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A COMPARATIVE STUDY OF TUBERCULINS (PPD) OF DIFFERENT ORIGIN

III DISC-TINE TEST

by

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In previous communication 1, 2, comparative study of Danish Tuberculin PPD. RT·23 and American Tuberculin (Parke Dsvis) PPD were reported. The present report consists of comparison made between Mantoux test performed with Danish Liquid tuberculin (PPD-RT-23) and the tuberculin Test performed with Tine discs produced by the Lederle Laboratories of the U,S.A. (Rosenthal)-[3].

MATERIALS

This study was conducted in two parts :

(*i*) At Tuberculosis Control & Training Centre, Karachi on bacteriologically proved tuberculosis cases.

(*ii*) In the school children of Karachi.

The tuberculin used for the Mantoux test was liquid PPD tuberculin RT-23, supplied by the Serum Institute Copenhagen through the BCG Production Laboratories, Karachi. The Mantoux test was performed by the standard Mantoux technique as recommended by the WHO. An induration of 10 mm. or more was taken as positive reaction (2)

The disc Tine was made by stretching the skin and pressing the Tine Disc on the lateral aspect of upper one-third of forearm without sterilization of skin. The disc consists of four 2 mm. triangular steel needles (tines) attached to a disc. The tines having been dipped in four time concentrated old tuberculin dried and gas sterilized are mounted to a plastic handle. These discs are then packed in a card-board box, each disc resting in a plastic bubble and remains sterile detached from it. The whole disc unit is disposable after use. The dried tuberculin maintains its potency for at least 2 years and can be stored at room temperature.

STANDARD OF POSITIVE REACTION

Mantoux Test :

In a previous study(2) criterion for positive Mantoux test was fixed at an induration of 10 mm. or more. This has been taken as the standard of positive reaction for the Mantoux test in the present study.

Disc-Tine Test :

Rosenthal(3) has recommended an induration of 2 mm. around one or more needle points as a positive reaction. In practice, however, it was found difficult to palpate an induration of 2 mm. with accuracy. A group of 20 tuberculous patients with positive sputa were given a Tine test. The reaction ranged between 6 mm. and 22 mm. with mean induration of 14 mm. It was, therefore, considered appropriate to use an induration of 4 mm. around one or more needle points as positive reaction.

DESIGNS OF EXPERIMENT

The tests were carried out in 550 Primary School Children. The following symbols were assigned to each tuberculin:

Danish Tuberculin PPD-RT-23	One I.T.U. = A.
Danish Tuberculin PPD-RT-23	Two I.T.U. = B.
Disc-Tine Tuberculin impregnated needles	= T.

RESULT

Group I.

105 primary school children were tested with A, those found negative to A. were divided into 2 sub-groups. Half of them were retested with B and those which were still found negative to B were again tested with T. The other half of this group who were negative to A were retested with T and those still found to be negative were again tested with B. The results are given in Table-I (A.B.C.).

TABLE - I. (A)
Comparing A & T

	Total	Absent	Positive	Negative	Mean induration
Test with A	105	28	25 32 5%	52	12.38 mm,
Negative to A Registered with B	22	—	1 4.5%	21	
Negative to A Retested with T	19	—	0 0%	19	
Negative to A Retested with T	22	—	1 4.5%	21	
Negative to A & T Retested with B	19	—	0 0%	19	

TABLE - I. (B)

Comparing T & A.

	Total	Absent	Positive	Negative	Main induration
Tested with T	105	7	14 14.3%	84	7.33 mm.
Negative to T Retested with A	38	—	2 5.3%	36	
Negative to T Retested with B	42	—	2 4.8%	40	

TABLE - I. (C)

	Total	Absent	Positive	Negative	Mean induration
Negative to T Retested with A	42	2	2 5%	40	
Negative to T & A Retested with B	38	6	2 5.3%	36	

"KEY"

'A' = Danish Tuberculin PPD-RT-23 one-I.T.U.
'B' = Danish Tuberculin PPD-RT-23 two-I.T.U.
'C' = Disc Tine Tuberculin impregnated needles.

Group II.

In this group 170 school children were given a simultaneous test with A on the left forearm and T on the right forearm. Those found negative to A or T were retested with B. The results are given in Table II.

TABLE - II.

Comparing A & T simultaneous Tests (Group II)

		A.				T.		
	Total	Absent	Positive	Negative	Mean Induration	Positive	Negative	Mean Induration
Tested with A & T simultaneously.	170	33	32 23.3%	105	12.2 mm	34 24.8%	103	5 mm.
Negative to A & T retested with B.	103	6	0 0%	97				

TABLE - I. (B)

Comparing T & A.

	Total	Absent	Positive	Negative	Main induration
Tested with T	105	7	14 14.3%	84	7.33 mm.
Negative to T Retested with A	38	—	2 5.3%	36	
Negative to T Retested with B	42	—	2 4.8%	40	

TABLE - I. (C)

	Total	Absent	Positive	Negative	Mean induration
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'C' = Disc Tine Tuberculin impregnated needles.

Group II.

In this group 170 school children were given a simultaneous test with A on the left forearm and T on the right forearm. Those found negative to A or T were retested with B. The results are given in Table II.

TABLE - II.

Comparing A & T simultaneous Tests (Group II)

	A.					T.		
	Total	Absent	Positive	Negative	Mean Induration	Positive	Negative	Mean Induration
Tested with A & T simultaneously.	170	33	32 23.3%	105	12.2 mm	34 24.8%	103	5 mm.
Negative to A & T retested with B.	103	6	0 0%	97				

"KEY"

'A' = Danish Tuberculin PPD-RT-23One-I.T.U.
'B' = Danish Tuberculin PPD-RT-23 Two-I.T.U.
'C' = Disc Tine Tuberculin impregnated needles.

Group III.

170 school children were tested with A, those found negative to A were retested simultaneously with B on the right forearm and with T on the left forearm, The results are tabulated below: —

TABLE - III
Comparing B & T

	Total	Absent	Positive	Negative
Tested with A	170	18	33 21.7%	129

	Total	Absent	Positive	B Negative	T Positive	Negative
Negative to A retested with B. (Right forearm & T left forearm).	129	4	6 4.8%	119	11 8.8%	114

"KEY"

'A' = Danish Tuberculin PPD-RT-23 One-I.T.U.
'B' = Danish Tuberculin PPD-RT-23 Two-I.T.U.
'T' = Disc Tine Tuberculin impregnated needles.

A group of 16 sputum positive cases which were found to be tuberculin negative in previous study 2 were again tested 3 to 9 months after 1st test, simultaneously with A & T. Out of those 16 cases, 11 turned to be positive both to A and T. There were 5 cases who were still negative to A as well as T.

DISCUSSION

It is apparant from these experiments that Disc tine Test compares favourably with Danish Liquid tuberculin PPD-RT-23. In group I Danish Tuberculin has given better result i.e. 33% positive reactors and 12.38 mm. mean induration as compared to 7.33 mm. mean induration and 14.3% positive reactors with Dise-Tine Test. But in group II where simultaneous tests with liquid tuberculin on the left arm and Disctine Test on the right arm were given the number of positive reactors in both

the subgroups were similar i.e. 33% positive reactors with Danish Tuberculin and 24.2% positive reaction with Disctine Test.

Those who were found negative to first strength of the liquid tuberculin (A), when retested with second strength showed 4.5% positive reactors. A similar test with T in negative reactors to 'A' also showed 4.5% positive reactors. Of the children found negative reactors to A & T when retested with second strength of liquid tuberculin none showed positive reaction. Similarly those children who were found negative to 1st and 2nd strength of the Danish Liquid tuberculin did not show any positive reaction when retested with Disc-Tine. Again, children who were found negative to first strength of Danish liquid tuberculin when tested simultaneously with Disc-Tine Test on the left forearm and the second strength of liquid tuberculin (B) on the right forearm, 8.8% positive reactions were found with Tine Test, and 4.8% with second strength of Danish liquid tuberculin.

The Disc Tine test gives similar information as the Mantoux test currently being used with R.T. 23 in both the strengths. Although mean induration with Tine Test is less than that with Mantoux test, it does not detract from the number of positive reactions The proportion of mean induration (12 mm. 5-7 mm is similar to standard induration used for positive reactions (10 mm: 4 mm.).

It appears therefore, that Disc Tine Test can be substituted for Mantoux with Danish liquid tuberculin PPD-RT-23, 1 and 2 international Tuberculin Units which are roughly equivalent to 5 and 10 International Units of old Tuberculin respectively. There are, however, distinct advantages in the use of Tine Test. Disc Tines can be stored at room temperature and maintain their potency for about 2 years as against 6 weeks for the diluted liquid PPD. The Disc-Tine Test saves cost of labonr and use of syringes and needles. There is no problem of sterilization of the syringes nor there is any wastage of tuberculin. The Tine Test is used with great ease, is practically painless and does not cause fear in children. The Disc-Tine Test can also save the trouble of repeating the Mantoux test with second strength of liquid tuberculin, There is, therefore, considerable saving in time both for the operator as well as the subject.

There is another advantage in the use of Disc-Tine Test that no specific training is necessasy for carrying out these tests, whereas it requires considerable practice for perfecting the technique of Mantoux Testing. However the cost of Tine Test is conspiciously higher than liquid tuberculin and will remain a deterring factor in Mass BCG campaigns unless the cost can be substantially reduced. It can be performed and read with ease by nurses and technicians without much training. Its storage quality and ease of handling makes it a very good test in office practice,— in small clinic and at tuberculosis hospitals where tuberculin tests are not used on a mass scale.

An interesting observation was made in the study of sputum positive patients. Sixteen patients who had positive sputum cultures had been previously reported to react negatively to Mantoux test with Danish liquid tuberculin and American reconstituted PPD 2. When tested again with Tine and Danish Liquid tuberculin(A), 11 out of 16 showed positive reaction to both the tests.

This phenomenon required some study. It is obvious that where is overwhelming evidence of tuberculous infection, negative tuberculin reaction should not necessarily rule out the diagnosis of tuberculosis. The tuberculin reaction repeated after 3 months may turn out to be positive. It may be pointed out that all these cases when retested were still receiving chemotherapy.

SUMMARY

A comparison of Danish PPD-RT-23 and the Disc-Tine Test was made in 16 sputum positive tubercuosis patients and 550 school children. It was found that 4 mm total induration around one or more needle point was better criterion of positive reaction instead of 2 mm recommended by the manufactures for Disc-Tine Test. The number of positive reactors were similar in both groups i.e. in case of tuberculin PPD RT-23 (1 and 2 I T.U.) and that of Tine Test, although mean induration was more in case of Danish liquid tuberculin as compared with Disc-Tine Test. The Disc-Tine Test has a great advantage in ease and speed of testing and length of storage at room temperature. It may not be economical to use this test in mass campaigns but it has distinct advantages in office practice, small clinics and tuberculosis hospitals.

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THE LAHORE RAINFALL FOR ONE HUNDRED YEARS*

By

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I. INTRODUCTION

It is the general view of the Climatologist all over the world that rainfall of a place decides to a very great extent the climate of the place as such it has been considered desirable to study the rainfall of Lahore for the last one hundred years from 1862, so that the climate of Lahore is clearly understood so far as it is affected by the rainfall of Lahore.

The normal rainfall of Lahore has two maxima, the higher one is in July and the lower one is in January. It has also two minima, one is in April and the other is in November. The higher maxima of July is 5.45 inches and the lower maxima of January is 1.04 inches while the lower minima in November is 0.10 inch and higher minima of April is 0.57 Inch.

From the distribution of monthly normal rainfall of Lahore, it is seen that there are two rain regimes in Lahore. The heavier one is during the summer moosoon season and the lighter one is during the winter. The summer and winter are here defined as consisting of June to September and December, January to March respectively.

From a look of the general circulation of atmosphere over the sub-continent in general and over Lahore in particular, it is seen that during the winter season a number of depressions and storms that form in the Eastern Mediterranean Sea move slowly eastwards throughout the year. These depressions or storms, while moving eastwards, give rainfall over Turkey, Jardan, Iraq, Iran and Russian Turkistan. But while moving eastwards during the winter they induce secondaries over Iran, Afghanistan and Baluchistan. Though these secondaries carry some moisture from the Persian Gulf yet they collect sufficient fresh moistures from the Arabian Sea and then cross over West Pakistan during October to May. The cause of Lahore rainfall

* Paper read in a symposium on Lahore Climate held at Meteorology Office, Lahore on March 24, 1964 on the occassion of World Meteorology Day.

during the winter is the general consequence of the movement of these secondaries over or in the neighbourhood of Lahore along the upper air troughs. This rainfall is more or less continuous, lighter in form and longer in durations.

The other rainfall regime which falls during the summer season from the middle of June upto the end of September is due to the summer monsoon that is a special feature of South-East Asia. During this season South westerly monsoon wind travels upto Lahore and beyond, from the Arabian Sea. Another branch of monsoon current, that travels to Bengal from Indian Ocean and Bay of Bengal, is deflected westwards bringing more moisture with it upto Lahore and beyond. During this season a number of cyclonic storms and depressions form in the Bay of Bengal and travel westwards over the Gangetic Valley and come upto Lahore and beyond. If such a depression of Bay origin happens to meet a secondary formed by the western disturbances of Mediterrenean Sea origin and if they happened to meet in the Punjab we get heavy rainfall at Lahore also during the summer monsoon season.

The upper atmospheric structure during the whole winter is controlled by the existence of the sub-tropical and sometime the polar front westerly jet streams whose axes ordinarily lie at a height of 40,000 ft along latitude 30°N or so giving a maximum wind speed at that height of the order of 150 to 250 miles per hour The lower level currents of the atmosphere, unless disturbed by secondary during the winters, are also controlled by the existence of these westerly jet streams.

During the summer monsoon season the upper atmospheric structures over the sub-continent and hence over Lahore also is controlled by the existence of the easterly jet streams which approach from the South upto latitude 20°N or so at a height of about 55,000 ft. with a maximum wind speed of about 60 miles per hour in its core. The second factor, which controls the upper wind structure during the summer monsoon is the formation of an anticyclone over the Tibetan plateau due to the formation of a warm pool on account of summer heating of the highest roof of the world. The third factor controlling the summer wind current is the formation of a heat low over Iran and Afghanistan and West Pakistan areas.

The above factors alongwith the altitude (700 ft.), latitude 31°N, vegetation, remoteness from the sea (about 700 miles) and also distance from Himilayas of Lahore and its orography control the total rainfall of Lahore round the year.

II. ANNUAL RAINFALL

The normal annual rainfall of Lahore is 19.21". During the one hundred years under consideration, it has been found that Lahore had twice annual rainfalls more than 35 inches i.e. 37.80 inch in 1875 and 37.43" in 1882. There were other four years when Lahore had annual rainfall between 30" to 35".

Again it is seen that Lahore also had four very dry years during the last one hundred years when it had rainfall each year less than 10 inches i.e. it had 6.21″ of rainfall in 1899, 8.7″ in 1872, 9.2″ in 1870 and 9.91″ In 1896. These four years were the dry years.

TABLE I

Frequency of annual rainfall from 1862-1961 for Lahore.

Rainfall	0″—	5″-	10″—	15″—	20″—	25″—	30″ -	35″—
Range	4.99″	9.99″	14.99	19.99″	24.99″	29.99″	34.99″	39.99″
No. of years	0	4	23	27	24	16	4	2

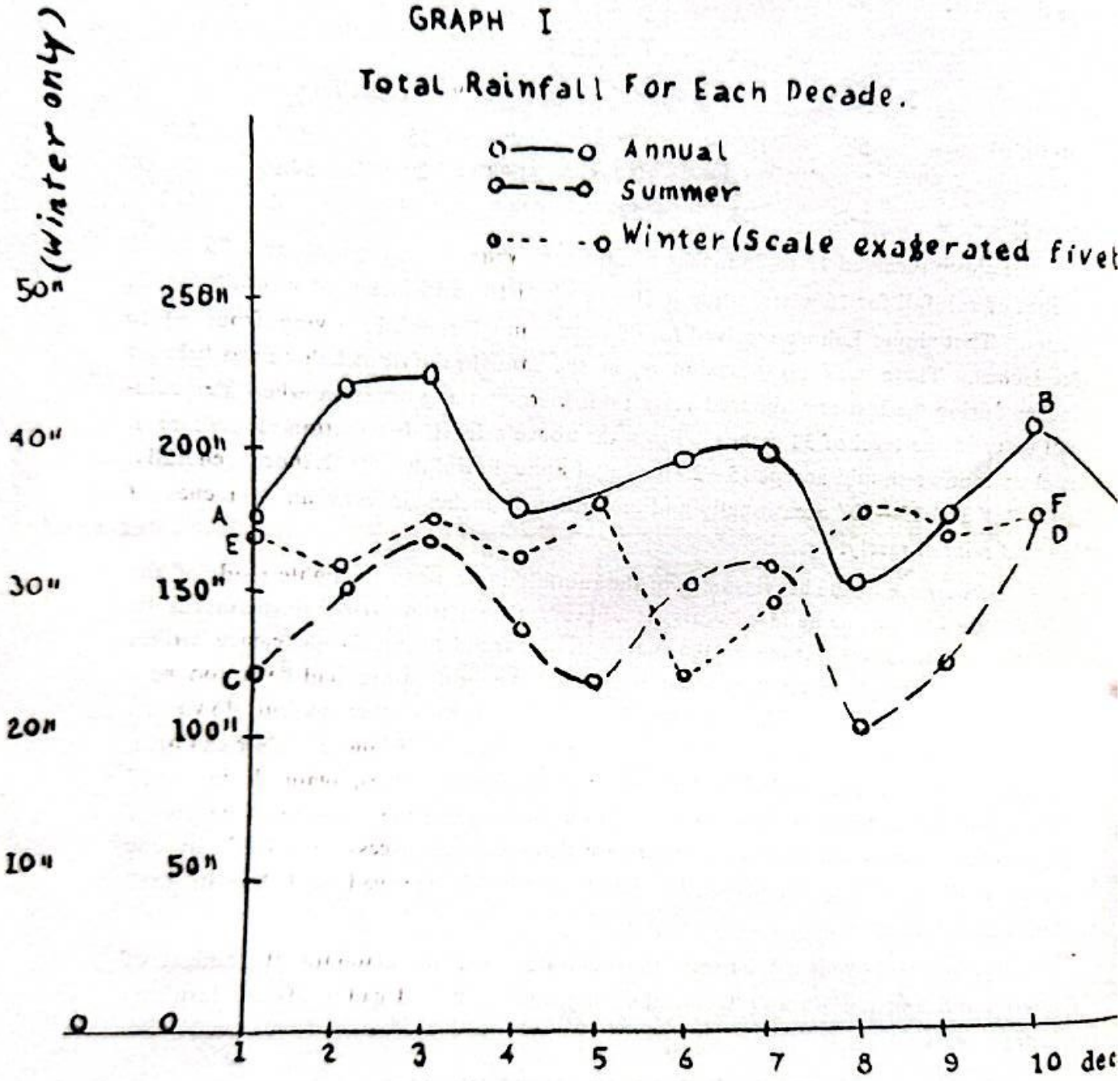
Lahore received 15 to 25 inches of rain each yeur for 51 years and 25 to 30 inches of rainfall for 16 years, while it also received 10 to 15 inches of rainfall for 23 years. That shows Lahore received for 90 years annual rainfall varying from 10 to 30 inches. There was no occasion when the annual rainfall of Lahore was below 5 inches during the last one hundred years ; nor there was any occasion when the rainfall reached the level of 38 inches. From the above rainfall distribution of Lahore it is clear that we should accept 15—25 inches of annual rainfall over Lahore generally, 10″—15″ and 25—30″ occasionally and more than 30 inches or less than 10 inches of annual rainfall rarely.

If we look to the heaviest side of the rainfall and also to the lightest side of the rainfall during the one hundred years, it appears that nature tried to maintain its budget well balanced. It is seen that natnre took care to fill up the deficiency within few years, in case there has been some dry years. Again if nature had been too generous in some years to give Lohore rainfall too heavy, it look care to cut down the budget equitably within few years to bring the budget belanced. For example, Lahore received in 1870 and 1871 the total reinfall of 17.90 inches, again during 1875 in one year it has received 37.80 inches. In the former case there was total deficit of 20.5 inches in two years and in the latter case there was an excess of 18.59" in one year. Similarly in 1896 it received 9.91" and in 1899 it received 6.21 but in 1882 alone again Lahore received 37.43 of rainfall.

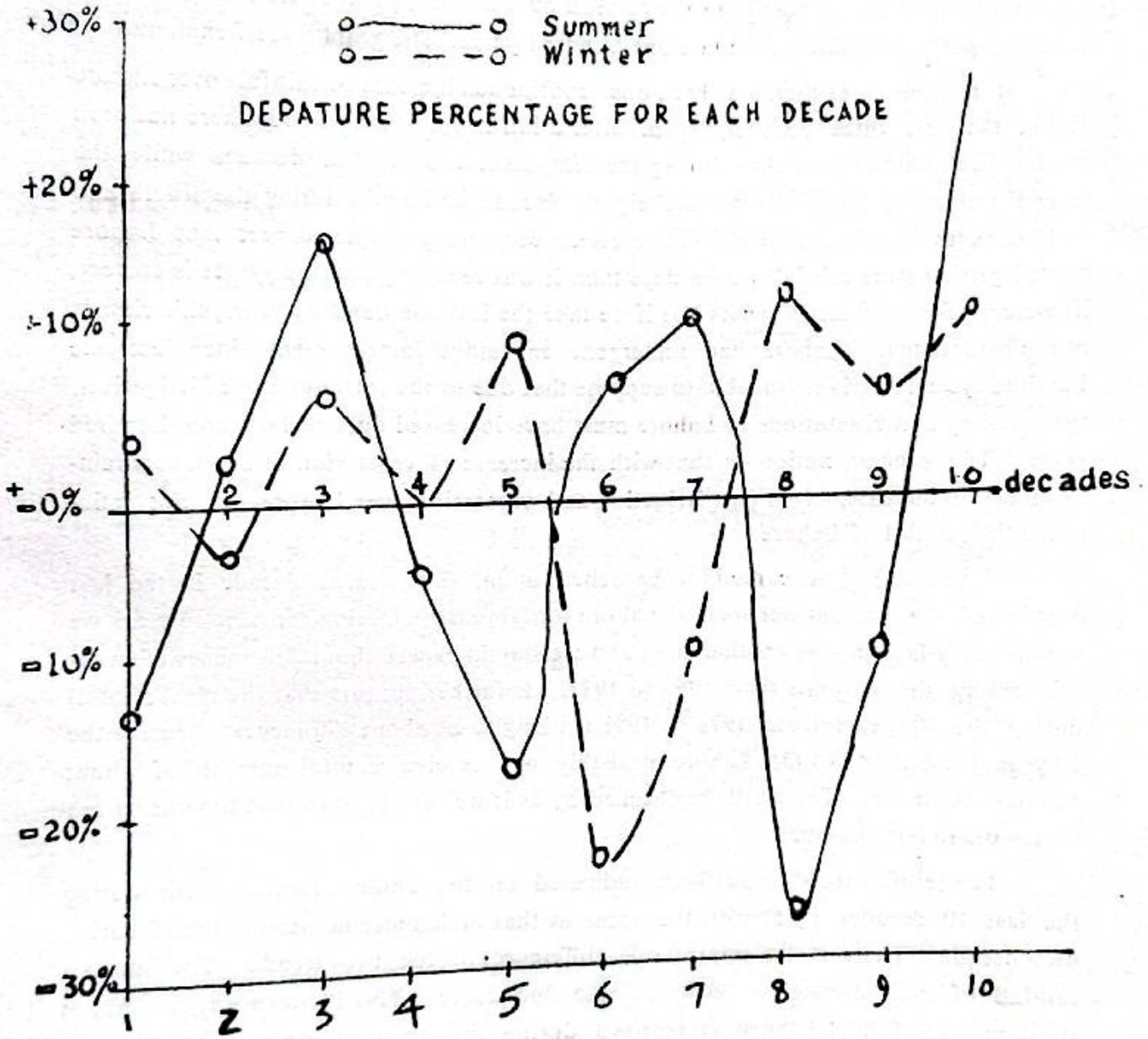
From the above it will be seen that Nature tried to maintain its budget of annual rainfall of Lahore well balanced during one to two decades of the last one hundred years.

III. RAINFALL IN EACH DECADE

The total of 100 years was divided into 10 decades starting from 1862 to 1871 as the first decade, and the remaining periods similarly. The result of this rainfall for each decade has been shown in graph number I, in three different curves, A B shows the total rainfall of each decade, D shows the total summer rainfall of the


GRAPH I
Total Rainfall For Each Decade.
Annual
Summer
Winter (Scale exaggerated five
50" (Winter only)
40"
30"
20"
10"
258"
200"
150"
100"
50"
A
B
C
D
E
F
1
2
3
4
5
6
7
8
9
10 dec

GRAPH II


Summer
Winter
DEPATURE PERCENTAGE FOR EACH DECADE
+30%
+20%
+10%
±0%
-10%
-20%
-30%
1
2
3
4
5
6
7
8
9
10
decades

decade and E.F. shows the winter rainfal of the 10 decades. It will be seen from the first curve that there has been 3 spells of rainfall periods during the last one hundred years. The first one was from the first to fourth decade, second was from fifth to seventh and the third one was from eigth to tenth decade. Though it is the general view that there is no periodicity in the rainfall over a place, yet it is seen that Lahore had some periodicity during the last one hundred years. The graph is self explanatory.

It is seen that there has been once continuous increase of rainfall over Lahore during the first three decades, again after a fall in the fourth decade there has been another rise though rather slow during the fifth, sixth and seventh decades while the second fall came again during the eighth decade and again during the nineth and tenth decades there has been continuous rise. Very many people suspect that Lahore started getting more rainfall now-a-days than it was receiving previously. It is correct, if we consider odly last 30 years but if we take the last one hundred years, this view is not substantiated. Lahore had undergone enormous improvement since last one hundred years. It is reasonable to suppose that due to the introduction of irrigation, the greenery and vegetations of Lahore must have increased during last one hundred years. The general notion is that with the increase of vegetation of a place its rainfall tends to increase, It is that irrigation and vegetation over Lahore has not influenced the rainfall of Lahore.

If the trend of the curve is to be relied upon, the present decade is the last decade of the present wet spell of Lahore for 20 years. During the next 30 years we are probably heading for another spell and we should expect about 200 inches of rainfall during the 10 years from 1962 to 1971. It further appears that the total rainfall during the 10 years from 1972 to 1981 is likely to be about 170 inches. During the 10 years from 1982 to 1991 Lahore probably will receive a total rainfall of about 150 inches or so. This will be checked by us if we survive upto that time or by our successors in our absence.

The rainfall trend as has been indicated on the annual rainfall basis during the last 10 decades is almost the same as that of summer monsoon rainfall during each decade. There is no appreciable difference in the two trends. The summer rainfall of each decade is shown in the 2nd curve. This is because about 75% of the annual rainfall of Lahore is received during the summer monsoon period and about 17% is received during the winter. It is due to this fact that the annual trend of each decade has been more or less controlled by the trend of the summer rainfall of the same decade. The normal winter rainfall is only 3.27'' in a year as such it does not influence the trend of annual rainfall in any appreciable manner, though at times it contribute to a minor extent.

The trend of the winter rainfall in each decade, however, gives a different picture, i.e., represented curve E F in graph I. It is seen that if there is any excess in summer rainfall there is a tendency to have a deficit in winter rainfall during

the same decade. It appears that Nature took care to maintain some sort of balance between summer and winter rainfall in each decade Sometime, if there is excess rainfall in winters there is a tendency to have deficiency in summers of the decade

Graph II shows the departure from normal expressed as percentage of the normal both for summer and for winter separately during the 10 decades of the hundred year. It will be noticed from the two curves, the summer and the winters ones that the diflciency of one season is compensated by the excess of the other season in the same decade. This has been almost always true from 1st to the 2nd decade and again from the 4th decade upto the 9th decade. There has been, however, two exceptions in the third and 10th decades when there was excess rainfall during the summers as well as during the winters. This probably gives us a tool for long range forecast for summer and winter rainfall of Lahore.

The following table for winter and summer for the 10 decades will explain the above observations :—

TABLE II

S. No.	Decade	Summer total rainfall	Departure % of normal	Winter total rainfall	Departure % of normal	Remarks
1	1862-71	121.90″	−14%	34.06″	+ 4%	
2	1872-81	148.28″	+ 2%	31 39″	− 3%	
3	1882-91	168.97″	+17%	34.95″	+ 7%	Exception
4	1892-1901	137 80″	− 5%	32.57″	−0.3%	
5	1902-11	119.15″	- 18%	36.05″	+10%	
6	1912-21	154.22″	+ 7%	24.66″	−24%	
7	1922-31	161.06″	+11%	29.45″	−10%	
8	1932-41	103.79″	−28%	36.82″	+13%	
9	1942-51	127.95″	−11%	34.62″	+ 6%	
10	1952-61	182.58″	+26%	36.40″	+11%	Exception

IV. MONTHLY RAINFALL DURING THE HUNDRED YEARS

TABLE III

Frequency of Rainfall (monthly) from 1861-1961

Months	0.00" ...	0.01" 0.49"	0.50" 0.99"	1.00" 1.90"	2.00" 3.99"	4.00" 5.99"	6.00" 9.99"	10.00" 14.99"	15.00" 19.99"	20.00" 30.00"
January	12	32	13	25	18	0	0	0	0	0
February	12	39	16	18	13	2	0	0	0	0
March	9	39	22	18	10	2	0	0	0	0
April	17	44	19	16	4	0	0	0	0	0
May	16	39	28	13	3	1	0	0	0	0
June	6	16	26	23	22	5	2	0	0	0
July	0	2	3	11	27	22	21	11	3	0
August	2	4	7	9	25	20	24	7	1	1
September	15	27	6	18	14	5	8	5	1	1
October	47	31	8	10	4	0	0	0	0	0
November	67	25	4	4	0	0	0	0	0	0
December	32	36	14	12	6	0	0	0	0	0

The monthly rainfall of Lahore during the hundred years, in question, has been shown in Table No. III in a monthly frequency table. The table speaks of itself; yet the following short observation is worth while :—

It is noticed from the table III that November is the driest month in Lahore and in fact we had 67 years when the Novembers did not get even a trace of rainfall. The next credit goes for dryness to October which remained dry totally for 47 years. The third position for dryness goes to December, which had 32 December wihout any rainfall. Again no month during winters of the hundred years received more than 6 inches of rainfall. The summer months are generally wet. There were one August and one September, which had each received more than 20 inches of rainfall during the period. Again there were three Julys, one August and one September, which received rainfall from 15 to 20 inches during this period. The pattern of rainfall is clearly shown in table No. III.

The annual and monthly means worked out on basis of the 100 years rainfall of Lahore gives almost the same values of monthly and annual normals worked on the basis of 40 years data now in use shown in table IV.

TABLE IV

	1	1	2	3	4	5	6	7	8	9	10	11	12	13
Normal		1.04	0 97	0.70	0.57	0.59	1.64	5.45	5 15	2.20	0.24	0.10	0 47	19 21
Mean		1 02	0.93	e.87	0.56	0 59	1.52	5.62	4.84	2.47	0.86	0.11	0.89	19 30

V. CONCLUSION

1. The above study of Lahore rainfall for the hundred years probably gives us some useful tool for the forecast of summer and winter rainfall of Lahore.

2. It probably gives us another clue to make National Plan keeping in view that Lahore received a total of 1929 83 inches of rainfall during the last one hundred years and is likely to receive about 520 inches of rain during 30 years from 1962 to 1991, thus giving a total of deficit of about 56 inches in 30 years.

3. The rainfall pattern of Lahore did not undergo any change during these hundred years.**

****Acknowledgements**: The original data for this study was made available to me by Mr. Saeed, Professional Assistant of Lahore (C. S.) from the Climatological Section of Lahore, Regional Meteorologicial Centre.

A Survey of Intestinal Parasites in a Village within City Corporation of Lahore: Incidence in Females

by

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I. INTRODUCTION.

We know very little about the common protozoal and helminthic parasites of our rural population.

A preliminary survey of intestinal parasites in a village within the City Corporation of Lahore was a modest step to fulfil this desideratum in our knowledge. It was carried out during the time commencing from 7th September, 1963 and ending on 31st August, 1964. In view of the magnitude of the task, the data obtained in such a limited time, represents only fraction of the securable information.

The distribution of the intestinal parasites in a community depends largely upon the geography of the place where the community lives and the attitudes of its people. Pertinent data, however, small and uninteresting it may be, is most welcome. This information does not only improve our understanding of the gigantic problem but also helps in adopting proper methods of control. The chalking out of any programme and future manipulation of the measures largely depends upon such information. Maximum benefit, in shortest possible time, with bare minimum expense to the community and least wastage of resources (men, material nnd money) available, can be achieved if there is a good scheme, good team work, good supervision and strict vigllence. The data collected in this regard from the venue of our survey is given beiow.

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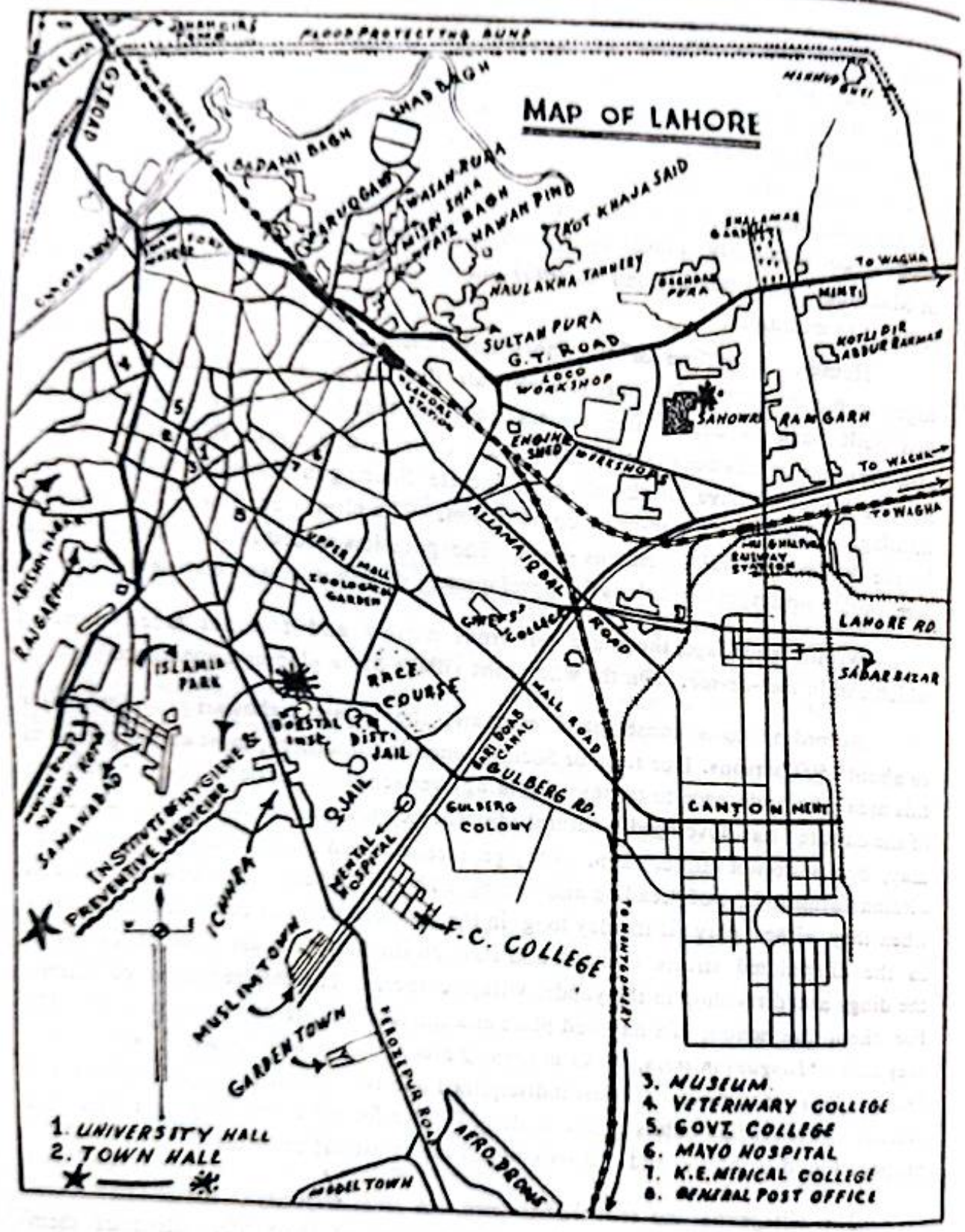
The Village. The village Sahowari lies on the Eastern side of the native city of Lahore. It is half a mile due South of Shalamar gardens. A metalled link road connects it with the Grand Trunk road near this point. The Upper Bari Doab Canal is about a mile on its South. At the West and South-West end of the village is the West Pakistan Railway Carriage and Wagon Workshop and Loco Workshop area. The Moghalpura railway station is about a mile and half on its Southwest. The Pakistan Mint stands on its North-Eastern corner. It is important suburb of Moghalpura and was once regularly inundated by Ravi when in spate. It has always been a conspicuously unhealthy station in the past. Thanks to the Construction of Mahmood Buti Band Road in 1957 on its North, this hazard has now been reduced to minimum.

Houses. It is one of the most unplanned abadi. The houses are huddled together in a criss-cross fashion. Almost all the houses are designed haphazardly and built back to back. The owners do not bother to give due regard to light and air. Ventilation has been largely neglected. Courtyards are generally *Kacha*. A few houses, however, have brick-soling. Concrete flooring in the rooms is more or less wanting. There is no damp-proof construction. The plinths are low. The humidity in the houses generally remains high. The parasites seeded in the courtyard therefore, obtain optimum conditions for development, distribution and transmission.

Within the village, there are numerous narrow and tortuous lanes, most of which end in *culs-de-sac*. On the whole, the village has a gloomy appearance.

According to a conservative estimate, the village Sahowari provides shelter to about 1500 persons. Due to poor Socio-Economic Conditions, most of the people of this area give preference to technical training over school education. A great majority of the children has developed a natural idiocyncracy towards education Try, what one may, books do not attract them. They get incessant and queer hysteric attacks when withinan atmosp here of "reading and writing". The morbid condition, however, corrects when they either play all the day long in the manured fields or roam about aimlessly in the dilapidated streets or stand and stare on the hideous mass of sweets in one of the dingy and dirty shop in the yonder village corner. The children suffer of whims. For them the school is a haunted place and the teachers are unwanted persons. Do they find *"Tongues in trees, books in running brooks and sermons in seas"*, we do not know. This progeny is of most indisciplined habits. Promiscuous defaecation and indiscriminate feeding habits dibble seeds of trouble for the community and facilitate propagation, distribution and transmission of the intestinal parasites.

The village has no school of its own. A great majority of the children therefore, are herded in a neighbourhood school for a part of their life. Most of them separate from the herd, desert the school, and become free early. The number



MAP OF LAHORE
SHOWING SITE OF
SURVEY

completing the primary school education is very small. The literacy level therefore, does not rise above 2 per cent. This level may probably improve if a school is established in the locality.

The bulk of the village inhabitants consists of refugees, mostly hailing from Shakargarh (Once in Sialkot district of pre-partittion days). This tract used to be notorious for the incidence of the *ancylostomiasis*. The percentage of educated persons is comparatively higher in refugees than in the locals.

Occupation. About 85 per cent of the male adults work in the West Pakistan Railway Workshop. The number of those who work in different government offices or private establishments does not probably exceeds 10 per cent. A very small proportion, not exceeding more than 5 per cent is, however, engaged in the cultivation of the land now available for gardening, vegetable growing and fodder crops in the village.

The village Sahowari, was once held almost entirely by small peasants proprietors. The city demands of fodder and vegetables and fruits was partially met out of the produce of this village. Although most of the land has now come under houses, yet there is still some proportion which is under plough. There is increased pressure of the population on this limited land. Bare minimum proportion of the village can subsist on the produce of the farm and the fields. Finding of alternate means to supplement the earning power of the family is a matter of great necessity. The desire to see the male progeny earning at an early stage of their life is directly proportionate to the economic pressure. Educated persons in these communities become burdon rather than boon. They usually shun laborious work and avoid duty. Dignity of labour is not understood and therefore, hated by those who get little education. Largest number of educated people cultivate a sense of selfishness. Each matriculate likes to be enrolled in an office where he can sit for an hour and loiter for hours together, discuss politics and policies without knowing what, sit on cases as if these are cosy cushions, start smoking and find back-door means to do it, misbehave with every body including parents except one who has administrative power to twist tails, dodge and then dislodge one who trusts him and ultimately make the Great-Grand-Granny sob, sigh and say : *dohbi ka kutta ghar ka na ghat ka*". The low level of education is a boon in disguise.

The washerman's dog roles from the heath to the house and can neither watch moorland not can ward the hearth. Longellow said, "*Let us then, be up and doing with a heart for any fate*" Nothing is great or small. Nothing is mean or irksome. Dusting drudging and darning are lovable labours. Thinking power, however, places them at different levels but love hallows them all. Both the parents and the progeny should know the essence of day-to-day training imparted, its cause and effects.

There are several shops to cater for the daily requirements of the villagers. The filth flies have an easy access to the articles vended in these shops. The adulterated and unhygienically prepared food stuffs are kept uncovered in the trays and allowed to have thin deposits of road dust, fly vomits and faeces. The milk-shop is partially fly-proofed.

Eating habits both of the children and adults are disgusting. Quite a good number of children move about bare footed,

Water-supply, sewage and refuse disposal are most poorly organised in Sahowari.

Water Supply : There is an open serviceable well in the middle of the abadi. Its depth does not exceed 25-30 ft. Major portion of the population obtain their water-supply from this common source. This well is insanitary, devoid of parapit and an overhead roof also. The sub-soil water from the well is drawn out unhygienically, stored in unclean earthen pitchers and used in an unaesthetic manner.

A few houses in the village are provided with hand pumps, which are usually installed indiscriminately in the courtyard. In most cases, it is near the laterine and bored by the side of a waste-water drain, parapet is low and plinth round the water pipe is invariably not provided.

Privies : The houses are generally provided with poorly constructed open surfaces privies for stay-at-home folks. In most cases the laterines are on the first floor. Men generally defaecate directly into the fields. The children practice promiscuous defaecation in the courtyard, streets and the drains. The toddlers are not well looked after. They play in the dust and dirt and ease when they feel and where they want.

The domestic hens and crows are another nuisance. One may find them busy in turning over the manure and scattering the faecal matter at any time of the day. It is disappointing to see dry faecal matter broadcasted throughout the length and breadth of the lanes.

Dust Bins : The Sahowarians neither believe nor bother in having dust bins in their houses. There are no filth depots and refuse bins outside in the streets. People usually throw all the rubbish, house-sweepings and kitchen refuse either outside their houses in the streets or in the field if there is one in front of the habitat, or collect it in one of the courtyard corners.

The night soil from the privies is generally removed once in twenty-four hours by the sweepers. This is entirely the responsibility of the house keeper and therefore, the sweepers are paid on monthly basis for removal of human waste and privy contents from the houses. To suppress the odours and stinks emitted, the house-wife gives a top-dressing of ashes to the privy-contents frequently during

the day. The sweepers heap all the rubbish from the houses in one of the street corners. The unwieldy manure heaps thus formed are first to greet the visitor to this village. During rainy season the entire village is full of awfull smell.

Sanitary Staff : Although the Municipal Corporation has provided sanitary staff for this Ward No. 11, yet no attempt seems to be made to remove the filth from the streets by these personnels. Movement of the manure further off to the fields is at slowest sloth speed, usually depending upon the convenience of the man with chvron or the farmer who has paid contract money. Copious amount of breeding material has attracted the filth flies from far and wide to this locality, where they multiply in geometrical progression. Their ubiquitous buzzing, swarming, and alighting on the face is one of the most disgusting experience.

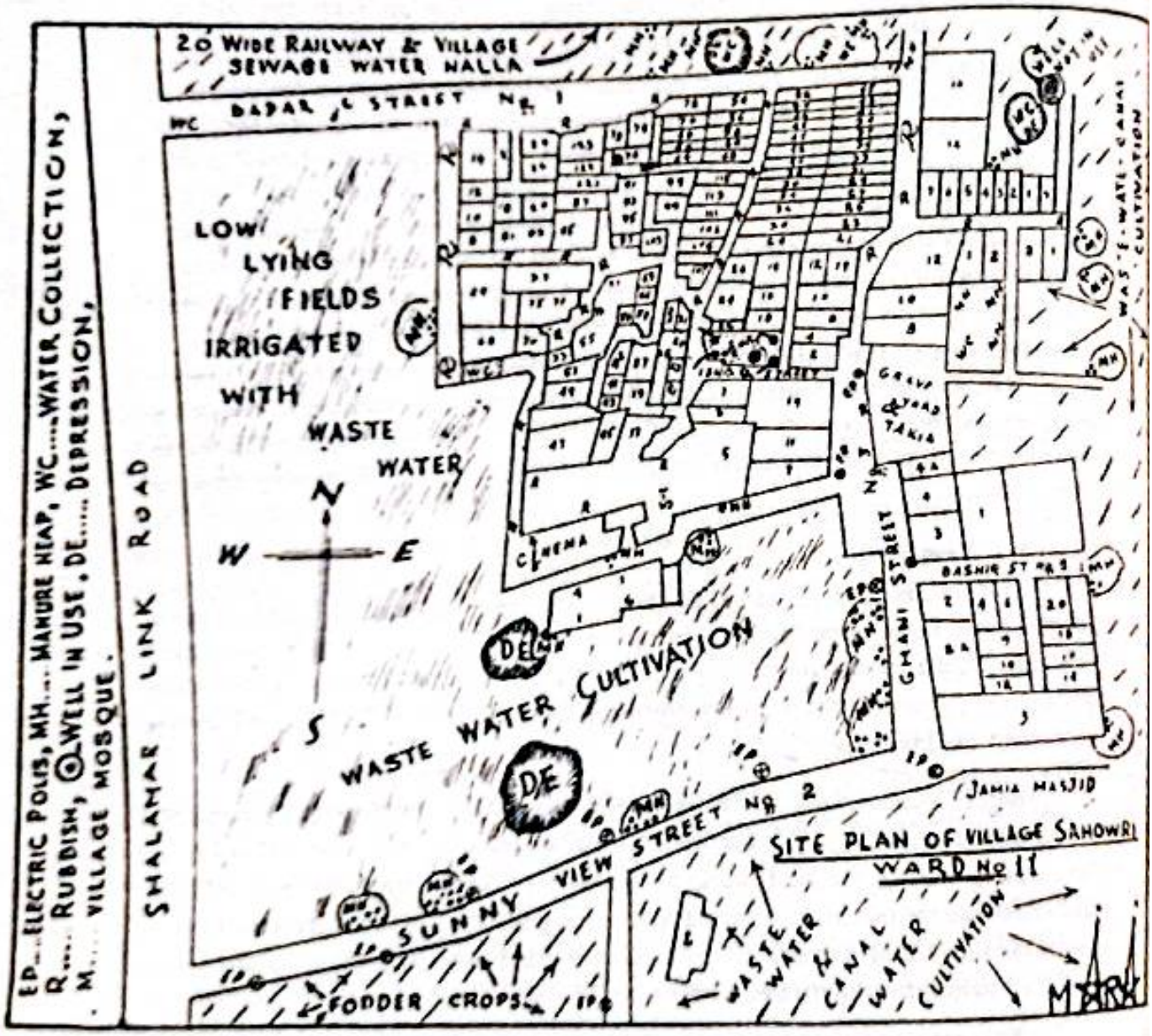
Drainage : The streets are kacha, unlevelled and without proper gradient. Waste water from the houses usually allowed to spread in the streets. Stinking and foul swelling cess-pools may be found in front of several houses. The waste water ultimately finds its way to the agricultural fields and helps in raising bumper crops

II. Procedure.

The information presented in this survey report is entirely based on those females who have been more-or-less permanently residing in village Sahowari. The age of the group ranged from a month and half to 70 years. The survey was carried out during the period commencing from September 7, 1963 and ending on August 31, 1964.

Before commencing the work, the villagers were given several general talks on the object of this survey. The audio-visual means were made use of to educate the masses during the first week of September. They were fully convinced of the bad effects of the intestinal parasites and damages done to their progeny, nursing mothers and bread earners The briefing worked well and the villagers gave us uninsted help throughout these studies.

The stools were collected from house to house according to the corporation numbers. The containers were supplied to the families a day before examination, by our Senior Laboratory Asisstant. Every time, the head of the family was given full insrtuctions on the technique of collection. Pertinent information was recorded in a standard proforma (Ansari and Sapru 1964) by Dr. N. A. Naru. It was numbered and corresponding number was also put on the container. Necessary arrangements were made to receive fresh stool specimens on the following morning to the Department of Medical Entomology and Parasitology before 9.00 a. m. The examination of all the samples was completed within 3-4 hours.



SITE PLAN

OF

VILLAGE SAHOWARI

Each stool sample was examined both by direct and concentration methods. The parasites were carefully searched in each stool specimen for 10-15 minutes.

The work of the technicians was under the direct supervision of the authors. Although our technicians were reliable yet we were careful in accepting their opinions. The observations recorded in this paper are not based on what the laboratory staff said but on what the technologist found. We strived to retain truth at all cost.

All the cases found containing *E. histolytica*, were thoroughly scrutinised. We debated the issue freely Positive decisions were made when we were of unanimous opinion. For all practical purposes, *E. histolytica* mentioned in this report may be taken to represent, *E. histolytica*, its homologous strains and morphologically allied form *E hartmanni*. We had not had good means to differentiate all these forms. *E. hartmanni* was found present in 50 per cent cases. For convenience of discussion, however, this differentiation has not been recognised in this report.

We do not claim that we are presenting something very perfect, because we are conscious of our society which evolved after mistakes. These observations may not tell us precisely what and how many parasites there were but are sufficient to to tell us how much of parasitism occurs in our rural communities.

III. OBSERVATION.

In the females of village Sahowari (Lahore), the incidence of infection with various intestinal parasites was as high as 65.88 per cent in 516 individual examined. 235 females (45 54 of the total (516) examined and 69.12 per cent of the total (340) positive) were carrying the pathogenic (not necessarily virulent stain) parasites.

The protozoan parasites were found in 241 i. e. 46.67 per cent of the total examined and 70.88 per cent of the total positive. Out of 241, 64 individuals (26.55 per cent) were carrying pathogenic protozoan parasites.

The helminthic parasites were found in 159 females (30.81 per cent of the total examined and 46.76 per cent of the total positive). Out of 159, 145 individuals (9.12 per cent) had pathogenic helminths.

III (A). PROTOZOAN PARASITES.

1. E. histolytica It does not seem to present any serious situation in village Sahowari. Only 12 carriers (2.32. per cent of the total (516) examined, 3.53 per cent of the total (340) positive and 4.98 per cent of the total (241) cases carrying protozoan parasites) were discovered. Fifty per cent of these cases harboured *E. hartmanni*, while the others had mixed infection, both of *E. histolytica* (small race) and *E. hartmanni*. In 5 cases *E. histolytica* occurred alone; in 2 cases it was involved

with *E. coli* or *I. butschlii* in 4 cases it was associated with two other parasites viz, *E. coli* + *I. butchlii* (1), *E. coli* + *A. lumbricoides* (1), *I. butschlii* + *A. lumbricoides* (2). In one case its companions were two protozoas (*E coli* + *G. intestinalis*) and a helminth (*A. duodenale*).

No active case of *amoebiasis* was encountered. The number of other pathogenic and non-pathogenic intestinal parasites for every case of *E. histolytica* in this community is given in Table X (bottom) The incidence of infection with *E. histolytica* stood below all the other parasites except *E. nana* (0.17%) and *H. nana* (0.19%).

In a previous survey from Lahore, the incidence of *E. histolytica* was found to be 10.31 per cent in hospital cases, complaining of dysentery, diarrhoea or abdominal distress.

The incidence was low in young children. No case of *amoebiasis* was found in girls below four years. One case each was found in females of 4,8,15,22,25,26 and 30 years of age. Three cases occurred in women of 40 years. There was a marked decline hereafter. Two cases, however were detected in grandmas of 70 years.

2. Entamoeba coli. Is one of the most common commensals living in the intestines of our Lahorites. In a series of people, complaining of gastro intestinal troubles it was present in 20.62 per cent females. In the females examined from village Sahowari, its incidence was, however, as high as 31.21 per cent.

In 11.43 per cent cases, it was the solitary parasite encountered.

In 72 cases, it occurred either with another protozoa or a helminth i.e. *E histolytica* (1), *E. nana* (1), *I. butschlii* (43), *G. intestinalis* (5), *A. duodenale* (7), *E. vermicularis* (3), *A. lumbricoides* (10) and *H. nana* (2).

In 20 cases, it occurred with a protozoa and a helminth or with two helminths. In this series it was associated with *E. histolytica* + *A. lumbricoides* (1), *I. butschlii* + *A. duodenale* (3), *I. butschlii* + *E. vermicularis* (3) *I. butschlii* + *A. lumbricoides* (3), *I. butschlii* + *H. nana* (2), *G. intestinalis* + *H. nana* (1). *A. duodenale*+*A. lumbricoides* (1), *A. duodenale* + *H. nana* (1), *E. vermicularis* + *A. lumbricoides* (1) and *A. lumbricoides* + *H. nana* (4).

E. coli was also associated with two protozoa and a helminth viz., *E. histalytica* + *G. intestinalis* + *A. duodenale* (1), *I. butschlii* + *G. intestinalis* + *H. nana* (1), and a protozoa and two helminths viz. *I. butschlii* + *A. lumbricoides* + *H. nana* (2).

E. coli is a parasite of all ages. It may occur more commonly in juvenile groups than in adults The infection may be acquired in very early age. It was found in infant girls of 1½, 6 and 9 months and also in an old lady of 70 years. The incidence of infection was found to be regular in frequency after 5 years of age.

The number of other protozoan and helminthic parasites for every case of *E. histolytica* is given in Table X (bottom).

3. **Endolimax nana.** Was found to be most uncommon protozoa in this series. In one case it occurred with *E. coli* while in another, it was involved with *E. coli* and *I. butschlii.* Although the environments of the village are suitable for its maintenance, yet the ecology of the place does not provide good conditions for the survival of the parasite in this locality. In another survey carried out in hospital cases, its incidence was found to be 4.62 per cent in females.

4. **Iodamoeba butschlii.** Was found more common than other protozoan infections except *E. coli* in this series.

I. butschlii was found alone in 5.62 per cent pure infection cases of females, In 9.11 per cent cases it occurred either with *E. histolytica* (1) or with *E. coli* (43) or with *G. intestinalis* (3). In 1.53 per cent cases, it was associated with a helminth viz, *A. duodenale* (3), *E. vermicularis* (2), *A. lumbricoides* (2) and *H. nana* (1).

1.16 per cent cases, *I. butschlii* occurred with two other protozoas viz, *E. histolytica* + *E. coli* (1), *E. coli* + *E. nana* (1) and *E. coli* + *G. intestinalis* (4), while 2.52 per cent eases were found compatable with a protozoa and a helminth viz, *E. histolytica* + *A. lumbricoides* (2), *E. coli* + *A. duodenale* (3), *E. coli* + *E. vermicularis* (3), *E. coli* + *A. lumbricoides* (3) and *E. coli* + *H. nana* (2).

In 2 cases, its companions were two helminths viz., *A. duodenale* + *H. nana* (1) and *A. lumbricoides* + *H. nana* (1). In 2 cases, it was found together with a protozoa and two helmiaths viz., *E. coli* + *A. lumbricoides* + *H. nana* (2). In a solitary case, two protozoas and a helminth *E. coli* + *G. intestinalis* + *H. nana* joined *I. butschlii.*

It is a parasite of all ages. We found heavy infection in an infant girl of 6 months. It occurred in children, juveniles and adults with equal frequency.

In a previous survey, *I. butschlii* was found in 8 25 per cent females examined. In this series the incidence was as high as 20.93 per cent.

5. **Giardia intestinalis.** Occupied fourth position in frequency of incidence of infection in this series In single parasite infections, it occurred in 5.62 per cent cases. In five cases it occurred together with *E. coli* while in three it was found with *I. butschlii.* In another group of five cases, it was associated with a helminth parasite viz., *A. duodenale* (3), *A. lumbricoides* (1) and *H. nana* (1).

In four cases, it was involved in three parasite infections and was invariably involved with *E. coli* + *I. butschlii.*

In one case each, *G. intestinalis* was found either with a protozoa and a helminth viz, *E. coli* + *H. nana,* or with two helminths viz, *A. lumbricoides* + *H. nana.*

In two cases, it was involved with two other protozoa and a helminth viz., *E histolytica* + *E. coli* × *A. duodenale* and *E. coli* + *I. butschlii* + *H. nana.*

G. intestinalis is a common parasite of children. In a previous survey in Lahore its incidence was 20.5 per cent in children of primary school. The incidence in a group of female patients was found to be 28 87 per cent.

Giardiasis may occur in early age groups. It was found in infant girls of 3 and 6 months of age. It occurred with a regular frequency in children between 1-14 years of age. In young adults the incidence has the tendency to be of very low level. Marked decline is observed after 30 years. *Giardia* was rare after 41 years of age.

III (B): HELMINTHIC PARASITES.

1. Trichocephalus Trichiurus was discovered only in a girl of 10 years of age. In previous surveys also it was found to be occasionally rare in Lahorites. We failed to discover whip.worm infection in 97 outdoor females examined in Lahore.

2. Ancylostoma duodenale is essentially a parasite of field workers, who toil with hands and move about barefooted in contaminated agricultural fields. Ordinarily, the females in this part of the country are stay-at-home folks and therefore, are seldom exposed to the infection of hook-worms. In this series, only 48 (9.31 per cent) female were found infected with hook-worms. In anothr series the infection rate was found to be 20.62 per cent.

In 3.87 per cent females, it was the only parasite. It occurred with another helminth in 1.55 cases. The other helminths involved were *A. lumbricoides* (7) and *H. nana* (1).

In 2.52 per cent cases, hook-worm infection occurred with a protozoa viz., *E. coli* (7), *I. butschlii* (3), *Giardia intestinalis* (3).

In 3 cases, *A. duodenale* was found with two protozoas viz., *E. coli* + *I. butschlii.* In 3 cases it was associated with a protozoa and a helminth viz. *E. coli* + *A. lumbricoides* (1), *E. coli* + *H. nana* (1), and *I. butschlii* + *H nana* (1), In only one case three protozoas occurred with *A. duodenale* viz., *E. histolytica* + *E. coli* + *G. intestinalis.*

The number of other pathogenic and non-pathogenic parasites, for every one case of hook-worm in the females of this community, is given in Table X (bottom). Incidence of *A. lumbricoides* was more or less $1\frac{3}{4}$ times higher than hook-worm infection in this series.

Hook-worm infection may occur in all age groups. In this survey, we did not encounter *ancylostomiasis* in infants and children below 5 years of age. The infection

however, occurred with equal frequency in all age groups ranging from 5 to 65 years. The incidence was more in women of 28-46 years of age.

3. Enterobius vermicularis is a most common human parasite. Although it may not necessarily be found in routine stool examination, yet expected to be present in all the Pakistanis. It is more annoying to children and we have yet to come across mothers who may deny to have never been bothered of presence of *enterobiasis* in their children. Since mothers and children live close together, the incidence of infection in mothers is usually as high as in the children. The stools of 18 females out of 516 females examined from village Sahowari had *Enterobius* eggs.

In four cases, it was the only parasite detected in three, it occurred with *A. lumbricoides* In another group of three. it was associated with *E.coli*, in two it was involved with *I. butschlii*, while in 0.58 per cent cases its companions were both *E. coli* and *I. butschlii*. In a solitary case, *E. coli* and *A. lumbricoides* occurred with it.

E. vermicularis was frequently found in children and adolescents. Its frequency was of irregular nature in the females of 25-40 years of age. After the age of 40 years, its presence was rarely detected.

In hospital patients, the incidence of *enterobiasis* was found to be 1.06 per cent as against 3.4 per cent in this series.

4. Ascaris lumbricoides flourishes well in localities where indoor sanitation is deplorable. The contaminated court yards and door yards play important role in the transmission of its infective eggs. The village Sahowari presented ideal conditions for the maintenance and dispersal of this helminth.

The incidence of *A. lumbricoides* (16.08 per cent) in this series lagged behind *I. butschlii* (20.93 per cent) and *E. coli* (51.2 per cent). The number of other pathogenic and non-pathogenic parasites may be perused in Table (X (bottom).

In 36 cases, *A. lumbricoides* was the only parasite. In 18, it occurred either with *E. vermicularis* (3) or with *A. duodenale* (7) or with *H. nana* (8). In 13 cases, it was found with a protozoa viz., *E. coli* (10), *I. butschlii* (2) and *G. intestinalis* (1).

In 6 cases, *A. lumbricoides* occurred with *E. histolytica* + *E. coli* (1),(—) *E. histolytica* + *I. butschlii* (2), and *E coli* + *I. butschlii* (3). In a group of 8 cases, its companion were a protozoa and a helminth viz, *E. coli* + *A. duodenale* (1), *E. coli* + *E. vermicularis* (1), *E. coli* + *H. nana* (4), *I. butschlii* + *H. nana* (1) and *G. intestinalis* + *H. nana* (1). In two cases it was associated with *E. coli* + *I. butschlii* + *H. nana*.

The incidence of infection was found common in younger age groups. Two cases occurred in infants below one year (6 months and 10 months). It was most frequent in children between one and five years of age, frequent in ages between six

and sixteen. The incidence begins to decline in adolescents. It is rare in adults above forty years of age.

A. lumbricoides. was found in 6.19 per cent outdoor patients examined previously.

5. **Hymenolepis nana** is practically world-wide in its distribution. It was one of the most frequently encountered helminths in the females examined from village Sahowari. Its incidence of infection was a little less than half of *ascariasis*. It lagged slightly behind hook-worm In this group it was found more active than in other groups examined from Lahore before.

H. nana is usually more prevalent in children than In adults. Infection occurs directly from patient to patient. *Anus-to-mouth* infection occurs frequenly in unmindful people.

7.74 per cent females examined from Sahowari were found infected with murine tape-worm.

It was found alone in thirteen cases. In nine cases it occurred with another helminth viz, *A. duodenale* (1) or *A lumbricoides* (8). In four cases it was found with a protozoa viz., *E coli* (2), *I. butschlii* (1) or *G. intestinalis* (1).

In three cases it occurred with two other protozoa viz, *E coli + I. butschlii* (2) and *E coli + G intestinalis* (1). In eight cases it existed with a protozoa and a helminth viz, *E. coli + A. duodenale* (1), *E. coli + A. lumbricoides* (4), *I. butschlii + A. duodenale* (1), *I. butschlii + A. lumbricoides* (1) and *G. Intestinalis + A. lumbricoides* (1).

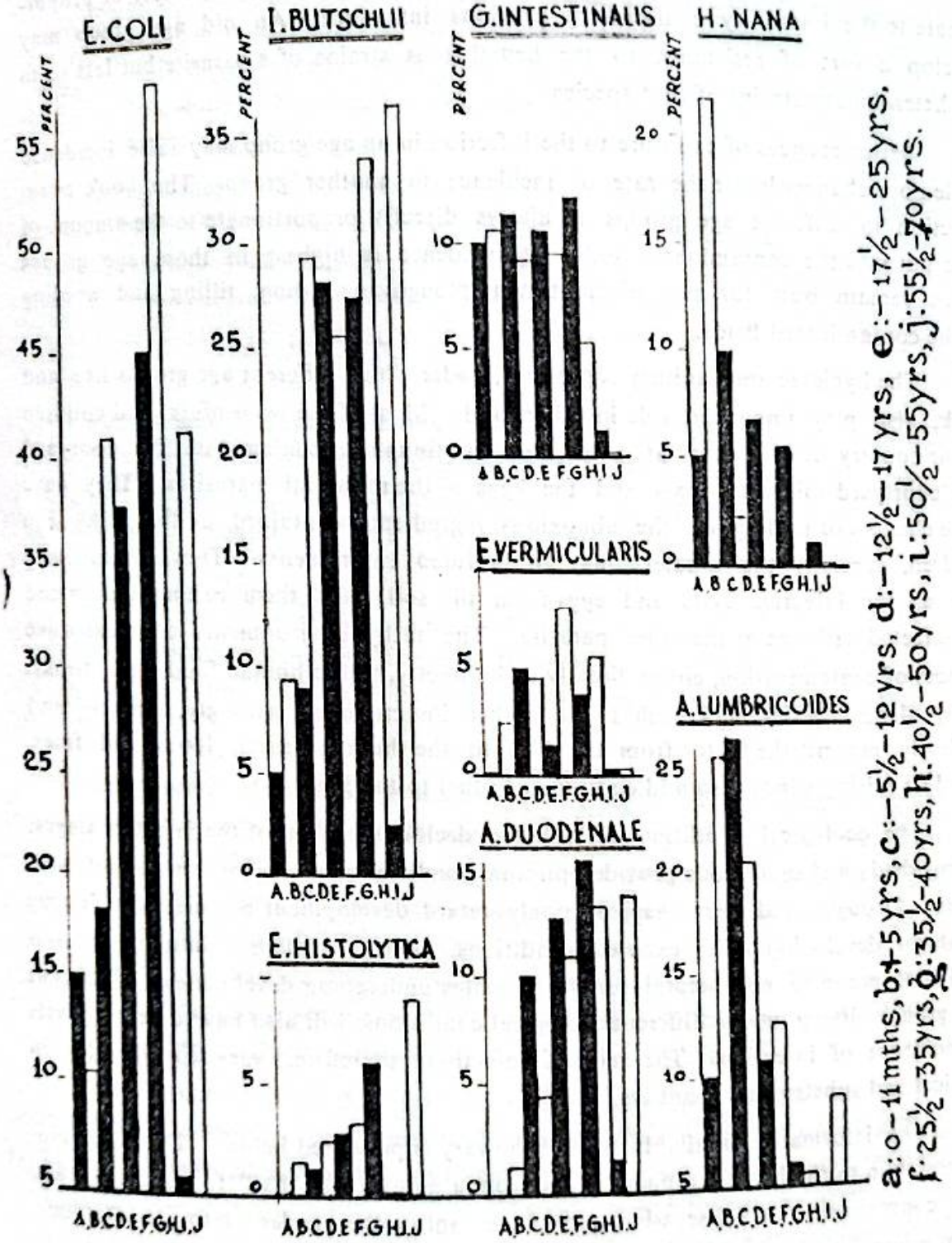
In three cases it was found with three protozoa or two protozoa and a helminth viz., *E. coli. + butschlii + G. intestinalis* (1) and *E coli + I. butschlii + A lumbricoides* (2).

The dwarf-tape worm was not discovered in infants below one year of age. The frequency of infection steadily increased in the toddlers and it was found most frequent in children between two and nine years of age. Sporadic cases of *hymenolepiasis* occurred in females of 10-25 years of age. There is definite decline of cases, amounting to absence, after twenty-five years

Sheer neglect of personal hygiene is of primary importance in human infections with *H. nana*. Fluctuation of incidence rate in different sections of a commnnity is directly proportionate to level of health consciousness in the people.

IV. SUSCEPTIBILITY OF DIFFERENT AGE GROUPS TO THE INTESTINAL PARASITES

The human intestinal parasites, in general may occur in all age groups. Some species however, have the tendency of predominating in one age group than the other. The restricted distribution is usually due to various reasons, differing again from species to species.



BAR DIAGRAM SHOWING
THE INCIDENCE OF PROTOZOAN
AND HELMINTHIC INFECTIONS
IN DIFFERENT AGE GROUPS

"Pak: Jour: Hlth. 14(4)".

Small incidence of intestinal parasites in different age groups may be proportionate to the immunity confered by previons infections. An old age group may develop a sort of resistance to the hemologous strains of a parasite but less so to the heterologous strains of that species.

Better chances of exposure to the infection in an age group may raise incidence while poor chances lower the rate of incidence in another group. The hook worm infection in different age groups is always directly proportionate to the amount of time put into the contaminated soil. Its incidence is highest in those age groups which remain busy for most of the time in ploughing, hoeing, tilling and weeding of the contaminated fields.

The hygienic and sanitary conditions, under which different age groups live and work, also play important role in this regard. Most of the womenfolk and children in our country usually stay at home and continuously contaminate the dooryard and courtyard-soil with cysts and the eggs of the intestinal parasites They have more chances of feeding on the abnoxious ingredients contained in the soil. The children, specially the toddlers play in polluted enviroments. They continuously pick up the infective cysts and eggs from the soil, pass them to their mouth and get infected with one or the other parasite. The filthy environments offer extensive chances of contamination, either directly or indirectly, to the human food and drinks. Flies, dung beetles, cockroaches and other insects most willingly, actively and fearlessly transmit the factor from the filth to the human feasts, foods and faces. The dust raising winds also add continuously fuel to the fire

The ecological condition of a place decide the fate of the infective stages. Warm, shady and moist soils provide optimum conditions for the survival of infective stages Drought and heat may not only retard development but may also destroy the stages, developing under exposed conditions. Direct sunlight, putrefaction and hard soil are also not helpful for the parasites undergoing development. Different age groups, living under different ecological conditions, will also have different levels of incidence of infection. The rate of infections therefore, vary considerably in tropical and substropical countries.

The information available from Sahowary is presented below. These observations pertain to the females ranging in age from a month and half to seventy years. For convenience of discussion we have split the series into ten groups. Each group has its own special features. We believe that these features play an important role in the distribution of intestinal parasites.

(i) *Incidence of infection in infants below one year.*— A child, under one year of age is in a phase of helplessness and presumably may become infected with intestinal parasites from the polluted fingers either of the mother, sister or brother. An unmindful mummy often contaminates the feeding cups

of the baby with her unclean hands The dust arising from the polluted courtyard and dooryard also transmit the infective stages to the dependant child more frequently than other factors. The intestinal parasites most frequently occur and wreck the worst havoc where houseflies hover about unchecked.

The incidence of infection with intestinal parasites in children is a rough index of public health and sanitation in a community. *E. histolytica* is not observed frequently in this young age group. *G. intestinalis* may be cause and contributory factor in chronic recurrent diarrhoes in children. The metazoan intestinal parasites may ordinarily play insignificant role in the causation of gastro-intestinal troubles in infants.

We examined twenty infants during this survey. Three infants (1½, 6 and 9 months of age) were found carrying *E. coli*, a baby of six months had *I. butschlii*. two babies (3 and 8 months of age) were infected with *G. intestinalis* and two (6 and 10 months of age) were found carrying the giant round worm (*A. lumbricoides*).

Presence of *A. lambricoides* in early months of life is a testimony to the fact that it is highly endemic in this area. In view of the presence of *ascariasis* in the young age-groups, further continued clinico-parasitological investigations are certainly needed

(*ii*) *Incidence of infection in toddlers of 1-5 years of age.*—Many public health authorities consider toddlers or pre-school group of children more important and significant for comparison of health standards. This is a neglected group. There is good evidence from widely scattered regions that the effects of poor hygiene, poverty and ignorance are most marked in this period. During the period of maximum malnutrition (from 1 to 3 years) many children acquire a heavy burden of intestinal parasites in general and helminths in particular.

Four intestinal protozoan infections were discovered in this age group of children. *E. histolytica* was found in a case of four years of age. Nine cases (1, 1½, 4 and 5 years of age) had *E. coli*.

Although *E. histolytica* is the only one amoeba capable of producing disease symptoms, *I. butschlii* may very rarely invade the intestinal wall and cause pseudo-amoebiasis. 9.31 per cent of those children were found infected with this amoeba.

The distribution of *G. intestinalis* corresponded to that of *E. coli*. It was found in nine cases of one (2 cases), 2 (one case), 3 (2 cases), 4 (one case) and 5 (3 cases) years of age.

About 51.2 per cent children were found infected with metazoan intestinal parasites. *A. lumbricoides* was much common (25.58 per cent) and of greatest importance amongst this age group. It was found in 22 cases of one (one case), 1½ (one case), 2 (2 cases), 2½ (2 cases), 3 (4 cases), 4 (6 cases) and 5 (6 cases) years of age. The parents complained of extreme commonness of *ascariasis* in their children. The history of passing round-worms was given for more than the number actually found passing eggs.

Cases of *ancylostomiasis* in this age group were rare. Out of 86 toddlers, only one of to 5 years of age had *A. duodenale*. Although contaminated fields are mostly responsible for hook-worm disease, yet kacha courtyards cannot also be exonorated of the charges if otherwise, fulfil the conditions for the developments of the larvae. Young children, when they begin to crawl, toddle or walk about in the manured courtyard often pick up the infection.

We did not make use of "Scotch tape technique" to detect the presence of *E. vermicularis* in the community. To say that it was found in 2.32 per cent cases examined is, therefore, far from truth. The presence of eggs in the stools of two cases (3 and 4 years of age) indicates its common occurrance.

Dwarf tape-worm was the only cestode found present in the toddlers. Nineteen children of 1 (one case), 2½ (3 cases), 3 (4 cases), 4 (4 cases) and 5 (7 cases) years of age were found infected.

(*iii*) *Incidence of infection in children of* 5½—12 *Years.*—By Pakistani standards, this group of children may be considered as "primary school-going group." In economically under developed areas of the world, where the average span of life is about 30 years, 30-40 per cent of the population is usually under the age of 10-12 years. This group, because of vagrant nature and promiscuous habits, is more exposed to the intestinal parasitism. We examined 98 girls of this age and found parasites in 69.4 per cent, 40.8 per cent had protozoan parasites while the helminths were in 53.1 per cent alone.

The incidence of *E. histolytica* was found to be very low. *E. coli* was detected in 18 cases. A case of 11 years of age was found infected with *E. nana*. 9.2 per cent girls had *I. butschlii*. The duodenal flagellate (*G. intestinalis*) was detected in 11 cases of 6 (one case), 7 (5 cases), 9 (one case) and 12 (4 cases) years of age.

The giant-round-worm (*A. lumbricoides*) was again found common (26.53 per cent). It was found in 26 cases of 5½ (one case), 6 (2 cases), 7 (3 cases), 8 (2 cases), 9 (6 cases), 10 (3 cases), 11 (3 cases) and 12 (6 cases) years of age.

Ten children had hook-worms. The eggs of *A. duodenale* were more or less detected in children of 7 (2 cases), 8 (1 case), 9 (2 cases), 10 (2 cases) and 12 (3 cases) years of age.

The seat-worm eggs were found in the stools of five children. The whip-worm infection was detected in one girl of 10 years. The environments in the village are probably not very suitable for the development and successful transmission of this helminth.

The incidence of dwarf-tape-worm (*H. nana*) was found to be as high as of hook-worm. The cases detected were of 7 (4 cases), 9 (2 cases), 10 (one case), 11 (one case) and 12 (2 cases) years of age.

(iv) *Incidence of infection in children of* 13-17 *years.*—In our country, the girls of this age group usually attend the secondary school. In the rural and rural like communities, the adolescent age is boon in disguise. The mothers heave a sigh of grief when there is no daughter in the house to look after the household work. In the more sophisticated families cooking, washing, and care of children is usually entrusted to the daughters of 13-17 years of age. These God sent helpers are conspicuous success in less privileged groups with weaned children. Much can be done in getting the children better fed and well cared for if this group is imparted proper health education. *Vocational guidance*, if organised in this group will certainly advance the cause of Public Health, better.

The incidence of infection in this group of girls was as high as 75 per cent. 54.5 per cent had protozoan parasites as against 31.8 per cent who had metazoan parasites.

The incidence of *E histolytica* was found low in this group of girls also. About 41 per cent were found harbouring *E. coli*. *I. butschlii*. an amoeba of doubtful pathogenic status, was detected in the stools of 29.5 per cent girls examined. *G. intestinalis* cysts occurred in not more than 9 per cent cases.

The round-worm infection remained high (20.5 per cent) in this group of girls. It was found in 9 cases of 13 (1 case), 14 (2 cases), 15 (2 cases) and 16 (4 cases) years of age.

Ancylostomiasis was detected in two cases of 14 and 15 years of age.

The seat-worm eggs were found in the stools of two girls of 14 years of age. The incidence of dwarf-tape-worm was found to be very low. Mild infection of *H. nana* occurred in a girl of 16 years.

(v) *Incidence of infection in females above* 17 *and half years of age.*—69.03 per cent of the females falling in this age group, were found infected with either protozoan or helminthic parasites or both. The majority (145 i.e. 54.11 per cent) however, had protozoas as against 67(25 per cent), who harboured helminths.

Out of 145 females with protozoan parasites, only nine had *E. histolytica*. In most of these cases the parasite involved was *E. hartmanni* and in few, however, it was the small race of the *E. histolytica*. Some of these cases complained of entero-gastric troubles.

E. coli was found to be very predominant. Its cysts were detected from 111 cases (41.42 per cant).

E. nana was found to be a rare infection. It occurred in one case of 22 years of age.

I. butschlii was found to be fairly common in this age group. The pathogenic role of this amoeba has not yet been finally decided therefore, we hesitatingly commit that we found it in some who complained of periodical abdominal distress It is not possible to fix the responsibility on it because it occurred alone in 47 symptomless cases also.

Out of 145 females carrying protozoan parasites, 24 (8 95 per cent) had duodenal flagellates. 8.95 per cent incidence of infection may be a usual figure from adults but it appears unusually high when compared with figures (10.53 per cent) obtained from young age group of the series.

Out of 67 females harbouring helminths, 35 had *A. duodenale*. The incidence of *ancylostomiasis* was one and half times as high as of *ascariasis*, showing that the community is more rural than urban in character. It does not mean that these females have picked up the infection from the fields. The katcha courtyard, when it fulfills the requirement for the development of the parasite, may also play an important role in the transmission of the disease.

The incidence of *A. lumbricoides* more or less corresponded to that of *G. intestinalis* It was present in 8 57 per cent females. The giant round-worm was found more common in females of 18 to 35 years of age. Although the worms were harboured by grandmas of 65 and 70 years of age, yet it can be safely said that the parasite was most uncommon in females above 35 years.

The coprological examination of this group revealed *enterobiasis* In 3.36 per cent only.

About 3.73 per cent females were found infected with dwarf-tape-worm. *Hymenolepis nana* is already known to be more common in young age groups than in advance age groups. The figures available to us from this village confirm these observations. The rate of infection was 22 per cent in children below one year and 10 per cent in toddlers. Thirty cases, out of 173 examined, occurred in females between 2 months to 12 years as against 10 (out of 343 females examined) which occurred in females between 13 years to 55 years.

We failed to detect the presence of *Taenia saginata*.—The consumption of meta in this community is bare minimum and whatever is taken is thoroughly cooked. The females have not have the chance of eating kababs and smoked Tikkas.

(a) *Incidence of infection in Girls of* 18—25 *years.*—Most of the girls are prospective brides during this age group. This may not be a period of extra cleanliness but is certainly the state of general esteem and a period of mental exertion.

The incidence of protozoan infection is more or less as high as in the previous group. The incidence of *E. histolytica* did not exceed 2.35 per cent. *E. coli* occurred in 37.64 per cent. *I. butschlii* was detected from 28.24 per cent stools. The duodenal flagellate (*G. intestinalis*) was found in 10.59 per cent girls examined.

About 28.2 per cent of these girls were infected with metazoan parasites as against 58.8 per cent with protozoan parasites. The giant-round-worm (*A. lumbricoides*) was much less common in this group than in the previous group, It was found in 10.6 per cent cases. *Ancylo-stomiasis*, however, occurred in 12.94 per cent cases as against 4 55 per cent in the previous group. The incidence of dwarf-tape-worm was found to be comparatively high.

(b) *Incidence of infection in women of* 26-35 *years.*—41 out of 63 females in this age group were found harbouring one or the other intestinal parasite. 49.21 per cent had protozoan parasites as against 30.16 per cent who had helminths.

E. histolytica was detected in two females. *E. coli* remained a common perasite. *I. butschlii* was found in 25.39 per cent cases. *G. intestinalis* was in 9.52 per cent females.

The eggs of *A. duodenale* were discovered in 11.11 per cent cases. *A. lumbricoides* was in 12.69 per cent females. All the 63 females examined were found free of *H. nana.*

(c) *Incidence of infection in women of* 36—40 *years.*—Only 51 females of this group were examined and 66.7 per cent were found harbouring parasites. The protozoan parasites were found in 56.86 per cent cases examined as against 25.49 per cent. who had helminthic parasites.

E. histolytica cysts were detected in 5.88 per cent cases. It was the highest incidence in the series. All the cases occurred in women of 40 years of age.

The common commensal amoeba was present in 45.1 per cent. *I. butschlii* occurred in 27.45 per cent cases. *G. intestinalis* was found in 11.76 per cent cases (twice as high as *E. histolytica*),

Hook-worm infection was found to be highest in this age group. Two cases occurred in females of 36 years of age and six in females of 40 years of age.

The incidence of *Ascaris lumbricoides* and *H. nana* was equal to *E. histolytica.* All the cases of *A. lumbricoides* occurred in a female of 40 years of age while the dwarf-worm was found in females of 36, 38 and 40 years of age.

(*d*) *Incidence of infection in women of* 41-50 *years.*—This is the period of retirement. Females of this age group usually begin to wash their hands of the domestic duties, become religious and take more interest in extra-mural works. In this country, females of this age group become more conscious of *pak* and *napak*.

E. histolytica could not be detected in this group of the series. The incidence of *E. coli* was found to be highest. A female of 50 years of age was found harbouring *E nana*. *I. butschlii* was present in 34.21 per cent females examined. The duodenal flagellate was detected only in two females of 50 years.

Hook-worm infection was more or less as high as in the previous group of the series. The rate of infection with *A. lumbricaides* was as high as of *E nana*. 2.63 per cent infection of *ascariasis* is testimony to the fact that this group cleverly avoids transmission of the infective eggs from the contaminated soil. Although the environments are unhygienic, yet very little transmission of the parasites is occurring in this group.

(*e*) *Incidence of infection in women of* 51—55 *years.*—The number of females falling in this age group is very small. Therefore, the rate of infection worked out is not reliable for comparison with other groups of the series. 77.8 per cent were found harbouring parasites, out of which 66.7 per cent had protozoas while 22.2 per cent had helminths.

No female in this group was found harbouring *E. histolytica*. The commensal amoeba was found in 5 cases. *I. butschlii* was found in 2 cases, while *G. intestinalis* occurred in one case only.

Hook-worms and *H. nana* were the only two helminths which were found in this group. Hook-worm infection was detected in a female of 55 years, while *H. nana* was found in a female of 53 years.

(*f*) *Incidence of infection in women above* 55 *years.*—Out of 22 grandmas examined 63.6 per cent were found harbouring intestinal parasites. 59 09 per cent had protozoan parasites while 22.73 per cent had helminths.

E. histolytica cysts were found in 2 cases of 70 years. The commensal amoeba was present in 9 cases. *I. butschlii* was present in 36.36 per cent cases. *G. intestinalis* was not at all detected in this age group of the series.

Hook-worm and *A. lumbricoides* were the only two helminths, which were detected in this group. Hookworm infection was detected in three grandmas, two of 60 years and one of 65 years of age. *A. lumbricoides* was found in one case of 65 years of age.

V. WOMEN EXERCISE AN INCALCULABLE INFLUENCE

Helminthiasis and **protozoasis** are mainly the results of defective environments. The rate of incidence of different parasites in a community is directly proportionate to the degree of defective hygiene. Although our estimates are usually approxmations, yet warrant suitable line of action.

The community may not be able to take an action even after energetic persuasion. This situation warrants efforts to alter generations—old public opinions. Let the people first learn to appreciate the teacher and his teachings and the action would come spontaneously. If public health measure adapted is relevant, the present situation will improve. We invariably say "*improve your environmental situation and community health will take care of itself.*"

We know that protected water-supply is of primary importance. But how many of us are able to procure it? If there is no active co-ordination between our preaching and our practices we should not expect much from the community also. Unfortunately we have borrowed policies in the hired hands. Our community is awake and can muster resources to achieve the goal. The resources are passed over to the callous hand, who have feable national outlook. Much of these resources are therefore, misappropriated and wasted.

Improvement in the structure of tranditional privies involves money. Provision of bored-hole latrines for public use is an extra expense. Safe-disposal of night soil is neither understood nor it suits the convenience of the man behind the plough. Effective composting pit he would not make, because it involves extra labour viz, digging, carting, dressing, watering etc. Collecting of household rubbish in one corner of the house will not reduce the fly menace either. The flies continue coming from the manure heaps, if near the habitation. Rubbish bins do not serve the purpose if the means to maintain them properly are wanting.

"*Sow an act and you reap a habit; sow a habit and you reap a character*" is an acknowledged truth. A habit and a cable are two similar things in many respects. Thread by thread we weave a habit every day, till it becomes an unbreakable, strong and stiff string.

Education received daily in the domestic environments casts far more influence than the training thrust in schools, colleges and academies. An average Pakistani is not the creature of instinct, like the birds, the bats and beasts. Although a capitalist considers man a *beast of burden* yet, he is the creature of habits and his nature can be conveniently split into inherent or indigenous and induced or ingrafted. He is accustomed to do certain things in a certain manner as a matter of habit, education and training than by virtue of birth. Long and continuous indulgence

makes him slave to certain practices. Habit is his second nature. It grows with his growth and strengthens with his strength. It is ordinarily hard for him to part and abandon the ingrained habits.

A young tree may be trained into any shape. Shaping of an old tree, on the other hand, may not be impossible but is certainly most arduous. Altering of habits in a community amounts to putting in of a new nature. The dovetailing and interlocking may help close fitting. A gardener resorts to the method of grafting young scions into the old stock when he wants to modify the nature of the fruit. We have to follow this principle when intending to modify the ways of our living.

The force of proper health education is very great. It can mould the minds and manners of young generation into what shape we please. A similar attempt with rigid and frigid old people warrants nice discernment and delicate skill. It is the suitable tact, combined with guts, which is needed under these circumstances otherwise, the money will waste, material will worn and means will wart. A green stick, being meleable, can be regulated and trained according to our perceptions. An old deformed twig usually breaks when an attempt is made to correct it. A good change in the nature of the nation, in shortest possible time, is possible if the children are made the target of our attention.

Mother is our greatest teacher. She plays an important role in the formation of habits. All mothers feel strongly that the customs and beliefs of their society are uniquely correct and it is their moral duty to perpetuate these attitudes from generation to generation of their family. Each community has its own taboos, superstitions, magical beliefs and food prejudices. Their mistaken ideas, socio-anthropological beliefs and customs have their own role to play in this direction. Food ideologies and concepts of disease etiology have a profound influence on our general health. Health education is a crusade. Its aims are numerous and varied. The main object is to correct habits and remove ignorance.

The close and satisfying relationship with the mother is instrumental in conveying pleasant as well as unpleasant manners and means from generation to generation. She is source of strength. She conveniently communicates accepted pattern of behaviour of the group. The child and the adolescents imitate in great details the parental behaviour and attitudes. They do not only copy the actions of their parents but also their attitudes towards health and happiness. *Prapat put, pita par ghora; Bohat nahin to thora thora** is a common man's saying showing that the effect of cradle-training is known to the nation.

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* *"Like begets like"* is an old proverb. Human babies are cast in human molds. The biological characters are transmitted from parents to the off springs and the properties of the person to the heirs. The progeny therefore, resembles in particular ways the parents and the siblings. Puppies always grow to be dogs of their breed and have the body, shape, size, colour and other characters of mongrils, whelp and hound. We all know that *"as the crow is so the eggs will be."*

Extreme poverty is associated with malnutrition, illiteracy and ignorance. All of these have far reaching effects —— direct or indirect, on the general health of a community. Health education, if based on local conditions is always acceptable. Advice should always be orientated and shaped according to the local conditions and imparted when and where required. Health education, particularly by persuasion and demonstration, may do the right and may change the pattern of parasitic diseases.

The parasitologists, the physicians and the public health workers, should always remain conscious of an important buffer which more than often deadens the impact of their teachings. Ayurvedic and Unani systems have usually great hold over the mind of our rural population. Haemeopathy has its own approach road. Psyscho-therapy rules over some sectors of our people, including ultra moderns. The charms and incantations are still believed to cure the incurables by most of us. The purpose of health education is never and must not be to upset the mode of life. The health education aims to provide means for understanding the right. It imparts scientific, realistic and meaningful advice It neither attempts nor affords to condemn old practices. The advice is never forced to displace the superstitions but is formed to replace ceremonies. Its aim is to modify the old order. Health education never dictates terms nor asks people to discard, rather it requests them to mend the worn carving. Health education is not a dispute with any established feature nor an attempt to balance bargain. It is a call to build a massive fort and protect the human race from marauding enemies and the depredations of foreign invaders. Effective health education is the vital need of the developing countries. The innate fatalism in a community cannot be overcome without health education. The modern community hates dictation. Common man does not like to be deprived of his liberties. He also hates to be taxed. He is entitled to the rights of equality and needs to be actively involved in the campaign as an important partner. The socratic method suits, which warrants collaboration and unbiased discussion.

According to consensus of opinion, the mother is an important environment. Our interests, throughout our life, tend to swing to and from between ourself and the mother. With age, the interest may widen but still she remains the centre. Her affection and wisdom is an important advantage. High incidence of parasites in a community is due, in part at least, to ignorance. The rate, in fact varies according to the standard of education of the mother more than to the pay packet of the father.

It is the reasonable consistency in the handling of the child by the mother and other grown up women in the daily environment, which moulds him. A child experiences, day in and day out, a reasonsable continuity of experiences. The public health training starts from the cradle. The first lession of cleanliness is a kind of bewildering change for a child. He is accustomed gradually to the use of

a particular place of defaecation and helped in the establishment of controlling functions. The social restrictions and family prohibitions the child learns not in days but after years. A child has a peculiar confidence in the mother, who helps him through the necessary development in his behaviour.

The school age (5-15 years) is very impressionable age. This is the period of habit forming. It is a phase of trial and error. All the good principles and practices are acquired and learnt during this period. Children who live in tidy houses are also tidy themselves. The living conditions have a profound influence on the behaviours of the children. An orderly house accustoms children to keep perfect. Out of a shabby house usually comes out a shrieking child. These years are of great benefit to the individual and to the community.

We are of the considered opinion that improved education of the women folk improves the outlook of nation. A sensible and well educated mother has the power to inspire such tastes and propensities as shall nearly decide the destiny of the future man. The formation of character in early stages of life largely depends upon mother. Although the mother does not exert any visible influence on the progeny, yet the child gradually continues imitating her and acquiring her habits. By education here, we do not mean school education. We beg to draw attention to health education which may be imparted to the community by persuation and demonstration.

By education most have been misled :
So they believe, because they so were bred.
The priest continues what the nurse began,
And thus the child Imposes on the man.

(DRYDEN)

TABLE I. FEMALES (1½ mth. TO 67 Yrs.) WITH SINGLE PROTOZOA INFECTION

Age in months/ Years	PROTOZOAS				Age in Months/ Years	PROTOZOAS			
	EH	EC	IB	GI		EH	EC	IB	GI
8 Yrs.	1	—	—	—	26 Yrs.	—	1	—	—
22 Yrs.	1	—	—	—	27 Yrs.	—	1	—	—
26 Yrs.	1	—	—	—	29 Yrs.	—	1	—	—
40 Yrs.	2	—	—	—	30 Yrs.	—	2	—	—
1½ Mnths.	—	1	—	—	32 Yrs.	—	1	—	—
9 Mnths.	—	1	—	—	38 Yrs.	—	2	—	—
1 Yr.	—	1	—	—	40 Yrs.	—	5	—	—
1½ Yrs.	—	1	—	—	42 Yrs.	—	3	—	—
5 Yrs.	—	1	—	—	43 Yrs.	—	1	—	—
6 Yrs.	—	1	—	—	45 Yrs.	—	3	—	—
8 Yrs.	—	1	—	—	50 Yrs.	—	2	—	—
9 Yrs.	—	1	—	—	52 Yrs.	—	1	—	—
11 Yrs.	—	1	—	—	55 Yrs.	—	1	—	—
12 Yrs.	—	5	—	—	67 Yrs.	—	1	—	—
13 Yrs.	—	2	—	—	2½ Yrs.	—	—	1	—
14 Yrs.	—	2	—	—	4 Yrs.	—	—	1	—
16 Yrs.	—	3	—	—	5 Yrs.	—	—	3	—
18 Yrs.	—	2	—	—	6 Yrs.	—	—	1	—
20 Yrs.	—	4	—	—	8 Yrs.	—	—	1	—
22 Yrs.	—	2	—	—	10 Yrs.	—	—	1	—
24 Yrs.	—	3	—	—	12 Yrs.	—	—	1	—
25 Yrs.	—	2	—	—	14 Yrs.	—	—	1	—

TABLE I.—(CONTD.)

Age in Months/ Years	PROTOZOAS				Age in Months/ Years	PROTOZOAS			
	EH	EC	IB	GI		EH	EC	IB	GI
15Yrs.	—	—	1	—	1 Yr,	—	—	—	2
16 Yrs.	—	—	2	—	2 Yrs.	—	—	—	1
17 Yrs.	—	—	1	—	3 Yrs.	—	—	—	2
18 Yrs.	—	—	1	—	4 Yrs.	—	—	—	1
22 Yrs.	—	—	1	—	5 Yrs.	—	—	—	1
24 Yrs.	—	—	1	—	6 Yrs.	—	—	—	1
25 Yrs.	—	—	3	—	7 Yrs.	—	—	—	3
26 Yrs.	—	—	1	—	9 Yrs.	—	—	—	1
30 Yrs.	—	—	1	—	12Yrs.	—	—	—	3
34 Yrs.	—	—	1	—	16 Yrs.	—	—	—	1
35 Yrs.	—	—	1	—	18 Yrs.	—	—	—	1
40 Yrs.	—	—	1	—	22 Yrs.	—	—	—	2
45 Yrs.	—	—	1	—	23 Yrs.	—	—	—	1
54 Yrs.	—	—	1	—	24 Yrs.	—	—	—	1
60 Yrs.	—	—	1	—	27 Yrs.	—	—	—	1
65 Yrs.	—	—	1	—	31 Yrs	—	—	—	1
3 Mnths.	—	—	—	1	32 Yrs.	—	—	—	2
8 Mnths	—	—	—	1	40 Yrs.	—	—	—	2
					50 Yrs.	—	—	—	1

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with one protozoa = 123 (23.84%)
4. Out of 340 positive females 36.18% had one protozoa.

5. Summary :	EH	EC	IB	GI
(a) Total (123)	5	59	29	30
(b) Percentage of total (516) examined.	0 . 97	11 . 43	5 . 62	5 . 82
(c) Percentage of total (340) positive.	1 . 47	17 . 35	8 . 53	8 . 83
(d) Percentage of total (123) with one protozoa.	4 . 06	47 . 96	23 . 57	24 . 37

TABLE II. FEMALES (1 mth. to 70 Yrs.) WITH TWO PROTOZOA INFECTIONS

Age in months/years	PROTOZOAS					Age in months/years	PROTOZOAS				
	EH	EC	EN	IB	GI		EH	EC	EN	IB	GI
30 Yrs.	1	1	—	—	—	21 Yrs.	—	1	—	1	—
70 Yrs.	1	—	—	1	—	22 Yrs.	—	1	—	1	—
11 Yrs.	—	1	1	—	—	25 Yrs.	—	3	—	3	—
6 Mnths.	—	1	—	1	—	30 Yrs.	—	3	—	3	—
6 Yrs.	—	1	—	1	—	34 Yrs.	—	1	—	1	—
13 Yrs.	—	1	—	1	—	35 Yrs.	—	2	—	2	—
16 Yrs.	—	1	—	1	—	37 Yrs.	—	3	—	3	—
17 Yrs.	—	2	—	2	—	40 Yrs.	—	5	—	5	—
20 Yrs.	—	3	—	3	—	45 Yrs.	—	5	—	5	—

TABLE II.–Contd.

Age in months/years	PROTOZOAS					Age in months/years	PROTOZOAS				
	EH	EC	EN	IB	GI		EH	EC	EN	IB	GI
49 Yrs.	—	1	—	1	—	14 Yrs.	—	1	—	—	1
50 Yrs	—	3	—	3	—	16 Yrs.	—	2	—	—	2
55 Yrs.	—	1	—	1	—	23 Yrs.	—	1	—	—	1
60 Yrs.	—	2	—	2	—	52 Yrs.	—	1	—	—	1
62 Yrs.	—	1	—	1	—	7 Yrs.	—	—	—	1	1
67 Yrs.	—	1	—	1	—	23 Yrs.	—	—	—	1	1
70 Yrs.	—	1	—	1	—	25 Yrs.	—	—	—	1	1

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with two protozoas = 54 (10.47%)
4. Out of 340 positive females 15.88% had two protozoas.

5 Summary :

	EH	EC	EN	IB	GI
(a) Total (54)	2	50	1	47	8
(b) Percentage of total (516) examined	0.39	9.69	0.19	9.11	1.55
(c) Percentage of total (340) positive	0.58	14.71	0.29	13.82	2.35
(d) Percentage of total (54) with two protozoas.	3.71	92.59	1.85	87.03	14.81

TABLE III. FEMALES (1½ mths. to 70 Yrs.) WITH THREE PROTOZOA INFECTIONS

Age in years	PROTOZOA					Age in years	PROTOZOA				
	EH	EC	EN	IB	GI		EH	EC	EN	IB	GI
25 Yrs.	1	1	—	1	—	35 Yrs.	—	1	—	1	1
50 Yrs.	—	1	1	1	—	36 Yrs.	—	1	—	1	1
32 Yrs.	—	1	—	1	—	50 Yrs.	—	1	—	1	2

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with three protozoas = 6 (1.16%)
4. Out of 340 positive females 1.77% had three protozoas.
5. Summary :

	EH	EC	EN	IB	GI
(a) Total (6)	1	6	1	6	4
(b) Percentage of total (516) examined.	0 . 19	1 . 16	0 . 19	1 . 16	0 . 76
(c) Percentage of total (340) positive.	0 . 29	1 . 77	0 . 29	1 . 77	1 . 16
(d) Percentage of total (6) with three protozoa.	16 . 66	100 . 00	16 . 66	100 . 00	66 . 66

TABLE IV FEMALES (1½ mths. to 70 Yrs.) WITH SINGLE HELMINTH INFECTION

Age in years	HELMINTHS					Age in years	HELMINTHS				
	TT	HW	EV	AL	HN		TT	HW	EV	AL	HN
10 Yrs.	1	—	—	—	—	3 Yrs.	—	—	—	1	—
8 Yrs.	—	1	—	—	—	4 Yrs.	—	—	—	3	—

TABLE IV.– (Contd.)

10 Yrs.	—	2	—	—	—	5 Yrs.	—	—	—	1	—
12 Yrs.	—	1	—	—	—	6 Yrs.	—	—	—	2	—
14 Yrs.	—	1	—	—	—	8 Yrs.	—	—	—	1	—
15 Yrs,		1	—	—	—	9 Yrs.	—	—	—	1	—
18 Yrs.	—	2	—	—	—	10 Yrs.	—	—	—	2	—
20 Yrs.	—	1	—	-	—	11 Yrs.	—	—	—	3	—
22 Yrs.	—	1	—	—		12 Yrs.	—	—	—	3	—
24 Yrs.	—	2	—	—	—	13 Yrs.	—	—	—	1	—
26 Yrs,	—	1	—	—	—	15 Yrs.	—	—	—	1	—
28 Yrs.	—	1	—	—	—	16 Yrs.	—	—	—	2	—
35 Yrs.	—	1	—	—	—	20 Yrs.	—	—	—	1	—
45 Yrs.	—	1	—	—	—	23 Yrs.	—	—	—	1	—
48 Yrs.	—	1	—	—	—	25 Yrs.	—	—	—	1	—
49 Yrs.	—	1	—	—	—	30 Yrs.	—	—	—	3	—
55 Yrs.	—	1	—	—	—	32 Yrs.	—	—	—	1	—
60 Yrs.	—	1	—	—	—	45 Yrs.	—	—	—	1	—
4 Yrs.	—	—	1	—	—	65 Yrs.	—	—	—	1	—
7 Yrs.	—	-	1	—	—	1 Yr.	—	—	—	—	1
11 Yrs.	—	—	1	—	—	2½ Yrs.	—	—	—	—	1
30 Yrs.	—	—	1	—	—	3 Yrs.	—	—	—	—	2
40 Yrs.	—	—	1	—	—	4 Yrs.	—	—	—	—	2
50 Yrs,	—	—	1	—	—	7 Yrs.	—	—	—	—	2
6 mths.	—	—	—	1	—	9 Yrs.	—	—	—	—	1
10 mths.	—	—	—	1	—	10 Yrs.	—	—	—	—	1
1¼ Yrs.	—	—	—	1	—	12 Yrs.	—	—	—	—	1
1½ Yrs,	—	—	—	1	—	23 Yrs.	—	—	—	—	2
2 Yrs,	—	—	—	2	—						

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with one helminth = 76 (1.47%)
4. Out of 340 positive females 22.35% had one helminth.

5. Summary :

	TT	HW	EV	AL	HN
(a) Total (76)	1	20	6	36	13
(b) Percentage of total (516) examined.	0 . 19	3 . 87	1 . 16	6 . 97	2 . 52
(c) Percentage of total (340) positive.	0 . 29	5 . 88	1 . 77	10 . 59	3 . 82
(d) Percentage of total (76) with one helminth.	1 . 32	26 . 32	7 . 89	47 . 37	17 . 11

TABLE V. FEMALES (1½ mths. to 70 Yrs.) WITH TWO HELMINTH INFECTIONS

Age in years	HELMINTHS				Age in years	HELMINTHS			
	HW	EV	AL	HN		HW	EV	AL	HN
7 Yrs.	2	—	2	—	10 Yrs.	—	1	1	—
9 Yrs.	2	—	2	—	2¼ Yrs.	—	—	2	2
28 Yrs.	1	—	1	—	3 Yrs.	—	—	2	2
35 Yrs.	1	—	1	—	4 Yrs.	—	—	1	1
40 Yrs.	1	—	1	—	7 Yrs.	—	—	1	1
36 Yrs.	1	—	—	1	9 Yrs.	—	—	1	1
3 Yrs.	—	1	1	—	12 Yrs.	—	—	1	1
9 Yrs.	—	1	1	—					

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Tctal number of females with two helminths = 19 (3.68%)
4. Out of 340 positive females 5.59% had two helminths.

5. Summary :

	HW	EV	AI	HN
(a) Total (19)	8	3	18	9
(b) Percentage of total (516) examined.	1 . 55	0 . 58	3 . 48	1 . 74
(c) Percentage of total (340) positive.	2 . 36	0 . 88	5 . 29	2 . 65
(d) Percentage of total (19) with two helminths.	42 . 11	15 . 79	94 . 74	47 . 37

TABLE VI. FEMALES (1½ mths. to 70 Yrs.) WITH ONE PROTOZOA AND HELMINTH

Age in years	PROTOZOAS			HELMINTHS			
	EC	IB	GI	HW	EV	AL	HN
5 Yrs.	1	—	—	1	—	—	—
18 Yrs.	1	—	—	1	—	—	—
28 Yrs.	1	—	—	1	—	—	—
40 Yrs.	1	—	—	1	—	—	—
42 Yrs.	1	—	—	1	—	—	—
60 Yrs.	1	—	—	1	—	—	—
65 Yrs.	1	—	—	1	—	—	—
6 Yrs.	1	—	—	—	1	—	—
14 Yrs.	1	—	—	—	1	—	—
39 Yrs.	1	—	—	—	1	—	—

TABLE VI.—(Contd.)

Age in years.	PROTOZOAS			HELMINTHS			
	EC	IB	GI	HW	EV	AL	HN
8 Yrs.	1	—	—	—	—	1	—
39 Yrs.	1	—	—	—	—	1	—
9 Yrs.	1	—	—	—	—	1	—
12 Yrs	2	—	—	—	—	2	—
16 Yrs.	1	—	—	—	—	1	—
25 Yrs.	1	—	—	—	—	1	—
30 Yrs.	1	—	—	—	—	1	—
40 Yrs.	2	—	—	—	—	2	—
5 Yrs.	1	—	—	—	—	—	1
53 Yrs.	1	—	—	—	—	—	1
20 Yrs.	—	1	—	1	—	—	—
32 Yrs.	—	1	—	1	—	—	—
36 Yrs.	—	1	—	1	—	—	—
14 Yrs.	—	1	—	—	1	—	—
27 Yrs.	—	1	—	—	1	—	—
5½ Yrs.	—	1	—	—	—	1	—
14 Yrs.	—	1	—	—	—	1	—
11 Yrs.	—	1	—	—	—	—	1
12 Yrs.	—	—	1	1	—	—	—
23 Yrs.	—	—	1	1	—	—	—
40 Yrs.	—	—	1	1	—	—	—
22 Yrs.	—	—	1	—	—	1	—
5 Yrs.	—	—	1	—	—	—	1

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with one protozoa and a helminth = 35 (6.78%)
4. Out of 340 positive females, 10.29% with one protozoa and a helminth.

5. Summary :

	PROTOZOAS			HELMINTHS			
	EC	IB	GI	HW	EV	AL	HN
(a) Total (35)	22	8	5	13	5	13	4
(b) Percentage of total (516) examined.	4.26	1.53	0.97	2.52	0.97	2.52	0.76
(c) Percentage of total (340) positive.	6.47	2.35	1.47	3.82	1.47	3.82	1.17
(d) Percentage of total (35) with one protozoa and a helminth.	62.86	22.86	14.29	37.14	14 29	37.14	11.43

TABLE VII. FEMALES (1½ Mths. TO 70 Yrs.) WITH TWO PROTOZOAS AND A HELMINTH

Age in Years	PROTOZOAS				HELMINTHS			
	EH	EC	IB	GI	HW	EV	AL	HN
70 Yrs.	1	1	—	—	—	—	1	—
4 Yrs	1	—	1	—	—	—	1	—
15 Yrs.	1	—	1	—	—	—	1	—
12 Yrs.	—	1	1	—	1	—	—	—
40 Yrs.	—	1	1	—	1	—	—	—
50 Yrs.	—	1	1	—	1	—	—	—
25 Yrs.	—	1	1	—	—	1	—	—
28 Yrs.	—	1	1	—	—	1	—	—

TABLE VII.– (Contd.)

Age in years.	PROTOZOAS				HELMINTHS			
	EH	EC	IB	GI	HW	EV	AL	HN
31 Yrs.	—	1	1	—	—	1	—	—
14 Yrs	—	1	1	—	—	—	1	—
18 Yrs.	—	1	1	—	—	—	1	—
20 Yrs.	—	1	1	—	—	—	1	—
20 Yrs.	—	1	1	—	—	—	--	1
22 Yrs.	—	1	1	—	—	—	—	1
7 Yrs.	—	1	—	1	—	—	—	1

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with two protozoas and a helminth = 15 (2.91%)
4. Out of 340 positive females, 4.41% with two protozoas and a helminth.

5. Summary :

	PROTOZOAS				HELMINTHS			
	EH	EC	IB	GI	HW	EV	AL	HN
(a) Total (15)	3	13	13	1	3	3	6	3
(b) Percentage of total (516) examined.	0.58	2.52	2.52	0.19	0.58	0.58	1.16	0 58
(c) Percentage of total (340) positive.	0.88	3.82	3.82	0.29	0.88	0.88	1.77	0.88
(d) Percentage of total (15) with two protozoas and a helminth.	20.00	86.66	86.66	6.66	20.00	20.00	40.00	20.00

TABLE VIII.—FEMALES (1½ Mths. TO 70 Yrs.) WITH SINGLE PROTOZOA AND TWO HELMINTHS

Age in Years	PROTOZOAS			HELMINTHS			
	EC	IB	GI	HW	EV	AL	HN
25 Yrs.	1	—	—	1	—	1	—
25 Yrs.	1	—	—	1	—	—	1
26 Yrs.	1	—	—	—	1	1	—
5 Yrs.	3	—	—	—	—	3	3
16 Yrs.	1	—	—	—	—	1	1
40 Yrs.	—	1	—	1	—	—	1
5 Yrs.	—	1	—	—	—	1	1
5 Yrs.	—	—	1	—	—	1	1

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with a protozoa and two helminths = 10 (1.93%)
4. Out of 340 positive females, 2.94% with a protozoa and 2 helmintes.

5. Summary :

	PROTOZOAS			HELMINTHS			
	EC	IB	GI	HW	EV	AL	HN
(a) Total (10)	7	2	1	3	1	8	8
(b) Percent of total 516 examined.	1.36	0.38	0.19	0.58	0.19	1.55	1.55
(c) Percent of total (340) positive.	2.06	0.59	0.29	0.88	0.29	2.36	2.36
(d) Percent of total (10) with a protozoa and 2 helminths.	70.00	20.00	10.00	30.00	10.00	80 00	80.00

TABLE IX TWO (OR THREE) PROTOZOAS AND TWO (OR ONE) HELMINTHS

Age in Years	PROTOZOAS				HELMINTHS		
	EH	EC	IB	GI	HW	AL	HN
40 Yrs.	1	1	—	1	1	—	—
38 Yrs.	—	1	1	1	—	—	1
4 Yrs.	—	1	1	—	—	1	1
18 Yrs.	—	1	1	—	—	1	1

1. Total number of females examined = 516
2. Total number of females positive = 340 (65.88%)
3. Total number of females with two (or three) protozoas and two (or one) helminths. = 4 (0.77%)
4. Out of 340 positive females, 1.18% with two (or three) protozoas and two (or one) helminths.

Summary :

	PROTOZOAS				HELMINTHS		
	EH	EC	IB	GI	HW	AL	HN
(a) Total (4)	1	4	3	2	1	2	3
(b) Percent of total (516) examined.	0 19	0.76	0.58	0.38	0.19	0.38	0.58
(c) Percent of total (340, positive.	0.29	1.17	0 88	0.59	0.29	0.59	0.88
(d) Percent of total (4) with two (or three) protozoas and two (or one) helminths.	25.00	100.00	75.00	50.00	25 00	50.00	75.00

TABLE X INCIDENCE OF VARIOUS INTESTINAL PARASITES IN FEMALES OF DIFFERENT AGE GROUPS IN VILLAGE SAHOWARY (LAHORE)

Age in Yrs.	Number		EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
	Exam.	+Ve										
1/8	2	1	—	1	—	—	—	—	—	—	—	—
1/6	3	0	—	—	—	—	—	—	—	—	—	—
1/4	1	1	—	—	—	—	1	—	—	—	—	—
1/3	5	0	—	—	—	—	—	—	—	—	—	—
5/12	1	0	—	—	—	—	—	—	—	—	—	—
1/2	2	2	—	1	—	1	—	—	—	—	1	—
2/3	3	1	—	—	—	—	1	—	—	—	—	—
3/4	1	1	—	1	—	—	—	—	—	—	—	—
5/6	2	1	—	—	—	—	—	—	—	—	1	—
Total : 20		7	—	3	—	1	2	—	—	—	2	—
Percent of total=		35.00	—	15.00	—	5.00	10.00	—	—	—	10.00	—
Percent of positive=		—	—	42.86	—	14.28	28.57	—	—	—	28.57	—
1	10	4	—	1	—	—	2	—	—	—	—	1
1½	4	2	—	1	—	—	—	—	—	—	1	—
1¾	3	1	—	—	—	—	—	—	—	—	1	—
2	8	3	—	—	—	—	1	—	—	—	2	—
2½	6	4	—	—	—	1	—	—	—	—	2	3
3	17	8	—	—	—	—	2	—	—	1	4	4
3½	1	0	—	—	—	—	—	—	—	—	—	—

TABLE X. (Contd.)

Age in Yrs.	Number Exam.	Number +Ve	EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
3½	1	0	—	—	—	—	—	—	—	—	—	—
4	15	11	1	1	—	3	1	—	—	1	6	4
5	21	14	—	6	—	4	3	—	1	—	6	7
Totals:	86	47	1	9	—	8	9	—	1	2	22	19
Percent of total =		54.6	1.16	10.46	—	9.31	10.46	—	1.16	2.32	25.58	22,09
Percent of positive =		—	2.13	19.15	—	17.02	19.15	—	2.13	4.25	46.81	40.42
5½	1	1	—	—	—	1	—	—	—	—	1	—
6	10	7	—	3	—	2	1	—	—	1	2	—
7	17	11	—	1	—	1	5	—	2	1	3	4
8	11	6	1	2	—	1	—	—	1	—	2	—
9	12	9	—	2	—	—	1	—	2	1	6	2
10	14	8	—	—	—	1	—	1	2	1	3	1
11	8	7	—	2	1	1	—	—	—	1	3	1
12	25	19	—	8	—	2	4	—	3	—	6	2
Totals :	98	68	1	18	1	9	11	1	10	5	26	10
Percent of totals =		69.4	1.02	18.36	1.02	9.18	11.23	1.02	10.02	5.10	26.23	10.02
Percent of +ve		—	1.47	23.53	1.47	13.23	16.18	1.47	14.71	7.35	38.23	14.71
13	6	4	—	3	—	1	—	—	—	—	1	—
14	11	9	—	5	—	4	1	—	1	2	2	—
15	8	4	1	—	—	2	—	—	1	—	2	—

TABLE X.—Contd.)

Age in Yrs.	Number Exam.	Number +Ve	EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
16	16	13	—	8	—	3	3	—	—	—	4	1
17	3	3	—	2	—	3	—	—	—	—	—	—
Total :	44	33	1	18	—	13	4	—	2	2	9	1
Percent of total =		75.0	2.27	40.91	—	29.54	9.19	—	4.55	4 55	20.45	2 27
Percent of +ve		—	3 03	54.54	—	39.39	12.12	—	6.(6	6.06	27.27	3.03
18	13	9	—	5	—	3	1	—	3	—	2	1
20	18	12	—	9	—	6	—	—	2	—	2	1
21	3	1	—	1	—	1	—	—	—	—	—	—
22	14	10	1	4	—	3	3	—	1	—	1	1
23	8	6	—	—	—	1	3	—	1	—	1	2
24	7	7	—	3	—	1	1	—	2	—	—	—
25	22	15	1	10	—	9	1	—	2	1	3	1
Total :	85	60	2	32	—	24	9	—	11	1	9	6
% of total =		70.59	2.35	37.64	—	28.24	10.59	—	12.94	1.17	10.59	7.06
% of +ve =		—	3.33	53.33	—	40.00	15.00	—	18.33	1.66	15.00	10.00
26	9	5	1	2	—	1	—	—	1	1	1	—
27	3	3	—	1	—	1	1	—	—	1	—	—
28	6	4	—	2	—	1	—	—	3	1	1	—
29	1	1	—	1	—	—	—	—	—	—	—	—
30	24	12	1	7	—	4	—	—	—	1	4	—

TABLE X.—(Contd)

Age in Yrs.	Number Exam.	Number +Ve	EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
31	2	2	—	1	—	1	1	—	—	1	—	—
32	7	6	—	2	—	2	3	—	1	—	1	—
34	3	2	—	1	—	2	—	—	—	—	—	—
35	8	6	—	3	—	4	1	—	2	—	1	—
Total :	63	41	2	20	—	16	6	—	7	5	8	—
Percent of total =		65.08	3 17	31.74	—	25.39	9 52	—	11.11	7.93	12.69	—
Percent of +ve		—	4 88	48.76	—	39.02	14.63	—	17 07	12.19	19.51	—
36	6	3	—	1	—	2	1	—	2	—	—	1
37	4	3	—	3	—	3	—	—	—	—	—	—
38	5	3	—	3	—	1	1	—	—	—	—	1
39	1	1	—	1	—	—	—	—	—	1	—	—
40	35	24	3	15	—	8	4	—	6	1	3	1
Total :	51	34	3	23	—	14	6	—	8	2	3	3
Percent of total =		66.66	5.88	45.09	—	27.45	11.76	—	15.68	3.92	5.88	5.88
Percent of +ve		—	8.82	67.64	—	41.17	17.64	—	23.59	5.88	8.82	8.82
42	4	4	—	4	—	—	—	—	1	—	—	—
43	1	1	—	1	—	—	—	—	—	—	—	—

TABLE X.—(Contd.)

Age in Yrs.	Number Exam.	Number +Ve	EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
45	14	11	—	8	—	6	—	—	1	—	1	—
48	3	1	—	—	—	—	—	—	1	—	—	—
49	2	2	—	1	—	1	—	—	1	—	—	—
50	14	10	—	8	1	6	2	—	1	1	—	—
Total :	38	29	—	22	1	13	2	—	5	1	1	—
Percent of total =		76.32	—	57.89	2.63	34.21	5.26	—	13.17	5.26	5.26	—
Percent of +ve		—	—	75.86	3.45	44.83	6.89	—	17.24	3.45	3.45	—
52	2	2	—	2	—	—	1	—	—	—	—	—
53	1	1	—	1	—	—	—	—	—	—	—	1
54	1	1	—	—	—	1	—	—	—	—	—	—
55	5	3	—	2	—	1	—	—	1	—	—	—
Total ;	9	7	—	5	—	2	1	—	1	—	—	1
Percent of total =		77.77	—	5.55	—	2.22	1.11	—	1.11	—	—	1.11
Percent of +ve		—	—	71.43	—	28.57	14.28	—	14.28	—	—	14.28
60	9	5	—	3	—	3	—	—	2	—	—	—
62	2	1	—	1	—	1	—	—	—	—	—	—

TABLE X.—(Contd.)

Age in Yrs.	Number Exam.	Number +ve	EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
65	4	3	—	1	—	1	—	—	1	—	1	—
67	2	2	—	2	—	1	—	—	—	—	—	—
70	5	3	2	2	—	2	—	—	—	—	1	—
Total : 22	14		2	9	—	8	—	—	3	—	2	—
Percent of total =	63.64		9.01	40.91	—	36.36	—	—	13.64	—	9.01	—
Percent of +ve	—		14.29	64.29	—	57.14	—	—	21.43	—	14.29	—
Total (for 18-70 yrs. 268)	185		9	111	1	77	24	—	35	9	23	10
Percent of total	69.03		3.36	4.14	0.37	28.63	8.95	—	13.06	3.36	8.57	3.73
Percent of +ve			4.86	60.00	0.64	41.62	12.97	—	18 92	4.86	12.43	6.41
Total : 516	340		12	161	2	108	51	1	48	18	83	40
Percent infected of total examd.	65.9		2.32	31.21	0.38	20.93	9.69	0.19	9.31	3.49	16.08	7.74
Percent infected of total positive	—		3.35	47.35	0. 59	31.77	14.71	0.29	14.11	5.29	24.14	11.76

SUMMARY OF INCIDENCE : giving number of respective intestinal parasites for each one infection of an individual parasite :		EH	EC	EN	IB	GI	TT	HW	EV	AL	HN
	EH	1	13.42	0.17	9,00	4.17	0.09	4.00	1.50	6.92	3.33
	EC	0.07	1	0.02	0.67	0.31	0.01	0.29	0.11	0.51	0.24
	EN	6.00	80.50	1	5400	2500	0.50	2400	9.00	4150	20,00
	IB	0.11	1.49	0.01	1	0.46	0.01	0.44	0.17	0.77	0.37
	GI	0.24	3.22	0.08	2.16	1	0.02	0.96	0.36	1.66	0.80
	TT	12	161	2	108	51	1	48	18	83	4.04
	HW	0.25	3.35	0.04	2.25	1.04	0.02	1	0.37	1.73	0.83
	EV	0.66	8.95	0.11	6.00	2.78	0.05	2.68	1	4.61	2.22
	AL	0.14	1.94	0.24	1.30	0.60	0.01	0.57	0.22	1	0.48
	HN	0.30	4.02	0.05	2.70	1.25	0.02	1.20	0 45	2.07	1

VI. SUMMARY

This survey report is from a village within city Corporation of Lohore, where the people live in rural environment but have urban habits. It presents a vivid picture of the distribution of the intestinal parasites

The previous surveys carried out in Lahore, showed the presence of protozoan parasites in 55.13, 25.8 and 47.22 per cent as against 46.67 per cent in the females of Sahowa.i. The pathogenic forms of protozoas were found in 26.55 per cent females only.

The helminths usually occur in greater number of people and were found in 71.8, 30.82 and 35.33 per cent people examined in previous surveys as 30.81 per cent females examined from the village Sahowari. The pathogenic forms of helminths were found only in 9.12 per cent females.

E. histolytica cysts were detected from 2.32 per cent females examined. This number includes cases harbouring *E. hartmannii*. The commensal form of amoeba (*E. coli*) was found present in 31.21 per cent females. The cysts of *E. nana* were discoverd in rare instances, probably because the extrinsic conditions available in the village were unfavourable for this delicate amoeba. Although *I. butschlii* is

usually much less common than *E. coli*, yet in this community its cysts were encountered more frequently. The incidence of infection was found to be as high as 20.93 per cent.

The cysts of duodenal flagellate (*G. intestinalis*) were found only in 9.69 per cent females. It is unexpectedly a very low figure. Two cases occurred in infant girls of 3 and 6 months. Well marked incidence occurred in children between 1-14 years of age.

The helminths were harboured by 30.81 per cent females in the village Sahowari. The whip-worm infection (*T. trichiurus*) occurred in one solitary case. Although the methods of dissemination of *Ascaris* and *Trichocephalis* are similar, yet it is surprising that the distribution of these two parasites in the females of Sahowari differed so widely. Probably the moisture requirements, so essential for the developments, of *Trichocephalus* eggs, were not available in the soil of this village. It is well known that infections with *Trichocephalus* are not acquired so rapidly as with *Ascaris*.

The hook-worm infection (*A. duodenale*) usually occurs more frequently in rural areas. The incidence of infection in this group was found low, because very small number of females generally go about in the contaminated fields. In females an incidence of 9.31 per cent, appears to be fairly high. The infection was incriminated in all age groups, except below five years. Incidence was comparatively high and more frequent in women between 28 and forty years of age.

The eggs of seat-worm (*E. vermicularis*) usually do not occur in stools. Incidence of infection based on coprological examintion alone, does not therefore, presents the true picture. From the figures available we however, conclude that this parasite does not make any distinction between urban and rural population.

The giant-round-worm (*A. lumbricoides*) remained one of the most common parasites of the females of Sahowari. It is a court yard, door yard and house hold infection and therefore, occurs more commonly in young age groups. Two infant girls, below one year of age, had round-worm infection. Incidence of infection was high in girls between 1-5 years. was frequent in girls between 6-16 years and was sporadic in adolescents. Adults, above forty year of age, rarely suffered of *ascariasis*.

The eggs of dwarf-tape-worm (*H. nana*) were found more or less as frequently as the eggs of hook-worm (*A. duodenale*). The incidence of infection was 7.74 per cent. It was freqeuntly found in toddlers, High incidence was discovered in children between 2-9 years of age. Sporadic cases however continued occurring in females of 10-75 years of age. It was most rare infection in adults over 25 years.

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Close contact of Mr. Din Mohammad Bhutta (Senior Laboratory Assistant) with the village community created good atmosphere for us to collect the relevent data with ease. Our thanks are due to him and Mr. Mohammad Allah Dad (Senior Laboratory Assistant) for carrying out the work carefully, diligently and strictly according to our instructions.

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SOME RURAL PROBLEMS AND MALARIA ERADICATION*

BY

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Malaria has long been recognised as a chronic invalid producing disease. It lowers life expectancies as it directly or indirectly sapps human vitality. Malaria has a profound influence on our national progress. It deprives the victim of vigour and renders the out put less productive.

The malaria season more or less coincides with the harvest of cash crops. The emaciated former can not do his work to his full capacity. Malaria therefore interfers with crop production and seriously upsets the economy of the country. According to the census of opinion Malaria Eradication is the only answer to meet the challenge posed by this disease. The residual spraying of such chlorinated hydrocarbons as D. D. T. has made malaria control possible in our country. These operations were initiated without any proper planning, and up was unknown. The malaria control programme did not gradutee total coverage therefore allowed malaria to play the game of hide and seek. The incidence was brought down in endemic areas but the threat of an epidemic always remained haging on the head of public health workers. The disease control effort did not meet all its targets and all that was expected could not be achieved. The fears always continued haunting. It does not apply to an eradication operation, failure in tne field of eradication is not only most expensive in terms of money but is also costly to the health organization concerned in terms of loss of perstige and public confidence. It is much wiser therefore to have passimistic views and take stock of the difficulties which may be encountered in the field.

The author had considerably long stay in rural areas of the country and was in position to appreciate some of the problems of the field workers generally met during the spraying operation. These problem generally accelrate between the threepillers.

I BEHAVIOURAL PATTERN OF POPULATION DISTRIBUTION.

Major portion of our population comes from villages. The rural population unlike urban population and industrial communities is not eongregated at one place. The agriculture holding on tremendously scattered. In the interest the agricultural

* Summary of the thesis submitted for the partial fullfilment of the D. P. H. Examination.

operations, the former prefer to be in their field for all their life. These conditions gives rise to small villages and hamlets. The hamlets are usually unapproachable The communication in between some villages is not only diplorable but most difficult.

(*ii*) Socio Economic conditions

Our rural population is mainly "agriculturist" by profession. Illeteracy and ignorance has made them poor and helpless. Water-logging menace is some parts and scarcity of water supply in others does not only deteriorate the agricultural conditions but also lowered the economic status of rural population. Malnutrition, overcrowding inadequacy of medical services, poor standard of sanitation and large families have created favourable conditions for wasting disease to flourish uninterruped. The people become sick because they are poor they become poorer because they are sick and sicker because they become poor. This vicious cycle of poverty and disease persue its disasterous course unchecked. Illiteracy prevents people from taking preventive measures, thus hampering their health.

III. DIFFICULTIES IN THE ACHIEVEMENT OF BEST RESULT

(*a*) *Prejudice and non-coperation.* People in rural areas are most conservative, indifferent and inert towards the modern scientific methods. Fate is their abiding law. They are ignoarnt of hygiene and pay a heavy toll of lives due to their prejudice. Generally they are apathetic In their attitude towards illness and death. They accept deplorable condition and attribute it to God's will.

(*b*) *Eradication theme not well explained.* Since at least a decade or two the public health teams have been visiting and spraying certain villages. This plan failed to reduce the morbidity rate to the level of nothingness. The transcendental results of previous non effective sprayings have assured the villagers that public health department personnel come to them as a matter of routine, disturb their dwellings for nothing and made their livings nncomfortable.

(*c*) *Uneffective spraying.* The rural areas provide a score of resting and hiding places for the mosquitoes. These nicles are in thousands both outside and inside our rural habit which are Kacha with thatched roofs. Ordinarily the roofs consist of uneven and course loge of wood, sometimes branches, twigs and reeds etc. come out from the roofing material. The crevices and stands of reads hanging down provide suitable resting places for mosquitoes. Such surfaces can not be effectively sprayed. The walls are mostly plastered with mud. Plastering is usually done by the women of the house. It is done after frequent intervals. The presence of holes and creeks is one of the special feature of this walls. The houses are deplidated. The house hold within is usually arranged in a haphazard way one may find pictcher's bozes, charpoys, vessels, grain

bines, firewood collection animal-shed material providing suitable re-stint places for the mosquitoes. This material is usually not approachable by the sprays.

Precisely enough, malaria eradication operation is a very sophisticated affair. It requires a degree of propetuation, of dedication, of honestly and cooperation at all ends, that is routinely available. There must be stability of funds sincerity in public administration and ability in field operation. Administrating on eradication service is not to be learned from reading a printed manual of instructions. No matter how carefully prepared and detailed the instructions may be, it would be difficult in turning out competent "eradicators" Participants in such training courses need through grinding proper field training, and extensive patience. They need also to know the difficulties they are going to encounter in the field. We must work on the principle of "Forearm is to fore Warn."