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EPIDEMIOLOGY OF DIARRHEAL DISEASE

IN NEPAL

A Report Prepared By PRITECH Consultant:
JOHN SNYDER, M.D.

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I. EXECUTIVE SUMMARY

The purpose of this consultancy was to collect, review, and interpret unpublished and published data on the epidemiology of diarrheal disease in Nepal.

Diarrhea is regarded as one of the major health problems in Nepal although the magnitude of the problem has not been well quantified. To combat the problem of diarrheal disease, the National Diarrheal Disease Control Program (NCDDP) was established in 1982 with many of its activities carried out by the MOH through its service network of health posts (serving villages), health centers (serving some districts), and hospitals (serving all 75 districts and 14 zones of Nepal). The agency within the MOH with primary responsibility for many of the NCDDP activities is the Integrated Community Health Services Development Project (ICHSDP). The NCDDP activities are coordinated by Dr. B.B. Karki. The ICHSDP is currently attempting to reorganize the government health posts, centers, and hospitals to provide integrated primary health services rather than the present system of several vertical programs.

Data on diarrheal disease generated in the government health facilities is channeled to two separate divisions of the MOH. In the integrated facilities the data are purchased by the ICHSDP while data from non-integrated facilities goes to the Epidemiology and Statistics Division of the Department of Health Services (ESD, DSH).

The purpose of this project is:

1. To review the available diarrheal disease morbidity and mortality data from Nepal including data on etiologic agents.
2. To provide an assessment and recommendations on measuring the magnitude of the problem of diarrheal disease, monitoring the progress of NCDD Program, and strengthening these activities.

II. METHODOLOGY

Several categories of data were reviewed.

Literature search. Before leaving the United States, I conducted a Medline literature search of the Countway Medical Library, Harvard University, and National Library of Medicine using the call words "Nepal" and "diarrhea", "diarrheal disease", "gastroenteritis", "dysentery", "disease", and "health".

Review of published MOH data. The ICHSDP carried out the first national diarrheal disease survey in the peak diarrheal disease months of May and June, 1985 in the Terai (plains) and hill regions of Nepal, with the help of WHO and John Snow, Inc. Sixty randomly chosen cluster locations comprising 100 households each were samples. (An initial review indicates that urban areas may be under-represented in the sample.) A two page questionnaire included questions on diarrheal disease prevalence (two week recall), mortality (one year recall), attitudes and practices regarding diarrhea, and focused on children less than five years old. The survey was completely administered and supervised by the field staff of the NCDDP. Computer analysis of the data is being carried out by the ICHSDP and JSI staffs.

A second source of data was the quarterly Epidemiological Bulletin published by the ESD, DHS which reports on the health statistics compiled from government non-integrated health facilities. Only the single 1984 edition was available for review.

A third resource was the report of the research project, Operational Research Related to Control of Diarrheal Disease, Pokhara, carried out from 1980 to 1984 by Dr. B.B. Karki. Three hill villages were selected: ORS treatment for diarrhea was offered in one village, pinch and scoop home-made sugar-salt solutions were used in a second village, and no special

therapy was offered in the third village. The therapy was administered by male and female volunteer health workers and the health post staffs. Through surveys and monitoring of health post statistics, the study evaluated the morbidity and mortality from diarrhea, knowledge, attitudes, and practices related to diarrheal disease and nutrition, and the nutritional status of children. Because of financial and logistical constraints, the sample size of the final survey was about one-half of the initial survey. The methods for conducting the surveys were not discussed in detail.

Review of unpublished hospital and health post data in the Kathmandu area and in the Terai. Hospital and health post registers in hill and plains area were reviewed and their data tabulated. Each hospital used the same printed discharge register which provides information on age, sex, diagnosis, outcome, but not treatment. The hospitals visited in Kathmandu (hill area) included Teku (Infectious Disease), Bhaktapur (Zonal), Patan (private), and Kanti (pediatric) Hospitals. Inpatient registers were reviewed at the first three hospitals and the outpatient oral rehydration center data were reviewed at Kanti Hospital. Visits were made to an integrated (Naubise) and a non-integrated (Gokarna) health post which were 30 and 20 km from Kathmandu, respectively. No formal printed register was found at the health posts; the staffs were responsible for making the information columns by hand in their books. In addition, a hand-made diarrheal disease summary sheet was prepared at Naubise Health Post.

In the Kosi Zone in the Terai (plains area), inpatient registers were reviewed at Kosi Zonal and Rangeli District Hospitals; the outpatient record was reviewed at Sunsari District Hospital. The records from a non-integrated (Dadarberia) and an integrated (Ithari) health post, each approximately 25 km from Biratnagar, the capital of Kosi Zone, were also reviewed.

These data were used to assess the incidence, seasonality, age-specific attack rate, and severity of diarrhea. Because of a lack of uniform reporting of ages of patients, the groupings < 5 years old and \geq 5 years old are used for comparison in this report. Severity of diarrhea was assessed by determining the number of patients reported to have dysentery and those who died from diarrhea. The definition of dysentery was asked at each facility and the general consensus was "stools with blood or mucus" or "dark stools".

The final unpublished data source was a survey of a single hill village conducted in October, 1985, by the Woodlands Institute, a public health educational group. A questionnaire was administered to 200 village households (2/3 of all households) and included a question on the prevalence of diarrhea in children < 5 years old in the previous two weeks.

Review of the data on the enteric pathogens. The only facility routinely testing stools for enteric pathogens is the Central Health Laboratory (CHL). The majority of specimens received at the CHL come from inpatients at the adjacent Teku (ID) Hospital but specimens are also sent from other hospitals in Kathmandu and, more rarely, from hospitals in the Terai and other distant parts of Nepal. Specimens are routinely tested for Salmonella and Shigella and microscopic evaluation for parasites is often carried out. If the clinical history indicates, the CHL has the capability to test for Vibrio cholerae, Campylobacter, and rotavirus. The enteric pathogen testing data were reviewed for the inpatients of Teku Hospital.

The laboratory at Kosi Hospital was reported to have the capability to test for enteric pathogens but no such testing is being done at this time.

III. RESULTS

Literature search. No articles on the epidemiology of diarrheal disease in Nepal were found.

Review of published MOH data. The data from the national survey are being analyzed at this time. Very preliminary data indicate 30% two-week prevalence rate from diarrhea in children < 5 years old during the high diarrhea months of May and June. The prevalence in the hill region was greater than in the Terai. Forty-five percent of the childhood deaths were attributed to diarrhea with a mortality rate of 16/1000 children < 5 years old from diarrhea. Almost 15% of children with diarrhea received ORS and 12% received the homemade sugar-salt solution.

The data from the Epidemiology Record pertained only to diarrhea in patients from several Western, Central, and Eastern hospitals. Children made up only a minority of admissions for diarrhea and had a case-fatality ratio of 7% at eight selected zonal and district hospitals. The remaining data were not broken down by age.

The Pokhara study reported a 14% prevalence rate for diarrhea in children < 5 years old at the end of the high diarrhea season and 7% during the low diarrhea season. Total data on mortality from diarrhea reported four deaths from the Control Area (Naudada), one from Salt and Sugar (Batulechaew), and zero from packet (Majhthana).

Review of unpublished hospital and health post data in the Kathmandu area and in the Terai. These data are summarized in Tables 1, 2 and 3 and representative Figures 1-5. Combining the data from all the facilities demonstrated a peak of diarrhea cases for children < 5 years old between months 12 and 3 of the Nepali calendar (March-July). A second smaller peak of diarrhea cases in children < 5 years old in months 7 and 8 (October-December) was suggested by the data from all four Kathmandu Hospitals and the Dadarbaria Health Post (Fig. 6). The peak was not seen at the two Kathmandu area health posts nor Kosi Hospital; inadequate data to evaluate the peak was available at Rangeli and Inarwa Hospitals and Ithari Health Post.

Visits for diarrhea accounted for 9 to 12% of health post visits, with persons \geq 5 years old seen far more frequently than children (Table 1). Admissions for diarrhea ranged from 2% of all admissions (Patan and Kosi Hospitals) to greater than 50% (Teku Hospital). Children were admitted far less frequently for diarrhea than persons \geq 5 years old except at Patan, Kosi, and Kanti Hospitals.

Less than 0.1 case of diarrhea/child < 5 years old/year was seen at any of the health posts. Admission data from Kanti Hospital was not obtained, but only 692 children were admitted for diarrhea to the other three Kathmandu hospitals studied for the year 2041 (1984-1985).

The summary of diarrheal disease data available at Naubisa Health Post correlated poorly with the data found in the registers. Lower figures were reported in 10 months and higher figures in 2 months.

The severity of diarrhea as estimated by the frequency of dysentery reported varied greatly (Table 2). The wide range in percent of patients who had dysentery was similar at health posts and hospitals--from about 10% to 70%. In general, more patients from the Terai region were reported to have dysentery. The case/fatality ratios for children < 5 years old with diarrhea ranged from 0.8 to 15.8%. The highest mortality figures came from the hospitals in the Terai.

The Woodlands Institute survey determined the two-week prevalence of diarrhea in rural hill area children < 5 years old in month 7 (October) of the Nepali calendar. The prevalence rate was 20%.

Review of data on enteric pathogens. Enteric pathogens were sought from stool samples from 28% of children admitted to Teku Hospital with diarrhea in 2041 (Table 3). Bacterial pathogens were recovered from 12.5% of the stools; *Shigella* (7), enteropathogenic *E. coli* (4), *V. cholerae* (3), and *Salmonella* (2)

were the organisms isolated. Campylobacter was not reported and rotavirus was only sporadically sought. Only one complete month of parasitic testing was reviewed with stools from 7 of 22 children tested. One child had Entamoeba coli and one had giardia. The number of stool samples positive for enteric pathogens was too small to determine seasonality of infectious agents in children.

IV. ASSESSMENT AND CONCLUSIONS

Review of published MOH data. The national survey promises to provide the most accurate data available on diarrheal disease in Nepal. The final report should be used as a baseline to measure the success of the interventions and activities of the NCDDP.

An estimate of the incidence of diarrhea in children < 5 years old can be made from the preliminary survey data and the information on seasonality included in this report. In the four months of the high diarrhea season, approximately three times as many cases of diarrhea were seen in children < 5 years old as in the six months of the low season. In the two months of the secondary peak, about twice as many cases were seen as in the low months. Utilizing these approximations, an estimate of 4 to 4.5 episodes of diarrhea per child per year is obtained.

The figure of 45% of all deaths in children being caused by diarrhea may be a bit high in comparison to studies from other developing countries. The questioning techniques used by the surveyors should be evaluated before accepting this figure.

The use of ORS reported in the study may also be a bit high. If 15% of all childhood cases of diarrhea received ORS packets, approximately 1.8 million packets would be required each year; however, only 1.6 million packets were produced in Nepal last year (according to a National Survey in June 1985).

The usage rate of ORS in Nepal may be higher than the 8 to 10% in other developing countries because ORS campaigns at some level have been conducted since 1979.

The Epidemiological Bulletin has the potential to provide useful information on diarrheal disease but is currently limited by incomplete and delayed reporting. The fragmented government reporting system should also be consolidated. One agency should have the sole responsibility for collecting and analyzing the data on diarrheal disease.

The diarrhea prevalence data from the Pokhara study was less than one-half of that found in the recent NCDDP survey and was lower than that reported from other countries where frequent surveillance has been carried out. These low figures raise questions about the quality of the method used to carry out the surveillance.

Review of unpublished data. These data may provide a few useable pieces of information. Even with very low utilization of the government health facilities, the seasonal pattern of visits and admissions probably reflects the trends of illness occurring in the community because similar patterns were seen at each facility visited. The possible second peak of childhood diarrhea seen in the fall and winter coincides with the rotavirus season found in most countries around the world. The year-long study of enteric pathogens in childhood diarrhea discussed below would help to clarify this possible association.

Community surveys to determine more accurately how and where childhood diarrhea is actually treated would be helpful in planning future NCDDP campaigns. At this time, the government health posts see only a very small number of diarrheal cases and would not appear to be the place to put a major emphasis on implementation.

The severity of diarrhea is difficult to assess. The wide variation in the percentage of dysentery reported may be as much a factor of definition and clinical assessment as an indication of true differences. The hospital mortality data indicates that further efforts to improve the treatment of children with diarrhea are needed, especially in the Terai region.

A study of enteric pathogens in childhood diarrhea in defined populations would help to answer the question about the true incidence of dysentery in children in Nepal. Ideally, a population of urban and rural children in the hill and Terai regions could be studied. Such a study would also determine the etiologic agents responsible for the summer (and possible fall) peak of diarrhea. Data on etiologic agents could be used in teaching practitioners a practical approach to diarrheal therapy in Nepal. Possible sites for the study include the ORS unit at Kanti Hospital and a health post or hospital in the Terai. To limit the number of specimens processed, samples could be obtained from every second, fifth or tenth patient depending on the volume of patients seen. Suitable controls (children without diarrhea) should be included.

The need for standardized reporting forms using the internationally accepted age groupings < 1 year, 1-4 years, 5-15 years, and 15+ years is obvious. Simplifying and systematizing the forms may increase the accuracy of data abstracted which was poor in the one sample which I reviewed from a health post. Data collected and analyzed on a monthly basis could provide the MOH with important information on epidemics and on the procurement and dispersal of supplies. Feedback to the data collectors is an essential component of the system. An optimal trial setting for these forms would be as a replacement for the hand-made registers used at the health posts.

Review of the data on enteric pathogens. The lack of a systematic approach to the culturing of children makes assessment of the relative importance of the different etiologic agents difficult. However, with the facilities and expertise available at the CHL, a prospective study of defined populations (as described above) is indicated and possible.

V. RECOMMENDATIONS

1. Assess the impact of the NCDD Program with a follow-up national diarrheal disease survey in two years. The under-utilization of the government facilities and the current reporting system will not allow for adequate measurement of the progress of the NCDDP.

2. Produce, utilize, and analyze standard reporting forms and provide feedback to data collectors. An optimal trial location would be the health posts where hand-made registers are currently used.

3. Consider a study of the incidence and seasonality of enteric pathogens in childhood diarrhea. Dr. B.B. Karki and Dr. V.L. Gurubacharya, Chief of the Central Health Laboratories, would make excellent co-directors.

4. Reassess the teaching of the treatment of diarrheal disease especially in district hospitals and health posts.

LIST OF PERSONS MET

KATHMANDU

- Oct. 28 Dr. David Calder, Chief, Office of Health and Family Planning, USAID/Nepal
- Dr. Nils Daulaire, Chief of Party, John Snow, Inc.
- Benjamin Foote, Save the Children, UK
- Oct. 29 Dr. B.B. Karki, Deputy Chief, Integrated Community Health Services Development Project (ICHSDP)
- Dr. D.D. Joshi, Acting Chief, Epidemiology and Statistics Division, Department of Health Services
- Oct. 30 Mr. Bisshu Shreshtra, Health Inspector, ICHSDP
- Mr. Padmaraj Rajbandari, Chief, Health Educational Section, ICHSDP
- Dr. Shestra, general pediatrician, Kanti Children's Hospital
- Dr. F.B. Malla, Medical Superindendant, Teku (Infectious Disease) Hospital
- Oct.31 Mr. Basanta Maharjan, health assistant, Naubise Health Post, Dhading District
- Mr. Rajendra Kayastha, Chief, medical records, Laiiput (Patan) Hospital
- Nov. 1 Mr. Nayan Lama, health assistant, Gokarna Health Post
- Mr. Krishna Shrestha, administrator, Bhaktapur Zonal Hospital
- Nov. 3 Dr. V.L. Gurubacharya, Chief, Central Health Laboratory
- Nov. 4 Ms. Jyotsna Shrestha, microbiologist, Central Health Laboratory

KOSI ZONE

Biratnagar

- Nov. 5 Dr. K.R. Pandey, Civil Surgeon, Kosi Zone
- Dr. Shrestha, Chief of Pediatrics, Kosi Zonal Hospital
- Mr. J.D. Shrestha, senior malaria inspector, Kosi Zonal Health Office

LIST OF PERSONS MET (continued)

Rangeli	Dr. G.P. Shah, senior medical officer, Rangeli District Hospital
Dadarberia	Ms. Indra Kumari Rai, nurse midwife, Dadaberia Health Post
Nov. 6 Inarwa	Dr. I.N. Das, medical officer, Sunsari District Officer
Ithari	Mr. S.D. Mandal, auxillary health worker, Ithari Health Post

TABLE 1

HOSPITAL ADMISSIONS AND HEALTH POST VISITS
FOR DIARRHEAL DISEASE, BY AGE
2041-2042

	(MONTHS)												(AGE)					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A	C/A
KATHMANDU AREA HOSPITALS																		
TEKU (ID)	53/177	92/177	77/175	24/172	27/172	25/161	120/153	45/142	12/137	24/135	22/116	27/102						
BHAKTAPUR (ZONAL)	11/60	17/55	8/73	4/65	6/41	4/53	16/37	11/13	1/7	3/14	7/16	12/41						
PATAN (PVT)	12/16	27/15	15/9	8/9	6/6	3/8	8/10	17/7	3/6	9/4	10/3	13/12						
KONTI (ORS Center)	153	222	137	38	16	14	46	51	18	36	96	ND						
HEALTH POSTS																		
NAUBISE (Integ)							8/22	10/24	14/23	19/30	22/23	54/50	50/109	52/89	20/71	18/54	12/32	10/23
GOKARNA (Non-Integ)							7/30	5/27	4/10	11/18	8/24	25/54	24/100	24/109	16/82	13/52	5/32	4/29
KOSI ZONE HOSPITALS																		
KOSI (Zonal)																		
RANGELI (Distr)	15/10	14/10	10/9	12/11	7/2	4/6	1/6	3/0	0/0	4/0	1/4	5/3						
INARWA (Distr) Outpt*	122	119	80	40	66	INC	INC	INC	INC	INC	INC	INC	2/13	1/6	0/5	0/1	3/1	0/2
HEALTH POSTS																		
DADARBERIA				20/22	15/26	12/31	8/24	19/20	6/6	4/8	14/17	20/27	20/26	9/18	8/11			
ITHARI				22/50	19/56	28/48	*	*	*	*	*	*	26/45	32/77	23/34	22/35		

*Ages were available for < 50% of patients
INC = incomplete
* = Registers damaged

C = < 5 yo
A = ≥ 5 yo

13/

TABLE 2

SEVERITY OF DIARRHEA

BY AGE AND FACILITY

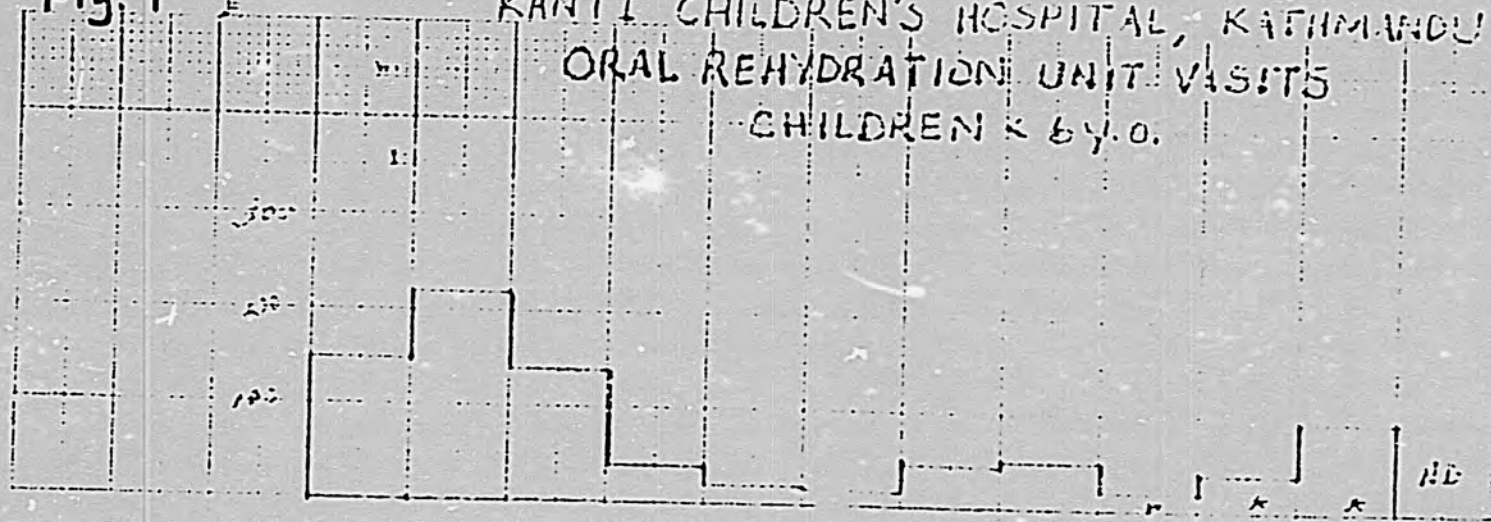
PERCENTAGE OF PATIENTS TREATED

HOSPITALS	DYSENTERY		DEATHS	
	< 5 yo	≥ 5 yo	< 5 yo	≥ 5 yo
	KATHMANDU			
TEKU	7%	11%	3.7%	0.8%
BHAKTAPUR	10%		ND	
PATAN	37%		0.8%	0
KOSI ZONE				
KOSI	50%	69%	15.8%	1.6%
RANGELI	43%	48%	7%	1.7%
HEALTH POSTS				
KATHMANDU				
NAUBISE	12%			
GOKARNA	33%			
KOSI ZONE				
DADABERIA	23%	45%		
ITHARI	45%			

Fig 1

KANTI CHILDREN'S HOSPITAL, KATHMANDU
 ORAL REHYDRATION UNIT VISITS
 CHILDREN < 6 Y.O.

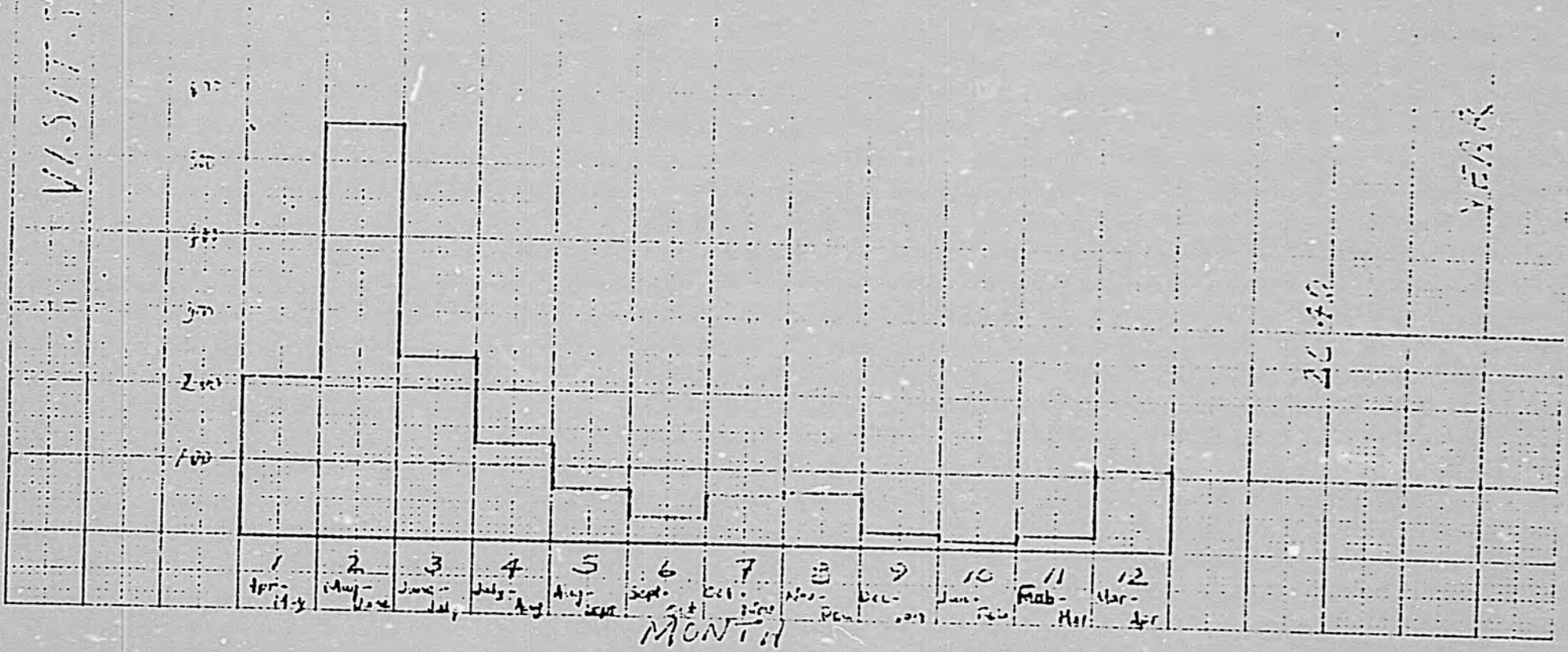
1/2



100
200
300

CHILDREN < 6 Y.O.

VISITS



YEAR

100
200
300
400
500

MONTH

Fig. 2

TEKU (INFECTIOUS DISEASE HOSPITAL)

ADMISSIONS FOR DIARRHEA

2041

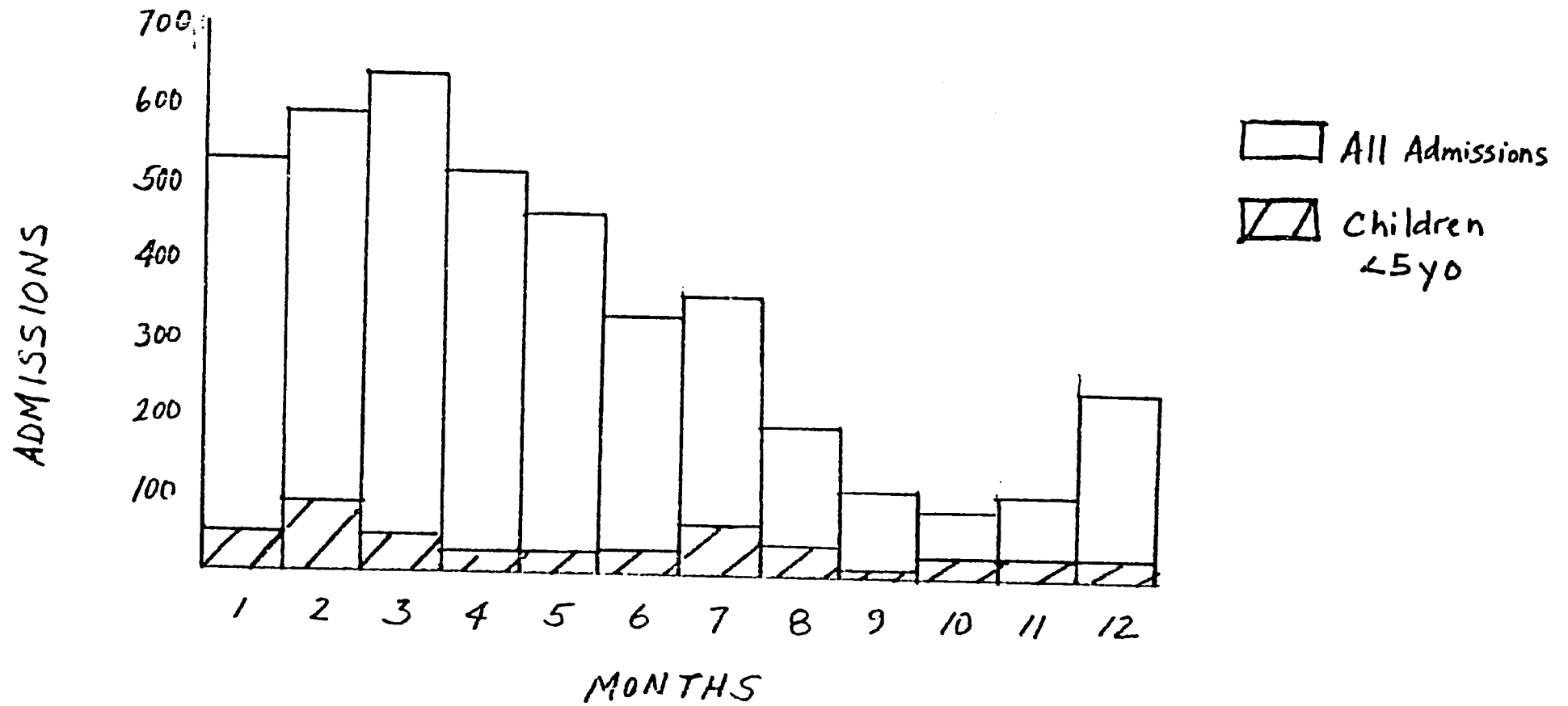


Fig. 3

KOSI ZONAL HOSPITAL
BIRATNAGAR
ADMISSIONS FOR DIARRHEA
2041

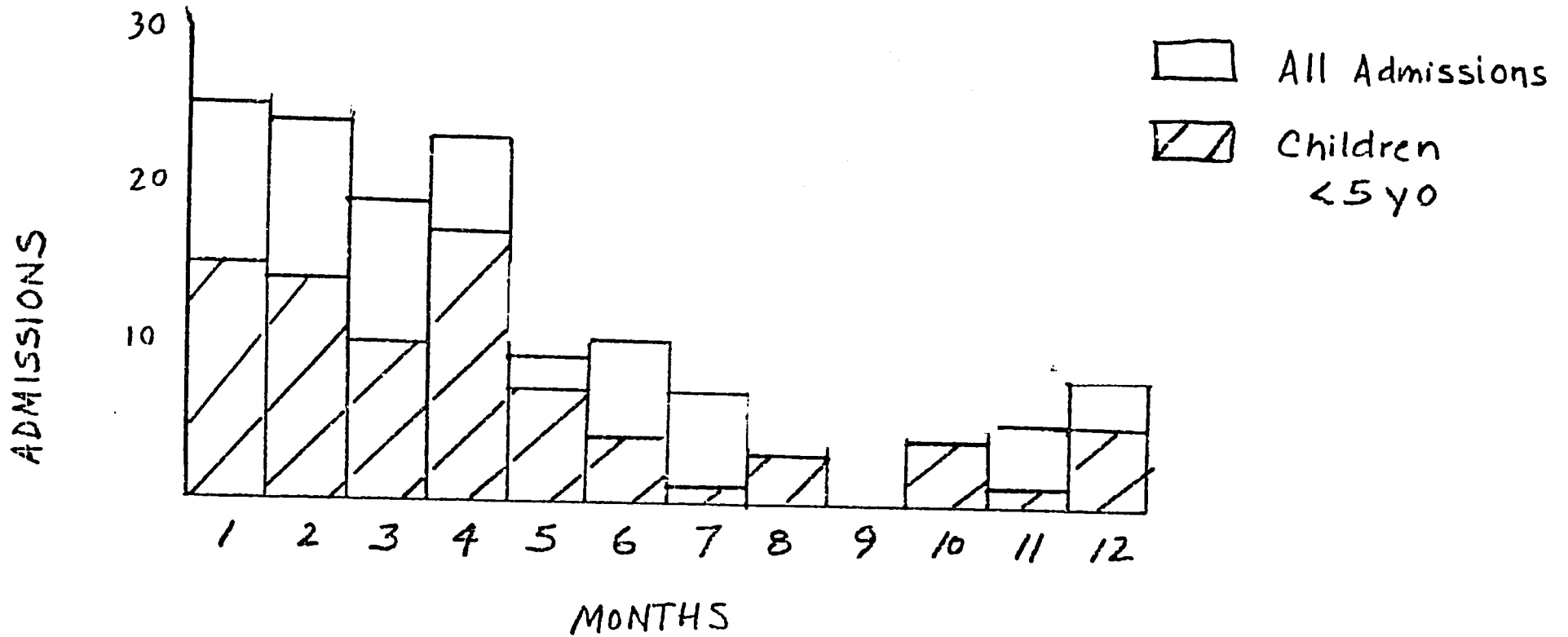


Fig. 4

VISITS TO NAUBISE HEALTH POST FOR DIARRHEA

7/2041 - 6/2042

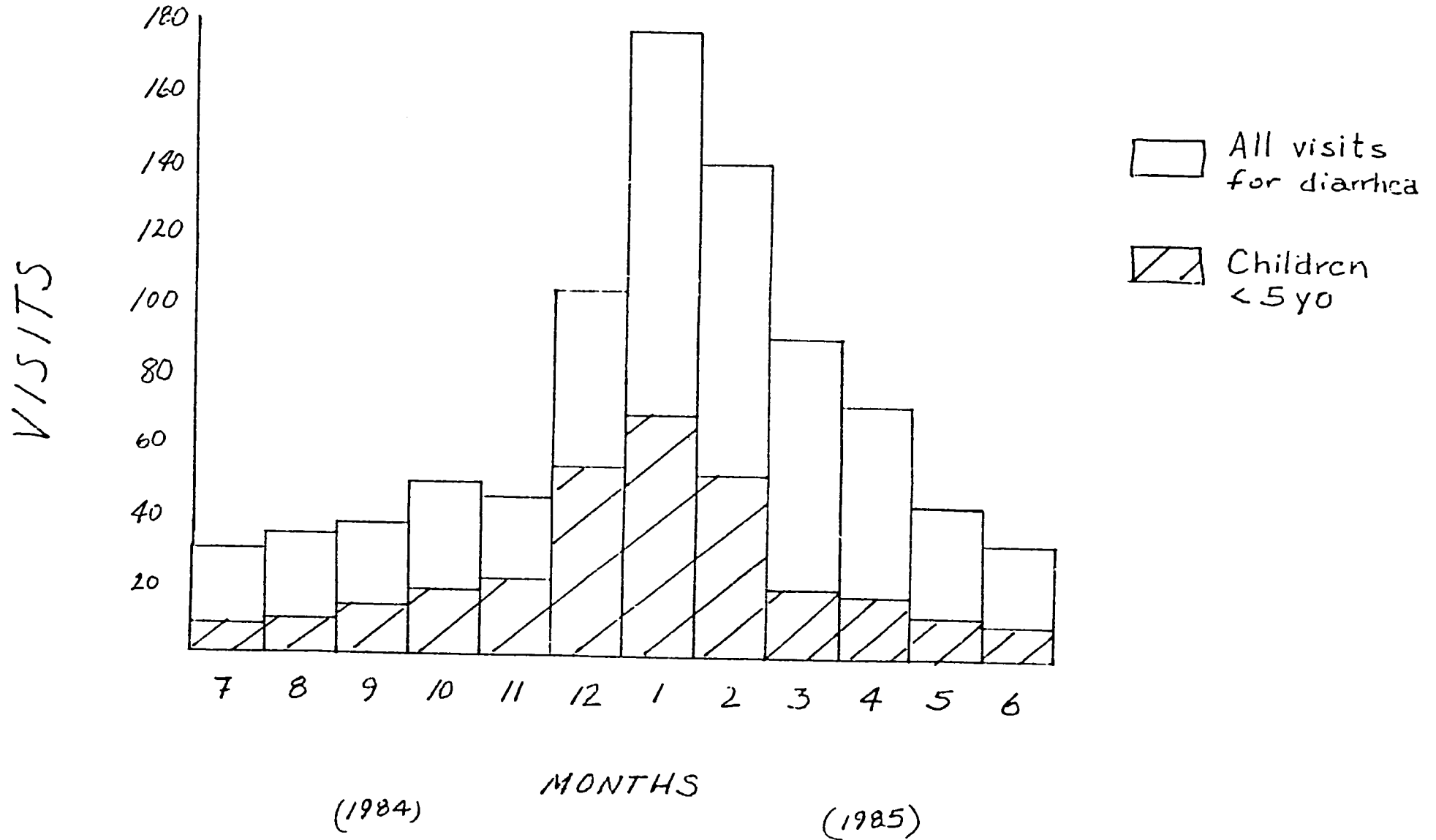


Fig. 5

VISITS TO DADARBERIA
HEALTH POST FOR DIARRHEA
4/2041 - 3/2042

20

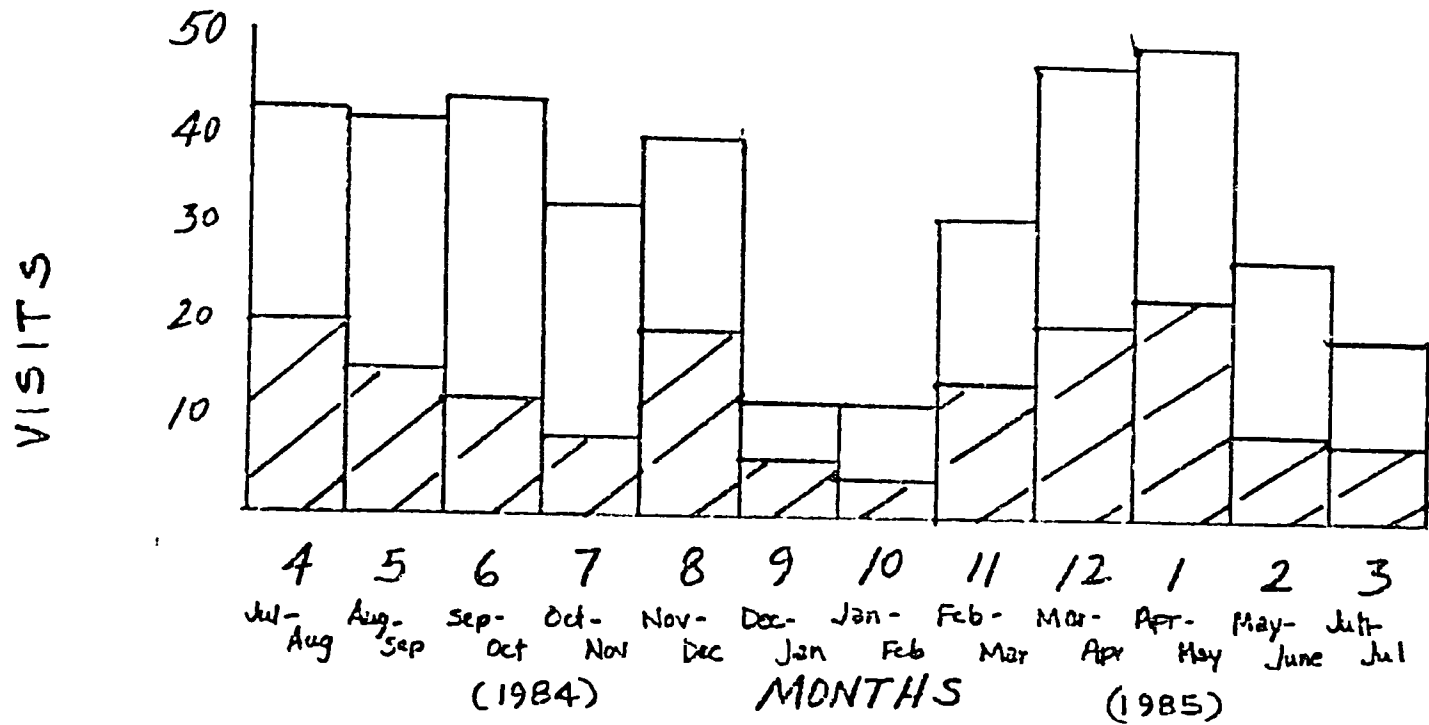


Fig. 6

SEASONALITY OF CHILDHOOD DIARRHEA
AT 4 KATHMANDU HOSPITALS AND ONE TERAI HEALTH
POST 2041

