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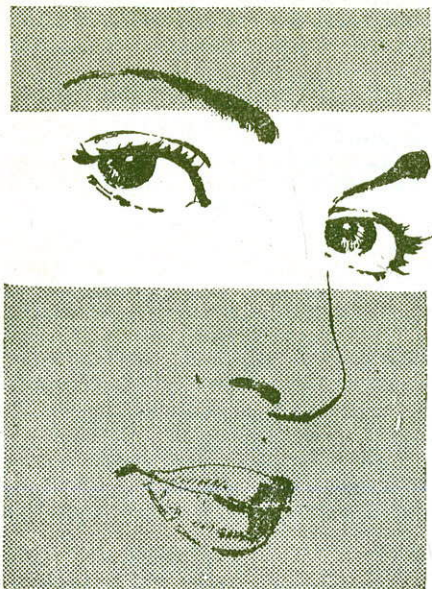
NUMBER 4

EDITOR :

DR. B. C. DASGUPTA, B.SC., M.B., M.R.C.P., D.P.H., D.T.M., & H.

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AN APPEAL TO MEMBERS

At the meeting of the Central Council of the Indian Public Health Association held in Calcutta on the 18th January, 1961 Dr. S. P. Ramakrishnan, Director of the Malaria Institute of India, Delhi, suggested that one of the effective ways in which the Indian Public Health Association can participate in World Public Health activities is by making a token contribution to some of the major public health programme of the W.H.O. A donation from the Association to the W.H.O. Malaria Eradication Programme "Special Account" may be appropriate at the present moment. He also cited the examples of similar organisations in other parts of the World giving such donations to the WHO programmes.

The Council approved the proposal but in view of the limited financial resources, they suggested that voluntary donations may be invited from the members of the Association for this specific purpose, and the amount thus collected sent as a donation from the I.P.H.A. to the W.H.O. Malaria Eradication Programme.

Members are therefore requested, to kindly contribute liberally for the purpose. Their generous contributions in this regard will enable the Association to participate in one of the major public health programmes and thereby strengthen this young Association.

Dr. T. B. Patel, President of the Association has opened the donation list with a contribution of Rs. 100. Members are requested to kindly send their donations to the General Secretary by the 30th May, 1961. All donations, however small, will be gratefully received.



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HEALTH STATUS OF SCHOOL CHILDREN IN URBAN WEST BENGAL

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INTRODUCTION

Health should be one of the primary objectives of present day education. A desirable standard of health, low incidence of sickness and low mortality rate among the younger generation, are important indices of the standard of health services available. Schools are the centres where an attempt could be made towards such improvement in order to get the most effective result. To build a stronger nation with a sound physical and mental make up, attention should be paid towards early detection and correction of defects, through the introduction of a sound and comprehensive school health service scheme. The determination of the health needs of the school children, and an effective treatment and follow up programme, are important and essential prerequisites before entry to community life.

The Urban Health Centre, Chetla consists of Wards 71 and 72 of the Calcutta Corporation, having an area of 2.02 sq. miles. 17 schools, which are situated within this area, are under the care of the School Health Section of the centre and contain about 8000 students. Students of six schools had complete medical examination by the time the present analysis was made, and are included in the study.

The medical examination is done by the school health team consisting of the following members:—

- | | |
|---|---|
| 1. School Health Officer
(in-charge) ... | 1 |
| 2. School Medical Officer
(Lady) ... | 1 |
| 3. School Health Nurses ... | 4 |

The school health work is done by the team along with other field and clinic duties allotted to each member. In order to find out the defective students and to assess the extent of the problem, each child has a thorough examination at the school. This includes complete physical examination, assessment of nutritional status, recording of height and weight, history of illnesses (present, past and of family), history of immunisations etc. The examination is done in the presence of the teachers and as far as practicable in the presence of parents. The findings of the examination are recorded in specially designed forms, one for each child examined.

After the medical inspection, all the defective students are asked to attend the School Health Clinic of the Health Centre, for further investigations and correction of defects and necessary treatment. References are made from this clinic to specialised clinics like Eye, Dental, E.N.T., T.B., Nutrition, Child Guidance, attached to this Health Centre, and also to outside hospitals for any special investigation or treatment.

The object of the present study was to analyse the findings of the medical inspection of the school children and to find out their status of health.

Methods & Material

1582 completed health records were available for analysis. The total male and female children were more or less equal in number (801 and 781 respectively). The age and sex

distribution are shown in table I, the maximum number of children being in the age group 8 to 13 years.

Table I

Age And Sex Distribution

Age	Male	Female	Total
4	10	7	17
5	18	25	43
6	48	56	104
7	74	38	112
8	73	65	138
9	80	66	146
10	150	123	273
11	106	139	245
12	132	157	289
13	69	75	144
14	26	13	39
15	12	1	13
16	3	16	19
Total:	801	781	1,582

Table II

General Nutrition

	Male	%	Female	%	Total	%
Good	47	5.9	73	9.3	120	7.6
Fair	507	63.3	546	69.9	1053	66.6
Poor	247	30.8	160	20.5	407	25.7
Fat	—	—	2	0.3	2	0.1

General Nutrition—General nutrition of these children were assessed by taking consideration of height and weight and the clinical appreciation of the examining personnel. They do not however represent any specific nutritional deficiency. Only 25.7% of the children were assessed to have good nutrition whereas 66.6% were fair and 25.7% poor. Fat school children were not common in this area and there were only 2 fat girls. This can be compared to that in the United States of America where obesity is found in 8.6% of school children (Culbert & Jacobziner 1950).

Table III

Foot-Gear

	Male	%	Female	%	Total	%
Number of students with shoes	329	41.0	536	68.6	865	54.7

About half of the children did not wear any shoes at all. Though economical condition is the main reason for this, it was surprising to find that more girls used shoes than boys in all the age-groups, and in all the schools. Hookworm infestation is uncommon in the city and the foot-gear thus has not any effect on the level of this infection in the city.

Table IV

State of small-pox vaccination

	Male	%	Female	%	Total	%
Number with mark of small-pox	5	0.6	2	0.2	7	0.4
Primary vaccination	796	99.4	789	99.8	1575	99.6

Only 7 children (0.4%) had marks of small-pox whereas rest of the children had successful vaccination at the time of examination. No child was found still unvaccinated. This is quite satisfactory when compared to two reports for U.P. in the district of Sitapur and Varanasi where 38% and 19% had already suffered from small-pox (Sehgal & Dutta, 1957; Harkauli, 1959). In the former survey 12% of the children were still unvaccinated.

Table V

Number of children by number of defects

	Total No	Male	%	Female	%	Total	%
	801	781		1582			
with defects	675	84.3	635	81.3	1310	82.8	
without „	126	15.7	146	18.7	272	17.2	
with 1 „	175	21.8	157	20.1	332	21.0	
„ 2 „	178	22.2	177	22.7	355	22.4	
„ 3 „	148	18.5	156	19.8	304	19.2	
„ 4 „	103	12.8	83	10.6	186	11.7	
„ 5 „	48	6.0	47	6.0	95	6.0	
over 5 „	23	2.9	15	1.9	38	2.4	

Large percentage of the children in all age-groups in both sexes were suffering from complaints, and found defective at the time of examination. Only 17.2% of the total children were found without any defect, 21% had one defect but the largest number (61.7%) had multiple defects. This can be compared to a similar study done in U.S.A. where 36.3%

distribution are shown in table I, the maximum number of children being in the age group 8 to 13 years.

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Large percentage of the children in all age-groups in both sexes were suffering from complaints, and found defective at the time of examination. Only 17.2% of the total children were found without any defect, 21% had one defect but the largest number (61.7%) had multiple defects. This can be compared to a similar study done in U.S.A. where 36.3%

HEALTH STATUS OF SCHOOL CHILDREN IN URBAN WEST BENGAL

children were found normal, 51% with 1 defect and only 10.5% with multiple defects.

Table VI
Average number of defects per child

Total number of children	Total number of defects	Average number of defects per child
1582	3404	2.1

Average number of defects per child was found to be 2.1 whereas in U.S.A. the corresponding figure was 0.79.

Table VII
Percentage of defects in different diagnostic group

Diagnostic group	%	Diagnostic group	%
Respiratory disorder both upper and lower including enlarged tonsils.	49.9	Dental diseases (other than caries)	3.7
Gastro-intestinal disorder	43.7	Defects of the male genitalia	2.5
Enlarged lymph glands	30.5	Mental and Neurological abnormality	1.9
Nutritional deficiency (including anaemia)	30.7	Joint pain	1.4
Caries teeth	21.1	Speech disturbances	0.9
Eye diseases	10.9	Enlarged liver and spleen	0.25
Ear diseases	4.9		
Skin diseases	4.9		

Defects have been classified above under different major diagnostic groups. Some children with multiple defects have been included in more than one diagnostic group.

Table VIII
Respiratory disorders (both upper & lower)

	Male	%	Female	%	Total	%
Enlarged tonsils	260	32.4	278	35.6	538	34.0
Septic tonsil	3	0.4	7	0.9	10	0.6
Chronic bronchitis	59	7.4	—	—	59	3.7
Pharyngitis	1	0.1	—	—	1	0.06
Bronchial asthma	6	0.7	1	0.1	7	0.4
Chronic nasal catarrh	82	10.2	41	5.2	123	7.8
Nasal congestion	1	0.1	—	—	1	0.06
Epistaxis	13	1.6	18	2.3	31	1.8
Nasal polyp	11	1.4	8	1.02	19	1.2
Total	436	54.4	353	45.2	789	49.9

Disorder of respiratory system—Largest number of children had some respiratory symptoms, enlarged tonsil being itself the main cause of upper respiratory disorders. This figure may be criticised as whether an enlarged tonsil is a defect or normal physiological condition in childhood. A decade ago in U.S.A. most of the reports showed hypertrophied tonsils and adenoids in 50% of the school children examined and to-day it is reported as 12.4%. The conception and degree of enlargement of tonsils had been changing recently and in future surveys this figure will be less. Only 0.6% of our children on the other hand had septic tonsils. Chronic nasal discharge and chronic cough accounted for the greatest number of the rest of the children.

Table IX

Gastro-intestinal disorders

	Male	%	Female	%	Total	%
Constipation	—	—	8	1.0	8	0.5
Diarrhoea	126	15.7	168	21.5	294	18.6
Dysentery	15	1.9	29	3.7	44	2.8
Worms	155	19.3	168	21.5	324	20.5
Pain in abdomen	15	1.9	14	1.8	29	1.8
History of haematemesis	—	—	1	0.1	1	0.06
Total:	311	38.8	381	48.8	692	43.7

Gastro-intestinal disorder—Diarrhoea and worm infestations are the main gastro-intestinal disorders, and account for ailments in a large percentage of children. These are common in younger children than those in higher age-groups. The stools of most of the children complaining of gastro-intestinal disorders had been examined and the results will be published shortly.

Nutritional Deficiencies

Table X
Vit B₂ deficiency

	Male	%	Female	%	Total	%
Glossitis	46	5.7	24	3.0	70	4.4
Stomatitis	26	3.2	22	2.8	48	3.0
Total:	72	9.0	46	5.9	118	7.4

Table XI
Vit. 'A' deficiency

	Male	%	Female	%	Total	%
Bitot's spot	10	1.2	6	0.8	16	1.0
Night blindness	4	0.5	1	0.1	5	0.3
Phryno-derma	10	1.2	1	0.1	11	0.7
Xerosis	32	4.0	24	3.0	56	3.5
Pig. conj.	1	0.1	—	—	1	0.06
Total:	57	7.1	32	4.0	89	5.6

Vitamin A deficiency—Eye signs are more important in Vitamin A deficiency, and Xerosis and Bitot's spot were seen in maximum number of children. Unlike Vitamin B₂ deficiency which were equally distributed in all age-group, vitamin A deficiency was seen amongst younger age-groups.

Table XII
Vit. 'C' deficiency

	Male	%	Female	%	Total	%
Spongy gum	66	8.2	37	4.7	103	6.5

Vitamin C deficiency—6.5% of the children had spongy gum which bled on pressure. Though this has been included under Vitamin C deficiency it is not beyond criticism. No laboratory studies had been done in these cases to find out the Vitamin C level. Most probably the deficiency of Vitamin C is much less than the deficiency of other vitamins in the school children.

Table XIII
Vit 'D' deficiency

	Male	%	Female	%	Total	%
Kyphosis	1	0.1	—	—	1	0.06
Pigeon shaped chest	1	0.1	—	—	1	0.06
Pot belly	—	—	1	0.1	1	0.06
Total:	2	0.2	1	0.1	3	0.2

Vitamin D deficiency—This was found uncommon in school children and only 3 children had suggestive changes of Vitamin D deficiency.

Table XIV
Anaemia

Male	%	Female	%	Total	%
48	6.0	129	16.5	177	11.2

Anaemia—Anaemia was found more common in female children, and the blood examination revealed that it was mainly microcytic hypochromic type (Iron deficiency type).

Unlike other similar reports specific nutritional deficiencies were seen in a less number of children in this study. In Sitapur following percentages of deficiencies were seen:—Vit. A 32%, Vit. D 23%, Vit. C 18%, Vit. B complex 16%, and anaemia 12%, whereas in Varanasi Vit. A 33%, Vit. B complex 25%, Vit. D 13%, Vit C 8% and Iron deficiency anaemia 4.2%. Though there was no specific nutritional deficiency most of the children examined in the present study had either poor or fair general nutrition.

Table XV
Enlarged lymph glands

Glands	Male	%	Female	%	Total	%
Cervical	252	31.5	212	27.2	464	29.3
Axillary	1	0.1	—	—	1	0.06
Sub maxillary	10	1.2	3	0.4	13	0.8
Sub mental	1	0.1	—	—	1	0.06
Sub mandibular	1	0.1	2	0.2	3	0.2
Total:	265	33.0	217	27.8	482	30.5

Enlarged lymph glands—Enlarged lymph glands were found in about one third of the children, in majority of them they were in the cervical region in the anterior triangle—so called tonsillar glands. This may be of significance because of a similar number of cases showing enlargement of tonsil (table VIII). In a few cases where posterior triangle lymph glands were enlarged, the cause was the dirty scalp. In no case the glands had the consistency of tuberculosis.

Table XVI
Caries Teeth

	Male	%	Female	%	Total	%
No. with caries	170	21.2	166	21.2	336	21.2

Caries teeth—Caries teeth have not been included in the diagnostic group of nutritional deficiency because there is controversy about the aetiological factor of this condition. The details of the number of caries teeth and their site are not discussed here. Largest number of caries teeth were seen in both sexes under the age of 12 years and very few above that age. Caries teeth are seen in large percentage of school children in Western countries, Australia and New Zealand. In 2 surveys in U.P. it was 37% in Sitapur whereas only 9% in Varanasi. In another study of 345 children in high schools at Calcutta (Haldar & Sundararajan, 1956) caries teeth was found in 23.7% of children. At Bombay 16.9% of the children had caries, largest number being in the 4 to 11 years age group, (30-45%) and above 14 years it was seen constantly in 15% children (Athevle, 1959).

Table XVII
Eye diseases

	Male	%	Female	%	Total	%
Defective vision	39	4.9	75	9.6	114	7.2
Conjunctivitis	24	3.0	13	1.7	37	2.3
Stye	1	0.1	1	0.1	2	0.1
Watering eye	1	0.1	5	0.6	6	0.4
Dilated pupil	1	0.1	—	—	1	0.06
Squint	6	0.7	2	0.2	8	0.5
Corneal opacity	2	0.2	2	0.2	4	0.25
Total:	74	9.2	98	12.5	172	10.9

Eye diseases—10.9% of the children had eye complaints, 7.2% of whom had defective vision. Some of them had glasses but in none the vision was so impaired as to make them unable to benefit from normal class.

Defective vision was more common amongst the female children. Conjunctivitis was the next common condition (2.3%). In U.S.A. 6.3% children had defective vision. Trachoma is not seen in this part, whereas 56% of children had Trachoma in Sitapur and 6% in Varanashi.

Table XVIII
Skin diseases

	Male	%	Female	%	Total	%
Scabies	25	3.1	9	1.1	34	2.1
Ring worm	4	0.5	1	0.1	5	0.3
Eczema	6	0.7	5	0.6	11	0.7
Forunculosis	7	0.9	—	—	7	0.4
Leucoderma	8	1.0	1	0.1	9	0.6
Pityriasis versicolor	2	0.2	—	—	2	0.1
Impetigo	1	0.1	1	0.1	2	0.1
Ulcer	6	0.7	2	0.2	8	0.5
Total:	59	7.4	19	2.4	78	4.9

Skin diseases—Skin diseases are more common amongst toddlers than school children. Only 4.9% of school children had skin diseases at the time of examination and the largest number were suffering from scabies. Leucoderma seems to be an important condition and 8 children suffered from this. In U.S.A. 2.3% of the school children suffered from skin diseases. The nature of skin disease differs in different places. In Varanasi 24% children suffered from skin disease (scabies 15%) whereas in Sitapur it was 9% (boils were most common).

Table XIX
Dental condition (excluding caries)

	Male	%	Female	%	Total	%
Tartar or dirty teeth	42	5.2	10	1.3	52	3.3
Pyorrhoea	5	0.6	2	0.2	7	0.4
Total:	47	5.8	12	1.5	59	3.6

Besides caries teeth, dirty teeth with foul odour were found in 59 children, this was due to neglect of personal care in cleaning of teeth regularly.

Table XX
Ear diseases

	Male	%	Female	%	Total	%
Otorrhoea	28	3.5	15	1.9	43	2.7
Earache	10	1.2	6	0.8	16	1.0
Defective hearing	7	0.9	1	0.1	8	0.5
Wax ear	8	1.0	2	0.2	10	0.6
Total:	53	6.6	24	3.0	77	4.9

Ear diseases—2.7% of the children suffered from chronic otorrhoea. Discharging ear is a very common complaint in infants and toddlers attending the clinics, and in some of them the condition persists until the school age. This may give rise to certain degree of defective hearing which in our series was found only in 8 children.

Table XXI
Male genitals

	Male	%
Phimosis	38	4.7
Balanitis	1	0.1
Inguinal hernia	1	0.1
Total:	40	5.0

Phimosis was found in 38 children (4.7% of male children). It is important to remember that this condition is physiological in infants and toddlers upto the age of 3 years and therefore when the condition is seen in school children it is a case of true phimosis.

Table XXII
Mental and Neurological abnormalities

	Male	%	Female	%	Total	%
Headache	2	0.2	3	0.4	5	0.3
Epilepsy	2	0.2	1	0.1	3	0.2
Bed wetting	12	1.5	5	0.6	17	1.0
Occasional fainting	1	0.1	—	—	1	0.06
Aggressive	1	0.1	—	—	1	0.06
Delayed response	1	0.1	—	—	1	0.06
Teeth grinding	2	0.2	—	—	2	0.1
Total:	21	2.6	9	1.1	30	1.9

Mental abnormalities—There was no case of gross mental retardation in this group of school children. Mental abnormalities included a few cases of mild behaviour disorder. In an American series behaviour and emotional disorders accounted for 5.8% of cases.

Table XXIII
Speech disturbances

	Male	%	Female	%	Total	%
Nasal intonation	4	0.5	—	—	4	0.2
Stammering	6	0.7	1	0.1	7	0.4
Delayed speech	1	0.1	—	—	1	0.06
Defective articulation	2	0.2	—	—	2	0.1
Total:	13	1.6	1	0.1	14	0.9

Speech disturbances—speech disturbances were observed in 13 cases, mainly stammering, but there was no difficulty in continuing studies in the schools meant for normal children. There was no case of complete dumb children.

Table XXIV

Enlargement of Liver and Spleen

	Male	%	Female	%	Total	%
Enlarged Liver	20	2.5	15	1.9	35	2.2
Enlarged spleen	3	0.4	1	0.1	4	0.25
Total:	23	2.9	16	2.0	39	2.5

Enlargement of Liver and Spleen—Liver was found enlarged in 35 cases (2.2%) whereas the spleen was palpable only 4 cases (0.25%) Liver is normally palpable in a large percentage of infants and toddlers but as the child grows older the palpability of liver diminishes. In Sitapur Survey, liver was palpable in 2.5%, and spleen in 1% of cases, whereas Athvale found liver palpable in 63% of his school children at Bombay.

Table XXV

Joint pains

	Male	%	Female	%	Total	%
Joint pains	7	0.9	15	1.9	22	1.4

Joint pains—Rheumatic fever is found uncommon in Calcutta and there was not a single cases of cardiac involvement amongst these children, but 22 cases (1.4%) complained of pain in the joints. In the U.S.A. 6.9% of the school children had cardiac complaints.

Table XXVI

Age of menstruation

Age	Total female students	Number menstruating	Percentage
11	139	5	3.6
12	157	30	19.1
13	75	51	68.0
14	13	11	84.6
15	1	1	100
16	16	16	100
Total:	401	114	28.4

Table XXVII

Age at which menstruation started in these 114 girls

Age	No. Starting menstruation	%
10—11	3	2.6
11—12	20	17.5
12—13	60	52.6
13—14	21	18.5
14—15	9	7.9
15—16	1	0.8

Age of Menstruation—Out of 401 female children between the ages of 11 and 16 years, 114 cases were found to have started menstruation, maximum number were menstruating between the age of 12 and 13 years. There was not a single case menstruating under the age of 10 years. Average age of menstruation in England was found to be 13.73 years which is slightly greater than the average of our groups (12.7 years). It is said that in the tropics girls menstruate earlier, but in a study of 268 Hindu girls by Curzel in 1920, the average of menstruation was found to be 14.12 = ±0.07 years; in our series it was earlier.

Dysmenorrhoea—Out of the 114 female children who were menstruating, 19 girls (16.6%) were complaining of dysmenorrhoea.

Comments

The results of the school medical examination and the nature of the defects may slightly vary if different medical officers conduct the examination and also if the survey is conducted in different seasons of the year. It is always better to conduct the examination by the same medical officer, for getting an uniform picture. The present study was made by the same team and the results obtained are thus quite comparable. This knowledge of the health status and the degree of defects in the school children is extremely important for 3 different purposes.

1. for treating the children at the school clinic and correcting the defects,
2. for the purpose of taking appropriate preventive measures and imparting health education,
3. for establishing a base line for future surveys, in order to evaluate our activities and to formulate future plans to improve the School Health Series.

Summary

Complete history of past and present illnesses were recorded and medical examinations were conducted for 1582 school children in the Chetla area of the city of Calcutta. These are analysed and classified. 82.8% of the children were found defective. Respiratory and gastrointestinal disorders, nutritional deficiencies, enlargement of lymph glands and caries teeth were the main defects observed.

Acknowledgement

We are grateful to Dr. N. Jungalwalla, the then Director, All-India Institute of Hygiene and Public Health for the interest he took in this study; to Dr. (Mrs) Muktha Sen, Professor of Maternal & Child Health and at present Director, All-India Institute of Hygiene and Public Health for her encouragement and permission to publish this paper; Dr. A. K. Banerjee, Officer-in-Charge of Administration, Urban Health Centre, Chetla for his help and support in carrying out this study; Dr. S. C. Seal, then Professor of Epidemiology, All-India Institute of Hygiene and Public Health for his advice; and Dr. (Mrs) K. Majumdar, School Medical Officer for her help in carrying out school medical examination.

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CHOLERA IN PONDICHERRY, 1913-1953

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Pondicherry situated on the Coromandel Coast (East Coast) in latitude 11°, 56' N and longitude 79° 49' E, consists of eight communes and the area of the settlement is 112 square miles. The population in 1948 numbered 2,22,566; and 79.6% of this population lived in 97 main villages and 119 hamlets. The settlement comprises of a number of isolated pieces of territory which are cut off from the main part and surrounded by the district of South Arcot, except where they border on the sea.

The soil is essentially formed of layers of sand and alluvial clay and marine alluviums. There are two torrential rivers flowing in this area, river Ponnear in the south and river Gingee in the north. River Gingee has a torrential flow in rains only, and at a distance of about seven miles from the sea, it bifurcates into two channels. Irrigation is carried out from rivers, tanks, and wells. The main crops are rice, sugarcane and groundnuts. Banana, coconut and mango orchards are very common.

CLIMATE

The climate is hot and humid throughout the year. There are no marked seasons of hot and cold weather. From January to October the day temperature is between 31° to 40°C and night temperature 27° to 29°C. From October to January the day temperature varies from 25° to 32°C. and night temperature from 13° to 20°C. The hottest months are May and June when the maximum temperature is recorded. South-west monsoon is responsible for the rains from June to September and north-east monsoon from October to January. It receives most of its rainfall from the latter, and the average annual rainfall is 40 inches. The relative humidity never falls below 60 per cent.

PEOPLE

The peoples of this establishment are mainly of Dravidian group (Tamil, Telugu and

Malayali). In urban areas there are a good number of Franco-Indians called "Creoles". Hindus constitute 85 per cent of the population, Christians 10 per cent and others 5 per cent.

The main occupations of the people are agriculture, handloom weaving, pottery, coir and toy-making, and toddy tapping. Some are serving in the French army and are posted in various French settlements in South East Asia, Africa and Europe.

The literacy is 23.33 per cent (1948). Rice is the staple diet and country liquor is consumed liberally.

The houses in rural areas are mostly of mud, with thatched/chattai roofing. The water supply is from open wells and tanks. Pondicherry municipality derives its water supply from a series of artesian wells. Latrines are not popular in rural areas. In the urban areas septic tanks are commonly used. The open drains are very conspicuous in the urban areas.

FAIRS AND FESTIVALS

There are four important fairs held in this area. The biggest one is of about 20,000 gathering "Masimagam Fair" held in the month of February. The other important fairs are of Veeranpatium held on every Friday for one month in July, car festival of Villianur and Kader Kanu Fair. The car festival attracts about 20,000 people and lasts for one day only in the month of May.

HISTORICAL

The establishment was founded by the French in 1674, but it was besieged, captured and restored many times by the Dutch and English and finally restored in 1816. The question of morbidity and mortality records did not arise before 1816, just like other parts of India, where the mortality figures of the civil population began to be recorded in some provinces from 1865, and in others from 1877.

CHOLERA IN PONDICHERY 1913-1953

The first health report of French establishment in India was prepared in 1913 but was discontinued between 1928-1938. The available annual reports were utilised for the preparation of this article. The deaths were not recorded by age, sex, religion, rural, urban and commune distribution, so those factors could not be analysed.

It is definite that cholera was prevalent in this area, as in other parts of south India, though no records are available. Rogers (1928) mentions in "Cholera in the Madras Presidency", "that the south-east coast division is comprised of the South Arcot, Trichinopoly, Tanjore, Madura and Tinneveli districts from north to south and includes the most densely

Table I

Monthly Mortality due to cholera in Pondicherry (1913-'53)

Year	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1913	32	28	22	40	6	3	0	2	2	8	9	104	624
1914	366	184	39	12	15	1	1	48	126	145	165	64	1,166
1915	30	67	44	9	0	4	0	0	0	1	0	22	177
1916	34	83	65	3	2	0	1	0	1	1	0	0	190
1917	1	0	0	0	0	0	0	0	1	4	3	7	16
1918	78	45	24	0	65	275	213	27	12	0	25	288	1,052
1919	315	69	30	25	2	37	89	69	38	23	3	4	704
1920	75	185	78	4	0	0	6	22	10	0	0	1	381
1921	5	76	91	10	2	4	1	0	0	0	2	1	192
1922	2	1	0	0	0	0	0	1	2	1	0	1	8
1923	1	1	13	0	0	0	0	0	0	0	0	0	15
1924	Data not available in detail												342
1925	14	15	56	32	10	5	37	28	40	24	95	712	1,068
1926	215	27	9	8	1	1	1	3	2	4	1	2	274
1927	7	4	3	2	0	16	30	13	8	1	5	22	116
1928													379
1929													298
1930													14
1930													706
1931													12
1932													12
1933	Data not available in detail												4
1934													147
1935													202
1936													148
1937													8
1938													32
1939	0	0	0	1	0	0	0	4	0	0	0	0	5
1940	5	1	0	1	0	1	0	0	0	0	0	0	8
1941	2	0	0	0	1	2	0	0	0	0	0	0	5
1942	0	0	0	0	0	0	0	2	0	76	99	100	277
1943	344	148	11	0	0	0	0	0	0	2	8	21	534
1944	34	12	32	0	0	1	1	1	0	0	0	0	81
1945	2	0	0	0	0	2	1	1	0	1	0	0	7
1946	Data not available in detail												0
1947													19
1948	2	11	27	0	0	0	60	96	150	2	0	5	253
1949	18	56	17	1	0	0	0	4	1	0	0	0	97
1950	0	7	17	11	13	31	152	197	52	5	5	22	505
1951	47	57	48	2	1	24	84	166	52	18	0	6	512
1952	6	3	5	0	0	0	0	0	1	0	0	2	17
1953	37	26	5	0	0	0	3	14	2	13	4	8	112
Average	61.92	40.96	23.55	5.96	4.36	15.07	25.22	25.85	18.74	12.22	19.22	61.59	10,807

Note: Average values for each month are calculated taking into account those years, for which detailed data are available.

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1940	5	1	0	1	0	1	0	0	0	0	0	0	8	
1941	2	0	0	0	1	2	0	0	0	0	0	0	5	
1942	0	0	0	0	0	0	0	2	0	76	99	100	277	
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1947	}													19
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1949	18	56	17	1	0	0	0	4	1	0	0	0	97	
1950	0	7	17	11	13	31	152	197	52	5	5	22	505	
1951	47	57	48	2	1	24	84	166	52	18	0	6	512	
1952	6	3	5	0	0	0	0	0	1	0	0	2	17	
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Note: Average values for each month are calculated taking into account those years, for which detailed data are available.

populated, highly irrigated and fertile areas of the Presidency, with much larger death-rate from cholera than any other Madras area". The Pondicherry establishment is surrounded and interspersed by the district of South Arcot, except where it is bordered by the sea. This fact must have been operating in the spread of the cholera epidemic which does not respect any international boundaries. The old history of cholera in all probability is linked with that of the south-east division of Madras.

This establishment is also situated close to the famous pilgrimage centres of Chidambaram and Tiruvannamalai from where outbreaks have been reported in connection with pilgrimages, and often spread by the pilgrims. The effect and spread of old epidemics of cholera in 1875, 1877, 1891, 1897, 1906 and 1908 in the Madras Presidency could not be traced, but from 1913 onwards there is a close relationship between the two areas. The data of South Arcot district which surrounds this establishment are given in table II.

Table II

Annual death rate per mille due to cholera

Year	District South-Arcot Cuddalore	Pondicherry
1941	0.01	0.02
1942	3.8	1.33
1943	2.4	2.54
1944	0.7	0.38
1945	0.01	0.03
1946	0.002	0.00
1947	0.3	0.086
1948	1.6	1.58
1949	0.2	0.43
1950	1.2	2.24
1951	1.2	2.19
1952	0.6	0.07
1953	1.0	0.47

The 1913-14 epidemic started in 1913 with a death-rate of 3.4 per mille and increased with a great intensity, and the death rate doubled itself in 1914 to 6.33 per mille. This visitation was followed by a gradual decline in 1915-17 and with a severe outbreak in 1918 when the death rate reached 5.62 per mille, though it was less than the 1914 epidemic.

The next very high incidence in the establishment occurred in 1925 and 1931. After that there has been a continuous gradual decline

with occasional exacerbations in 1943, 1950 and 1951 but the mortality never reached the pre-1931 levels.

During the period of forty-one years from 1913-1953 a total of 10,807 deaths from cholera have been recorded (Table I), the average being 263 deaths per year. The average annual death-rate from cholera for the period comes to 1.33 per mille. The annual mortality from cholera expressed as percentage of total mortality from all causes for (1949-1953) five years before merger works out to 3.3 per cent *i.e.* 3 out of every 100 deaths were due to cholera. The percentage of cholera deaths to total deaths for British India for ten years (1932-1941) was 2.4 (Health survey and development committee report 1946).

PREVALENCE OF CHOLERA

(1) *Secular trend*

From Table I it is clear that the disease has been more or less constantly present in the area. The mortality from cholera was highest in 1914, *i.e.* 6.33 per mille and lowest in 1946 *i.e.* nil per mille.

Cholera increases in the months of November-December and continues in epidemic form in the cold weather months of the following year, and this may cause an increase in the annual rate per mille over two years as the result of a single epidemic in the latter part of the first year and first half of the second year, thus producing two successive years of incidence above the average rates. If the epidemic did not subside it produced three years of incidence above average.

Quinquennial averages (deaths and death-rates) for the period 1913-1953 are shown in Table III.

Quinquennial averages (deaths and death rates) for the period 1913-1953 in Pondicherry settlement.

Table III

Period	Average Annual deaths	Average death rate per 1000 Population
1913—1917	434.6	2.34
1918—1922	467.2	2.47
1923—1927	363.0	1.88
1928—1932	281.8	1.43
1933—1937	101.8	0.50
1938—1942	65.4	0.32
1943—1947	128.2	0.59
1948—1952	296.8	1.30

In spite of the smoothing introduced by averaging five-yearly period, the range of variation in the deaths and death-rates is extensive, the highest and lowest rates being 2.47 and 0.32 for the 1918-1922, and 1938-1942 quinquennials respectively.

The annual mortality and the quinquennial averages show that the type of severe epidemics as of the early years from 1913 to 1932 are now less frequent, and there is a reduction in the cholera mortality except for the two exacerbations of 1942-1944 and 1948-1951. The reduction in the mortality is noticed from the year 1931. The introduction of chemotherapeutic agents and mass inoculations during war years of 1939-1945 may be responsible for this decline.

CYCLIC PERIODICITY

Bellow (quoted by Russel and Sundarajan) in 1884, produced statistics from every province in India, relating to the period 1862-1881 in order to prove that the disease appeared in triennial waves. He attempted to show that cholera tends to run a definite course of revival, decline and subsidence in the successive years of each triennial cycle.

Russel and Sundarajan (*loc cit*) applied the method of periodogram analysis to the monthly mortality figures for each of the three group areas of Madras Presidency viz. Northern, Southern and Central district groups, and observed that the annual periodicity is apparent at the 12, 24, 36 etc., month period, but by far the highest amplitude is reached at about the 72 month period in each case. He inferred that cholera in the Madras Presidency, over the period of years under examination has passed through a 6-yearly cycle.

Rogers (1928) made a study of cholera death-rates in some 200 districts and 45 divisions of India, for a period of 45 years and concluded that in India cholera epidemics occur at irregular intervals, the main causative factors being low autumn and winter rainfall of the previous years, high winter absolute humidity, and the influence of pilgrimages to and from places in endemic areas.

From the mortality rates over the period 1913-1953 and keeping in view the fact that the duration of each epidemic has been from 1-3 years at a time, one finds that there is an annual periodicity, and the highest amplitudes are met with at 36, 48, 60 month intervals

except from 1932-1942. One may conclude that cholera in Pondicherry establishment occurs at irregular intervals.

SEASONAL VARIATION

Numerous writers have observed the relationship between cholera and climate such as rainfall, humidity, temperature and pressure. Cholera has a regular seasonal periodicity in this area; just like other parts of the country. The average monthly cholera mortality for the period 1913-1953 is shown in Table IV.

Table IV

Death rate due to cholera per mille in three seasons in Pondicherry

Year	South-West monsoon June to September	North-east monsoon October to January	Inter mon- soon period February to May
1913	0.071	2.806	0.523
1914	0.955	4.016	1.357
1915	0.002	0.286	0.649
1916	0.001	0.188	0.824
1917	0.005	0.060	0.000
1918	2.814	2.088	0.715
1919	1.239	1.835	0.670
1920	0.201	0.403	1.414
1921	0.026	0.042	0.944
1922	0.016	0.021	0.005
1923	0.000	0.005	0.073
1924	Data	Not	Available
1925	0.0571	4.388	0.587
1926	0.036	1.148	0.233
1927	0.345	0.206	0.062
1928 } to } 1938 }	Data	Not	Available
1939	0.020	0.000	0.005
1940	0.005	0.024	0.010
1941	0.010	0.009	0.005
1942	0.009	1.327	0.000
1943	0.000	1.787	0.757
1944	0.014	0.160	0.207
1945	0.019	0.014	0.009
1946 } 1947 }	Data	Not	Available
1948	1.375	0.040	0.171
1949	0.002	0.080	0.329
1950	1.897	0.141	0.211
1951	1.416	0.308	0.469
1952	0.004	0.034	0.034
1953	0.008	0.263	0.132

TEMPERATURE

The temperature in Pondicherry establishment even in the coldest seasons of the year never falls below 25°C. A minimum temperature of 25°C is not sufficient to inhibit the

growth of the cholera bacillus. In this area the maximum outbreaks of cholera occur in the coolest months of the year December to February unlike the other parts of the country where the peak is reached in summer.

RAINFALL

Pondicherry establishment is affected by both the monsoons, south west from June to September and north east from October to January, but it receives its maximum rainfall from the latter. The mortality data were grouped according to the two monsoons and inter-monsoon period (Table IV) and it has been observed that the cholera incidence shows two fluctuations like the two periods of rainfall (graph 1). The disease is however maxi-

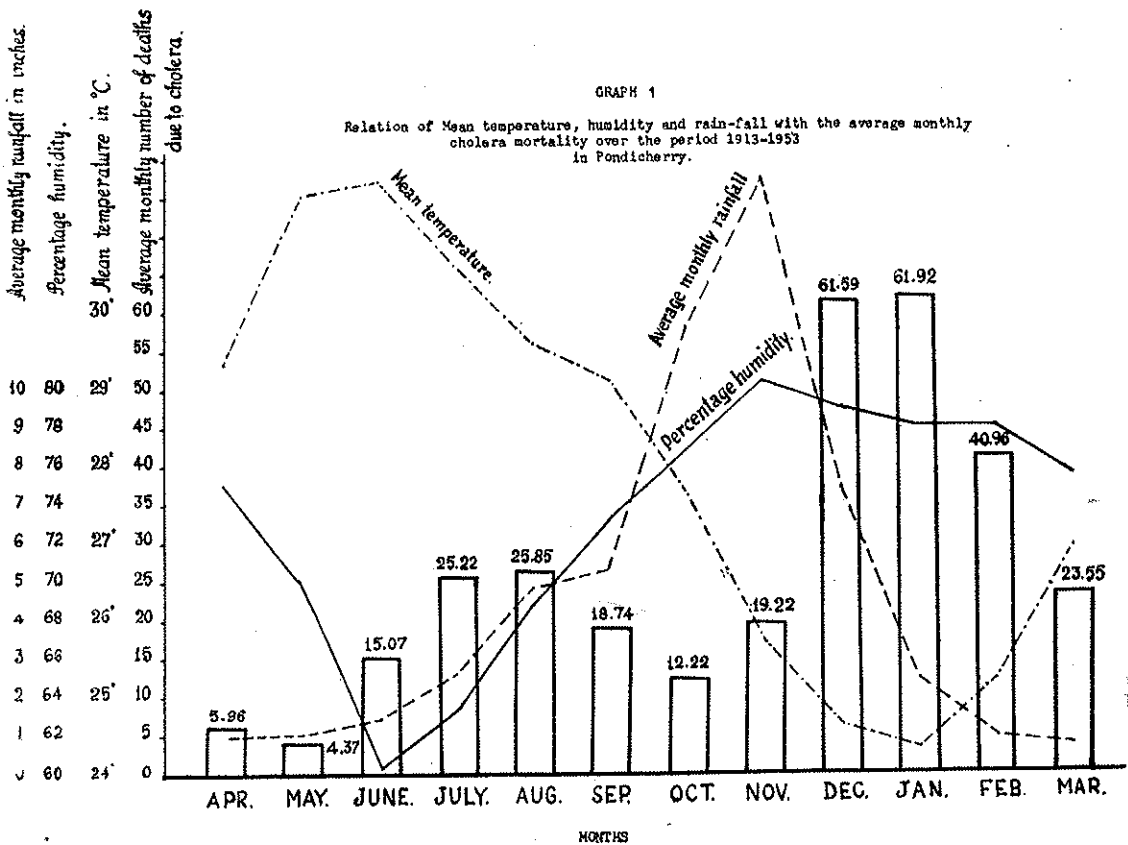
HUMIDITY

Rogers (1928) observed that there is a regular great decline or disappearance of the disease in all parts of India when the absolute humidity falls to or below 0.400, such great dryness of the atmosphere preventing the epidemic prevalence of the disease.

In Pondicherry which lies in the south east division, the average monthly relative humidity never falls below 60% which is not low enough to produce the decline of cholera incidence.

Russel and Sundararajan (1928) analysed the correlations of temperature, humidity, rainfall, and pressure for this southern group and inferred that—

1. Rainfall has a significant negative effect



mum following the north east monsoon than south west.

The cholera mortality is highest, one to two months after the onset of north east monsoon, then there is a gradual fall and a smaller rise in July August followed by a decline, and the cycle repeats itself.

2. Humidity has a slight positive effect
3. Temperature has a highly significant negative effect
4. Pressure has a slight negative effect

The correlation co-efficients of the cholera mortality with the temperature, humidity and

rainfall were determined for this area and are given in Table V.

Table V

Correlation coefficients between cholera mortality and climatic factors in Pondicherry

Factors	Lag 0	Lag 1	Lag 2
rCT	-0.76	-0.57	-0.21
rCH	+0.38	+0.36	+0.33
CR	-0.01	+0.60	+0.89

r=C. Co-eff. C=Cholera. T=Temp.
H=Humidity. R=Rainfall.
Lag 0, Lag₁, Lag₂ indicate zero, one and two months lag.

It can be inferred from the above table that

1. Temperature has got a negative significant effect, but as the number of months in the lag increases, there may not be any significant correlation.

2. Humidity has a positive effect and there is no lag and the correlation decreases as the number of months of lag increases.

3. Rainfall has a negative effect, and a maximum correlation exists between cholera and rainfall with a two month lag.

Seasonal relationship of humidity, temperature and rainfall to cholera mortality are shown in graph 1.

ENDEMICITY

Rogers (1928) considered an area to be hyperendemic if the lowest annual rate never fell below one-tenth of the average rate for 30 years (the period he studied). According to this criteria the annual rates have been lower for 14 years than the one-tenth average rates of forty-one years of this area. The area cannot be classed as hyperendemic. He considered the area endemic if the disease had never been absent for one year during the 30 years, (the period he studied) and the humidity never fell below 0.400 throughout the year. According to these suggested criteria, the data were analysed for 41 years (the period under study) and it was found that cholera was absent only in one year in 1946, and if 1-2 deaths in any month are also taken as absence of cholera during that month, then cholera has been absent for 3 years out of the 41 years under study. So the area cannot be classified as endemic.

In accordance with the criteria suggested in India by Raja (1943) for classification of areas into endemic, intermediate and non-endemic areas, percentage of months without cholera are taken into consideration, viz.

- Endemic
 - ... less than 30 per cent
- Intermediate
 - ... 30-50 per cent
- Non-endemic
 - ... over 50 per cent

On the basis of percentage of month without cholera (for the period under study) this area falls under Intermediate area viz. 36% of months without cholera, and if 1-2 deaths are also taken as absence of disease then it falls into non-endemic area viz. 57.4% of month without cholera.

The second criteria suggested in India for the determination of endemic areas is that mean length in months of intervals between prevalence of cholera should be less than 2.5.

On estimation it was found that the area does not fall in the endemic group. Data required for determining the endemicity are given in Table VI.

Table VI

Showing data for determination of endemicity

Data of endemicity	Pondicherry establishment
1. Total number of months in which establishment was free during the 27 years under study (324 months) ...	118
2. Percentage of months without cholera ...	36.4%
3. Mean length in months of intervals between prevalence of cholera. ...	4.2 months
1913-1923 ...	4.2 months
**1939-1945 ...	9
1948-1953 ...	2.8 "
4. Maximum period of freedom from cholera at any one time, in months... ..	12
5. Total No. of such periods ...	1
6. Average death rate per mille for 41 years ...	1.33
7. Lowest annual death rate during 1913-1953 ...	0.0

Some other factors which might have been helping in the spread of the disease are various religious fairs and festivals. This area is close to some important holy places, and one fair is held locally lasting for one month in July.

Free movements of local residents to the neighbouring S.E.A. countries (endemic cholera areas) for service and business was quite. The small rise in cholera mortality in July-August may be due to rise in fly population and the Veeranpatam fair.

However, some of the distinguishing features of cholera endemic area are present viz., coastal area, high humidity, rice eating population supplemented by poor nutrition, low socio economic condition, low percentage of literacy and insanitary wells and tanks, inadequate public health measures and migration of people to and from South-East Asian countries. The area might be taken as in between endemic and non endemic area.

ORGANIZATION AND CONTROL

Before merger there was integration of medical and public health services in the 20 rural dispensaries in the various communes. There was no separate public health department with its field staff existing in this establishment for rural area. The medical officers of the nearest rural dispensaries were supposed to be informed of any infectious disease case and they used to take the necessary preventive measures and inform the D.M.S. telegraphically. In urban areas there was a local health authority with its field staff for the control of epidemics.

In 1935 two mobile units were established to control the epidemic disease and later disbanded in 1944. During that period there was conspicuously low mortality and absence of epidemics, proving the utility of such units. After the de-facto transfer of Pondicherry in November 1954 and taking over the administration, the Government of India have become fully aware of the needs of the people and the state government have been striving to develop the state and promote the welfare of the people on a priority basis.

The planned development of India which had been embarked upon under the various five year plans was also extended to this newly merged state. The first five year plan was completed in March '56 and the second five year plan is now in operation. Under these plans the entire rural area of Pondicherry

establishment was covered by the National Extension Service Blocks and later converted into community development blocks.

The public health programmes in the blocks concentrated on the prevention of epidemic by health education and introduction of preventive measures through their field staff. All available evidence shows that the cholera case alone is the major factor in disseminating infection and contact carriers and infected water sources from the case may act as intermediaries, (Taylor 1941). The control of environmental sanitation is still one of the important sheet anchors in the control of cholera epidemics and so schemes for providing safe water supplies in the rural areas were introduced as important steps in the prevention of epidemics. 206 new sanitary wells were constructed and 39 old wells were renovated. The construction of rural overhead tanks for protected water supply is one of the most popular item of the programme. 12 overhead tanks each of one thousand gallons capacity have been constructed and many more are still to be taken up. This has been possible because of rural electrification scheme which is progressing at a very rapid pace and has already electrified 71% of the villages of this establishment.

All these overhead tanks are filled by electrically operated tube wells, as and when required by the villagers. The scheme for regularly chlorinating all these tanks is under consideration to give an added protection against water-borne diseases.

The introduction of pure water supply schemes and a simultaneous general improvement of environmental sanitation, added with health education programmes through the community project development schemes shall it is hoped, prevent all the water-borne epidemics, especially cholera, in spite of this establishment being situated and surrounded by cholera endemic zones.

SUMMARY

1. Epidemiology of cholera in Pondicherry establishment based on the available records of 41 years (1913-1953) data has been discussed.
2. There has been a decline in cholera after 1931 with lesser number of severe epidemics.
3. Cholera epidemics occur at irregular intervals in this establishment without any

A LATRINE FOR USE IN RURAL AREAS

definite long term periodicity. The annual cholera wave shows a double rise with a peak in December-March and smaller peak in July-August. The incidence is low in other months.

4. The disease is maximum after one to two months of the onset of the north east monsoon, the main rainy season of the area. The humidity never falls below 60% to produce a decline of cholera incidence.
5. The data for endemicity has been discussed and according to the criteria suggested in India for the endemicity of cholera, the this establishment falls in the intermediate group.
6. Organization and control of cholera has been discussed. Provision of safe water supply in the rural areas as a permanent sanitary measure shall go a long way in the prevention of epidemics and eradication of the disease.

ACKNOWLEDGEMENT

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A LATRINE FOR USE IN RURAL AREAS

By

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Introduction

Gastro-intestinal diseases have been the cause of a large number of deaths every year in India. These diseases have been controlled and even eradicated in many advanced countries of the West. The mode of transmission of these diseases has been established long back and scientific 'know how' for the control of these diseases has been known for sometime. Disease germs are excreted by sick persons. Fresh infection takes place through the ingestion of food or water which

has been contaminated with faeces containing these germs. Science of immunology has given mankind methods of imparting temporary and partial protection against some of these diseases like cholera and typhoid. A more permanent and better measure is the sanitary protection of food and drink. Satisfactory collection and disposal of human excreta is, perhaps, the most important factor in the control and eradication of these diseases.

Apart from gastro-intestinal diseases a large portion of our population suffer due to worm infestation. Hookworm and ascaris

infections are very high amongst our rural population—in some regions it is of the order of 80%. The vitality of the infested person is badly affected and the victims are incapacitated and so output in farms is very low. Man gets the infection through soil contamination and the only satisfactory control of the disease lies in the safe collection and disposal of human excreta. A satisfactory sanitation programme is therefore urgent, and needs encouragement from all concerned.

It is often said that India lives in villages. Latrines are almost unknown in villages. The few villagers who have seen or used a latrine often associate a latrine with a dirty place with a lot of stench. They are hostile towards it. Yet the solution to their ill-health lies in the use of latrines. There is no reason why they should be hostile to latrines if these were sanitary and clean. A study of the different types of latrines clearly indicates that the rural latrine is often defective, and the villager can not be blamed for his hostile attitude. It is therefore pertinent to pose a question 'is it not possible to build a clean and sanitary latrine in villages?' This latrine has to be cheap, made of indigenous materials, with the help of local labour, and above all has to be a sanitary latrine.

Need for a study

A latrine which is considered satisfactory in an urban area may not be so in rural area due to various reasons of which absence of piped water for flushing of latrines is the most important reason. Indian Council of Medical Research rightly stressed upon the importance of a study of the different types of latrines as are in use in rural India with a view to evolving a satisfactory and cheap latrine for use in these areas. I.C.M.R. therefore financed an enquiry in 1957 and a field unit was located at Singur, a village 22 miles from Calcutta. The All-India Institute of Hygiene and Public Health has its rural practice field at Singur and certain facilities were already available at this Centre for undertaking the study. This study was terminated in March 1959.

Type of Latrine

Different types of latrines were studied and the suitability of their use in rural areas was

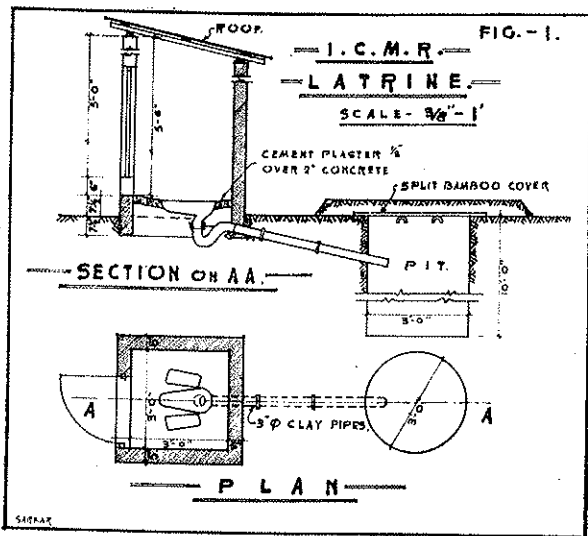
considered. The principal criteria for the selection of the type were:

- (i) Excreta should not be exposed to flies.
- (ii) Soil and water contamination must be avoided.
- (iii) It should be cheap.
- (iv) It should be made of materials readily available in the area with the help of local labourers.
- (v) It should be acceptable to the villagers.

Dug well latrines were considered the most suitable type of latrine for the villages in the region. Such latrines which were built by the Singur Health Centre in the villages in and around Singur consisted of a pit 30" in diameter dug in earth to a depth of 8'-12' and a water seal squatting plate placed above it. A superstructure was built to give the necessary privacy required in the use of the latrines. Quite a number of such latrines had been built previously in the area by the Health Centre. The villagers complained that it was difficult to keep the pans clean and in most cases needed more than one-half gallon of water to obtain an effective flushing. Moreover in loose soils if the sides of wells were not lined they sometimes collapsed during the monsoon. The seat, if directly placed over the well, caved in with the collapse of the sides. With the latrine seat being placed away from the pit the danger to the caving in of the seat was eliminated and villagers felt more safe in using these latrines. This was considered a desirable modification since it also allowed a second pit to be dug and connected to the latrine pan without disturbing the seat or the superstructure. A dug well of dimensions stated above has a limited capacity and normally gets filled up in course of four to five years when used regularly by a family of five to six members. The modifications allowed the discharges of the latrine to be switched on to the second pit when the first one got filled up. By the time the second pit would be full the first pit could be desludged and used again. Such an arrangement allowed use of more permanent type of superstructures for the latrine. The merits derived outweighed the extra cost. Thus the

dugwell latrine with the above modifications (fig. 1) was recommended as the most suitable

experimental latrines were next installed in the compound of the Health Centre. These were put to field test to observe the ease of flushing. The common defects found in these were as follows:



1. Water required for effective flushing was more than one-half gallon.
2. Repeated flushing was needed in order to get a clean pan.
3. Splashing of water in the trap was observed when the latrine was used.
4. Splashing of urine and thereby fouling of seats was also noticed during the use of latrine.

latrine for the region, and should be so for other regions also where soil conditions permitted digging of pits of stated dimensions within reasonable cost.

All the pans that were tested had one or more defects in respect of the above mentioned criteria. The RCA design was found to be the most satisfactory one, amongst those tested. The pans were however heavy and casting of these required much care and therefore needed the help of a skilled mason. Breakages were not uncommon while removing the casts from the mould. A cement plaster was needed to give the necessary finish.

Pan and trap

With the modifications of the latrine the water seal squatting plates which were used with the conventional type, needed certain changes. A pan and a trap which could be connected to the well with a few connecting pieces of three inch diameter soil (earthen) pipes, were considered necessary. The floor may be built in situ with the pan in position.

The unit therefore considered minor modifications of the dimensions of this pan, and mould for casting the same. After several modifications, a suitable design was evolved. The shape of the proposed pan was similar to the commercially produced porcelain pan and was appealing to the villagers. The mould was a simpler one to assemble and the pans were very much lighter in weight in comparison to those of other designs.

Since the pans were to be hand flushed a very small depth of water seal (five-sixteenth inch) was provided in the trap.

Geometry of pan

The geometry of the pan is of great importance since small quantities of water are to be used for flushing of these pans. Contacts were made with different centres in India to provide the unit with pans and moulds used in their regions. A few of these were obtained and scale drawings of the pans used by some other centres were received. These

Table 1

Weight of pan and trap.

Design.	Finish.	Pan.	Trap.
ICMR	Cement	10. lbs.	4.5 lbs.
	Mosaic	14 lbs.	5 lbs.
RcA	Cement	21 lbs.	5 „

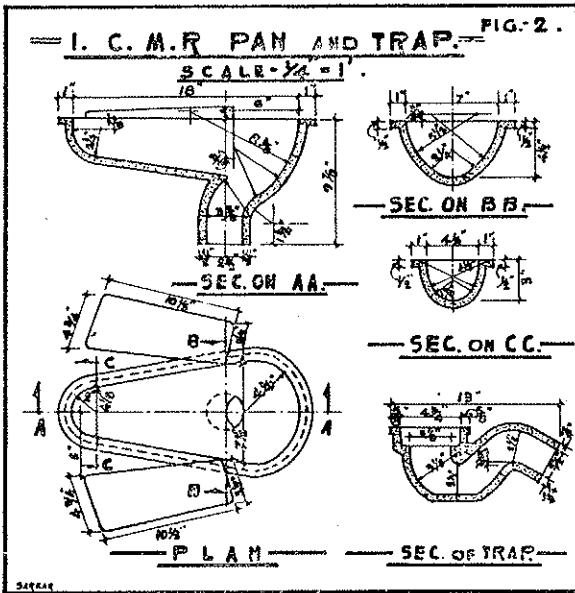
It was also possible to get correct dimensions in each cast with the new mould. The cast was obtained in one piece. The shape and size of the mould, pan and trap are given in figure 2. The details of RCA pan and trap are also given in figure 3 for com-

The outer mould was made of two pieces and jointed by two bolts at the ends so that the two pieces could be separated (horizontally) to facilitate the removal of pan.

Casting technique

The pan was cast in 'press and lift' system. Both inner and outer moulds were first smeared with a thick layer of oil (crude or kerosene oil). Cement and sand mortar in the proportion of 1:2 (for mosaic 1 part *dana* 1 part cement and colour in proportion to the texture desired) was placed on the inner side of the outer mould with a trowel (same way as plaster is laid on a wall). The inner mould was then placed in from the top and pressed to its position. The two moulds in this position were then turned over and the neck of the pan was cast by pouring mortar in the annular space between the inner and outer moulds, and tamped.

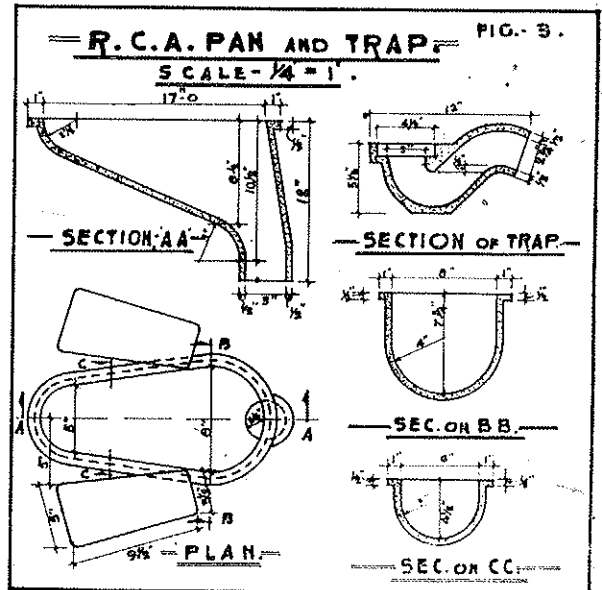
The moulds were then left for 15 to 20 minutes depending on the weather, and the consistency of the mortar, and then the moulds were turned over and the inner mould was



parison. It should be evident by examining these two figures that the two designs are more or less similar except for certain minor differences. It may be noted that in the ICMR design the centre of the arc at the rear is just above the outer edge of the neck leading to the trap (see fig. 2). Night-soil falls directly into the water in the trap. The chances of the faecal matter dropping on the pan surface when the latrine is used are very much less. Flushing becomes easier this way. Inside front slope of the pan surface is flatter than that in RCA pan. It was feared that this might result in an ineffective flushing but subsequent field testing proved otherwise. The foot rests are seven inches apart at the heel end and ten inches apart at the toe end. The dimensions were found quite satisfactory.

The mould

The moulds were made of teakwood and were in two parts (a) the inner mould and (b) the outer mould. The inner mould was made in one piece.



removed. The pan with outer mould was then left again for sometime to dry up. As the

A LATRINE FOR USE IN RURAL AREAS

pan started drying, dry neat cement screened through fine cloth was spread over the inner surface of the pan and brushed with a soft camel brush or fine cloth. The cast was left for the night and then was put into water next morning for curing for 8 days. For mosaic casting the pan was kept immersed in water for two days. It was then polished and cured again for six days. The mosaic finish presented a much smoother surface than the cement one, and compared well with the glazed finish of the commercial pans.

It was also possible to obtain different colours for the pans. These mosaic pans were made of three colours light grey, light brown, and light green. It was difficult to decide on the choice of colour since the villagers were divided in their opinion and it was thought that it would be desirable to have the pans stocked in all the three colours so that they could have their choice.

The trap was cast in two halves and jointed by cement grouting next morning. It was then cured in water for 8 days.

Due to the irregular shape of the neck the casting required special care particularly for the removal of inner mould for the neck before the final setting started and the removal of outer mould next morning. Difficulties were experienced at the beginning and there were quite a few breakages. The labourers themselves gradually got used to the technique and thereafter the job was done satisfactorily and breakages were few.

Materials and cost

Materials used in the making of these pans and traps are summarised in the Table below.

Table II

Material requirements of Pan and Trap.

Materials	Pan		Trap	
	Cement finish	Mosaic finish	Cement finish	Mosaic finish
Sand	0.10 cft.	—	0.048 cft.	—
Cement	0.05 cft.	0.08 cft.	0.024 cft.	0.033 cft.
Marble chips.	—	0.08 cft.	—	0.033 cft.

A cost analysis of making these pans and traps is given below.

Table III
Break up of cost.

	Pan		Trap	
	Cement finish	Mosaic finish	Cement finish	Mosaic finish
Materials	0.33	0.94	0.20	0.42
Labour	0.75	3.12	0.25	1.25
Contingencies	0.11	0.11	0.06	0.06
Breakages	0.06	—	0.06	—
Depreciation of mould.	0.25	0.25	0.12	0.12
Total:	Rs. 1.50	4.42	0.69	1.85

Breakages were few, and since the moulds were made of seasoned teakwood, there was very little of depreciation.

After these pans and traps had been tested at the centre, a few of these were installed in latrines built in village homes in and around Singur. The following centres were also provided with pans and traps for field testing.

1. RCA projects at Poonamallee and Najafgarh.
2. Friends Society, Barapalli.
3. Director of Public Health, Bombay.
4. Christian Medical College, Ludhiana.

The latrines that have been built in and around Singur were inspected frequently to note the performance of these pans and the reactions of the villagers using them. They were satisfied with their performance. A few reports were also received from outside agencies, stated earlier, to whom these pans and traps were sent. Some suggestions for improving the pan were also received. The final dimensions are given in figure 2. It was then considered that the design be approved and recommended for use with dugwell latrines in regions where such latrines were feasible.

Conclusions

Cost of latrine with the type of pans and trap recommended in this paper is approximately Rs. 15/- without the superstructure. The cost is still prohibitive considering the finances available with the villagers. Sanitation is the keystone for controlling gastro-intestinal diseases. Unless the price is brought down further it may not be possible to popularise these latrines in the villages. A part of the cost should be met by Gram

Panchayats or other agencies. A cheaper latrine today may be inferior to one suggested above and will cause nuisance in the area. Villagers who are already hostile to the presence of latrines in the vicinity of their homes may be further disappointed when inferior latrines are installed, and this will be a retrograde step in sanitation. A good latrine, well used, is the best publicity for latrine in the villages. It is therefore suggested that the dugwell latrines be subsidised; amounts depending upon local conditions.

Mass scale production of pans should bring down the price. Mass scale production in factories is feasible. Sufficient demand needs to be created to encourage private or public sector to manufacture these on a commercial scale. In the meantime, the health centres may have them made at one or two centres within the area from where these could be distributed to the villagers. The number of such centralised casting stations will depend upon local conditions particularly on the transport facilities available in the area. It is also felt that a few local villagers be trained to cast these pans and traps, and a few others to dig the hole and fit the pan and trap in

correct position. A great deal of health education will be necessary not only through trained health educators but also through all categories of staff at the Health Centres. The authors sincerely hope that health workers and social workers of the country would take up the challenge and try to root out diseases in the villages.

Acknowledgement

Authors wish to express their thanks to the different workers at the Singur Health Centre who had extended their assistance to the unit in conducting the study. They are particularly indebted to Sri A. V. Rao and Sri M. V. Suryaprakasam, Sanitary Engineers of the Centre who were directly supervising the field work. They also wish to acknowledge their thanks to I.C.M.R. which financed the enquiry, and to the Director of the All-India Institute of Hygiene and Public Health who not only permitted the authors to undertake the study but showed considerable interest in the project and gave continued encouragement in their work. Thanks are also due to the different organisations which sent valuable materials and suggestions for the study.

A STUDY OF THE RECENT RISE OF SMALL-POX CASES IN THE MADRAS CITY

BY

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There has been a rise in the incidence of small-pox in the city of Madras in recent years. This was brought to the notice of the Small-pox Committee at its meeting held at Madras in April 1960. In this connection it may be stated that this city has always been an endemic centre of Small-pox, and among the recent studies on this problem may be mentioned those of Pandit, Masilamani, Krishnan and Seal (1959) and of Rao *et al* (1960). As it was reported that cases had been occurring even amongst persons supposed to have been revaccinated more than once, an investigation into the problem was considered necessary. Accordingly the author was deputed

by the Director General of Health Services, New Delhi to carry out an investigation, the results of which are being reported in this paper.

PLAN OF STUDY

The following lines of investigation were undertaken:

1. Trends of small-pox incidence in the city of Madras during the last several years from the available records.
2. Recent admissions of small-pox cases in the infectious diseases hospital with regard to their age, sex, dates of onset, immunity status prior to symptoms etc.

3. Area of distribution and concentration of cases by spot mapping and proposed visits to the areas for local investigations from the next year.
4. System of vaccination and of recording adopted by the health staff of the Madras Corporation as obtained from the records available at the Birth and Death Registration and Vaccination Centres.
5. Administrative set up for vaccination and re-vaccination programme, staff position, full difficulties and existing lacunae in their overall execution.
6. Results of investigation, if any, already undertaken.
7. Visits to the various lymph production centres to study the methods adopted for the preparation, standardisation and preservation of the vaccine lymph, dilution at which it was being used in the field and procedures adopted for distribution and disposal of the unused lymphs, etc.
8. Selection of certain batches of lymph vaccine distributed to vaccinators, and follow up of results in the field obtained with those batches in respect of primary and revaccination cases and insertion successes.
9. Analysis of the data thus pooled to bring forward the factors considered to be responsible for the prevalence of small-pox in the city of Madras, particularly amongst the revaccinated population, and accordingly to base the recommendations. The results of the above lines of study are given below:

RESULT

(a) *Recent trends of small-pox in the Madras City.*

(i) The attacks and deaths from small-pox in the Madras city for the last 32 years are given in Table I.

(ii) The monthly distribution of small-pox cases for the years 1957, 1958 and 1959 is given in Table II.

It is clear from Table II that the city is highly endemic for small-pox, the cases occurring throughout the year. The rise in the incidence commences from September and ends in a peak in the months of March and April as will be seen from the records of 1957 and 1958. In 1959, however, the highest inci-

dence occurred in September rather than in March or April.

Table I.

Attacks and death from Smallpox in Madras city Between 1928 and 1960

Year	Attacks	Deaths
1928	1,066	251
1929	2,019	506
1930	877	188
1931	190	24
1932	842	176
1933	3,503	837
1934	638	131
1935	295	59
1936	37	3
1937	756	196
1938	2,110	561
1939	992	268
1940	98	31
1941	28	5
1942	60	18
1943	65	13
1944	545	128
1945	1,049	192
1946	823	162
1947	128	20
1948	82	12
1949	1,045	171
1950	4,432	882
1951	2,349	449
1952	647	122
1953	517	96
1954	1,214	277
1955	167	28
1956	189	50
1957	1,720	365
1958	4,869	1,260
1959	2,133	443
Upto end of April, 1960	*866	*164

* The latest figure supplied on 10th June, 1960.

(ii) The monthly distribution of smallpox cases for the the years 1957, 1958 and 1959 is given in Table II.

Table II.

Distribution of Attacks and Deaths from Smallpox during 1957, 1958 & 1959 by Months

Months	1957		1958		1959	
	A	D	A	D	A	D
January	30	4	532	123	211	47
February	32	2	613	154	173	28
March	195	29	616	171	220	47
April	251	47	652	169	196	46
May	122	35	412	135	116	30
June	64	13	291	82	80	10
July	78	18	446	100	121	22
August	99	18	370	120	277	52
September	138	32	237	48	285	60
October	178	46	268	61	207	53
November	188	51	211	46	116	31
December	346	70	211	51	136	17

(iii) The numbers of attacks and deaths from small-pox removed from the neighbouring mofussil areas to the City Infectious Diseases Hospital during 1958 and 1959 are given in Table III.

Table III.

Months	1958		1959	
	A	D	A	D
January ...	40	8	34	8
February ...	82	11	38	10
March ...	101	23	64	10
April ...	121	24	79	13
May ...	50	20	37	9
June ...	20	2	18	3
July ...	48	7	26	5
August ...	69	5	19	2
September ...	46	6	16	6
October ...	31	6	19	3
November ...	15	8	6	2
December ...	6	2	15	3

The data in Table III indicate that the neighbouring mofussil areas are as much endemic as the city itself with the difference that the mofussil areas are still maintaining the typical seasonal incidence. The records also show that there must have been to and fro movement of the small-pox cases between the city and the neighbouring mofussil areas.

2. *Incidence of small-pox cases in 1960 and vaccination status of cases admitted to Infectious Diseases Hospital*

According to the records obtained from the Superintendent of the I. D. Hospital, Madras, the admissions between 1st January and 30th April, 1960 included 372 unvaccinated and 465 vaccinated persons. The re-vaccination status of the 465 vaccinated cases is given in Table IV.

Table IV.

Revaccination Status, before Attack of 465 Vaccinated Cases Between 1st January to 30th April, 1960.

	R. V. Successful	R. V. not Successful	R. V. No. marks.
More than two years	9		
Within two years	1	22	
Within incubation period	7	78	346

It will be seen from Table IV that of 117 cases in which re-vaccination was done only 10 cases can be reckoned as fully protected due to re-vaccination, of the 23 cases re-vaccinated within 2 years only one was successful. In the rest 85 cases the re-vaccination was done during the incubation period and hence full benefit of the protection could not be secured by them. On the other hand, it must also be recognised that these 85 cases form only a small part of many thousands of re-vaccinations done during the prevalence of an epidemic. Again, of the 10 cases, the majority had the re-vaccination successful more than two years ago and these cases evidently lost their immunity. The other 348 cases which had no marks after supposed re-vaccination obviously had no immunity. This is to be expected as the programme of re-vaccination is not carried out systematically at planned intervals of time in the city. In order to further assess the status of re-vaccination, in relation to the clinical conditions of cases, the records of 304 patients which were made available to the author were further analysed and the results are given below:

(i) Chronological order of cases.

The weekly chronological order of cases according to the 1st symptom of fever is given in Table V.

Table V.

Chronological Order of Cases Admitted to the I. D. Hospital by Weeks

Week ending	No. of cases	Week ending	No. of cases
7.1.60	2	17.3.60	9
14.1.60	6	24.3.60	14
21.1.60	4	31.3.60	16
28.1.60	2	7.4.60	15
4.2.60	5	14.4.60	24
11.2.60	25	21.4.60	24
18.2.60	31	28.4.60	40
25.2.60	17	5.5.60	36
13.3.60	9	12.5.60	21
10.3.60	10		
			304

It will be seen from the above that there are two peaks in the incidence; the smaller peak in the middle of February and the larger peak towards the end of April and beginning of May, 1960.

(ii) Age incidence.

The incidence of cases by different age groups is given in Table VI.

Table VI.

Distribution of cases by age Groups (Vaccinated and Unvaccinated)

Age groups	No. of cases	Age groups	No. of cases
Less than 1 yr.	18	Less than 10 yrs.	11
" " 2 yrs.	12	" " 15 yrs.	22
" " 3 yrs.	8	" " 25 yrs.	82
" " 4 yrs.	10	" " 35 yrs.	69
" " 5 yrs.	14	" " 45 yrs.	32
" " 7 yrs.	14	Above 45 yrs.	17
			304

The distribution of cases by age-groups clearly shows that the brunt of attack falls on the age-groups between 15 to 45 years. The next group in order of incidence is the infants. Of the 18 infants who got the disease, all were unvaccinated, except two who were vaccinated during the incubation period, one having discrete and the other confluent type. The incidence in the age-groups between 15 to 45 years is apparently due to loss of immunity after primary vaccination in infancy.

(iii) Sex distribution.

Of 304 cases, 159 (52.3%) were males and 145 (47.4%) were females.

(iv) Distribution by religion.

Hindus	...	...	281
Muslims	...	...	9
Christians	...	...	14
Total	...	...	304

(v) Types of rash amongst the unvaccinated and the vaccinated (including re-vaccinated) are given in Table VII.

Table VII.

Types of Rash According to Vaccination Status

Vaccination status	Discrete %	Confluent %	Modified %	Haemorrhagic %	Total
Unvaccinated	41 (34.4%)	75 (63%)	2 (1.7%)	1 (8%)	119
Vaccinated	122 (66.1%)	31 (16.7%)	32 (17.3%)		185

It will be seen from the above Table that on the whole vaccinated group enjoyed much greater protection than the unvaccinated, the incidence of confluent types being 63% amongst the unvaccinated against only 16.7% in the vaccinated group.

(vi) The age distribution of 119 unvaccinated cases (including those who were said to have been vaccinated but without any mark) is given in Table VIII.

Table VIII.

Age Distribution of Unvaccinated Cases

Age group	Name of cases	Age group	No. of cases
1 year	14	15 years	9
2 years	11	25 years	24
3 years	7	35 years	9
4 years	6	45 years	6
5 years	9	50 years	3
7 years	10	50 years and above	2
10 years	10		

The youngest unvaccinated victim was 9 days old and the oldest 70 years.

It will be seen from the above table that there was apparently a large number of completely unprotected persons in all age-groups of the population including the lower age-groups. Thus the lacunae in the vaccination campaign are obvious. This observation was further confirmed by examining the unprotected children's registers in which the number of untraceable infants was found to be as high as 30 to 35 per cent.

(vii) The distribution of primary vaccinated cases by age and types of rash is given in Table IX.

From column 9 in Table IX it is seen that, as expected, the incidence of cases increased with age and the largest percentage of cases was concentrated in the age-groups between 10 to 25 and 25 to 45 years. In other words, the populations lost the vaccination immunity with the increase of time between the primary vaccination and the age of attack. This is confirmed when the above data are further analysed in Table X. It is also seen from

Table IX.

Distribution of Primary Vaccinated Cases by age and Types of Rash

Age group	Discrete	%	Confluent	%	Modified	%	Total	%
1	2	3	4	5	6	7	8	9
1 years*	1	50.0	1	50.0	—	—	2	1.1
3 years	1	50.0	0	0.0	1	50.0	2	2.1
5 years	7	70.0	2	20.0	1	10.0	10	5.4
10 years	7	77.7	1	11.1	1	11.1	9	4.9
25 years	50	68.5	7	9.6	16	21.9	73	39.4
45 years	48	63.1	16	21.0	12	15.9	76	41.0
45 years & above	8	61.5	4	30.8	1	7.7	13	7.0

* These 2 infants were vaccinated during incubation period-See 7.

column 5 of Table IX that the proportion of confluent cases is maximum in the same two age-groups.

(viii) The different periods of interval between the dates of primary vaccination and dates of attack are given in Table X.

Table X.

Intervals of time Between Primary Vaccination and Attack Irrespective of Revaccination

Intervals of time after primary Vaccination	No. of cases
Incubation priod upto 2 weeks	8
1 year	3
3 years	1
5 years	9
10 years	5
10 years and above (longest 60 years)	159

It will be seen from Table X that as high as 86% of the cases had their attacks after an interval exceeding 10 years, the longest interval being 60 years. Only twenty-one cases lost the immunity within five years and 5 other cases within 10 years. The three cases which were recorded as vaccinated and had the attack within 1 year seem to be unusual and it is difficult to hazard any opinion without making a detailed investigation. Excepting 8 cases vaccinated within the incubation period the rest of the 177 cases were reported to have been vaccinated during infancy.

(ix) As it may be worthwhile to examine the types of rash according to the primary vaccination marks, their distribution irrespective of re-vaccination is given in Table XI.

Table XI.

Distribution of Types of Rash According to Number of Marks of Primary Vaccination

No. of vaccination mark	Dis-tricts	%	Modi-fied	%	Con-fluent	%
1	16	61.5	3	11.5	7	27.0
2	32	65.3	10	20.4	7	14.3
3	8	61.5	17	7.7	4	30.7
4	63	67.7	17	18.2	13	14.0

Except for the small number of cases in group 3 marks of vaccination, those having only one mark suffered from a much higher rate of confluent types (27%) than those with either 2 or 4 marks.

(x) Re-vaccination and small-pox attacks. The types of rash in the re-vaccinated cases have been shown against (i) the intervals between the dates of re-vaccination and dates of attack and (ii) the results of re-vaccination in Table XII.

Table XII

Distribution of Types of Rash According to Intervals and Results of Revaccination

Interval between the date of revaccination and date of attack	No. of cases	Results of Revaccination			Type of rash		
		No. re-action	Posi-tive re-action	Dis-crete	Modi-fied	Con-fluent	
2 weeks (Incubation period)	17	15	2	13	4	—	
6months	12	11	1	6	4	2	
1 year	8	7	1	5	2	1	
3 years	10	9	1	7	1	2	
5 years	3	—	—	1	1	1	
5 years +	4	—	—	2	1	1	

From Table XII it will be seen that 17 cases had re-vaccinations within the incubation period. The interval between the date of re-vaccination and date of attack varying between 2 to 15 days. Only in 2 instances was the positive reaction after vaccination noted and it was to be expected that in these two cases, the infection should have been averted while the absence of reaction in the remaining 15 cases may be considered as re-vaccination being done too late to be of any value. However, all the cases resulted in discrete or modified attacks. In the remaining 27 cases only three were supposed to have given positive reactions, two marks in one case and one mark each in the other two cases. The intervals of time between the dates of re-vaccination and dates of attacks were less than 6 months, less than 1 year, and less than 3 years respectively. In the ordinary circumstances these 3 cases should have completely averted the attack. In the rest of 34 cases, reaction to re-vaccination was recorded as negative. These should also ordinarily indicate certain amount of immunity, provided it could be assured that the vaccine lymph was of proper strength, the technique was correct and the results were properly noted. It is most likely that all these conditions were not fulfilled and the negative reaction should be interpreted as failure. It may be stated that this is not however the first occasion that such observation has been made. For instance in the Madras City itself Pandit, Masilamani, Krishnan and Seal (1939) noted that as high as 350 out of 732 vaccinated cases occurred amongst the re-vaccinated persons. According to Prof. Seal, the negative result is not considered as a reliable indication of immunity, nor is it supposed to influence the immunity level in any way, unless there is a primary type or at least accelerated type of reaction. This however is a point for further research and investigation.

(xi) The results of further field investigations are given below:

The approximate number of re-vaccination done during the first 4½ months of 1960 is 2,26,369 and a large percentage of it has fallen within the incubation period according to the time of exposure. The actual number of attacks being only 54, and considering the long interval between the primary and re-vaccination, this figure (0.027%) is neither alarming nor unexpected.

3. Distribution of cases in different divisions of Madras City:

The Madras City is now divided into 100 divisions or constituencies with a total population of nearly 21,10,000. The distribution of cases in different divisions during the first 4 months of the year is given in Table XIII.

Table XIII

Distribution of Smallpox cases in Different Divisions of the Madras city Between 1.1.1960 & 30.4.1960

Division No.	No. of cases	Division No.	No. of cases	Division No.	No. of cases	Division No.	No. of cases
1	24	26	17	51	8	76	Nil
2	13	27	8	52	7	77	3
3	8	28	Nil	53	5	78	2
4	5	29	2	54	46	79	1
5	10	30	6	55	5	80	2
6	4	31	16	56	Nil	81	4
7	3	32	8	57	4	82	2
8	12	33	25	58	22	83	Nil
9	11	34	10	59	1	84	5
10	14	35	6	60	10	85	27
11	Nil	36	28	61	Nil	86	6
12	Nil	37	19	62	13	87	3
13	3	38	59	63	39	88	6
14	4	39	20	64	19	89	3
15	1	40	6	65	1	90	3
16	1	41	2	66	Nil	91	6
17	2	42	6	67	16	92	8
18	1	43	2	68	8	93	19
19	8	44	Nil	69	Nil	94	28
20	3	45	4	70	3	95	4
21	11	46	3	71	7	96	1
22	2	47	5	72	Nil	97	8
23	2	48	18	73	1	98	19
24	Nil	49	2	74	Nil	99	3
25	23	50	5	75	3	100	3

The divisions which registered 19 cases or more during this period are 1, 25, 33, 36, 37, 38, 39, 54, 58, 63, 64, 86, 94 and 98 with case incidence or 34, 23, 25, 28, 19, 59, 29, 46, 22, 39, 19, 27, 28 and 19 respectively. The worst affected areas therefore are 33, 38, 39, 54, 63, 94 and 85. Of these divisions 33 and 38 were visited for local investigation.

Altogether 84 cases were removed to the hospital from divisions 33 and 38. On house to house visit, the following conditions were noted. In one house having 6 families and 23 individuals, there were 5 cases and one death. The ages of these cases were 2½, 5, 12, 35 and 55 years. An unprotected child, 2½ years old was brought to that house from

a neighbouring district, got an attack of smallpox and died. Being alarmed, all members of the house got themselves revaccinated but none had a positive take. The above four members were already infected and got modified types of attack. Apparently these four persons had lost their immunity, though indicated by the reaction to revaccination. It must also be taken into consideration that they showed the symptoms within 6 days after revaccination. The above is a typical sample of what was found in those areas, i.e. revaccination was given too late.

Besides this, certain slum areas were visited and the following conditions were found. In a population of 1000, three cases of smallpox were reported. First case was a male, 18 years old who was completely unprotected, i.e. not vaccinated at all. Second case, a 30 years old male, had primary vaccination in infancy but had revaccination at 28 years without any reaction, and the 3rd case, a 23 years old female, had primary vaccination marked and also had revaccination during the incubation period. All had discrete rash and survived.

4. Administration of Vaccination in Madras :

The city of Madras is divided into 4 zones each of which is further subdivided into 25 divisions for the purposes of vaccination. Two of such divisions having nearly 40,000 population are provided with one Vaccination and Birth and Death Registration Centre manned by the following staff.

Birth & Death Registration Clerk	— One
Sanitary Inspector (vaccination)	— One or two
Peon	— One

For every 25 divisions there is one Sub-Assistant H. O. who is incharge of the epidemic control work and vaccination programme and thus co-ordinates and supervises the work of sanitary inspectors of the zone. The S. A. H. O's are responsible to the zonal A. H. O. and finally to the H. O. for the overall epidemic work including vaccination. In each of these centres the following registers are maintained :—

1. Register for birth and death.
2. Signs and symptoms register for house death.
3. Infectious disease register.

4. Unprotected children's register.
5. Nominal register for vaccination.
6. Muffassil intimation register.
7. Medical postponement register.
8. Prosecution register.
9. Block work register.
10. Vaccination diary.
11. Lymph register.

The object of maintaining so many registers in a centre is to ensure a hundred percent vaccination of the population. But a scrutiny of these registers reveals that in actual practice they have failed to achieve the objectives. For instance, a review of unprotected children's register showed that nearly 30 to 35% of births were not traced and escaped primary vaccination. The minimum numbers of primary and revaccinations to be completed in one month by each sanitary inspector are 50 and 200 respectively. These are low figures for a person if exclusively meant for vaccination work. This may be one of the reasons for an appreciable gap both in the primary and revaccination programmes. In a 40,000 population, there will be a minimum of 1,000 births per year who will be available for primary vaccination and more than 10,000 for revaccination if it is agreed that a 3 yearly period of revaccination is to be maintained. In this connection it may be mentioned that not only do a large number of babies move away from the area before the vaccination is performed, but a similar number of babies also enter the city from outside. A large percentage of these babies and their relatives being not in the register of these babies and their relatives being not in the register are also missed for vaccination purposes. This is because there is no effective liason between the mofusil area and the Corporation. This is a lacuna which needs immediate attention of the authorities.

5. The Checking of Vaccination Programme.

The results of primary vaccination are followed and checked by the A.H.O., S.A.H.O., and the Sanitary Inspector (vaccination) of the respective division. The Sanitary Inspector (vaccination) is responsible for checking 99.9% of the primaries of his own division and A.S.H.O.—50% and A.H.O. 25%. While this may be considered satisfactory for primary vaccination which generally gives 95-98% success rate it was noticed

that not much attention was given to the inspection and recording of results after revaccination as there was no fixed yard-stick for checking them. Thus the main defect was in the inspection and recording of the results of revaccination which is the crux of the problem, (the assessment of the efficacy of revaccination and subsequent action) which depends on this recording. The case success and insertion success are judged from the cases who come to the centre voluntarily for dressing after successful take. According to the Madras Public Health Act both primary and revaccination are compulsory but in actual practice, the enforcement of law for primary vaccination is only half-hearted and for revaccination it exists only on paper and is never applied either at the local or at the state level. It was further learnt that during the vaccination and re-vaccination campaigns, specially in slum area, the people run away. There is inadequate provision for actual Health Education Programme in the city of Madras and that too is poorly combined with vaccination programme.

6. Recent Investigational Work On Smallpox in the City

A W.H.O. team carried out investigation on the following problems connected with smallpox cases.

Isolation of virus in different stages of the disease and finding out the actual infectious period of a smallpox case.

Assessment of the efficacy of hyper immune vaccinal gammaglobulin as a measure of prophylaxis in smallpox.

Measurement of load virus in the infected atmosphere.

Finding out of susceptible tissues for culture of vario a virus.

The possibility of introducing routine vaccination in the new born infants 3 days after is being explored by the Corporation staff in Choolai Maternity Home, and they claim that 75% of the babies have shown both case success and insertion success. Some of these babies were examined by the author in the field and he is able to corroborate the above statement. But this also indicates that

mothers did not have enough protection against vaccinia or smallpox and therefore the new-born babies also had little or no congenital immunity.

7. Visit to the Vaccine Production Centre in the King Institute Guindy.

The Director and the staff the Institute explained the various steps in the manufacture and issue of the lymph vaccine. According to their statement all the batches of vaccines were treated by bubbling chloroform vapour and tested for purity, toxicity and potency and issued to the field only after the requisite standards were satisfied. The dilution of the lymph used was 1 in 7. (as against the accepted standard of 1 in 5). Not much importance was given to the results of re-vaccination. Apparently the laboratory was not using the accepted techniques of testing each batch of vaccine in the rabbit or by cultivating it in the allantoid membranes. Testing in human subjects for primary vaccination is not now considered as sufficiently reliable to judge the potency of the lymph vaccine. The doctor in charge of lymph production, however, stated that the potency of the vaccine went down rapidly the longer its use was delayed after issue from laboratory resulting in low case success and insertion success rates, due to viral deterioration. It therefore appears that there is still some scope for testing the quality of vaccine as they are sent out to the field after dilution and returned from the field after use. The Director also said that the lymph produced from the centre gave 90 to 100% success in primary vaccination but only 8 to 10% in re-vaccination. The supply of lymph is 30% in excess of what can be accounted for, from the vaccination records. But such instances are very few and far between and hence no regular records are kept of results of such examinations. The lymph after despatch from Institute is received the same day at the Central Vaccine Depot of the Corporation and is preserved at a temperature of -26°C from where the vaccine is issued to the Sanitary Inspectors (Vaccination), every week.

8. Particulars regarding some batches of vaccines from the time of issue to its final disposal have been given in table XIV. No vaccine samples are returned by any field staff for the retesting of potency except those which give poor results.

A STUDY OF THE RECENT RISE OF SMALL-POX CASES IN THE MADRAS CITY

From a brief review of the field test of lymph vaccine, as given in table XIV it will be seen that even in primary vaccination the insertion success rate went down when the lymph vaccine was carried in the lymph carrier

Another observation which was made in the field was that in spite of the system of regular checking and follow up through block work by the respective S.I., in practice however it did not work, as the scheduled staff were kept

Table XIV
Particulars of Recent Vaccine Lymph Used in the Field

Calf No.	Date of despatch from the King Instt.	Date of issue from Central Vaccine Depot.	No. of tubes issued	Success Rate (primary)		Revaccination success rate		Duration of preserving lymph in lymph carrier at room temp.	Residual samples from the field returned to the Institute for re-testing	Area of Vaccination (Division No.)
				Case success	Insert success	Case success	Insert success			
225	7.3.60	10.3.60	2	5/5*	19/20*	1/26*	2/52*	1 day	nil	66
228	-do-	18.3.60	2	2/2	8/8	1/37	2/74	1 day	nil	-do-
233	24.3.60	2.4.60	3	4/4	9/10	2/52	4/104	1 day	nil	-do-
240	17.3.60	24.3.60	10	12/12	36/44	0/88	0/76	3 days	nil	-do-
255	26.3.60	26.4.60	1	2/2	8/8	0/10	0/20	5 days	nil	-do-
-do-	4.4.60	28.4.60	10	8/8	17/32	8/112	6/224	...	...	33

* Denominator —number of vaccinated or insertions given.
Numerator —number of successes.

for 3 days and more. This point comes out more clearly when the number of babies tested is larger as in case of batch Nos. 233 and 255. The case success rate in re-vaccination is extremely poor. The reason for this would need careful and detailed investigation. According to this record, a lymph of higher strength may be used for re-vaccination. It may however be mentioned here that the lymph brought from U.K. when tested in Madras, gave a much higher percentage of both case and insertion success rates in re-vaccination. The difference between the local and the British vaccine may be in potency and strength.

Certain observations were made in the field regarding the case and insertion success rates. In a house having 23 members including the potential patients, the success rate for primary vaccination was 100%, but in re-vaccination it was only one mark out of 40 marks. Here it may be stated that even a low grade sub-standard vaccine may give 100% positive in primaries. In a second house with 16 families and 50 individuals, 3 out of 4 primary vaccinations were successful but none amongst the 46 re-vaccinated people had any positive reaction.

busy with the handling of the epidemic going on in their own or other areas almost all the year round.

10. Existing Facilities for Epidemiological Investigation :

There is no set-up for any epidemiological investigation either in the Corporation or in the State level except that there is one epidemiologist in the State without any field staff and laboratory for investigational work. It was however understood from the Director of Public Health, Madras that establishment of such a unit was under contemplation. This deficiency therefore needs immediate attention of the Government.

11. Summary and Discussion :

1. Occurrence of small-pox amongst persons in the city of Madras said to be re-vaccinated several times led to the present investigation.
2. The purpose of the investigation was to elucidate the persistence of small-pox in the city, particularly amongst the re-vaccinated persons and to recommend lines of action to prevent such occurrences.

3. The period of investigation extended from 13th to 20th May, 1960. It included the study of small-pox trend from records of the last several years, study of recent cases in the hospital and in the field, collection of facts about the administrative programmes of vaccination, visit to the vaccine production centre and discussion with various staff engaged in the vaccination work and authorities concerned, viz., the Mayor, the Commissioner and the Health Officer of the Corporation, Director of Public Health, Madras, and Professor of Preventive and Social Medicine, Madras Medical College.
4. The records indicate that there is roughly a 4-6 yearly period of epidemic wave in the Madras City, the peak years in recent times being 1950, 1954 and 1958. The cases occur all the year round and an appreciable percentage of hospital cases includes those imported from the neighbouring areas. Although there is a typical seasonal incidence with regard to the imported cases, an irregularity is seen in regard to cases in the city. High incidence some times come in the last quarter of the year.
5. It was seen from the hospital records that during the last 4 months of 1960, admissions in the hospital included 372 cases among the unvaccinated and 465 among persons said to have been vaccinated and re-vaccinated. Of the re-vaccinated group the operation was successful in 17 cases and unsuccessful in 100 cases. There is no evidence of re-vaccination among the remaining 348 cases. Of the 117 re-vaccinated cases, as many as 85 had been re-vaccinated during the incubation period. From the scrutiny of the data in Table IV regarding the above cases, it appears that except perhaps one case all could be explained on the basis of loss of immunity.
6. Records of 304 of the above cases were studied in detail. The results show that there were 2 peaks in the incidence—one in the middle of February and the other in the last week of April.

The preponderance of incidence is in the age-group of 15 to 45 years in addi-

tion to that in infants; 52.3% were male and 47.7% females. Hindus 281, Muslims 9 and Christians 14; 119 were unvaccinated and 185 vaccinated.

The incidence of confluent cases was 63% among the unvaccinated and only 16.7% amongst the vaccinated group. The age distribution of the unvaccinated group covered all age-groups, the oldest case being of 70 years, thus indicating that a fair proportion of the population remains unvaccinated.

Similarly a good proportion of the vaccinated population of all age-groups escape re-vaccination with consequent loss of immunity as the age advances. Thus the maximum incidence was found in the age-group of 15 to 45 years. This is corroborated by a higher proportion of serious cases in the higher age-groups.

Only 54 of 185 vaccinated cases had been re-vaccinated. But 17 of them fell within the incubation period. Of the remaining 37 cases only 3 had given positive reaction. Thus the effect of re-vaccination was uncertain in all but 3 cases. On the whole, the incidence of small-pox cases followed the natural course. If there was a failure of re-vaccination as shown by a high percentage of negative result, the fault must be sought in the strength and potency of vaccine used at the time of re-vaccination and other faults in technique. It cannot be said that re-vaccination was successful.

7. The administrative aspect of vaccination programme in the city of Madras was studied. A peripheral unit called Birth and Death Registration and Vaccination Centre meant for conducting a vaccination programme for two divisions (nearly 40,000 population) was visited and records and registers maintained by the Sanitary Inspectors (Vaccination) of the centre were scrutinised. Some 30 to 35% of infants born in the city leave the city before the primary vaccination is done and a similar number of unprotected children enter the city and are not vaccinated. With a minimum target of 50 primary and 200 re-vaccinations each month by a whole-time worker it can never be possible to

cover either the primary vaccination or re-vaccination quota for a population of about 40,000. While the checking of the primaries appears to be satisfactory, as nearly 100% cases are checked by the Sanitary Inspector himself, there is no systematic plan for checking the re-vaccinated cases. The normal duty of the Sanitary Inspector who should check 100% of the vaccinated and follow up is very often dislocated to meet the emergencies arising out of small-pox epidemics in the city. In spite of the existing legal provisions in the Madras Public Health Act to enforce primary and re-vaccination the application of the law is too lenient and the defaulters of the primaries and re-vaccination escape without any penalty. With so many people remaining unvaccinated at different age periods, there is sufficient scope for utilising the health educator's collaboration in the vaccination campaign of the city.

8. The observation in the field by personal visit also supported the above views. The high endemicity of small-pox in the Madras City may be attributable to incomplete vaccination as a result of administrative short-coming and lack of effective collaboration between the State and the Corporation Organisations.
9. While the lymph production is going on in a satisfactory manner, it appeared to the author that there is some scope for improving the technique for testing the potency of the vaccine, not only before it is sent out to the field but also of the residual samples returned from the field after different intervals of time. This is corroborated by the records in the lymph registers maintained by the Corporation and given in Table XIV.
10. The Health Department of the Corporation has been working on effectiveness of primary vaccination in the new born infants. The final results of this investigation are awaited.
11. There are no existing facilities for epidemiological investigations either in

the Corporation or in the Directorate of Public Health except that there is one officer in the State Organisation, designated as epidemiologist.

CONCLUSION

The results of investigation do not lend support to the statement that there had been cases of small-pox amongst the so-called re-vaccinated persons in the city of Madras. The cases said to have been re-vaccinated with assumed protection were really failures of re-vaccination with absence of adequate immunity. A large number of cases were however either without primary vaccination or vaccinated or re-vaccinated during the incubation period, or those whose immunity had run down due to lapse of long interval of time after primary vaccination. The problem therefore is mainly administrative in ensuring complete primary vaccination and systematic re-vaccination at definite intervals of time with good potent lymph vaccine, through checking and improved recording.

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WORLD HEALTH ASSEMBLY

It is a good augury that the World Health Assembly will hold its 14th session in India at New Delhi, in February next year. Five hundred delegates representing 103 countries from all over the world will attend this session. Vigyan Bhaban at New Delhi will remain active for 18 days (from the 7th to 25th February 1961) and many important decisions will be taken. It is also proposed, and very appropriately too, that an International Health Exhibition will also be organised on this occasion. This opportunity will give the Indian Health Workers and planners to meet the world leaders in health matters and to listen to their deliberations and also to have the benefit of witnessing the International Health Exhibition proposed to be inaugurated.

India is faced with many problems, but she is dealing with them boldly and with confidence and will continue to do so, and in this struggle she is greatly indebted to the World Health Organisation, the executive body of the Assembly, for the many-sided help that she has been constantly receiving since the inauguration of the Assembly in 1948. In fact, the Regional Headquarters of the South East Asia is located at New Delhi where a permanent building is going to be constructed soon for accommodating the entire office. With the assistance given to this country in the shape of technical personnel and scholarship, transport, equipments and finance, the control of many scourges such as, malaria, tuberculosis, trachoma, filaria, leprosy etc., is definitely in sight. Actually the eradication programme in malaria is well in hand.

The World Health Organisation is one of the organisations, a co-operative venture by the comity of nations, under the UN Charter which has shown no barrier to caste, creed, religion, or politics, and has proved to the world that health is a global issue and that there is no line of demarcation between nation and nation, or state and state, great and small. It has indeed created an atmosphere conducive to the promotion of health, social, physical and mental, of all communities in this world. Unlike other World Organisations it has so far steered clear of the conflicts and controversies that have over-cast the world in present time. The World Health Organisation believes that most of the problems facing the world are capable of solution by the means available to mankind and it is necessary to utilize these means to build up a measure of welfare of the world. This optimism is already paying a good dividend in the shape of remov-

ing the scourges particularly affecting the developing countries and in bringing up the standard of their health status. In fact, the organisation has promoted a spirit of co-operation making people and the nations realize that the world is progressively becoming one unit in regard to its major problems, particularly in the face of the shrinking world with the development of faster and faster communication system. The world is actually now a conglomeration of a closely set neighbouring states with increasing need for co-operative efforts to keep away the evils spreading from one area to another. The example set by the World Health Organisation is worthy of emulation by all similar organisations, and then only the seed for the contemplated World Government will receive the necessary nourishment that it requires to grow into a healthy and full-fledged tree to yield the much needed flowers and fruits, and to make the world worth living.

Recently India, particularly New Delhi, has been the venue of the meetings of many international organisations, and we are very happy to learn that the World Health Assembly, the highest authority in health matters in the world has agreed to India's invitation to hold its 14th session in India. We extend our hearty welcome to the Assembly and its 500 delegates coming from all over the globe and wish them a great success.

NOTES & NEWS

Balanced Protein Food

A new palatable protein food composition containing 16-19 per cent protein, fortified with calcium, phosphorous and vitamins has been standardized. The composition is based mainly (about 75 per cent) on ground nut and tapioca flours.

For the preparation of food product, the dough made from the flour mixture is vacuum extruded through a die in the shape of ringlets, which after steaming are dried under controlled conditions. The products cook in 3-4 min. The cooked product is blank in taste and therefore lends itself for different types of preparations.

Studies carried out to evaluate its nutritive value have shown that at 10 per cent level of protein intake over a period of four weeks, protein efficiency ratio of the food is 1.71 and the liver fat of rats averaged 14.9 per cent. Weanling rats fed on the product, supplemented with 10% ground nut oil for 8 weeks showed an average weekly gain of 14.3. g.

C.S.I.R. News

Oral Contraceptives

Phasic fertility performance tests on male rats injected with cadmium chloride showed that the animals are sterile but the characteristic male sexual behaviour patterns are not impaired. It seems that cadmium chloride produces a state of 'Chemical vasectomy'. The effective dose range for total destruction of the seminiferous epithelium lies between 0.25 mg. to 1 mg. of cadmium chloride per 100 g. bodyweight.

C.S.I.R. News

* * *

Bacterial Control of Insects

Bacillus cereus (var. *thuringiensis*; strain, *Heliothis*) isolated from a diseased field bean borer has been found to be effective in controlling lepidopterous pests of vegetable crops. The bacterial spore powder prepared on artificial medium is effective against pests when sprayed on crops at the rate of 7-10 g. per acre. The bacterial spore is not harmful to higher animals.

C.S.I.R. News

*Antibiotic Action in *Vivrio Cholerae**

The mode of action of the broad spectrum antibiotics, penicillin, streptomycin, kanamycin, viomycin, neomycin, and novoliocin on *V. cholerae* has been studied. The antibiotics are added to exponentially growing cultures of *V. Cholerae* (Inaba type) and the degree of growth inhibition, with concomitant protein and nucleic acid synthesis is measured at different time intervals.

The growth of *V. Cholerae* is inhibited by all the above antibiotics except viomycin. Metabolic experiments are being planned with streptomycin and chloramphenicol resistant strains.

C.S.I.R. News

* * *

New Drugs for Treatment of Cancer

Using a new synthetic drug called methotrexate, the team of American experts working in two hospitals in Nairobi, one an Asian and the other a European institution, treated 41 African patients most of whom were beyond surgical aid and on the threshold of death.

The drug produced startling reactions causing large cancerous growths to disappear within ten days after treatment. After another month the experts will follow up as carefully as possible the classes of patients already treated. It is also planned to increase the number of cancer case histories to confirm whether the drug does work.

Mr. Michael Wood, Executive Director of the African Research Foundations under whose auspices the new treatment was organised, said: "We would not like to say that this is a cure, but it is a considerable breakthrough and it is a fact that many of the patients who were past surgical treatment would have been dead to day but for the drug".

Mr. Wood and a Nairobi surgeon, Mr. Jhon Duff, worked with the American team and together produced a technique for introducing a catheter or tube into the artery supplying the area of the cancerous growth. In several cases the catheter had been left in place in case of the cancer returning. It is claimed that the drug had a remarkable effect on patients suffering from cancer of the

face or nasal sinuses and in particular, in the case of women with cancer of the cervix. But there had been no reaction in case of cancer of the liver.

The drug was injected intra-arterially by using the catheter and the injection continued at a fixed rate over a period of 24 hours. This subjected cancerous growths to a tremendous bombardment. A second drug was injected intramuscularly to prevent damage to bone marrow and body tissues when the drug flowed back into the blood stream.

J.I.M.A.

New Remedy for Heart Failure

Four research doctors at the Johns Hopkins Medical School, Baltimore, have after experimenting on dogs, developed a technique and used it to treat 20 heart failure patients. The treatment, which was applied to an eight week old baby and a man of 80, was successful and 14 of the patients are still alive.

The treatment is similar to artificial respiration. A doctor presses hard on the breast bone of the patients which squeezes the heart and forces the flow of blood through the arteries again.

Hitherto, the normal treatment for heart failure has involved opening the chest and massaging the heart itself.

J.I.M.A.

* * *

Hospital for All-India Institute of Medical Sciences

A 650 bed hospital is proposed to be built at the All-India Institute of Medical Sciences in New Delhi at an estimated cost of Rs. 4.25 crores.

The Health Minister giving this information in the Lok Sabha on 2nd August, 1960 said that the Rockefeller Foundation had agreed to provide 500,000 dollars and the technical co-operation mission had allocated a grant of Rs. 290 lakhs for the construction and development of the hospital.

Estimates amounting to Rs. 57.61 lakhs for the construction of the frame-work of the hospital during the Second Five-Year period has been approved recently.

U. N. Demographic Report

There are about 2,900 million of people in the world, and some 48 million more are added every year, according to the United Nations *Demographic Year Book* published on August 28, 1960.

Africa is the most prolific continent, with a birth rate of 45 per thousand. As a region South East Asia and tropical and Southern Africa go one better—46 per thousand.

At the other end of the scale, Europe's birth-rate is only 19 per thousand. The Isle of man is at the bottom of the scale with only 12.1, followed by Sweden with 14.2.

Japan whose pre-war birth rate was among the highest, now has one of the lowest.

More than half the world's inhabitants live in four countries—China (600 million) India (403 million) the Soviet Union (209 million) and the United States (178 million).

Britain ranks tenth in size of population, after Japan (92 million), Pakistan, Indonesia, Brazil, and West Germany. All these countries have more than 50 million people each.

Children born in Norway, Sweden, and Holland have the greatest expectancy of life, according to the United Nations figures. Girls born in those countries can expect to live to be 74 or more and boys to 71.

India remains at the bottom of the scale with a life expectancy of 32. But it is one of the few areas where men live longer than women.

Guinea has the highest death rate—40 per thousand.

People are tending to get married younger in industrialised countries and older in others, the *Year Book* discloses. The world average is 24 for women and 27 for men.

Albania, Egypt, the Fiji Islands, Costa Rica and Honduras have the youngest brides and French Guiana, Macao and the West Indies the oldest.

The figures show that the "baby boom" which followed the World War reached its peak in 1946 and 1947.

A chart of birth-rates by age groups since 1949 in ten countries shows that fertility rates for women aged 20 to 24 increased in Australia, England and Wales, West Germany, Jamaica and the United States. The rate decreased in Hungary, Yugoslavia, Israel and Japan, and remained steady in France.

A table of Illegitimacy rates in 55 sovereign countries showed that 60 per cent of children

were born to unmarried mothers in El Salvador, the Dominican Republic, Honduras, the West Indies, Guatemala and Panama and less than one per cent in Albania and the United Arab Republic. J.I.M.A.

Integrated School Health Services Scheme

An integrated health services scheme, covering all school children, has been recommended for inclusion in the Third Plan by the School Health Committee, set up by the Union Ministry of Health.

At the end of the Third Plan period, it is estimated, there will be some 5.80 crore students, in the age group 6-11, in schools. The committee has, therefore, recommended that the entire student population should be covered by the proposed scheme in stages.

The committee under the Chairmanship of Mrs. Renuka Ray, M.P., met in Calcutta lately to finalise its interim report. It has, it is gathered, based its findings on a mass of materials submitted by different State Governments regarding school health.

From the material made available in the Committee, it has been found that the basic cause of the ill health among the school children, was malnutrition. In order to tackle this problem, school feeding has, therefore, assumed a very important aspect of School Health Services. As financial requirements for a big project of this nature, will be large, phasing is understood to have been found absolutely necessary, starting first with places, where health centre services are already available.

So far as the school health services are concerned, the scheme will cover medical examination of students, as also a regular follow-up of students' health. This programme to build up not only the health of the future generation of the Nation, but to improve environmental hygiene and sanitation as well, will provide a big scope for utilising the services of large number of medical practioners, particularly in a state like West Bengal, where their number is too many. In West Bengal, for example, the student population proposed to be covered by the scheme would be about 33 lakhs. A large number of doctors would, therefore, be required.

It has been suggested that the scheme should be integrated with the national health plan, so that the utilisation of available medical services could be ensured.

J.I.M.A.

ABSTRACTS

Dick Elliot C., Skull Ivan F. & Armstrong
Lan S. *Surface-Subsurface Distribution of
Bacteria in Swimming Pools-Field Studies*
—*Am. J. Pub. Hlth.* 50 : 689, 1960.

The authors studied the surface and sub-surface distribution of bacteria in swimming pools to check the claim of Amies who presented data suggesting dangerous concentration of upper respiratory tract bacteria on the surface of the water. Seven outdoor swimming pools of Kansas city and its round about, 2 fill-and-draw and 5 circulating types, all regularly chlorinated were examined by special techniques described by the author. The results show that in both shallow and deep ends of the pools the number of bacteria in the surface usually exceeds those in the surface. But in about one-third of the pools the sub-surface samples were considerably higher than the surface counts and there was a great deal of variability in count from one sample to the next despite uniform chlorine residuals in such of the pools. The authors conclude that although the surface and sub-surface sample results do indicate that there may be a concentration of bacteria in the surface field it does not appear to be alarming as the counts fell within the standards set by the American Public Health Association. The authors, however, wish to suggest that as the predominant organisms on the plates made from both surface and sub-surface waters were from normal upper respiratory track like micrococci, hemolytic, nonhemolytic and alpha-hemolytic streptococci and Neisseria, it would be useful to develop a standard plate count technique of these organisms for swimming pool sanitation.

Shiote R. A., Girling J. A., Mathias J. Q.
& Williams R. E. O. *Staphylococcal Infection In A Medical Ward.* *Asst. Med. J. I.*: 1923, June 25, 1960.

The authors made a pilot survey of staphylococcal infection in a medical ward of 26 beds for a period of one year between October 1958 and September 1959. Of the 349 patients admitted, 9 (2.6%) had sepsis and 13 (3.8%) of the remainder developed staphylococcal sepsis of various types. They were using woolen blankets and the beds were separated by cotton curtains. Nasal swabs were taken on admission and then weekly.

Besides, 73 sputa, 43 urines and 74 other specimens were examined. 14% of the patients with malignant disease or disease of blood developed staphylococcal sepsis as against 3% among the rest. Only two patients were infected with the same type of staphylococcus, the rest were different from one another. Apart from this there was no evidence of infection spreading from one patient to another and causing disease, although 27% acquired new staphylococcus in nose during their stay in the hospital and 37 or 10.6% were carrying the organism at the time of admission. There was no evidence that antibiotic treatment increased the chance of the patients in acquiring a penicillin resistant strain.

In another rapid survey of 243 patients in 10 medical wards of the hospital only 8 had staphylococcal sepsis at the time and there was no evidence of common type in any ward. Thus in respect of staphylococcal infection the situation in the medical wards were different from that of surgical wards.

Anderson Kevin, Coulter John & Looks ENE
Transfer of Staphylococcus Pyogenes from infected to non-infected Hospital Beds, Brit. med. J. I : 1925, June 25, 1960.

An experiment was conducted by the author in a small ward 34' x 28' x 14' with artificially infected blanket to see to what extent blankets might be a source of infection in a hospital ward. Eight beds were put up with slightly differing composition with 4 in between. Two of the beds, one of them all woolen, were experimentally infected with different types of coagulase positive staphylococci. All precautions were taken for any extraneous infection to come in and standard bed-making routine was followed throughout the experimental period of 15 days. The results showed that a simple bed-making routine resulted in considerable dissemination from both wool and cotton fabric both by direct contact and aerial route. The number of viable organisms recovered from the infected bedding fell by 90% after the first 72 hours. After 13 days no pathogenic cocci was detected in 22 samples examined. The authors conclude that if these results pertain to condition in the surgical wards, beddings infected with pus or other body fluids remain dangerous during the first three days.

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INDIAN JOURNAL OF PUBLIC HEALTH

OFFICE JOURNAL OF THE INDIAN PUBLIC HEALTH ASSOCIATION

110, CHITTARANJAN AVENUE, CALCUTTA - 12

Telephone: 34-2839

Rates of Advertisement :

Only approved matters are accepted for insertion in the Journal published quarterly in January, April, July and October at the following rates:—

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2nd and 3rd Cover	Rs. 200/- per insertion
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Full page space	8" × 6"
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Number of column per page	2
Length of column	8"
Breadth of column	2 $\frac{3}{4}$ "

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Blocks up to 85 Screen accepted.

Extra charges for Matrices and unmounted Blocks.

For further details apply to the Secretary.