URBAN CHOLERA STUDY, 1974 AND 1975, DACCA

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PREFACE

The Cholera Research Laboratory (CRL) operates under a bilateral project agreement between the government of Bangladesh and the United States of America. Research activities of CRL center on the inter-relationships between diarrheal disease, nutrition, fertility and their environmental determinants. CRL issues two types of papers: scientific reports and working papers which demonstrate the type of research activity currently in progress at CRL. The views expressed in these papers are those of authors and do not necessarily represent views of the Cholera Research Laboratory. They should not be quoted without the permission of the authors.

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ABSTRACT

During 1974 all the classical Vibrio cholerae was replaced by the El Tor. Along with the unprecedented flooding of the country specially the Dacca city the first El Tor cholera epidemic appeared in largest magnitude in the history of cholera in Dacca, a famine stricken city. The epidemic began about 6 weeks earlier than the usual classical post-monsoon epidemics. This epidemic afforded opportunity to study the factors associated with the occurrence of cholera.

Cholera Research Laboratory was the principal center for treatment of all diarrhea in Dacca. During the epidemic of 1974 we interviewed 203 hospitalised cholera cases and their families. An equal number of matched controls and their families were also interviewed. During 1975 epidemic another 168 cases and 168 controls along with their families were interviewed. The question included, number of family member, sources of water, sanitary facilities, history of eating outside home, duration of residence in Dacca city, effect of flood, monthly income, history of diarrhea in past 5 days prior to admission and other medical aids used outside.

From the study certain features were observed. The 1974 cholera epidemic was the largest cholera epidemic and the first El Tor Epidemic in Dacca. This was followed in 1975 by a second largest epidemic. The peaks of both epidemics were however, during the post-monsoon time but over a month earlier than classical peaks. We observed uniform distribution of cholera cases as against clustering of classical cholera observed by other workers. The elegant areas were spared but the low economic areas were affected in both the years. Children below 10 were the most common victims like classical cholera. The overall male female percentages were identical, but the females between 15-39 had twice the percentage as males. The overall rates per 1000 were 1.73 and 1.37. Both the cases and controls were equally affected by flood. The short duration of stay did not seem to play any role in the incidence.

The rate of cholera per 1000 in a camp were there was modest arrangement of water and waste disposal facilities was much lower (1.61) than the camps (4.29) where there was no such facilities. Another remarkable feature was the association of contracting cholera with eating outside homes. One day's antibiotic and disinfection treatment in cholera affected families reduced the number of hospitalised of subsequent cases from those families.

INTRODUCTION

A great change of Vibrio cholerae from classical Inaba to El Tor Ogawa took place from 1970 through 1973 in Bangladesh. The cholera epidemic of 1974 was the first El Tor epidemic and the largest recorded cholera epidemic in Dacca. It commenced six weeks earlier than usual and began during unprecedented flooding in the city. The flood destroyed the standing crops and people flocked to the city for Government assistance and jobs. Since accommodations were insufficient and costly, refugees constructed thousands of huts near the markets, Railway stations, on the outskirts of the city, industrial parks and on the unused Government land. Waste disposal was inadequate and the few hand pump tubewells provided insufficient quantities of drinking water. People used available ditches, ponds, canals and rivers for bathing, washing, cooking and drinking water. In many bustees (slums) people washed, bathed and swam in the same tanks which were directly contaminated with night soil from latrines situated right on the banks. In many other places both the submerged and the dry city roads were contaminated by night soil either leaking from sewarage pipes or from service latrines during the period of rain and flood. Under these situations a large increase in the number of cases of cholera and shigella were observed.

Cholera epidemics repeatedly occurred in the Dacca urban areas and although several studies have been done no specific progress has been made in defining the factors related with the occurrence of cholera in the urban situation. The cholera epidemics in 1974 and subsequently in 1975 afforded opportunities to study the factors associated with cholera in Dacca.

MATERIALS AND METHODS

The Cholera Research Laboratory (CRL) was the principal center for treatment of diarrhea in Dacca. To study the changes in the prevalence of the serotype and biotype of Vibrio cholerae the CRL admission records were analysed for the years 1970-75. The population figures from the 1974 Bangladesh census were used in calculation of rates. The population of Dacca city in 1974 was 1,310,975 in the 6 Police Stations and 1,659,219 in the greater Dacca including Gulshan, Mirpur and Narayanganj Police Stations.

During October the peak of 1974 epidemic we interviewed 203 hospitalised cholera cases residing in Dacca city within a few hours of their arrival at CRL. Questions included the patients'

sources of water, sanitary facilities, history of eating out, duration of residence in Dacca city, effect of flood, monthly income of the family, number of members in the family, history of diarrhea in past 5 days and other medical facilities used prior to admission. We collected the same data from 203 matched control families from the neighbourhood of cholera cases. We interviewed the cases in the hospital and the controls in the residences. In the cases of children or unconscious patients we questioned parents or attendants.

During 1975 epidemic we studied 168 matched controls. We also included more detailed questions concerning the types of food and drink taken outside the home. In both cases the control and case families were visited to varify the facilities. In addition, 54 food and 57 water samples were collected from the restaurants, road-side shops and also from cholera families within 10 hours from the onset of acute diarrhea.

During 1975 epidemic the Government attempted to limit speed of infection by distributing tetracycline capsules and water sterilizing tablets among the contacts of cholera cases. The CRL-Government staff visited 265 cholera families and distributed water sterilization tablets once and tetracycline capsule for one day's dose to all the members of the contact families. In addition 165 cholera families were interviewed but no medicine was supplied to them. Both the groups of families were visited 10 days after the 1st interview to find out the number of new diarrheas and hospital admissions from those families. We considered the second group a control group for evaluation of the government epidemic control measures.

Cholera cases occurring in one non-local (A) and two local refugee-camps (B, C) and the water and waste disposal facilities were recorded to evaluate the effect of water and sanitation facilities. People in both camps were equally poor. Camp A of Mohammadpur has modest provision of water and waste disposal facilities whereas the camps B and C of Ramna had only a few tubewells and some tanks. The residents of camp B and C used open privies located by the sides of the sources of water.

RESULTS

Table 1 shows the serotypes and biotypes of Vibric cholerae organisms isolated from CRL indoor patients from the year 1970 through 1975. It shows the gradual changes from classical Inaba to El Tor Ogawa in 3 years time. Inaba Serotype re-appeared as

TABLE 1

URBAN CHOLERA STUDY, 1974 AND 1975

ALL CHOLERA ADMISSIONS TO CRL, DACCA BY YEAR, SEROTYPE, AND BIOTYPE

Year	Classical Inaba	Classical Ogawa	El Tor Inaba	El Tor Ogawa	T o t a l
1970	2,792	38	-	138	2,968
1971	1,042	1,426	-	185	2,653
1972	40	598	1	63	702
1973	1	-	10	1,265	1,276
1974	-	2	552	4,496	5,320
1975	-	-	1,827	1,530	3,357

Inaba El Tor in next two years in the urban areas of Dacca. The highest number of cholera cases occurred in 1974, the year of flood and famine. Figure 1 shows the number of all cholera cases admitted to the CRL ward by week during 1974 and 1975.

The seasonal incidences of cholera which were admitted to CRL from within the Dacca municipal areas in 1974 and 1975 are shown in table 2. The distribution of cases by months shows two distinct features, one a small pre-monsoon rise and the other a sharp epidemic peak in October. These peaks are identical with past classical peaks of Dacca urban areas except that the post-monsoon peaks were 6 weeks delayed during the classical epidemics. The usual discontinuation of cholera cases during monsoon was not observed during these El Tor epidemics. Over 45% of all cases of 1974 and 1975 occurred during the month of October only.

The next table 3 shows that the 1974 and 1975 attack rates in Dacca municipal police stations varied from 0.81 to 2.10 per 1000. The rates of cholera in Tejgaon Police Station need to be explained

TABLE 2

URBAN CHOLERA STUDY, 1974 AND 1975

MONTHLY OCCURRENCE OF CHOLERA WITHIN CITY AREA

Year	Months	January	February	March	April	May	June	July	August	September	October	November	December	Total
1974	No.	5	-	1	20	9	10	22	129	588	1114	369	38	2305
	Percent	0.2	-	0.04	0.9	0.4	0.4	1.0	5.6	25.5	48.3	16.0	1.7	100.0
1975	No.	7	9	9	36	50	109	75	155	395	724	207	50	1826
	Percent	0.38	5.5	0.5	2.0	2.7	6.0	4.1	8.5	21.6	39.6	11.3	2.7	100.0
Total		12	-	10	56	59	119	97	284	983	1838	576	88	4131
Percent		0.3	-	0.2	1.4	1.4	2.9	2.3	6.9	23.8	44.5	13.9	2.2	100.0

TABLE 3

URBAN CHOLERA STUDY 1974 AND 1975 DACCA
CHOLERA CASES WITHIN THE CITY BY POLICE STATION

Police Station	Population	Cholera Admission		Rate Per 1000	
		1974	1975	1974	1975
Kotwali	159275	261	214	1.63	1.34
Sutrapur	218938	420	417	1.91	1.90
Lalbag	247494	396	344	1.60	1.39
Ramna	268363	472	235	1.75	0.88
Tejgaon	218103	460	440	2.10	2.02
Mohammadpur	217134	296	176	1.36	0.81
Total	1,329307	2305	1826	1.73	1.37

considering the facts that this police station had been divided recently into three police stations (Gulshan, Mirpur, Tejgaon) and some people probably committed mistakes in stating address. The combined rate for all these police stations together is 1.28 per thousand. Excluding Tejgaon highest rate (1.90) was in Sutrapur Police Station in both the years. This police station comprises of lower middle class and poor classes of people. The Ramna Police Station had the next highest rate in 1974. This police station had the fascinating mix of elegant upper class residents and the lower class refugees in 1974. In 1975 identical rates were observed

in most police stations except lower rates in Ramna and Mohammadpur following the removal of large numbers of slum dwellers. The overall rates were 1.73 and 1.37 per 1000 in 1974 and 1975 respectively.

The age and sex distribution of urban cases admitted in CRL ward are shown in table 4. In two years 4131 cholera cases were hospitalized in CRL from the city areas. The percent of male cases for the 3 groups below the age of 14 were higher than the females of the corresponding ages. Between the ages from 15 to 39 females had much higher rate of cholera than males of the corresponding age groups. Nearly 49% of all cholera cases occurred in children below the age of 10. The percent decreased gradually with the increase in age.

Table 5 shows the rates of cholera in the 3 refugee camps. The camp A having modest provision of water and waste disposal facilities had 1.61 cholera cases per 1000 people. Camps B and C having no such facilities had 3.95 and 4.29 cholera cases per 1000 residents. The average rate (2.41) of the camps was higher than the rate of the city as a whole. The differences between A and B and A and C were highly significant statistically (X^2= 23.78 and 31.62 and P<.001 and P<.001). The next table 6 gives the duration of residence in Dacca city of cholera and control families in 1974. It shows that ten percent of the cholera cases occurred in families living for less than 3 months, 12% in 3-12 months and 78% in families living for more than a year. The temporary residents were also of low percentage compared to those who stayed over a year.

The percent of case and control families affected with flood are shown in Table 7. It shows that 29% of cholera and 32% of control families were affected with flood and nearly 9% of cholera and 7% of control families had to shift their residences due to the effect of flood.

Table 8 shows the water use pattern of index and control families of different income groups of people during 1974 and 1975 epidemics. In the urban areas nearly hundred percent of the people of different income groups used water either from tap or tubewell for drinking. The use of tap and tubewell water for bathing and washing increased with the increase in income. The controls of highest income group used open sources of water less frequently than the index families for bathing and washing. The differences of drinking, bathing and washing between the cases and control and between the income groups are not statistically significant.

The uses of latrine by cases and controls are shown in table 9. There are no differences in the use of sanitary and open latrines by the cases and controls of lowest and highest income groups. Both

TABLE 4

URBAN CHOLERA STUDY
AGE AND SEX OF CHOLERA CASES ADMITTED TO CRL
FROM THE CITY AREA IN 1974 AND 1975

Age Group	No. of Male	Percent of Male	No. of Female	Percent of Female	No. of Total	Percent of Total
0-4	512	24.8	449	21.7	961	23.3
5-9	591	28.6	452	21.9	1,043	25.2
10-14	285	13.8	226	10.9	511	12.4
15-19	95	4.6	111	5.4	206	5.0
20-24	117	5.7	224	10.8	341	8.3
25-29	102	4.9	192	9.3	294	7.1
30-34	77	3.7	129	6.2	206	5.0
35-39	81	3.9	102	4.9	183	4.4
40-44	61	2.9	65	3.1	126	3.0
45-49	42	2.0	26	1.3	68	1.6
50-54	28	1.4	35	1.7	63	1.5
55-59	18	0.9	12	0.6	30	0.7
60+	57	2.8	42	2.0	99	2.4
Total	2,066	100.0	2,065	100.0	4,131	100.0

TABLE 5

URBAN CHOLERA STUDY, 1974

CHOLERA RATES, WATER AND SANITARY FACILITIES OF BUSTEES AND CAMPS

Within the City Area

Bustees/Camp	Population	No. of Cases	Attack Rate/ 1000	No. of Tap/ Tubewell	No.of Pond/ Tank	No. of Sanitary Latrine	No. of Open Surface Latrine
A							
Geneva Camp (New Relief)	49,675	80	1.61	75	-	382	-
B							
Kanalapur Rly. Station Bustees	11,375	45	3.95	6	2	-	35
C							
Kataban Babupara Bustees	12,112	52	4.29	6	4	-	30
Total	73,162	117	2.41	87	6	382	65

A VS B X^2 = 23.78 P<0.01

B VS C X^2 = 0.90 P<.50

A VS C X^2 = 31.62 P<.001

TABLE 6

URBAN CHOLERA, 1974

DURATION OF STAY IN CITY AND RATE OF CHOLERA

Groups	Duration of Residence			Total
	0 - 3m	3 - 12m	12m +	
Cholera	20	25	158	203
Percent	9.9	12.3	77.8	100.0
Control	12	39	152	203
Percent	5.9	19.2	74.9	100.0

TABLE 7

URBAN CHOLERA STUDY, 1974

PERCENT OF INDEX AND CONTROL AFFECTED WITH FLOOD

Group	No. of Family	Flood Effected	Residence Shifted
Cholera	203	59	18
Percent	-	29.0	8.9
Control	203	65	14
Percent	-	32.0	6.9

TABLE 8

URBAN CHOLERA EPIDEMIC, 1974 AND 1975
SOURCES OF WATER FOR DOMESTIC USE OF CASES AND CONTROL FAMILIES BY INCOME

Monthly Income	Sources of Water	Cases			Controls		
		Drink	Bathe	Wash	Drink	Bathe	Wash
Upto Tk. 400	Tap/T.Well	283	188	194	286	183	190
	Percent	99.7	66.2	68.3	98.3	62.9	65.3
	Other/Open	1	96	90	5	108	101
	Percent	0.3	43.8	31.7	1.7	37.1	34.7
Tk. 401-800	Tap/T.Well	68	53	53	59	40	40
	Percent	98.6	76.8	76.8	100.0	67.8	67.8
	Other/Open	1	16	16	-	19	19
	Percent	1.4	23.2	23.2	-	32.2	32.2
Tk. 800+	Tap/T.Well	18	13	12	21	18	17
	Percent	100.0	72.2	66.7	100.0	85.7	81.0
	Other/Open	-	5	6	-	3	4
	Percent	-	27.8	33.3	-	14.3	19.0

TABLE 9

URBAN CHOLERA EPIDEMIC 1974 AND 1975
USAGE OF LATRINE BY CASES AND CONTROLS BY INCOME

Income	Cases			Control		
	Sanitary Latrine	Open Latrine	Total	Sanitary Latrine	Open Latrine	Total
0 - 400	57	228	285	56	233	289
Percent	20.0	80.0	-	19.4	80.6	-
401-800	20	48	68	8	52	60
Percent	29.4	70.6	-	13.3	86.7	-
800 +	10	8	18	12	10	22
Percent	55.6	44.4	-	54.5	45.5	-

the cases and controls used sanitary latrine at higher proportion with the increase in income.

The number of diarrhea and hospitalised contacts of cases and controls which occurred 5 days prior to admission of the case or interview of the control are shown in table 10. Over 76% of the index families had a diarrhea case in the family prior to admission of a case in CRL where as 27% of the control families had a case of diarrhea. Twenty-five percent of index families had to admit a case in the hospital within the same period but less than 1% of control families had to do so. These were statistically highly significant.

The history of eating outside homes by cases and controls of different age groups within 5 days prior to hospitalisation or

TABLE 10

URBAN CHOLERA EPIDEMIC 1974 AND 1975

DIARRHEA AMONG FAMILY CONTACTS OF CASES AND CONTROLS

Occurring in 5 Days' Prior to Admission/Interview

Group	No. of families studied	No. of Diarrhea Cases	Diarrhea Cases Per 100 Families	No. of Cases Hospitalized	Hospitalized Cases Per 100 Families
Cholera Cases	371	284	76.5	93	25.0
Controls	371	101	27.2	3	0.8

Diarrhea: Case Vs Control X^2 = 178.8 P<.0001

Admission: Case Vs Control X^2 = 94.7 P<.0001

interview is stated in table 11. Out of 371 cases and 371 controls 194 cases and 110 controls ate outside homes. In all age groups the differences were remarkable and statistically significant. Though we have not shown separately, the differences between male and female cases and controls were also statistically significant.

Table 12 shows the eating out places of the cases and controls. Overall 52.3% of cases and 29.6% of controls ate outside homes in some sort of food installation. In all groups the indexes ate outside home more often than the controls. However, the differences between cases and control, are not statistically significant in the cases of eating outside in ordinary restaurants and relatives houses. In other cases the differences are quite significant. Eating of charitable meals is highly significant.

The last table 13 shows the efficacy of one day treatment and disinfection as a tool of epidemic control measure adopted by the CRL-Government group. Of the 265 families receiving treatment 13.5% of the contacts of cholera cases developed diarrhea within 10 days of treatment. This rate was 14.4% in contacts of controls. But the rate requiring hospitalisation was 4.5% in treated and 8% in

TABLE 11

URBAN CHOLERA STUDY, 1974 AND 1975
HISTORY OF EATING OUT BY CASES AND CONTROLS WITHIN
5 DAYS OF ILLNESS/INTERVIEW

Age	Cases		Controls		Significance	
	Ate Out	Not Eat Out	Ate Out	Not Eat Out	X^2	P.Values
0-4	22	30	13	47	4.6	<.05
5-9	45	35	33	85	14.8	<.001
10-14	33	28	16	48	9.9	<.005
15 +	94	84	48	173	40.2	<.001
Total	194	177	110	353	38.4	<.001

TABLE 12

URBAN CHOLERA STUDY, 1974 AND 1975
EATING OUT PLACES OF CASES AND CONTROLS

Name of Eating Places	Cases Ate Out	%	Controls Ate Out	%	X^2	P.Values
Ordinary Restaurants	46	(15.1)	37	(12.1)	0.9	<.5
Charitable Meals	33	(10.8)	3	(0.99)	24.5	<.001
Roadside Hawkers	84	(27.9)	59	(19.4)	4.9	<.05
Relatives' Houses	17	(5.6)	8	(2.6)	2.6	<.10
Family with cholera/ diarrhea	13	(4.2)	3	(1.0)	5.2	<.01
Total	194	(52.3)	110	(29.6)	38.4	<.001

TABLE 13

URBAN CHOLERA STUDY, 1975

HISTORY OF ILLNESS 10 DAYS AFTER TREATMENT/INTERVIEW

Status	No. of Families	No. of Members	No. of Diarrhea	Percent Diarrhea in Contacts	No. of Diarrhea Hospitalized from Contacts	%Contacts Hospitalized
Families treated	265	1,817	246	13.5	81	4.5
Families not treated	145	930	134	14.4	74	8.0

Hospitalisation: Treat vs untreat $X^2=13.5$

$P = <.001$

untreated groups. This difference between treated and untreated groups was statistically highly significant.

DISCUSSION

Although the classical serotype of Vibrio cholerae disappeared earlier from other countries, it was present in considerable number in Dacca until 1971. During 1972 there were only a few hundred classical cholera cases detected in CRL and by 1973 the classical cholera completely disappeared from the urban areas of Dacca. The classical cholera was seasonal in urban areas, but since the change to El Tor the strict pattern of seasonality appears to be minimized though the peaks of epidemics were still in the vicinity (October) of those of the classical peaks (November). Occurrence of two consecutive major epidemics in the urban areas as had been seen during 1974 and 1975 was uncommon during the period of classical cholera in Dacca. Though other workers had reported localisation of classical cholera epidemic to small communities in urban areas of Dacca, this pattern was not

seen in case of El Tor epidemics. The cholera cases of both the years were evenly distributed throughout the city. Thana attack rates were calculated on the basis of the national population census data for each police station. Even though the rate of Tejgaon topped the list, it may be attributed to an artifect in that this police station had been divided into 3 and many people still erronously mentioned Tejgaon as their place of residence. Tejgaon is also the nearest Thana to the CRL. The combined rate for all those 3 police station (former Tejgaon area) however, was less than Ramna Police Station. Although thousands of people stayed in relief camps and refugee colonies (Bastuhara) located in Mohammadpur Police Station the attack rate was lowest 1.35 per 1000 in the entire Municipal area.

Interesting data was developed from Ramna Police Station where there were essentially two classes of residents - distinctly upper class residents and clearly lower class refugees during 1974. Perhaps because of these two widely different social classes staying in this police station the overall attack rate by thana was similar in 1974. But the rate in 1975 was 0.88/1000 compared to 1.75 of 1974. This difference was probably due to the fact that most of the bustees on government land of this police station had been demolished during early 1975. In Dhanmondi and in the elegant areas of Ramna there was practically no cholera during the last two years of ever greatest epidemics but there were many cases in the refugee camps located there. We have recorded very few cholera cases in the government housing areas of Azimpur whereas the government housing areas of Peelkhana and Hazaribag had many cases. Similarly less densely populated areas of Mohammadpur Thana had a lower rate of cholera than other police stations in 1974. It is not only the location but also the class of people which appear to have great influence in the occurrence of cholera. In Sutrapur Police Station the population remained the same and a highest rate of cholera was observed in this police station in both the years. The data obtained from the 3 refugee camps show great difference in the rates. These rates were 1.6, 3.9 and 4.3 per thousand. This may have been due to provision of water and waste disposal facilities in the camp with the lowest attack rate.

An analysis of cases by location in the Dacca Municipal area revealed no stricking differentials with regards to time to occurrence. Despite certain differences the epidemic began, peaked and ended simultaneously in each section of the city during both the years. This is distinctly unlike the pattern of urban classical cholera observed by Martin and others. Many authors are of the opinion that cholera is a disease of young adult males. Our finding in Dacca urban area (and

also in Matlab rural area) shows that cholera is a disease of children below the age of 10 (49%). Though males are more active and mobile than females of the corresponding ages the females of the age group 15-39 have much higher attack rates than males in Dacca (22.8 vs 36.7). This may be due to the social customs that females nurse and clean the sick, wash the stool and buttocks of children and the soiled clothes of the members and thus expose themselves to higher risks.

During the flood and epidemic of 1974 there were tremendously increased number of homeless people in the city, and it had been suggested the transient nature of the population was a factor in the large epidemic. We observed that 10% of the families affected had stayed in the city for 3 months or less whereas 78% had lived here a year or more and no differences were noted between cases and controls. During the next year there was no flood and the number of transients were fewer, but the second largest urban epidemic was recorded. We conclude that the flood and resulting large floating population had little influence on the increased number of cases. It was expected that poorer people would use unhygienic water for drinking more that the wealthier groups, however, it was found that in Dacca almost 100% people of all income groups use tap or tubewell water for drinking. The rate of use of tap or tubewell water for washing and bathing increases with the increase in income.

The use of sanitary latrine is more frequent in people having better income both in cases and controls. But a huge number of people (one report says that 500,000 people) in urban area use open latrines. During heavy rain and flood these latrines are overflooded and may help transmission of vibrio in the environment. It may explain why cholera is common in people living in unhygienic environment.

The rate of diarrhea occurring within 5 days prior to interview was higher in index families than in control families. Another striking feature was the rate of hospitalisation of diarrhea cases from case and control families. When 25% of all diarrheas from the index families had to be hospitalized only 0.8% of diarrheas from control families had to do so. These early cases might be either primary, co-primary, or secondary cases in the index families.

All types of eating places were availed by both cases and controls. During 1974 frequent charitable meals were supplied by voluntary agencies, and the government also operated charitable feeding stations in the city. During the period of crisis the price of food was very high and innumerable number of hawkers started selling food on the main roads and crossings. The association of charitable meals with cholera may be due to unhygienic preparation,

service or prolonged storage of prepared food before serving. We assume that asking a detailed list of foodstuff enhances the recall of eating out.

In all age groups of males and females, eating outside the home was associated with being hospitalized with cholera. The finding was most stricking in the older age groups. Since it is customary for everyone in this country to drink at least a glass of cold water after every meal or snack, it was not possible to ascertain whether food or water was related with the high incidence of cholera.

In the past we could isolate vibrio from left over food from an outbreak at Rayer Bazar. (Dr. Khan's unpublished data). But none of the 54 samples of food cultured this time yielded Vibrio cholerae. Exact food consumed by the cases was not however, obtained for culture. Seven samples of water out of 57 collected from the jars of affected houses, restaurants and also directly from the source yielded Vibrio cholerae. Fifteen percent of the contacts of cases was found to be positive for Vibrio cholerae by a single swab.

Dose of tetracycline used to prevent further cases in index families by the CRL-Government staffs was inadequate as previously demonstrated by MacCormack et al. The sterilisation of water, which was limited to one small, available earthen jar or enamel cooking-pot, was also probably inadequate. Another drawback in the prevention program was the delay in finding index families. Therefore, it is not surprising that the rate of diarrhea was not different between the case and control families. Nevertheless a possible advantage of even prophylactically inadequate tetracycline treatment was that of all the diarrhea cases occurring in treated families 4.5% required hospitalization in comparison to 8.0% from the non-treated families. Thus we have not ruled-out the use of antibiotic prophylaxis in a situation with prompt reporting of cases and early visiting of families to give the recommended 5 days of tetracycline.

Severe cases of cholera are often brought or referred to the CRL but the majority of mild cases are either treated locally or not at all. We do not know how many sub-acute or mild cases or inapparent infection occur for one severe case during a pure El Tor epidemic. So the exact proportion of diarrhea or cholera cases of the city treated by the CRL is not known. Though clustering of classical cholera had been observed by other workers, during the last two years of study we observed almost uniform distribution of El Tor cholera cases among the susceptible group of people. The simultaneous occurrence of cholera throughout the city suggests some sort of mechanism helping prompt transmission. The camp data confirms our Rayer Bazar findings that people using open water contacts cholera more than others.

CONCLUSION

In conclusion several points may be mentioned. There has been a radical change from classical to El Tor biotype of Vibrio cholerae

within a period of two years. The cholera epidemic of 1974 was the first largest El Tor epidemic in Dacca urban area. This was followed by an identical epidemic in the next year which was uncommon with classical cholera. The peaks of epidemics, however, were during the post-monsoon months like the classical epidemics in Dacca which occurred about 4-6 weeks later. It may be mentioned that when El Tor epidemics in Dacca occurs in post-monsoon months it occurs in Calcutta during pre-monsoon months. Dr. Martin observed clustering of classical cholera while we observed uniform distribution of El Tor cases specifically in identical geographical areas of Dacca. The elegant areas like Gulshan, Banani, Dhanmondi and the Secretariat areas eastern to the Ramna Green were not affected in any of the epidemics. As in classical period the children below the age of 10 were the commonly affected groups. The overall rates between male and female were identical. But the females between the age groups 15-39 had higher (22.8 vs 36.7) attack rates as males of the corresponding age. The majority of the cases were not from the flood affected families and the short duration of stay in the city was not associated with higher rates. As all the cases used to drink water either from tap or tubewell, only drinking of tubewell or tap water was not apparently associated with cholera in the urban area. But the rate was associated with the availability of tap water for all purposes and the existence of waste disposal facilities. Eating outside homes from the ordinary food installations increased the risk of contracting cholera. Consumption of food from charitable institution was more related with cholera than others. One day's disinfection and treatment of contact families with antibiotics seemed to reduce the number of members hospitalized.

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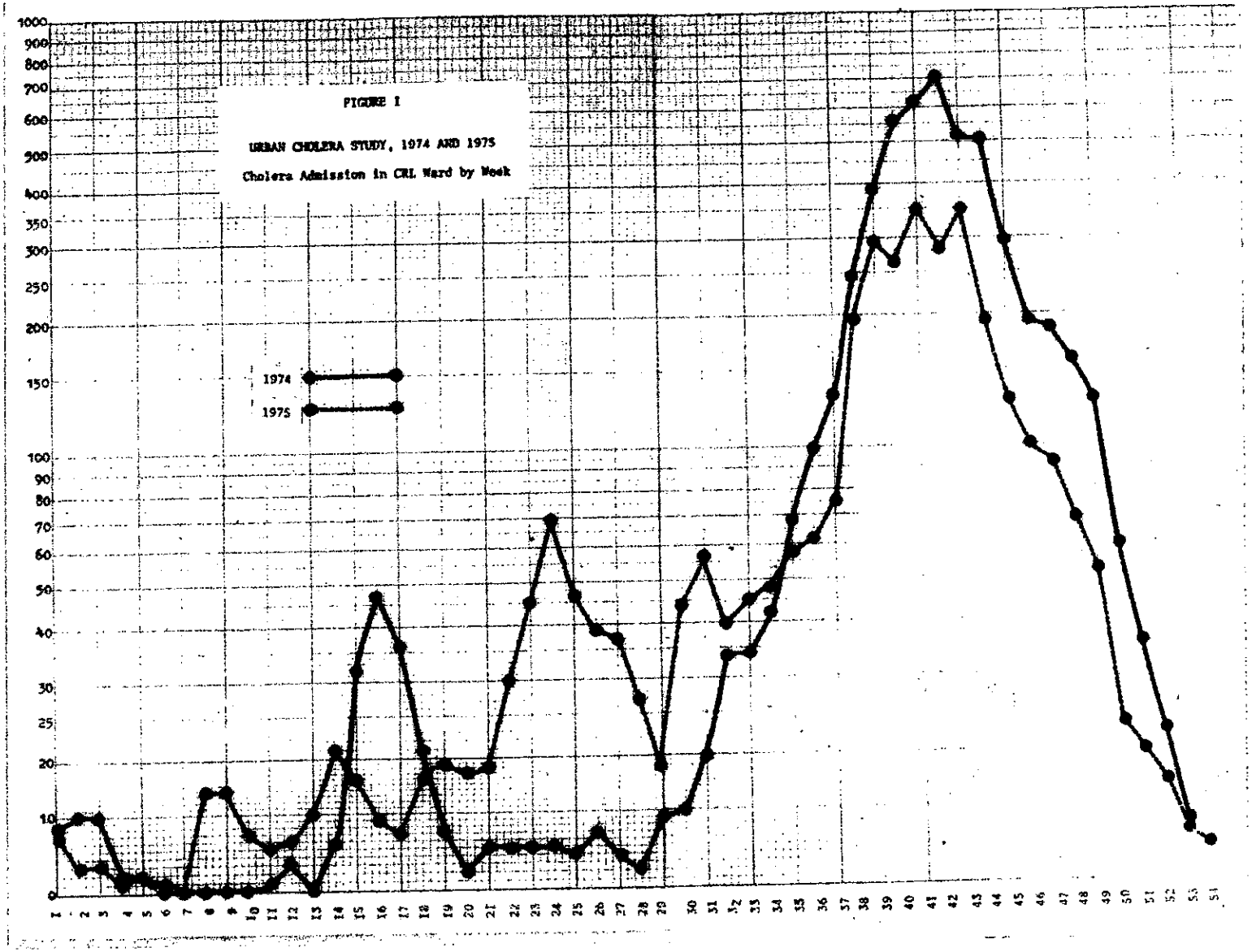
FIGURE I
URBAN CHOLERA STUDY, 1974 AND 1975
Cholera Admission in CRL Ward by Week
1974
1975

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DACCA URBAN EPIDEMIC, 1974

MAP OF CONFIRMED CHOLERA CASES FROM JULY THROUGH DECEMBER

1 GREEN PIN = 1 OGAWA ELTOR CASE ; 1 PINK = 10 OGAWA ELTOR CASES

1 GREEN PIN = 1 INABA ELTOR CASE

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