMU	1	0	0	11	0	21	33	0	0	0	0	0	14	2	3	25	58
	63 SIAYA	1	1	0	7	0	21	30	0	0	0	0	0	7	0	0	9	39
	64 SOUTH NYANZA	1	2	0	15	0	29	52	0	0	0	1	1	15	0	0	34	86
NYANZA		5	3	0	45	0	94	156	2	0	0	7	1	48	4	4	91	247
	71 KAJIADO	2	0	0	7	0	20	29	0	0	0	0	0	1	0	0	5	37
	72 KERicho	0	0	0	9	0	22	31	0	0	0	0	0	0	0	0	0	31
	73 LAIFIFIA	1	0	0	9	0	10	20	0	0	0	0	0	0	0	0	0	20
	74 NAFURU	3	0	0	9	0	29	39	0	0	0	0	0	0	0	0	0	39
	75 NAROK	1	0	0	10	0	22	33	1	0	0	0	0	0	0	0	5	64
	76 TRANS NZOIA	2	0	0	3	0	11	16	0	0	0	0	0	10	0	0	14	47
	77 UASIN GISHU	1	2	0	7	0	18	28	0	0	0	0	0	11	0	1	12	28
	81 BAKINGO	1	1	0	4	0	41	53	0	0	0	0	0	8	0	0	13	41
	82 ELGEYO MARRAKWET	2	0	0	4	0	7	15	1	0	0	0	0	13	0	0	16	69
	83 NANDI	2	0	1	5	0	19	27	0	0	0	0	0	0	0	0	0	27
	84 SAMBURU	1	0	0	2	0	9	12	1	0	0	1	1	22	0	0	25	52
	85 TURKANA	0	0	0	2	0	7	11	0	0	0	1	0	6	0	0	8	20
	86 WEST POKOT	1	0	0	3	0	15	19	1	0	0	0	0	27	0	0	35	46
RIFT VALLEY		20	6	1	74	1	272	375	15	0	0	28	1	191	0	2	240	633
	91 BUNGOMA	1	0	0	11	0	7	19	2	0	0	1	0	8	0	0	11	30
	92 BUSIA	0	0	0	10	0	6	19	1	0	0	0	0	2	0	0	5	24
	93 KAKAMEGA	1	1	0	26	1	11	40	6	0	0	0	0	17	0	0	23	63
WESTERN		5	1	0	47	1	24	78	9	0	0	1	0	27	0	0	39	117
TOTAL - 39 RURAL DISTRICTS		70	23	5	266	42	808	1215	57	0	0	77	1	443	13	7	599	1814

ATTACHMENT 3

NATIONAL OUT-PATIENT MORBIDITY STATISTICS SUMMARY BY PROVINCE, 1988

DISEASES	NAIROBI	CENTRAL	COAST	EASTERN	N/EASTERN	NYANZA	N/VALLEY	WESTERN	KENYA TOTAL	KENYA %
Number of Institutions		297	251	364	39	261	655	117	1,987	
Reporting Institutions		195	169	172	24	58	212	27	857	
Response Rate		65.52	67.42	47.32	61.52	22.02	32.52	23.22	43.22	
DISEASES										
Diarrhoeal diseases	0	148,807	121,499	162,844	17,508	83,247	194,560	94,631	823,096	4.852
Tuberculosis	0	892	1,015	475	521	365	5,834	85	9,107	0.052
Leprosy	0	77	161	37	56	231	110	84	751	.002
Whooping cough	0	889	2,570	1,393	18	1,980	2,755	646	10,201	0.062
Measles	0	171	112	56	20	96	409	43	909	0.012
Scarlet fever	0	325	153	102	14	44	347	156	1,141	0.012
Poliovirelitis	0	662	139	153	13	89	557	55	1,668	0.012
Chicken pox	0	21,975	2,976	7,267	175	556	6,059	3,419	42,427	0.252
Measles	0	15,378	6,372	8,573	429	10,317	22,906	6,225	70,200	0.412
Infectious hepatitis (Jaundice)	0	14,977	1,533	2,709	91	915	3,270	439	23,034	0.142
Ruhs	0	68,232	17,856	8,280	495	2,138	62,260	2,364	161,625	0.952
Malaria	0	493,967	877,730	892,653	135,105	531,265	674,577	356,761	3,961,558	23.342
Gonorrhoea	0	79,382	41,860	46,339	5,119	36,182	59,509	17,485	285,876	1.682
Urinary Tract Infections	0	39,120	44,580	78,072	9,663	37,875	53,327	5,098	267,735	1.582
Bilharzia (Schistosomiasis)	0	30,507	34,366	8,655	2,839	5,019	11,172	606	93,164	0.552
Intestinal worms	0	226,304	101,306	157,289	10,135	74,996	174,117	44,308	788,455	4.642
Malnutrition	0	26,349	9,154	10,190	2,139	14,040	17,008	6,538	85,418	0.502
Anaemia	0	32,270	49,715	17,748	8,187	24,852	31,401	13,867	177,240	1.042
Eye infections	0	109,684	58,109	88,022	10,564	42,974	115,483	24,287	449,123	2.652
Cataract	0	23,942	1,893	2,425	515	652	9,319	169	38,915	0.232
Ear infections	0	81,837	51,696	55,833	9,831	32,903	64,320	19,546	315,166	1.862
Dis. of Circulatory System	0	223,618	13,612	11,672	55	2,800	48,531	1,111	301,399	1.782
Dis. of the respiratory System	0	1,067,521	506,024	644,771	106,411	704,341	713,774	175,277	3,418,119	20.142
Pneumonia	0	169,783	26,087	54,229	3,747	19,700	54,447	9,950	337,943	1.992
Abortion	0	11,852	2,965	3,715	231	2,576	7,073	1,083	29,495	0.172
Dis. of Puerperium and Child Birth	0	3,332	7,721	5,080	194	2,273	3,666	1,001	18,267	0.112
Neoplasms	0	992	148	595	2	209	888	169	3,003	0.022
Dis. of Blood and Blood forming organ	0	2,777	386	972	17	1,023	1,044	245	6,464	0.042
Mental Disorders	0	14,842	1,553	4,918	694	1,297	6,702	6,684	36,690	0.222
Dental disorders	0	71,240	17,659	27,549	3,482	15,197	53,429	3,279	191,835	1.132
Dis. of the skin (incl. ulcers)	0	336,798	226,516	252,201	20,690	109,025	267,032	76,918	1,289,180	7.592
Rheumatism, Joint pains etc.	0	115,833	166,941	72,113	5,374	27,770	73,991	11,253	473,775	2.792
Congenital Anomalies	0	12,822	505	690	16	307	3,554	25	17,919	0.112
Pyrexia of unknown origin (PUO)	0	30,683	11,564	17,058	337	11,125	21,616	15,274	107,657	0.632
Poisoning	0	29,426	2,251	651	616	460	7,075	151	40,630	0.242
Accidents (Incl. fractures, burns, etc)	0	149,801	46,163	80,743	5,339	18,132	66,628	14,282	381,088	2.242
All other diseases		1,340,104	418,756	533,670	51,758	148,424	465,860	175,565	3,134,137	18.462
TOTAL NEW CASES	0	4,578,000	2,868,096	3,259,013	412,400	1,465,395	3,304,610	1,088,281	16,975,795	100.002
RE-ATTENDANCES (RE-VISITS)	0	1,412,796	669,508	1,175,086	244,107	350,456	755,250	244,722	4,851,925	
REFERRALS	0	401,729	88,789	90,503	35,635	27,831	109,997	32,323	786,007	
NO. OF FIRST ATTENDANCES	0	1,743,617	724,226	2,104,100	110,366	782,366	468,641	2,681	5,436,005	
AVERAGE DIS. PER ATTENDANCE		3	4	2	4	5	7	406	3	
POPULATION										
	1,357,045	3,414,741	1,756,620	4,075,065	583,507	4,030,543	4,910,486	2,632,084	22,710,091	

ANNUAL OUT-PATIENT MORBIDITY STATISTICS BY DISTRICT/PROVINCE 1988

COAST PROVINCE

	DISTRICTS					PROVINCIAL		%
	MOHAKASA	MOALE	MLIFU	LANU	T. RIVER	TATA	TAVEYA	
Number of Institutions	65	37	57	10	36	30	30	251
Reporting Institutions	35	27	43	10	24	30	30	169
Response Rate	53.62	73.02	76.22	54.22	67.12	79.22	67.42	
DISEASES								
Diarrhoeal diseases	26,471	17,814	40,530	6,438	16,055	14,191	121,499	4.242
Tuberculosis	108	82	152	16	480	177	1,015	0.042
Leprosy	29	71	37	4	6	33	161	0.012
Whooping cough	340	149	1,882	9	20	182	2,520	0.092
Measles	8	15	22	0	3	64	112	0.002
Tetanus	19	15	32	0	5	81	153	0.012
Poliovirus	14	26	13	3	1	89	139	0.002
Chicken pox	573	686	728	220	112	741	2,976	0.102
Measles	747	824	2,883	437	843	569	6,322	0.222
Infectious hepatitis (Jaundice)	246	516	558	9	90	148	1,533	0.052
Measles	937	14,504	1,707	497	162	13,891	17,856	0.622
Malaria	209,315	155,945	232,690	32,617	108,253	124,999	877,230	30.592
Gonorrhoea	17,682	5,246	5,479	867	8,813	4,062	41,860	1.462
Urinary Tract Infections	8,741	11,308	12,216	4,127	6,798	1,638	44,580	1.552
Bilharzia (Schistosomiasis)	1,705	13,232	8,780	1,137	8,432	1,829	34,360	1.202
Intestinal worms	17,994	18,022	34,340	8,592	9,763	10,953	101,306	3.532
Malnutrition	1,469	2,246	2,741	190	2,255	1,279	9,154	0.322
Anaemia	7,901	12,186	17,296	1,932	6,832	3,348	49,715	1.732
Eye infections	12,969	8,267	15,091	3,270	7,236	10,431	58,109	2.032
Cataract	125	813	235	115	506	677	1,893	0.072
Ear infections	16,556	8,167	13,032	3,501	6,298	3,595	51,696	1.802
Dis. of Circulatory System	1,372	6,123	418	494	992	9,612	13,612	0.472
Dis. of the respiratory System	124,824	77,034	138,148	26,207	48,647	86,080	506,024	17.642
Pneumonia	3,660	4,501	4,249	1,062	9,288	3,011	26,087	0.912
Abortion	512	425	854	101	714	336	2,965	0.102
Dis. of Puerperium and Child Birth	641	811	461	170	426	205	2,721	0.092
Neoplasms	1	28	10	7	23	88	148	0.012
Dis. of Blood and Blood forming organs	7	40	22	18	104	185	386	0.012
Mental Disorders	41	369	191	192	94	898	1,553	0.052
Mental disorders	1,010	5,288	3,900	2,805	1,454	6,429	17,659	0.622
Dis. of the skin (incl. ulcers)	59,510	44,252	56,884	13,081	23,648	26,070	226,516	7.902
Rheumatism, Joint pains etc.	7,302	4,081	140,551	2,592	4,643	7,395	166,941	5.822
Congenital Anomalies	9	101	98	22	161	156	505	0.022
Pyrexia of unknown origin (PUO)	4,421	692	1,492	232	3,105	1,573	11,564	0.402
Poisoning	31	476	63	129	512	1,361	2,251	0.082
Accidents (incl. fractures, burns, etc)	10,780	4,406	12,344	7,470	4,214	11,949	46,163	1.612
All other diseases	98,286	55,243	117,168	29,557	35,262	83,240	418,756	14.602
TOTAL NEW CASES	636,356	474,004	867,297	143,120	316,160	431,485	2,868,896	100.002
RE-ATTENDANCES (RE-VISITS)	83,068	60,974	305,681	11,916	88,840	169,879	649,508	
REFERRALS	11,467	9,674	12,482	508	1,238	14,644	80,789	
NO. OF FIRST ATTENDANCES	41,594	42,623	78,683	70,839	125,278	304,948	724,226	
AVERAGE DIS. PER ATTENDANCE	15	11	11	2	3	1	4	
POPULATION								
	496,873	423,057	632,018	69,388	211,336	149,931	1,756,620	

ANNUAL OUT-PATIENT MORBIDITY STATISTICS BY DISTRICT/PROVINCE 1988

RIFT VALLEY PROVINCE

	DISTRICTS												PROVINCIAL TOTAL	PROVINCIAL %	
	BARINGO	KARURI	KAJIADO	KERICHO	LAKEURIA	MARO	MAKURRA	MANDERA	SAMBURU	T-MZOTI	TURKANA	U.GISHA			U.POKOT
Number of Institutions	69	39	37	132	35	31	64	52	24	28	46	41	35	653	
Reporting Institutions	0	0	0	37	0	26	14	34	14	11	26	25	26	212	
Response Rate	0.02	0.02	0.02	27.72	0.02	51.32	21.92	64.72	59.42	39.02	56.32	61.42	73.32	32.52	
DISEASES															
Diarrhoeal diseases	0	0	0	31,994	0	13,257	10,271	29,353	9,536	34,296	11,911	31,454	22,488	194,560	3.092
Tuberculosis	0	0	0	2,011	0	61	15	193	573	1,754	113	741	313	5,834	0.182
Leprosy	0	0	0	13	0	0	0	18	0	13	11	22	25	110	0.002
Whooping cough	0	0	0	1,249	0	35	34	571	76	393	0	237	0	2,755	0.082
Measles	0	0	0	98	0	13	23	150	25	58	6	0	28	409	0.012
Tetanus	0	0	0	194	0	6	2	16	1	89	4	31	4	347	0.012
Polioarthritis	0	0	0	270	0	7	14	13	0	205	7	34	7	557	0.022
Chicken pox	0	0	0	2,089	0	209	493	322	146	1,911	157	602	130	6,059	0.182
Measles	0	0	0	6,934	0	1,085	1,098	4,846	679	4,052	93	3,397	722	22,906	0.692
Infectious hepatitis	0	0	0	1,259	0	75	84	107	460	810	193	198	84	3,270	0.102
Ruops	0	0	0	21,299	0	1,128	2,042	10,560	2,498	17,170	258	6,191	1,114	62,260	1.882
Malaria	0	0	0	145,496	0	48,827	38,229	170,368	21,090	74,772	51,563	149,110	112,702	674,577	20.412
Gonorrhoea	0	0	0	6,786	0	8,672	3,534	8,540	3,027	7,173	2,455	15,161	4,856	59,509	1.802
Urinary tract infect.	0	0	0	15,364	0	4,491	4,613	14,221	4,895	7,719	3,040	13,837	3,171	53,327	1.612
Bilharzia (Schistosomal)	0	0	0	5,101	0	32	336	101	922	4,384	101	142	53	11,172	0.342
Intestinal worms	0	0	0	50,339	0	14,860	9,161	37,294	3,971	15,856	2,752	20,282	19,602	174,117	5.272
Malnutrition	0	0	0	2,577	0	231	410	1,086	3,075	6,996	880	746	1,907	17,008	0.512
Anaemia	0	0	0	6,669	0	1,245	606	2,875	4,543	8,347	1,250	4,241	1,625	31,401	0.952
Eye infections	0	0	0	23,901	0	7,706	6,189	13,490	7,370	10,803	9,335	19,334	17,355	115,483	3.492
Cataract	0	0	0	2,357	0	114	228	291	1,471	4,177	184	226	271	9,319	0.282
Ear Infections	0	0	0	13,516	0	4,255	4,526	8,987	4,756	7,133	3,259	11,256	6,632	64,320	1.952
Bis. of Circ. System	0	0	0	22,234	0	323	2,514	679	5,029	13,619	60	3,366	707	48,531	1.472
Bis. of the resp. System	0	0	0	102,757	0	53,275	62,542	162,941	29,813	50,136	31,970	140,862	79,483	713,774	21.602
Pneumonia	0	0	0	8,054	0	9,019	4,692	7,336	4,532	4,465	3,082	7,540	5,727	54,447	1.652
Abortion	0	0	0	1,687	0	817	513	756	554	903	245	608	990	7,073	0.212
Bis. of Puerperium	0	0	0	429	0	643	117	782	422	163	149	450	511	3,666	0.112
Neoplasms	0	0	0	384	0	2	86	39	227	83	3	54	10	888	0.032
Bis. of Blood	0	0	0	247	0	42	85	87	65	170	161	148	39	1,044	0.032
Mental Disorders	0	0	0	2,364	0	347	150	446	722	1,000	25	1,597	51	6,702	0.202
Dental disorders	0	0	0	14,033	0	2,960	3,114	5,748	3,878	12,468	343	9,881	1,004	53,429	1.622
Bis. of the skin	0	0	0	77,539	0	17,531	16,145	42,144	13,969	11,281	10,152	48,719	29,532	267,032	8.082
Rheumatism, Joint pains etc.	0	0	0	12,444	0	5,209	5,542	16,134	6,589	7,178	2,052	12,765	6,078	73,991	2.242
Congenital Anomalies	0	0	0	843	0	72	40	60	1,535	921	30	37	71	3,554	0.112
Pyrexia (PUO)	0	0	0	6,279	0	598	1,648	3,409	5,142	1,031	929	1,494	1,086	21,616	0.652
Poisoning	0	0	0	2,521	0	600	67	53	1,341	2,139	296	46	12	7,075	0.212
Accidents	0	0	0	19,337	0	7,765	5,923	16,019	4,428	3,565	2,874	15,546	5,923	66,628	2.022
All other diseases	0	0	0	128,644	0	36,643	45,881	92,860	14,930	61,714	28,411	97,942	33,863	465,860	14.102
TOTAL NEW CASES	0	0	0	739,307	0	242,164	230,987	518,642	118,651	378,987	168,434	618,320	357,306	3,304,610	100.002
RE-ATTENDANCES (RE-VISITS)	0	0	0	77,151	0	80,562	66,132	120,949	55,473	45,766	162,087	208,287	66,630	755,250	
REFERRALS	0	0	0	1,903	0	1,766	1,256	65,800	6,020	38,247	618	38,739	1,262	109,997	
NO. OF FIRST ATTENDANCES	0	0	0	52,685	0	28,160	733	307,846	49	14,000	48,372	339	88,357	468,641	
AVERAGE BIS. PER ATTENDANCE				14		9	315	2	2,421	27	3	1,824	4	7	

POPULATION 286,097 167,887 241,531 912,634 229,126 336,923 857,782 448,686 99,491 445,883 148,380 469,893 266,173 4,910,486

ANNUAL OUT-PATIENT MORBIDITY STATISTICS

BY DISTRICT/PROVINCE

MTANZA PROVINCE

	DISTRICTS			PROVINCIAL TOTAL	
	KISII	KISUMU	S.MYANZA	SIATA	2
Number of Institutions Reporting Institutions	73	63	86	39	261
Response Rate	0	26	31	0	58
	0.02	41.52	36.42	0.02	22.02
DISEASES					
Diarrhoeal diseases	0	43,675	39,572	0	83,247 5.682
Tuberculosis	0	223	142	0	365 0.022
Leprosy	0	83	148	0	231 0.022
Whooping cough	0	647	1,333	0	1,980 0.142
Meningitis	0	33	63	0	96 0.012
Tetanus	0	18	26	0	44 .002
Poliovirus	0	10	79	0	89 0.012
Chicken pox	0	238	318	0	556 0.042
Measles	0	3,581	6,736	0	10,317 0.702
Infectious hepatitis (Jaundice)	0	346	569	0	915 0.062
Whooping	0	810	1,328	0	2,138 0.152
Malaria	0	263,159	268,106	0	531,265 36.252
Gonorrhoea	0	17,763	18,419	0	36,182 2.472
Urinary Tract Infections	0	14,105	23,770	0	37,875 2.582
Bilharzia (Schistosomiasis)	0	1,335	3,684	0	5,019 0.342
Intestinal worms	0	32,672	42,324	0	74,996 5.122
Malnutrition	0	6,685	7,355	0	14,040 0.962
Anaemia	0	10,957	13,895	0	24,852 1.702
Eye infections	0	19,623	23,351	0	42,974 2.932
Cataract	0	268	384	0	652 0.042
Ear Infections	0	14,787	18,196	0	32,983 2.252
Dis. of Circulatory System	0	1,376	1,424	0	2,800 0.192
Dis. of the respiratory System	0	97,712	106,629	0	204,341 13.942
pneumonia	0	7,498	12,292	0	19,790 1.342
Abortion	0	976	1,600	0	2,576 0.182
Dis. of Puerperium and Child Birth	0	1,162	1,111	0	2,273 0.162
measles	0	90	116	0	209 0.012
Dis. of Blood and Blood forming organs	0	69	954	0	1,023 0.072
mental Disorders	0	108	1,191	0	1,299 0.092
mental disorders	0	7,019	11,287	0	18,306 1.042
Dis. of the skin (incl. ulcers)	0	45,426	61,271	0	106,697 7.442
gonorrhoea, Joint pains etc.	0	11,730	15,257	0	27,000 1.902
congenital Anomalies	0	301	266	0	567 0.022
psoriasis of unknown origin (PUO)	0	4,396	6,469	0	11,125 0.762
poisoning	0	440	419	0	859 0.032
accidents (incl. fractures, burns, etc)	0	6,968	10,765	0	18,132 1.242
All other diseases	0	105,813	82,670	0	188,483 10.132
TOTAL NEW CASES	0	721,132	783,519	0	1,465,395 100.002
RE-ATTENDANCES (RE-VISITS)	0	74,387	188,089	0	262,456
REFERRALS	0	13,420	13,611	0	27,031
NO. OF FIRST ATTENDANCES	0	1,435	280,931	0	282,366
AVERAGE DIS. PER ATTENDANCE		503	3		5

POPULATION

1,345,030 723,716 1,240,428 721,369 4,030,543

ANNUAL OUT-PATIENT MORBIDITY STATISTICS

BY DISTRICT/PROVINCE

WESTERN PROVINCE

	DISTRICTS			PROVINCIAL	PROVINCIAL
	BUSIA	BUNGOMA	KARAREGA	TOTAL	%
Number of Institutions	24	30	63	117	
Reporting Institutions	3	0	24	27	
Response Rate	14.22	0.02	37.72	23.22	
DISEASES					
Diarrhoeal diseases	6,022	0	88,609	94,631	8.702
Tuberculosis	2	0	83	85	0.012
Leprosy	7	0	77	84	0.012
Whooping cough	49	0	597	646	0.062
Meningitis	0	0	45	45	.002
Tetanus	0	0	156	156	0.012
Polioomyelitis	0	0	55	55	0.012
Chicken pox	15	0	3,404	3,419	0.312
Measles	361	0	5,864	6,225	0.572
Infectious hepatitis (Jaundice)	35	0	404	439	0.042
Whoops	90	0	2,274	2,364	0.222
Malaria	35,744	0	321,017	356,761	32.782
Gonorrhoea	836	0	16,649	17,485	1.612
Urinary tract infections	1,225	0	3,873	5,098	0.472
Bilharzia (Schistosomiasis)	116	0	490	606	0.062
Intestinal worms	4,820	0	39,488	44,308	4.072
Malnutrition	958	0	5,580	6,538	0.602
Anaemia	1,923	0	11,144	13,067	1.202
Eye infections	1,607	0	22,680	24,287	2.232
Cataract	47	0	122	169	0.022
Ear infections	1,584	0	17,962	19,546	1.802
Dis. of Circulatory System	108	0	1,003	1,111	0.102
Dis. of the respiratory System	15,075	0	160,202	175,277	16.112
Pneumonia	1,095	0	8,855	9,950	0.912
Abortion	190	0	893	1,083	0.102
Dis. of Puerperium and Child Birth	47	0	954	1,001	0.092
Neoplasms	13	0	156	169	0.022
Dis. of Blood and Blood forming organs	2	0	243	245	0.022
Mental Disorders	33	0	6,651	6,684	0.612
Dental disorders	645	0	2,634	3,279	0.302
Dis. of the skin (incl. ulcers)	8,155	0	68,763	76,918	7.072
Rheumatism, Joint pains etc.	1,771	0	9,482	11,253	1.032
Congenital Anomalies	3	0	22	25	.002
Pyresia of unknown origin (PUO)	640	0	14,634	15,274	1.402
Poisoning	133	0	18	151	0.012
Accidents (Incl. fractures, burns, etc)	1,107	0	13,175	14,282	1.312
All other diseases	6,769	0	168,796	175,565	16.132
TOTAL NEW CASES	91,227	0	997,054	1,088,281	100.002
RE-ATTENDANCES (RE-VISITS)	42,879	0	201,843	244,722	
REFERRALS	353	0	31,970	32,323	
NO. OF FIRST ATTENDANCES	2,681	0	0	2,681	
AVERAGE DIS. PER ATTENDANCE	34			486	

POPULATION

441,482 741,608 1,448,994 2,632,084

ANNUAL OUT-PATIENT MORBIDITY STATISTICS BY DISTRICT/PROV. 1988

CENTRAL PROVINCE

	DISTRICTS					PROVINCIAL	PROVINCIAL
	ELABU	EIRIMYAGA	MURANGA	MTANDARUA	MYERI	TOTAL	2
Number of Institutions	78	48	70	34	67	297	
Reporting Institutions	45	30	53	28	39	195	
Response Rate	57.02	62.52	75.62	81.42	50.02	65.52	
DISEASES							
Diarrhoeal diseases	44,288	31,649	34,005	15,238	23,627	148,807	3.252
Tuberculosis	260	122	234	40	228	892	0.022
Leprosy	10	16	40	2	9	77	.002
Whooping cough	24	414	29	52	370	889	0.022
Meningitis	38	47	31	8	47	171	.002
Tetanus	265	24	26	3	14	325	0.012
Polioyelitis	478	2	71	1	92	662	0.012
Chicken pox	2,807	5,214	8,788	464	4,378	21,975	0.482
Measles	2,695	2,469	2,175	3,474	3,248	15,378	0.342
Infectious hepatitis (Jaundice)	11,350	222	128	54	157	14,077	0.312
Measles	4,292	4,401	5,017	2,302	3,960	48,232	1.492
Malaria	97,477	131,395	188,759	26,055	43,755	493,967	10.792
Gonorrhoea	16,138	3,702	7,904	5,755	8,270	79,382	1.732
Urinary Tract Infections	13,146	8,991	6,324	3,984	4,373	39,120	0.852
Bilharzia (Schistosomiasis)	2,854	1,872	301	39	61	30,507	0.672
Intestinal worms	49,837	43,525	60,257	20,120	48,152	226,304	4.942
Malnutrition	8,180	1,179	1,635	214	585	26,349	0.582
Anaemia	5,881	2,393	2,801	564	1,156	32,270	0.702
Eye infections	20,296	17,457	33,730	13,077	18,579	109,684	2.402
Cataract	4,766	475	580	237	659	23,942	0.522
Ear Infections	34,374	7,574	19,405	7,462	9,910	81,837	1.792
Dis. of Circulatory System	31,932	1,471	1,023	314	1,175	223,618	4.882
Dis. of the respiratory System	178,994	198,755	289,636	109,280	232,277	1,067,521	23.322
Pneumonia	44,154	10,869	9,864	13,972	27,400	169,783	3.712
Abortion	4,640	583	694	544	1,467	11,852	0.262
Dis. of Puerperina and Child Birth	1,780	187	722	305	480	3,332	0.072
Neoplasms	506	65	9	31	80	992	0.022
Dis. of Blood and Blood forming organs	883	104	60	140	64	2,777	0.062
Mental Disorders	6,325	1,277	1,052	1,014	2,521	14,842	0.322
Mental disorders	10,388	5,915	6,215	3,138	1,470	71,240	1.562
Dis. of the skin (incl. ulcers)	121,745	41,772	67,713	28,320	47,782	336,798	7.362
Rheumatism, Joint pains etc.	27,072	17,868	18,262	11,839	24,068	115,833	2.532
Congenital Anomalies	2,659	661	51	51	57	12,822	0.282
Pyrexia of unknown origin (PUO)	5,628	5,556	7,878	1,023	9,283	30,683	0.672
Poisoning	4,915	301	90	84	253	29,426	0.642
Accidents (Incl. fractures, burns, etc)	34,125	27,322	42,806	12,838	24,831	149,801	3.272
All other diseases	250,662	124,781	168,009	74,781	138,866	1,340,104	29.272
TOTAL NEW CASES	930,130	699,830	986,224	356,827	683,704	4,578,000	100.002
RE-ATTENDANCES (RE-VISITS)	277,385	338,731	477,524	116,669	264,639	1,412,796	
REFERRALS	17,461	6,512	14,071	3,978	19,170	401,729	
NO. OF FIRST ATTENDANCES	116,480	418,348	656,028	61,359	491,010	1,743,617	
AVERAGE DIS. PER ATTENDANCE	8	2	2	6	1	3	
POPULATION							
	1,012,438	416,140	960,077	330,183	695,903	3,414,741	

ANNUAL OUT-PATIENT MORBIDITY STATISTICS BY DISTRICT/PROVINCE 1988

EASTERN PROVINCE

	DISTRICTS					PROVINCIAL		PROVINCIAL %
	ERBU	BITUI	NACHAKOS	NERU	ISIOLO	MARSABIT	TOTAL	
Number of Institutions	62	58	85	122	20	17	364	
Reporting Institutions	9	44	67	46	0	6	172	
Response Rate	14.82	76.02	78.62	37.52	0.02	37.32	47.32	
DISEASES								
Diarrhoeal diseases	6,854	47,282	77,107	27,228	0	4,373	162,844	5.002
Tuberculosis	15	116	191	99	0	54	475	0.012
Leprosy	0	12	13	7	0	0	32	.002
Whooping cough	14	151	547	680	0	1	1,393	0.042
Meningitis	3	22	18	13	0	0	56	.002
Tetanus	3	75	23	1	0	0	102	.002
Poliomylitis	0	81	36	36	0	0	153	.002
Chicken pox	1,904	1,769	2,810	1,659	0	25	7,267	0.222
Measles	952	1,254	3,005	3,342	0	20	8,573	0.262
Infectious hepatitis (Jaundice)	49	690	692	971	0	307	2,709	0.082
Measles	1,025	3,501	1,441	2,266	0	47	8,280	0.252
Malaria	75,757	239,854	381,701	179,032	0	16,309	892,653	27.392
Gonorrhoea	3,739	17,057	18,381	6,131	0	1,531	46,339	1.422
Urinary Tract Infections	6,331	31,975	33,773	5,263	0	730	78,072	2.402
Bilharzia (Schistosomiasis)	298	4,188	4,015	197	0	47	8,655	0.272
Intestinal worms	13,283	35,657	52,774	52,966	0	2,609	157,289	4.832
Malnutrition	277	3,643	2,871	3,239	0	160	10,190	0.312
Anaemia	820	4,994	7,500	4,105	0	329	17,748	0.542
Eye infections	7,651	18,612	28,675	31,036	0	2,048	88,022	2.702
Cataract	117	1,678	356	130	0	144	2,425	0.072
Ear Infections	4,143	12,654	20,144	16,938	0	1,154	55,033	1.692
Dis. of Circulatory System	288	7,917	1,875	477	0	1,115	11,672	0.362
Dis. of the respiratory System	61,099	155,085	267,198	150,311	0	11,078	644,771	19.782
Pneumonia	2,416	11,425	23,841	15,626	0	921	54,229	1.662
Abortion	210	1,153	1,714	580	0	58	3,715	0.112
Dis. of Puerperium and Child Birth	204	1,025	1,298	2,430	0	123	5,080	0.162
Neoplasms	14	98	204	0	0	279	595	0.022
Dis. of Blood and Blood forming organs	30	300	438	0	0	204	972	0.032
Mental Disorders	388	929	1,845	1,694	0	62	4,918	0.152
Dental disorders	5,379	7,415	10,198	4,234	0	325	27,549	0.852
Dis. of the skin (incl. ulcers)	18,509	61,073	110,891	60,081	0	1,647	252,201	7.742
Rheumatism, Joint pains etc.	2,647	10,926	24,794	32,757	0	989	72,113	2.212
Congenital Anomalies	29	346	168	57	0	90	690	0.022
Pyrexia of unknown origin (PUO)	1,006	1,483	5,286	8,980	0	301	17,058	0.522
Poisoning	29	389	210	2	0	21	651	0.022
Accidents (incl. fractures, burns, etc)	7,562	20,520	25,683	25,967	0	1,011	80,743	2.482
All other diseases	32,688	137,176	235,461	114,187	0	14,158	533,670	16.382
TOTAL NEW CASES	254,245	842,525	1,347,253	752,722	0	62,268	3,259,013	100.002
RE-ATTENDANCES (RE-VISITS)	109,293	314,530	496,587	219,138	0	35,538	1,175,086	
REFERRALS	4,650	66,859	13,745	5,196	0	53	90,503	
NO. OF FIRST ATTENDANCES	183,347	541,642	880,437	0	0	496,964	2,104,108	
AVERAGE DIS. PER ATTENDANCE	1	2	2			0	2	
POPULATION								
	394,820	670,586	1,522,551	1,214,950	64,479	157,479	4,325,065	

ANNUAL OUT-PATIENT MORBIDITY STATISTICS

BY DISTRICT/PROVINCE 1988

NORTH EASTERN PROVINCE

	DISTRICTS			PROVINCIAL	PROVINCIAL
	GARISSA	BAJIR	MANDERA	TOTAL	%
Number Of Institutions	20	13	6	39	
Reporting Institutions	17	4	3	24	
Response Rate	84.62	29.52	54.22	61.52	
DISEASES					
Diarrhoeal Diseases	9,875	3,475	4,158	17,508	4.252
Tuberculosis	30	38	453	521	0.132
Leprosy	56	0	0	56	0.012
Whooping cough	2	7	9	18	.002
Measles	6	12	2	20	.002
Tetanus	4	3	9	14	.002
Polioyelitis	5	5	3	13	.002
Chicken pox	42	46	87	175	0.042
Measles	146	60	223	429	0.102
Infectious Hepatitis(Jaundice)	50	38	3	91	0.022
Whoops	338	28	129	495	0.122
Malaria	104,285	9,153	21,667	135,105	32.762
Gonorrhoea	2,103	1,755	1,261	5,119	1.242
Urinary Tract Infections	5,447	73	4,143	9,663	2.342
Bilharzia (schistosomiasis)	2,794	40	5	2,839	0.692
Intestinal worms	6,590	1,249	2,296	10,135	2.462
Malnutrition	918	414	807	2,139	0.522
Anaemia	5,987	1,034	1,166	8,187	1.992
Eye infections	5,865	1,842	2,857	10,564	2.562
Cataract	281	194	40	515	0.122
Ear infections	5,245	1,566	3,820	9,831	2.382
Dis. of circulatory system	12	35	8	55	0.012
Dis. of the respiratory system	75,793	9,343	21,275	106,411	25.802
Pneumonia	1,891	411	1,445	3,747	0.912
Abortion	156	42	33	231	0.062
Dis. of puerperium and child birth	81	92	71	194	0.052
Neoplasms	0	0	2	2	.002
Dis. of blood and blood forming organs	6	0	11	17	.002
Mental Disorders	16	0	678	694	0.172
Dental Disorders	522	10	2,950	3,482	0.842
Dis. of the skin (inc. ulcers)	15,163	1,868	3,659	20,690	5.022
Rheumatism, Joint pains etc.	3,347	1,123	904	5,374	1.302
Congenital Anomalies	12	0	4	16	.002
pyrexia of unknown origin(puc)	88	208	41	337	0.082
Poisoning	3	0	613	616	0.152
Accidents Incl. fracture, burns, etc	2,892	471	1,976	5,339	1.292
All other diseases	33,443	5,851	12,464	51,758	12.552
TOTAL NEW CASES	283,494	48,484	88,422	412,400	100.002
RE-ATTENDANCES(REVISITS)	212,043	4,015	28,049	244,107	
REFERRALS	35,146	137	352	35,635	
NO. OF FIRST ATTENDANCES	100,688	5,449	4,229	110,366	
AVERAGE DIS. PER ATTENDANCE	3	7	21	4	
POPULATION	222,760	223,223	137,524	583,507	

ATTACHMENT 4

(RAW DATA)

OUT-PATIENT MORBIDITY KENYA TOTALS FOR 1987

PROVINCES	NAIROBI	CENTRAL	COAST	EASTERN	NORTH EASTERN	NYANZA RIFT VALLEY	WESTERN	KENYA TOTALS	KENYA %	
Malaria	4716	445661	940070	857435	81612	881884	716403	139791	4067572	23.41
Dis. of the respiratory System	12973	1041797	570032	744524	58917	358531	776844	79546	3643164	20.97
Dis. of the skin (incl. ulcers)	6283	233523	258690	269117	15222	226412	247036	28759	1295042	7.45
Intestinal worms	3034	223492	122162	166409	5158	124204	165832	12398	323689	4.74
Diarrhoeal diseases	5520	149822	144895	170349	10143	150728	171354	20753	322595	4.74
Eye infections	2074	104003	66193	103459	6477	64456	109194	7333	463209	2.67
Accidents (incl. fractures, burns, etc)	2746	117871	52253	86967	3080	32872	92986	4675	393472	2.26
Rheumatism, Joint pains etc.	1677	85254	46542	82939	4130	47859	71658	4393	344451	1.98
Ear Infections	893	50900	51910	63406	6501	52333	59165	4620	294928	1.70
Urinary Tract Infections	7	30610	34095	67658	6006	68994	53741	4465	272976	1.57
Pneumonia	475	86095	24967	49913	3307	34443	50066	1937	251225	1.43
Gonorrhoea	1110	27374	41120	45722	2638	58162	55059	4027	235212	1.33
Anaemia	248	7047	53468	19202	4714	47097	15943	3756	151475	0.87
Dental disorders	163	22786	15551	49417	2757	28769	26173	1099	147720	0.83
Pyrexia of unknown origin (PUO)	793	35898	10448	18722	329	22465	21729	1211	111596	0.64
Measles	269	16378	11358	26104	549	22390	27084	3162	107294	0.62
Mumps	147	35196	7943	23311	660	6510	26225	626	100618	0.58
Malnutrition	451	2764	10376	11541	1352	24134	6590	864	50672	0.33
Bilharzia (Schistosomiasis)	8	4733	38531	5799	1772	7083	1478	47	59451	0.34
Dis. of Circulatory System	128	3162	12602	5536	365	9481	6780	173	39727	0.23
Chicken pox	101	12547	2733	3525	275	1993	4892	554	31621	0.18
Dis. of Puerperium and Child Birth	96	1092	7770	5052	359	2344	4527	411	21751	0.13
Abortion	69	3846	3376	3938	280	3847	5161	590	21107	0.12
Mental Disorders	80	7347	1560	3496	549	2702	3036	174	18944	0.11
Whooping cough	25	999	2870	2748	72	3843	4117	460	13134	0.07
Cataract	11	1165	2596	1952	367	1345	2753	307	10396	0.06
Infectious hepatitis (Jaundice)	43	551	2924	2021	212	1860	1881	165	9657	0.06
Congenital Anomalies	144	636	1750	1378	72	1145	985	40	6150	0.04
Poisoning	0	895	1179	671	42	907	2073	27	5994	0.03
Tuberculosis	3	405	726	748	427	250	3010	35	5667	0.03
Dis. of Blood and Blood forming organs	11	363	825	752	23	565	660	55	3254	0.02
Neoplasms	48	151	1256	193	33	438	391	73	2588	0.01
Meningitis	7	641	157	117	9	191	307	56	1485	0.01
Leprosy	0	448	189	225	4	280	100	32	1279	0.01
Tetanus	0	18	298	102	3	208	338	2	969	0.01
Polio-myelitis	0	85	124	221	61	114	117	3	725	0.00
TOTAL NO OF ALL KNOWN DISEASES	44353	2755555	2555040	2906892	219978	2289839	2745795	326897	13843349	79.56
ALL OTHER DISEASES	62041	641146	1225930	634793	40963	239801	632334	53525	3530533	20.32
TOTAL NEW CASES	106394	3396701	3780970	3541685	259941	2529640	3378129	380422	17373582	100.00
RE-ATTENDANCES (RE-VISITS)	55000	1326530	521587	1338044	66370	607838	1105019	135962	5156330	
REFERRALS	12000	159782	17191	81431	435	58615	28760	4906	363120	
NO. OF FIRST ATTENDANCES	45000	1627166	570717	1687762	48454	708007	837843	68301	5593250	
AVERAGE DIS. PER ATTENDANCE	2.4	2.1	6.6	2.1	5.4	3.6	4.0	5.6	3.1	
TOTAL NO OF PATIENT VISITS	100000	2953696	1092304	3025806	114824	1315845	1942862	204263	10749600	
POPULATION	1282634	3284845	1904109	3864707	556977	3892624	4702401	2535881	22030178	