

3. PROGRESS REPORT FROM THE EPIDEMIOLOGY UNIT

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH
UNIVERSITY OF GHANA
LEGON.

EPIDEMIOLOGY UNIT REPORT 1986/87-89/90

Aim

1. The aim of the Epidemiology Unit under the Programme implementation schedule of the Noguchi Memorial Institute for Medical Research for 1986/87-1990/91 is to improve the health of pregnant women and preschool children in rural communities through research and provision of services within the context of primary health care strategies in Ghana.

Objectives

2. The objectives of the Unit could be summarized as follows:-
- a. To determine incidence of diseases in preschool children and select major causes of ill health for intervention purposes
 - b. To observe seasonal changes in incidence of diseases
 - c. To distinguish the causative agents of diseases with similar clinical manifestation
 - d. To determine the impact of therapeutic and prophylactic measures
 - e. To prevent maternal mortality
 - f. To collaborate with the University of Ghana Medical School and the Ministry of Health in the training of epidemiologists for the health services in Ghana.

Activities

3. The following Research and Service oriented activities have been/are being carried out to achieve Units objectives.

Selection of Reference Population

a. Gomoa Fetteh, a coastal village in the Gomoa District in the Central Region was the first community to be selected for the project in 1983. The project/survey areas have since been extended to include Gomoa Onyadze/Otsew Jukwa and Gomoa Mprumem in 1986/87 and 1988 respectively. These communities are few kilometers inland and they are also in the Gomoa District in the Central Region. All the communities are about 80km from Accra. The selection of the villages was based on the following criteria.

- (i) low vaccination coverage and high infant mortality rate
- (ii) easy accessibility to the communities
- (iii) the communities initial willingness to participate in the project.

b. These three communities constitute field research/outreach stations for the Institute. (Fig 1-5)

Collection of Demographic Data

Censuses are conducted every two years in the selected communities. Censuses were conducted in June 1986 at Gomoa Fetteh, and Gomoa Onyadze/Otsew Jukwa, and in June 1988 in all the three communities. The results of these censuses have been presented in previous unit reports. The 1990 census in the three

- communities has just been completed. The data is being analysed to enable us produce report as soon as possible.
- d. All births and deaths, and possible causes of deaths are recorded continuously in the communities by trained community health workers.
- e. The total population of the three communities is 4239. Children under five years of age form about 18-20 per cent of the total population; female about 55-57 per cent. Crude Death rate is generally low. It ranged from 2.3 to 14.9/1000 population. Crude Birth rate is relatively high in the three communities (34.7-52.7/1000 population). The natural rate of population increase is generally high (3.6-3.9%) in the three communities in 1989. In spite of this high rate of natural population increase, the total population in 1988 (1988 census) in Gomoa Fetteh and Gomoa Onyadze/Otsew Jukwa is slightly lower than that of 1986 (Tables 4 and 5). Indications are that this may be largely due to high population morbidity in the area.
- f. Infant mortality rate in the new project area (Gomoa Mprumem) was 69.7/1000 live births but that of Gomoa Fetteh and Gomoa Onyadze were 23.5 and 37/1000 live births respectively. Under five mortality rates are generally low in the three communities (Tables 1-3).
- g. No maternal deaths have occurred since the beginning of the programme in the three communities although about 95 per cent of infants have been delivered by traditional birth attendants.

Under-Five Disease Surveillance

h. Preschool children in the three communities are registered and followed up at a weekly clinic in the villages. The growth of these children is monitored monthly and the sick child treated. The body weight, height measurements and health status of each child are recorded on specially designed Disease Register, and the data fed into a computer at the Institute.

i. The four most common causes of morbidity in the three communities have been identified as acute respiratory illnesses/infections, malaria, diarrhoeal diseases and skin conditions accounting for about 50-70 per cent of all under five visits to the clinics from 1987-1989 (Tables 4-6).

j. Seasonal variation in disease incidence with high incidence during the wet season (April/May to October/November) was characteristic of all major causes of morbidity but diarrhoeal diseases (Figs. 6-8).

k. Control programmes have been initiated for malaria and diarrhoeal diseases since 1988. Indications are that incidence of diarrhoeal diseases is decreasing gradually while the trend of malaria have not changed much compared with previous years (Figs. 6-8).

Primary Health Care Activities

1. The Unit continues to carry out primary health care activities within the concept of primary health care strategies in Ghana. The activities were as follows:-

Health Education

(1) This took the form of talks, discussions, film shows, role plays, and demonstrations to address the following:-

- (a) personal, water, food and environmental sanitation.
- (b) food values, food habits and childcare in general.
- (c) diarrhoeal disease control based on oral rehydration therapy with locally available fluids and ORS.
- (d) malaria control with emphasis on early detection and treatment especially among preschool children with readily available antimalaria drugs.
- (e) family planning.
- (f) prevention and control of childhood diseases with emphasis on vaccination against the six vaccine preventable childhood diseases and yellow fever.

Growth Monitoring

(2) Measurements of body weights and heights of preschool children were taken monthly to monitor the growth of each child.

Treatment of Childhood Diseases

(3) An attempt was made to see and clinically examine each registered child at least once every two weeks. Those found to be sick were treated with drugs and dressings supplied by JICA and the Ghana Government.

Vaccination Sessions

(4) Vaccination of children against tuberculosis, diphtheria, tetanus, pertussis, poliomyelitis and measles were done regularly to ensure that at least 90 per cent of children aged between one and two years were fully vaccinated. As a result of the level of vaccination coverage in the communities measles and other childhood vaccine preventable diseases are no more causing childhood morbidity and mortality in the three communities.

Antenatal and postnatal Clinics

(5) These clinics were held at least once a month at each village to improve the health of the mother and the baby to be born.

(6) Pregnant women were also given a course of tetanus toxiod antigen.

(7) Since 90 to 95 per cent of pregnant women seen at **our** ante-natal clinics are delivered by TBAs, the Unit collaborates with the TBAs to ensure safe and hygienic methods of child delivery in the villages.

Laboratory Support

(8) The Parasitology, Immunology, Bacteriology, Virology and Haematology Units at the Institute provide support especially in the areas of malaria, diarrhoeal diseases, some skin infections and seroepidemiological studies.

Research Activities (Survey/Special Studies)

4. The following research activities have been carried out by the Unit:-

Some Demographic Characteristics in Two of the Communities

(a) A study of the demographic characteristics of Gomoa Fetteh and Gomoa Onyadze/Otsew Jukwa in 1987 showed a rate of natural population growth of 3.9 per cent. This rate is higher than the national rate of 2.6 per cent recorded during the 1984 census. Family planning services have been introduced in the communities as a result of this study. The results of this study have been published in the Ghana Medical Journal.

Diarrhoeal Morbidity and Treatment Survey

(b) Under five diarrhoeal morbidity and treatment survey was conducted in June 1987 in Gomoa Fetteh and in Gomoa Onyadze/Otsew Jukwa to provide base-line data for diarrhoeal disease control programme in the two communities. The results of this study have been published in the NEIMR Bulletin.

Parasitic, Bacterial and Viral Isolates from Acute Diarrhoeal and Non-Diarrhoeal Stools

(c) Diarrhoeal (acute) and non diarrhoeal stools were collected weekly from preschool children for a period of one year (1987/88) to determine an association between intestinal isolates and diarrhoeal diseases in preschool children at Gomoa Onyadze/Otsew Jukwa. The results of this study were presented at the Ghana-Japan Joint Scientific Conference in August, 1989.

Nutritional Status of Preschool Children

(d) In a cross-sectional study conducted in May, 1988 to assess the nutritional status of 512 preschool children at Gomoa Fetteh and Gomoa Onyadze/Otsew Jukwa 2.9 per cent of the children were found to be wasted (acutely malnourished) 28.5 per cent stunted (chronically malnourished) 21.7 per cent stunted or wasted (under-nutrition) whilst 0.8 per cent were stunted and wasted. Indications are that the growth deficit in the two communities was partly due to inadequate food supply and food habits as a result of low income levels from poor agricultural/fishing and trading practices. The situation is worsened by the high population growth in the two communities. Measures taken to improve the nutritional status of the preschool child in the two communities were summarized in last years report.

Seasonal Characteristics of Malaria Infection in Preschool Children in a Rural Ghana

(e) A quarterly survey of malaria infection among preschool children at Gomoa Onyadze/Otsew Jukwa was conducted in 1987 to determine seasonal variations in the prevalence of malaria infection, identification of parasite species and estimation of parasite density in the age group 0-4 years. The results indicated that the crude parasite rates ranged from 19.6 to 33.5 per cent in the dry season and 33.0 to 44.0 per cent in the wet season.

P. falciparum was the predominant parasite species by parasite formula analysis with higher rates in the wet season (94.2 to 95.8 per cent) compared to the dry season (51.4 to 78.8 per cent). As high as 30.4 to 44.8 per cent of positive parasite slides had parasite density of above 3200 per ml of blood (above class 6 degree of parasitaemia). Depending on the season, 7.2-27.3 per cent of children had parasite density above 25,600 per ml of blood (above class 10 degree of parasitaemia).

(f) "An article" seasonal characteristic of malaria infection in under-five children of a Rural Community in southern Ghana has been submitted to the West African Journal of Medicine to be considered for publication.

Antibody Response to Measles Immunization at Seven Months in Ghanaian Infants in Two Rural Communities

(g) The results of a serological study conducted to determine the optimal age for measles vaccination indicated that measles antigen can be administered effectively at the age of seven months as well as nine months. The results of the study were presented at the Ghana-Japan Scientific Conference in August 1989.

On-going Research Projects

5. The Unit is currently engaged in the following research activities.

- a. Sensitivity Status of Plasmodium falciparum to chloroquine and other antimalaria drugs in Ghana.

Objectives

- (1) The objective of the study is to map out Plasmodium falciparum sensitivity to chloroquine and other antimalaria drugs in tropical rain forest areas in Ghana.

Progress Report

- (2) The findings of the first phase of the study which covered Gomoa Fetteh (Central Region) Nima and Madina in the Greater Accra Region has been highlighted in last years report. The study was followed by a two day seminar on "Malaria in Ghana" in March 1989. The second phase of the study in the Ho District (Volta Region) and Frafra District (Upper East Region) was completed in March 1990. The third phase of the project which will cover Brong Ahafo Region will be conducted in November 1990.

A paper on "In vivo and in vitro sensitivity status of P. falciparum to Chloroquine in three communities in Southern Ghana" has been submitted for publication in the Ghana Medical Journal.

- b. Malaria infection, morbidity and antibody levels in infants in a rural community in Ghana.

Objectives

- (1) To determine an association between
 - i. Malaria antibody levels and first infection in infants
 - ii. Malaria antibody levels and incidence of malaria in infants
 - iii. Antibody levels, parasite density and incidence of malaria.

Progress Report

- (2) Fifty infants at Gomoa Fetteh and Gomoa Onyadze/Otsew Jukwa have been recruited into the study and they are being followed up monthly. It is estimated that all samples will be available for analysis by December 1990 and a final report will be submitted to the Institute in January, 1991.
- c. The Unit is collaborating with the Immunology Unit and virology Unit to conduct the following research activities.
- (1) Randomized controlled clinical Trial of APDT vaccine in Ghana. The pilot study is presently being conducted at Gomoa Fetteh.
 - (2) Randomized Controlled Clinical Trial of the New WHO Schedule of Immunization with the Trivalent Oral poliomyelitis vaccine in Ghana. The study is being conducted at Ashiaman, a ~~perurban~~ community in the Greater Accra Region, with active participation of the staff of the Ministry of Health.

Collaboration with the University of Ghana Medical School
and the Ministry of Health in the Training of Epidemiologists

6. Although the Unit has been collaborating with the University of Ghana Medical School and the Ministry of Health in the areas of research activities especially in relation to Malaria, it has not been possible to organize courses to train epidemiologists in the country. The Unit intends to organize short courses in Epidemiology for district health personnel of the Ministry of Health under its medium and long term programme.

Drugs

7. Drugs and consumables are supplied by JICA and the Government of Ghana. It is estimated that about 3 million cedis is spent annually on drugs for the treatment of childhood diseases in three communities. The cost of drugs used per child per visit is estimated to be about ₵358.4. About 92 per cent of the total amount used for drugs constitutes the cost of drugs imported by JICA (Table 7):

Equipment and Consumables

8. JICA has spent ₣1,488,100 (₵2,976,200.00) on consumables and ₣5,317,750 (₵10,635,00.00) on equipment (imported) for the period 1987-1990 (Table 8). JICA has also spent ₵76,551.00, ₵354,264.00 and ₵254,820.00 on consumables purchased locally in 1987, 1988 and in 1989 respectively.

Vaccines

9. Vaccines are supplied locally by the Ministry of Health. The supply has been regular and adequate.

Petrol, Oil and Lubricant

10. An estimated amount of about five million cedis (¢2,063,360.00) is spent on petrol/Diesel, oil, lubricant and maintenance of vehicles (2) which are used to convey Unit Staff to outreach stations in the Central Region. This amount is mainly borne by the Government of Ghana. JICA also spent an amount of ¢72,285.00 in 1987, ¢201,689 in 1988 and ¢250,680.00 in 1989 on diesel for field work.

Counterpart Training in Japan

11. One Senior Technician has undergone training in Laboratory Science and Computer Science in Japan. He was away for one year, One Principal Nursing Officer has been recommended for training in Public Health in Japan for a period of one year.

Japanese Expert

12. Dr. H. Sakatoku has joined the Unit for a period of two years. He took over from Dr. T. Nakano who was in the country from February, 1987 to March 1989. Dr. K. Mimura has recently joined the Institute specially for the WHO-JICA-NMIMR Polio Project.

Future Research Projects/Activities

13. These could be summarized as follows:-

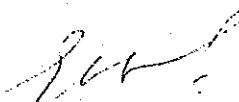
- (a) Assessment of Malaria Diagnosis and Treatment Practices in Ghana
- (b) Epidemiology of Malaria in two different Ecological Zones in Ghana
- (c) Teenage Pregnancy in Second Cycle Institutions and in the Gomoa District
- (d) Strengthening PHC Activities in the Gomoa District
- (e) Tuberculosis Control Project in Ghana
- (f) Epidemiology Courses For Health Personnel.

14. The Short, medium and long term Unit Project/Activities have been outlined in the Units Development Programme for the period 1990/91-1995/96

PUBLICATIONS

15. The Units publications are as follows:-

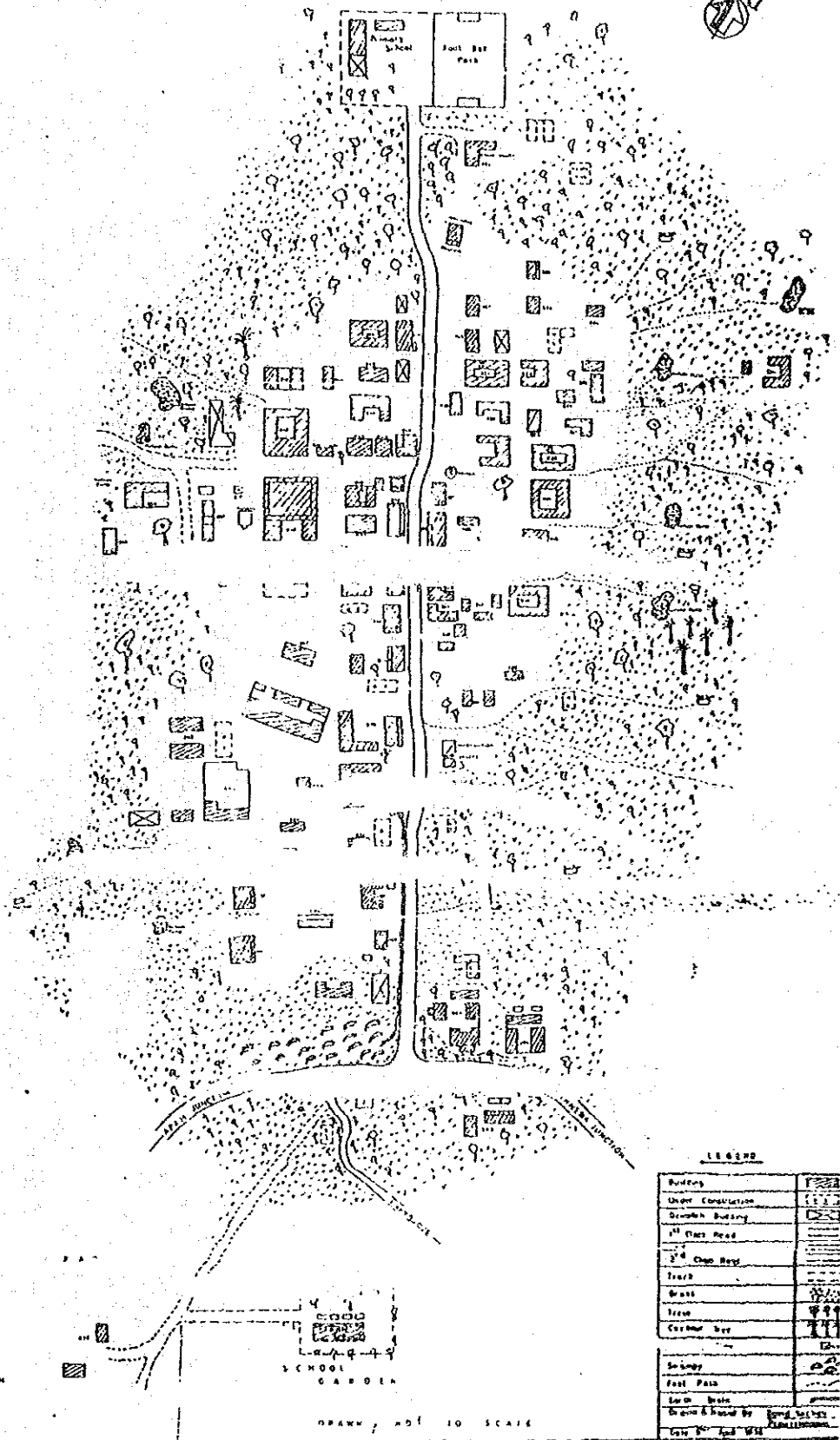
- (a) Biritwum R.B., Isomura S., Assoku A., Torigoe S., Growth and Diarrhoeal Disease Surveillance in a Rural Ghanaian Pre-School Child Population. *Trans.Roy.Soc.Trop.Med.Hyg.* 1986,80:203-213.
- (b) Isomura S., Biritwum R. B., Ofosu-Amaah S. Serum Polio Antibodies in Unimmunized Pre-School Children in a Rural Village in Ghana before active Immunization Programme. *Annals of Tropical Paediatrics* 1987,7:10-14.
- (c) Afari E.A., Nakano T., Owusu-Adjei S. Some Demographic Characteristics of Two Rural Communities in Southern Ghana. *Ghana Med. J.* 1988 22(3)59-62.
- (d) Afari E.A., Nakano T., Binka F., Owusu-Agyei S. Childhood Diarrhoea Morbidity and Treatment Survey in Two Rural Communities in Ghana. *Bull of NMIMR* 1988 1(2)5-10.
- (e) Afari E.A., Nakano T., Binka F., Owusu-Agyei S., Penteng J., Asiedu B.K. Major causes of Morbidity Among Pre-School Children in Two Rural Communities in Southern Ghana *Bull of NMIMR* 1989 1(2)7-16.
- (f) Afari E.A., Akanmori B.D., Nakano T., Ofori-Adjei D., Owusu-Agyei S., Gyan B., Adjei A. In vivo and In vitro Sensitivity Status of *P. falciparum* to Chloroquine in three communities in Ghana. (Accepted for publication in the Ghana Medical Journal).
- (g) Afari E.A. The Role of the Noguchi Memorial Institute For Medical Research in the Control of Communicable Diseases and Malnutrition in Ghana. *Proceedings of Ghana-Japan Joint Scientific Conference in Commemoration of the 10th Anniversary of the NMIMR* 1979-1989.
- (h) Sakatoku H., Nakano T., Arai S., Afari E.A., Mingle J.A.A., Kaniya H., and Sakurai M. Antibody Response to Measles Immunization at Seven Months in Ghanaian Infants in Two Rural Communities in Ghana 1990. In Press.
- (i) Afari E.A., Nakano T., Binka F., Owusu-Agyei, S. and Asigbee J., Seasonal Characteristics of Malaria Infection in Under-Five Children of Rural Community in Southern Ghana". In Press.
- (j) Abrahams C.A., Agbodadze D., Nakano T., Afari E.A., & Longmatey. Prevalence and Antibigram of *Campylobacter jejuni* in Domestic Animals in Rural Ghana. *Archives of Env. Health* 45(1):5g-62,1990.


DR. E.A. AFARI
HEAD OF UNIT

EAA/bdk*

Fig. 3

GOMOA ONYAAZIE



LEGEND

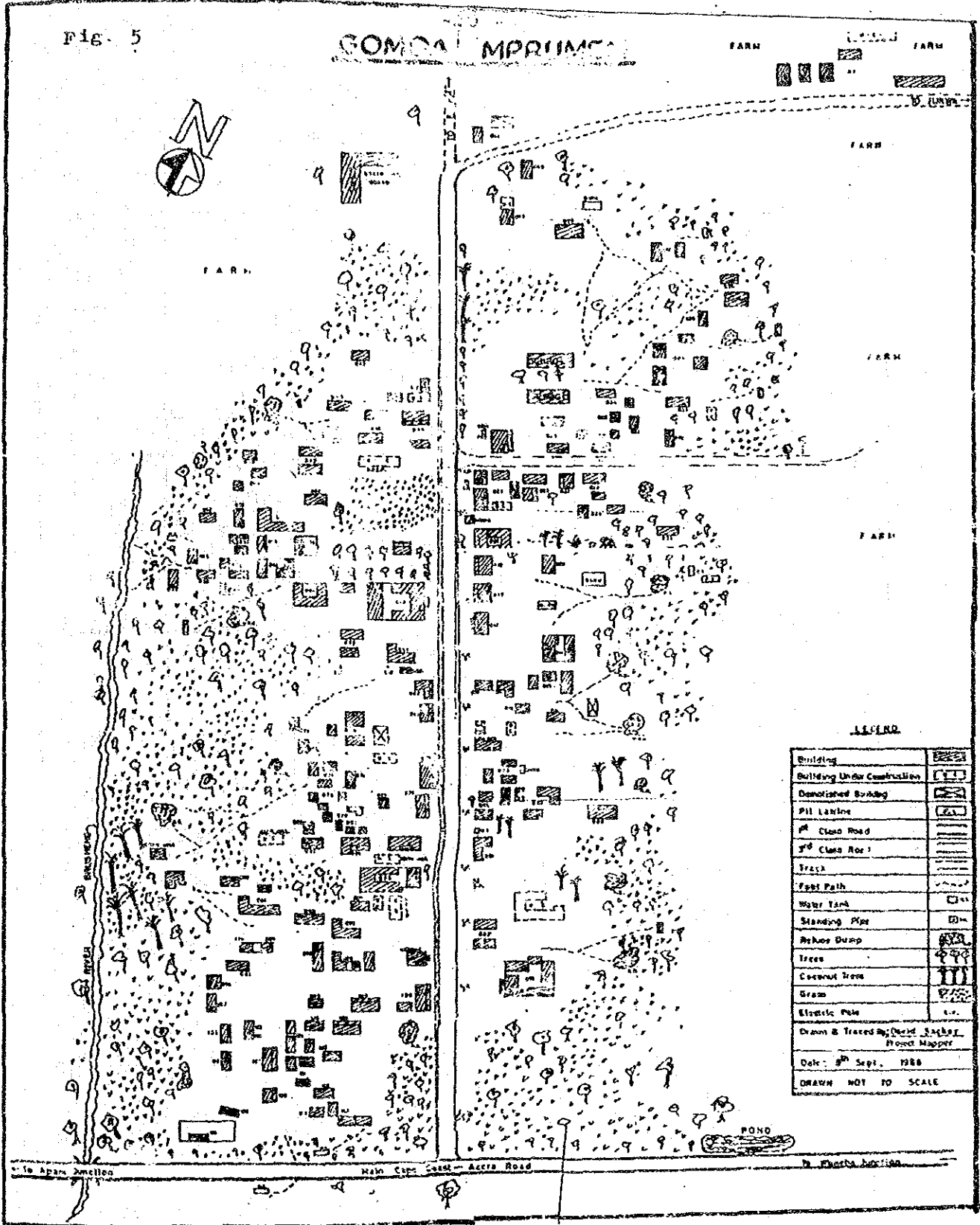
Buildings	[Hatched Box]
Under Construction	[Dotted Box]
Demolish Building	[Cross-hatched Box]
4" Flag Road	[Double Line]
2" Open Road	[Single Line]
Track	[Dashed Line]
Grass	[Stippled Area]
Tree	[Circle with Dot]
Compound Wall	[Thick Line]
Soil Layer	[Wavy Line]
Foot Path	[Thin Dotted Line]
Arch Drain	[Line with Arch]
Drain & House by	[Line with House]
Gate	[Line with Gate]

DRAWN AT 10 SCALE

Fig. 5

GOMBA MPRUMBA

FARM FARM FARM



LEGEND

Building	[Symbol]
Building Under Construction	[Symbol]
Demolished Building	[Symbol]
Pit Latrine	[Symbol]
1 st Class Road	[Symbol]
2 nd Class Road	[Symbol]
Track	[Symbol]
Foot Path	[Symbol]
Water Tank	[Symbol]
Standing Pile	[Symbol]
Refuse Dump	[Symbol]
Trees	[Symbol]
Coconut Trees	[Symbol]
Gram	[Symbol]
Elastic Pole	[Symbol]
Drawn & Traced by: David Sackey, Flood Mapper	
Date: 9 th Sept. 1988	
DRAWN NOT TO SCALE	

to Apam Junction

Main City East - Accra Road

POND

TABLE 7

SOME DEMOGRAPHIC CHARACTERISTICS OF
GONOA FETTEH 1986-1989

VARIABLES	YEARS			
	1986	1987	1988	1989
TOTAL POP.	2316	2316	2241	2241
<5 POP.	430	430	372	372
TOTAL BIRTHS	96	122	109	85
LIVE BIRTHS	96	122	109	85
STILL BIRTHS	0	0	0	0
TOTAL DEATHS	18	14	23	5
NO. OF INFANT DEATHS	11	6	7	2
NO. OF <5 DEATHS	13	8	10	2
CER/1000 POP.	41.5	52.7	48.6	38.0
CDR/1000 POP.	7.8	6	10.3	2.3
NATURAL RATE OF POP. INCREASE(%)	3.4	4.7	3.8	3.6
IMR/1000 LIVE BIRTHS	114.6	49.2	64.2	23.5
<5 MR/1000 UNDER 5 POP.	30.2	18.6	26.9	5.4

TABLE 2

SOME DEMOGRAPHIC CHARACTERISTICS OF
GOMOA ONYADZE/OTSEW JUKWA 1987-1989

VARIABLES	YEARS		
	1987	1988	1989
TOTAL POP.	1297	1074	1074
<5 POP.	269	214	214
TOTAL BIRTHS	45	41	54
LIVE BIRTHS	45	41	54
STILL BIRTHS	0	0	0
TOTAL DEATHS	17	16	13
NO. OF INFANT DEATHS	3	3	2
NO. OF <5 DEATHS	7	5	4
CBR/1000 POP.	34.7	38.2	50.3
CDR/1000 POP.	13.1	14.9	12.1
NATURAL RATE OF POP. INCREASE(%)	2.2	2.3	3.8
IMR/1000 LIVE BIRTHS	66.7	73.2	37.0
<5 MR/1000 UNDER 5 POP.	26.0	23.4	18.7

TABLE 3

SOME DEMOGRAPHIC CHARACTERISTICS OF
GOMOA MPRUMEM 1989

VARIABLES	YEAR
	1989
TOTAL POP.	978
<5 POP.	195
TOTAL BIRTHS	43
LIVE BIRTHS	43
STILL BIRTHS	0
TOTAL DEATHS	5
NO. OF INFANT DEATHS	3
NO. OF <5 DEATHS	4
CBR/1000 POP.	44.0
CDR/1000 POP	5.1
NATURAL RATE OF INCREASE (%)	3.9
IMR/1000 LIVE BIRTHS	69.7
<5 MR/1000 UNDER 5 POP.	20.5

TABLE 4

**UNDER FIVE DISEASE INCIDENCE
GOMOA FETTEH 1987 - 89**

DISEASES	1987		1988		1989	
	NO.	%	NO.	%	NO.	%
MALARIA	1558	22.61	1260	21.85	855	33.37
ARI	1952	28.33	1576	27.33	698	27.24
DIARRHOEA	507	7.36	323	5.60	174	6.79
SKIN DISEASES	417	6.05	347	6.02	133	5.19
WORM INFECTION	73	1.06	92	1.60	43	1.68
EYE DISEASE	136	1.97	92	1.60	20	0.78
OTHERS	323	4.69	344	5.96	119	4.64
HEALTHY	1924	27.92	1733	30.05	520	20.30
TOTAL	6890	100.00	5767	100.00	2562	100.00

TABLE 5

**UNDER FIVE DISEASE INCIDENCE
GOMOA ONYADZE/OTSEW JUKWA 1987 - 89**

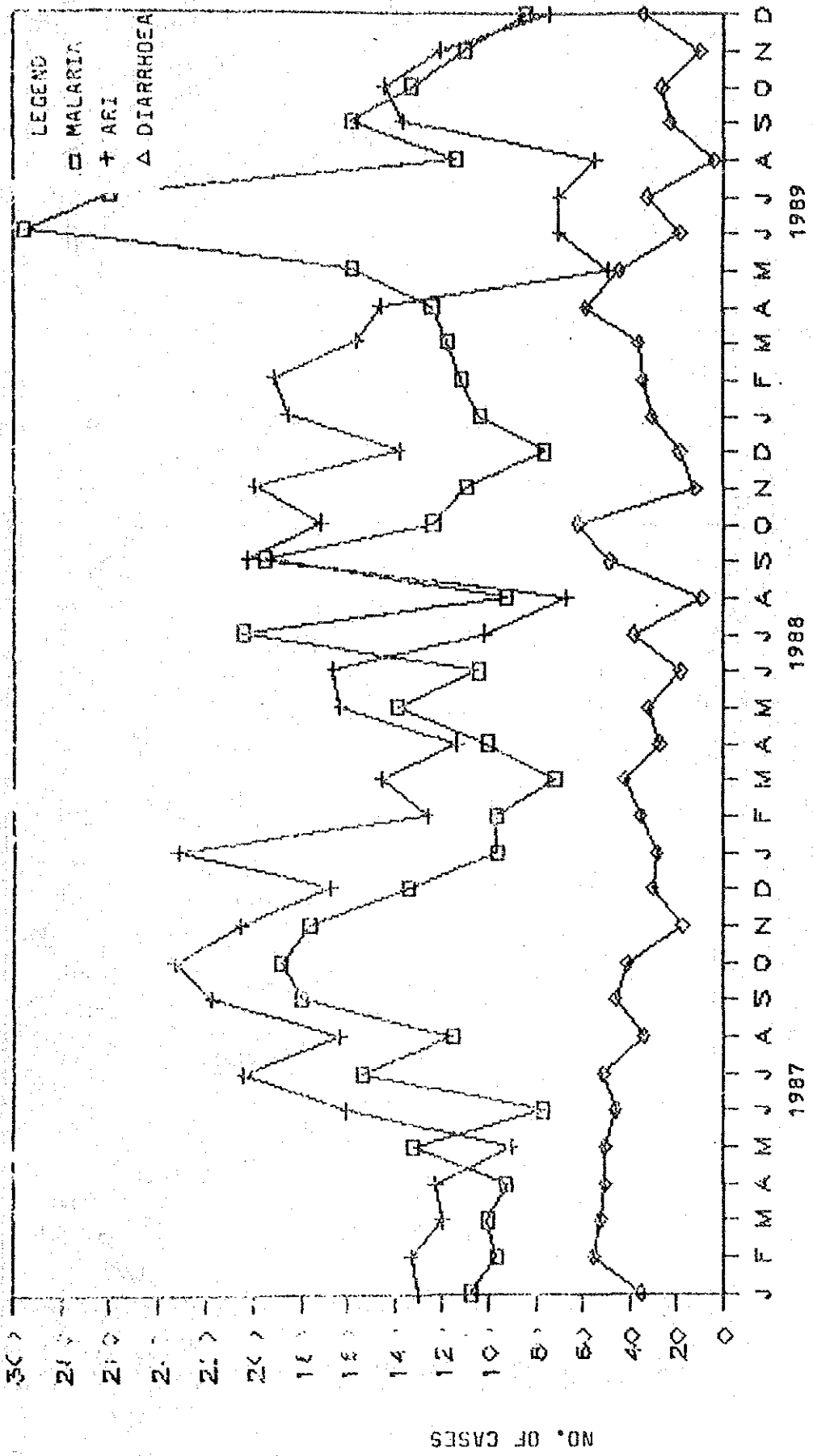
DISEASES	1987		1988		1989	
	NO.	%	NO.	%	NO.	%
MALARIA	1016	18.76	1294	21.07	1384	29.76
ARI	1030	19.02	1279	20.83	961	20.66
DIARRHOEA	331	6.11	341	5.55	326	7.01
SKIN DISEASES	549	10.14	488	7.95	334	7.19
WORM INFECTION	116	2.14	69	1.12	87	1.87
EYE DISEASE	117	2.16	48	0.78	53	1.14
OTHERS	425	7.95	449	7.31	284	6.11
HEALTHY	1831	33.81	2172	35.37	1222	26.27
TOTAL	5415	100.00	5767	100.00	4651	100.00

TABLE 6
 UNDER FIVE DISEASE INCIDENCE
 GOMOA MPRUMEM 10/88 - 12/89

DISEASES	1989	
	NO.	%
MALARIA	549	44.85
ARI	156	12.75
DIARRHOEA	79	6.45
SKIN DISEASES	52	4.25
WORM INFECTION	36	2.94
EYE DISEASE	3	0.25
OTHERS	70	5.72
HEALTHY	279	22.79
TOTAL	1224	100.00

UNDERFIVE DISEASE INCIDENCE

GCMC FETICH 1987 - 89



UNDERFIVE DISEASE INCIDENCE

GOMBA ONYADZE/OTSEW JUKWA 1987-88

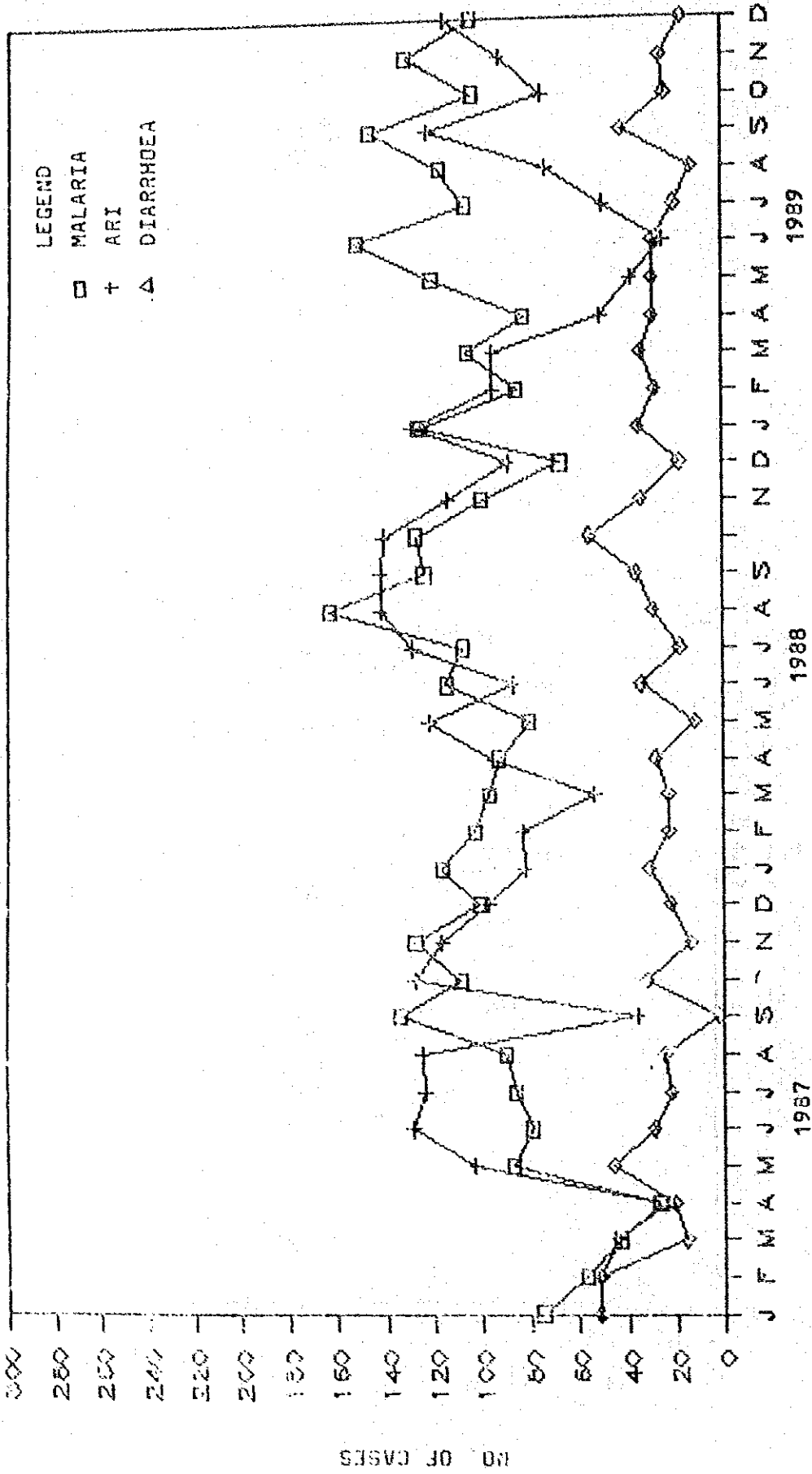


FIG. 8

UNDERFIVE DISEASE INCIDENCE

GOMCA MPRUMEM OCT 1988 - DEC 1989

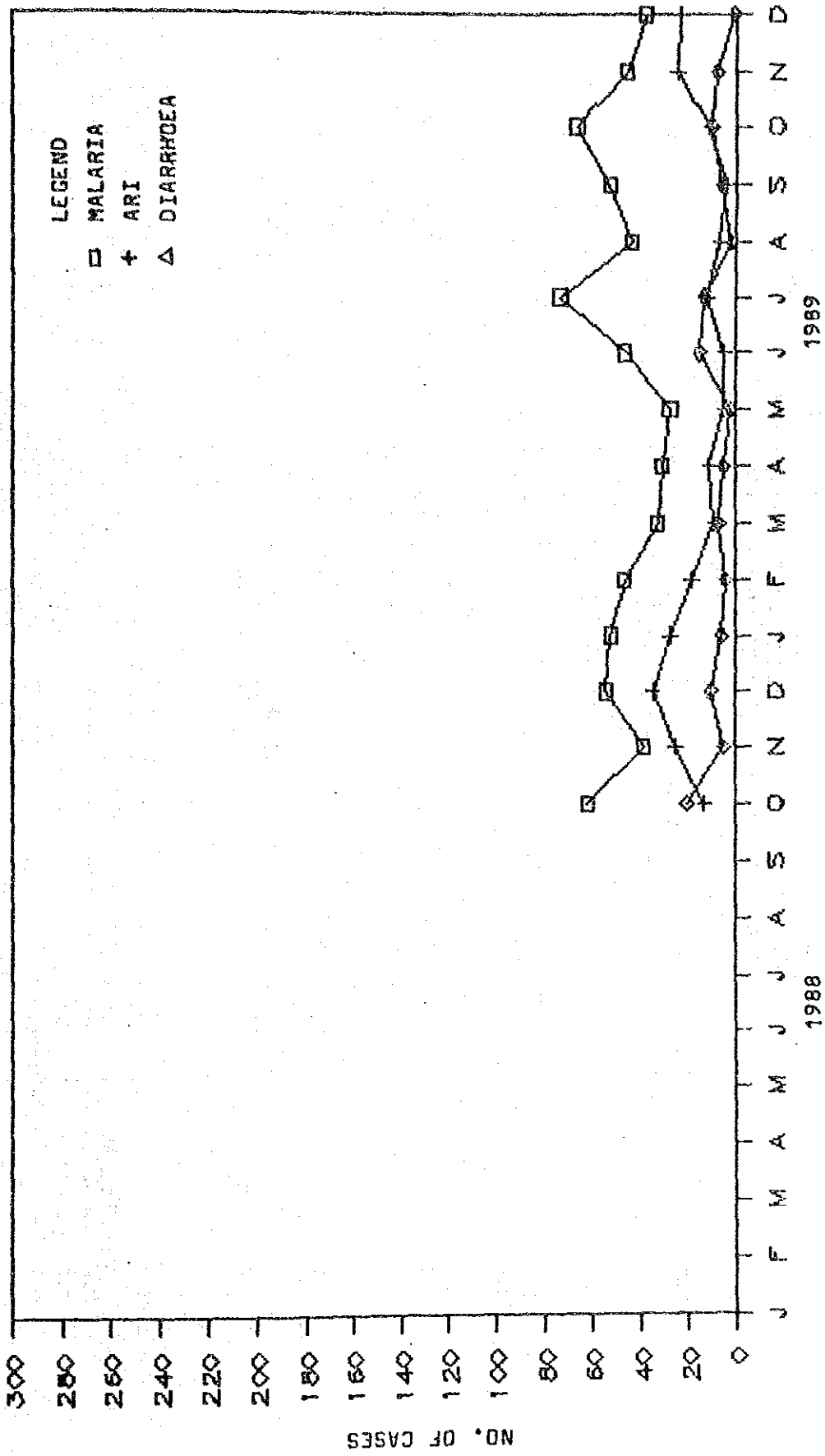


TABLE 7

OUTREACH SERVICES IN THREE RURAL COMMUNITIES
DRUG USAGE RATE/CHILD/VISIT 1989

MONTHS	NO OF CLINIC ATTENDANCES	COST OF JICA DRUGS USED IN CEDIS	COST OF LOCAL DRUGS USED IN CEDIS	TOTAL COST OF DRUGS USED IN CEDIS
JAN	768	106,302.88 (132.42)	16,224.60 (21.13)	122,533.48 (159.5)
FEB	591	256,954.80 (434.80)	14,644.00 (24.78)	271,598.80 (459.6)
MAR	772	280,224.40 (360.19)	12,035.50 (15.47)	292,259.90 (375.6)
APR	740	274,772.40 (371.32)	14,236.00 (19.23)	289,014.40 (390.6)
MAY	649	244,034.16 (376.01)	15,305.00 (23.58)	259,339.66 (399.6)
JUN	752	216,019.92 (287.26)	16,800.50 (22.34)	232,820.42 (309.6)
JUL	715	371,109.12 (519.03)	25,560.00 (35.75)	396,661.12 (554.8)
AUG	559	274,372.32 (490.82)	25,398.00 (47.22)	300,770.32 (538.1)
SEP	728	312,412.32 (396.46)	34,249.00 (43.46)	346,661.32 (439.9)
OCT	761	213,342.60 (280.35)	32,436.00 (42.62)	245,778.60 (322.9)
NOV	735	108,464.30 (447.57)	19,196.00 (26.11)	127,660.30 (173.7)
DEC	660	137,234.20 (207.93)	22,341.00 (33.85)	159,575.20 (241.8)
TOTAL	8496	2,795,255.42 (329.00)	249,426.10 (29.26)	3,044,651.52 (358.4)

TABLE 8

EQUIPMENT AND CONSUMABLES BROUGHT IN BY
JICA 1987 - 1990

EQPT/CONS.	1987	1988	1989	1990	TOTAL
EQUIPMENT	1,508,200 (3,016,400)	223,900 (447,800)	1,270,400 (2,540,800)	2,315,250 (4,630,500)	5,317,750 (10,635,500)
CONSUMABLES	-	531,300 (1,062,600)	406,800 (813,600)	550,000 (1,100,000)	1,488,100 (2,976,200)
TOTAL	1,508,200 (3,016,400)	755,200 (1,510,400)	1,677,200 (3,354,400)	2,865,250 (5,730,500)	6,805,850 (13,611,700)

The amounts are quoted in Yen with cedris
equivalents in brackets.